

# Science and Invention

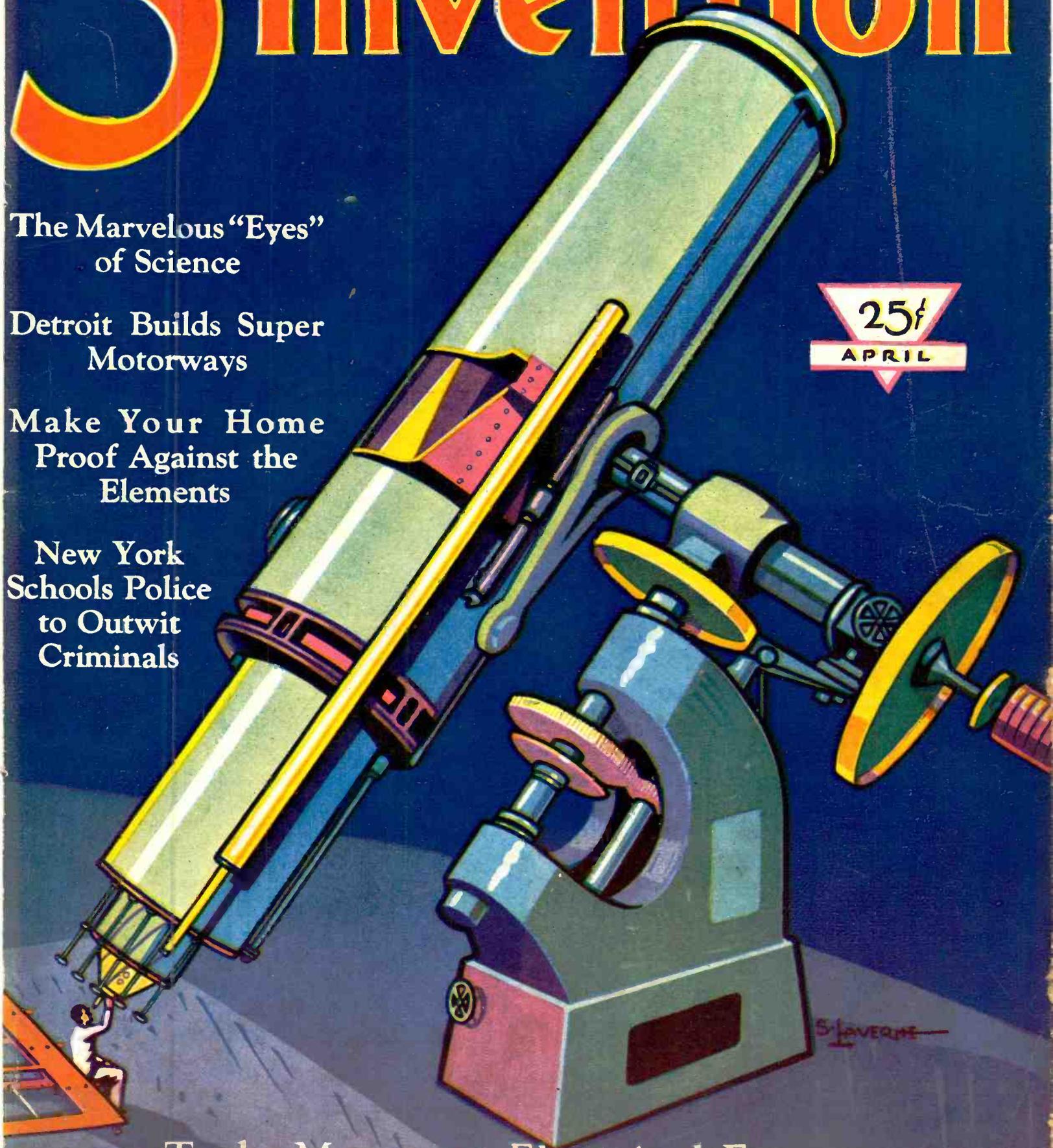
The Marvelous "Eyes"  
of Science

Detroit Builds Super  
Motorways

Make Your Home  
Proof Against the  
Elements

New York  
Schools Police  
to Outwit  
Criminals

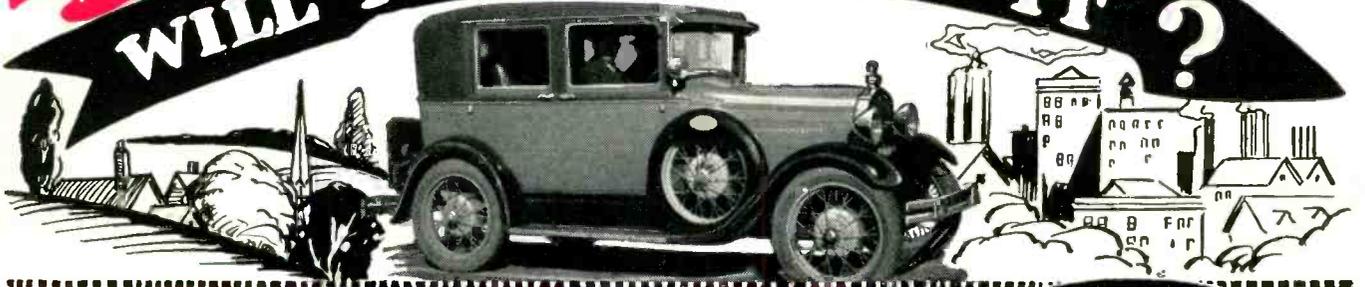
25¢  
APRIL



Tesla Maps our Electrical Future

# 42 Miles on 1 Gallon of GAS

WILL YOUR CAR DO IT ?



## New Moisture Humidifier & Carbon Eliminator

for all Makes of Cars, Trucks, Tractors and Engines

An amazing Scientific Humidifier has been patented throughout the World that beats any ever got out. It makes engines run ALL THE TIME with the same wonderful efficiency they do on a cool moist night. It gives MORE pep and power, HIGHER top speed, eliminates hard carbon, and gives AMAZING mileage. Fords report 28 to 42 miles per gallon. Other makes (both American and Foreign) report marvelous increases of 1/4 to double mileage. Some of the best records are:

Miles	Miles	Miles	Miles
Buick.....28 1/2	Essex.....32	Nash.....30	Pierce Arrow.....22
Cadillac.....21 1/2	Ford (Model T).....42	Oakland.....31	Pontiac.....31
Chevrolet.....41	Ford (Model A).....40	Oldsmobile.....34 1/2	Reo.....26 1/2
Chrysler.....30 3/4	Hudson.....23 1/2	Packard.....21 1/2	Studebaker.....29
Dodge.....31 1/2	Hupmobile.....24 1/2	Plymouth.....29	Whippet.....41
Durant.....41 1/2	Marmion.....21 1/2	Graham-Paige.....23 1/2	Willis-Knight.....29

And Hundreds of Other Wonderful Records on ALL American and Foreign Makes

## Big Profits

to Man with Car Spare or Full Time

\$350 to \$1500 a month  
 1 man \$4,939.66 in 3 1/4 months.  
 Another \$1,656.60 in 58 days.  
 \$5,150.00 in 5 months to another.  
**BIG MONEY can be—IS being made.**

**Fitting Motors With Vix**  
 One man sold 8 first morning.  
 Another sells all 3 men can install.  
 Another's profits as high as \$100.00 a day.

VIX sells itself by 8 STARTLING demonstrations — BIG, STUNNING, ASTOUNDING DEMONSTRATIONS. Successful VIX men make MORE MONEY than they ever made before.

## Free Trial Try This New Principle Gas Saver AT MY RISK



Try this wonderful VIX Moisture Humidifier and Carbon Eliminator AT MY RISK on YOUR OWN CAR to prove that VAPOR MOISTURE (drawn from Radiator to Engine) gives you that wonderful night driving effect ALL THE TIME with MORE mileage from gas and oil—eliminates hard carbon accumulation — gives MORE power, a SNAPPIER, PEPPIER motor. FASTER acceleration, a SMOOTHER, QUIETER running engine and HIGHER top speed.

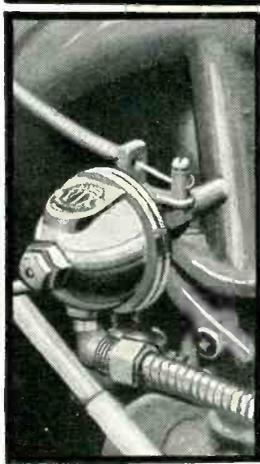
VIX will PROVE ITS MONEY SAVING MERIT on your own car by 8 DEMONSTRATIONS—conducted by yourself AT MY RISK—the most SENSATIONAL, most ASTOUNDING, most CONVINCING DEMONSTRATIONS you ever saw. If you don't find from your tests that it does MORE than I claim, return it and it COSTS YOU NOTHING. I want wide-awake, hustling, County, State, Province and National Agencies everywhere, part or full time, to make \$350 to \$1500 per month filling the great DEMAND for this wonderful invention wherever introduced. Write for my FREE TRIAL and MONEY MAKING OFFER. Use coupon below.

**WALTER CRITCHLOW**

Inventor and Manufacturer, 863-O Street, WHEATON, Ill., U. S. A.

## FREE VIX offer Mail Now

Pictures here and at top show Model "B" VIX attached to my own New Model A Ford. This car is wonderfully improved in performance with the VIX Moisture Humidifier. So is every Auto, Truck, Tractor, Taxi, Bus, Marine, Stationary and Aircraft Engine, both American and all Foreign makes.



**GUARANTEED TO SAVE** { 1/4 to 1/2 Gas  
 Carbon Cleaning  
 Engine Repairs  
**or Costs You Nothing**

**WALTER CRITCHLOW**  
 INVENTOR and MANUFACTURER  
 863-O Street, Wheaton, Ill., U. S. A.

Please send me without obligation or charge your FREE TRIAL and MONEY MAKING VIX OFFER.

Name.....  
 Address.....  
 Town..... State.....

# I will train you at home

to fill a

# BIG PAY Radio Job!



**Here's Proof**

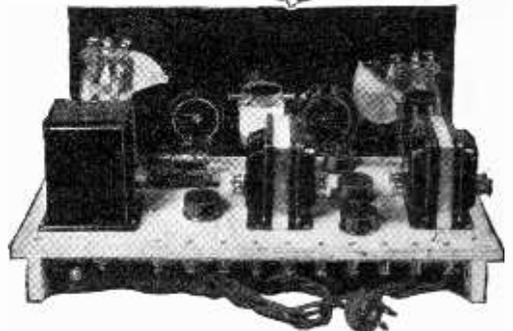
If you are earning a penny less than \$50 a week, send for my book of information on the opportunities in Radio. It is free. Clip the coupon NOW. Why be satisfied with \$25, \$30 or \$40 a week for longer than the short time it takes to get ready for Radio.



I will give you my new 8 OUTFITS of RADIO PARTS for a home Experimental Laboratory

You can build over 100 circuits with these outfits. You build and experiment with the circuits used in Crosley, Atwater - Kent, Eveready, Majestic, Zenith, and other popular sets. You learn how these sets work, why they work, how to make them work. This makes learning at home easy, fascinating, practical.

Back view of 5 tube Screen Grid A. C. tuned Radio frequency set—only one of many circuits you can build with my outfits.



\$100 a week

"My earnings in Radio are many times greater than I ever expected they would be when I enrolled. They seldom fall under \$100 a week. If your course cost four or five times more I would still consider it a good investment."

E. E. WINBORNE  
1414 W. 48th St.,  
Norfolk, Va.

### Radio's growth opening hundreds of \$50, \$75, \$100 a week jobs every year

In about ten years Radio has grown from a \$2,000,000 to a \$1,000,000,000 industry. Over 300,000 jobs have been created. Hundreds more are being opened every year by its continued growth. Men and young men with the right training—the kind of training I give you—are needed continually.

### You have many jobs to choose from

Broadcasting stations use engineers, operators, station managers and pay \$1,800 to \$5,000 a year. Manufacturers continually need testers, inspectors, foremen, engineers, service men, buyers, for jobs paying up to \$15,000 a year. Shipping companies use hundreds of Radio operators, give them world wide travel at practically no expense and a salary of \$85 to \$200 a month. Dealers and jobbers employ service men, salesmen, buyers, managers, and pay \$30 to \$100 a week. There are many other opportunities too. My book tells you about them.



Jumped from \$35 to \$100 a week

"Before I entered Radio I was making \$35 a week. Last week I earned \$110 servicing and selling Radios. I owe my success to N. R. I. You started me off on the right foot."

J. A. VAUGHN  
8715 S. Kingshighway,  
St. Louis, Mo.

### So many opportunities many N. R. I. men make \$5 to \$25 a week while learning

The day you enroll with me I'll show you how to do 10 jobs, common in most every neighborhood, for spare time money. Throughout your course I send you information on servicing popular makes of sets; I give you the plans and ideas that are making \$200 to \$1,000 for hundreds of N. R. I. students in their spare time while studying.

### Talking Movies, Television, Wired Radio included

Radio principles as used in Talking Movies, Television and home Television experiments, Wired Radio, Radio's use in Aviation, are all given. I am so sure that I can train you satisfactorily that I will agree in writing to refund every penny of your tuition if you are not satisfied with my Lessons and Instruction Service upon completing.

### 64-page book of information FREE

Get your copy today. It tells you where Radio's good jobs are, what they pay, tells you about my course, what others who have taken it are doing and making. Find out what Radio offers you, without the slightest obligation. ACT NOW.

J. E. SMITH, President  
National Radio Institute Dept., ODS  
Washington, D. C.

### Our Own Home

Pioneer and World's Largest Home-Study Radio training organization devoted entirely to training men and young men for good jobs in the Radio industry. Our growth has paralleled Radio's growth. We occupy three hundred times as much floor space now as we did when organized in 1914.



### \$500 extra in 6 months

"In looking over my records I find I made \$500 from January to May in my spare time. My best week brought me \$107. I have only one regret regarding your course—I should have taken it long ago."

HOYT MOORE  
R. R. 3, Box 919,  
Indianapolis, Ind.,



**BIGGER PAY**



**FILL OUT AND MAIL THIS COUPON TODAY**

J. E. SMITH, President,  
National Radio Institute, Dept. ODS  
Washington, D. C.

Dear Mr. Smith: Send me your book. This request does not obligate me.

Name .....  
Address .....  
City ..... State .....

**Lifetime Employment Service to all Graduates**

In This Issue . . April 1930

# SCIENCE *and* INVENTION Offers You

	PAGE
Alloys—a New Basis of Wealth..... <i>Our financial editor takes a wide view of the metal situation</i>	1068
The Grand Concourse..... <i>An aspect of a great railway terminal that will surprise you</i>	1070
Heat—the Great God of Science..... <i>An editorial by Arthur H. Lynch, Editorial Director</i>	1074
Tesla Maps Our Electrical Future..... <i>An intelligent forecast by a genius of our time</i>	1077
Super-Motorways for the Motor Age..... <i>Detroit is building for the traffic of today and tomorrow</i>	1078
It's Outboard Time!..... <i>A picture page devoted to this popular summer sport</i>	1080
The Long Arm of Science..... <i>Science supports the modern policeman in his war on crime</i>	1082
Brains of Silver, Eyes of Glass..... <i>How the film and lens of your camera are made</i>	1084
America's New Motors Pass in Review..... <i>An unorthodox view of 1930's automotive progress</i>	1085
Insulation—a Paying Investment for All Seasons..... <i>S. Gordon Taylor follows his basement planning article with one on year-round comfort for the home. Don't forget the contest closes at our office on May 31</i>	1086
Help Your Trees Get Their Vitamines..... <i>The president of a seven-million-dollar nursery tells you how</i>	1088
Once He Made Steam Automobiles—Now Violins..... <i>An intimate sketch of the life of the man who built the Stanley Steamer</i>	1089
The Marvelous "Eyes" of Science..... <i>With visual Big Berthas men span space, peer into distant worlds</i>	1090
A Great Lake City—and Its Applied Science..... <i>Milwaukee has many things to be proud of, civically and industrially</i>	1092
Deep Sea Surgeons Mend World's Nerves..... <i>Sequakes break cables, ships restore them to use</i>	1097
Here Comes the Pentode!..... <i>A consideration of what may be the next big popular radio development</i>	1098
Radio Rides the Roads..... <i>Our radio editor looks at the new automotive receiving sets</i>	1099
Dancing Down the Centuries..... <i>The fascinating tale of marionettes and how to make them</i>	1101
The Way I See It..... <i>Not entirely scientific reflections on half a dozen subjects—by the editor</i>	1104
Floors That Clean Themselves..... <i>Mrs. Christine Frederick shows how to eliminate more household drudgery</i>	1108

## Other Articles

### General

In the Spotlight of Science..... <i>A here-and-there review of what's happening</i>	1093
When Speed Makes Time "Run Slow"..... <i>Dr. Menzel guides you through Relativity</i>	1102
When the Fates Fooled Dunninger..... <i>At last—he admits having been baffled himself</i>	1105
Beauty, Health and Comfort in New Scientific Devices..... <i>Some recent products of applied science</i>	1109
The Safety Valve..... <i>Our readers set forth their views</i>	1114
Let's Laugh..... <i>Science ventures into the comic side of life</i>	1118
The Oracle..... <i>In which questions are answered</i>	1119
Book Reviews..... <i>A glance at scientific literature</i>	1138

### Construction, Experiment, Amusement

Make a Chemical Nest of Serpents..... <i>How you can conjure reptilian forms</i>	1100
One Step More to the Take-Off..... <i>Third in the Reynolds glider construction series</i>	1103
Make an Attractive Day Bed for Your Home..... <i>You'll be delighted with this furniture</i>	1106
From Old Lancaster . . . a Tea Table and Footstool..... <i>A sample of English woodworking ingenuity</i>	1107
Wrinkles and Recipes..... <i>Many hints for the handy man to apply at home</i>	1110
Hints for the Motorist..... <i>Mr. Luers' suggestions will save any owner time</i>	1112
Tips for the Young Machinist..... <i>Efficient operation of the home machine shop</i>	1113
Brain Teasers..... <i>Sam Loyd's cerebral setting-up exercises</i>	1116
Magic..... <i>Dunninger reveals more of his tricks</i>	1117
How's Your Geography?..... <i>A cross-word puzzle by Richard H. Tingley, C.E.</i>	1128

### Radio

What's New in Radio?..... <i>Which supplements our two radio feature stories</i>	1081
---	------

### Health

Deafness Yields to Galvanic Current..... <i>An article by an ardent student of the subject</i>	1144
---	------

### For Inventors

Yankee Brains at Work..... <i>American inventiveness is still going strong</i>	1120
Patent Advice..... <i>Conducted by Field Editor Joseph H. Kraus</i>	1122

### Home Improvement

List of Manufacturers' Literature..... <i>For those interested in the Basement Plan Contest</i>	1147
Index to Advertisers.....	1158

**R. T. I.** QUALIFIES YOU TO MAKE MONEY AND ITS SERVICE KEEPS YOU UP-TO-THE-MINUTE ON **R. T. I.**  
 THE NEWEST DEVELOPMENTS IN RADIO, TELEVISION, AND TALKING PICTURES

Easy to Get into  
 this **BIG**  
 Money Making  
 Work

\$60 to \$125<sup>00</sup>  
 A WEEK  
 Radio  
 Operator

\$8 to \$15<sup>00</sup>  
 A DAY  
 Servicing and  
 Repairing Radio Sets

\$5000<sup>00</sup> A YEAR  
 AND UP  
 Radio Engineer  
 for Broadcasting Station

\$85<sup>00</sup> A WEEK  
 Installing and  
 Repairing Talking  
 Picture Equipment

**GOOD JOBS** Right at Your Finger Tips  
 WHEN YOU ARE R.T.I. TRAINED IN  
**RADIO-TELEVISION-Talking Pictures**

BIG PAY JOBS! SPARE TIME PROFITS! A FINE BUSINESS OF YOUR OWN! They're all open to you and other live wire men who answer the call of RADIO. The fastest growing industry in the world needs more trained men. And now come Television and Talking Movies—the magic sisters of Radio. Will you answer this call? Will you get ready for a big pay job Now and step into a BIGGER ONE later on? You can do it EASILY now.

**R. T. I. Home Training**  
 Puts You In This Big Money Field

Radio alone, pays over 200 MILLION DOLLARS a year in wages in Broadcasting, Manufacturing, Sales, Service, Commercial Stations and on board the big sea going ships, and many more men are needed. Television and Talking Movies open up other vast fields of money-making opportunities for ambitious men. Get into this great business that is live, new and up-to-date, where thousands of trained men easily earn \$60 to \$100 a week—where \$10,000 a year jobs are plentiful for men with training plus experience.

**Easy To Learn At Home—In Spare Time** Learning Radio the R. T. I. way with F. H. Schnell, the "Ace of Radio" behind you is EASY, INTERESTING, really FUN. Only a few spare hours are needed and lack of education or experience won't bother you a bit. We furnish all necessary testing and working apparatus and start you off on practical work you'll enjoy—you learn to do the jobs that pay real money and which are going begging now for want of competent men to fill them.

**Amazingly Quick Results**

You want to earn BIG MONEY, and you want some of it QUICK. R. T. I. "Three in One" Home Training—Radio-Television-Talking Movies—will give it to you, because it's easy, practical, and



**FRED H. SCHNELL**  
 Chief of R. T. I. Staff  
 Twenty years of Radio Experience. First to establish two-way amateur communication with Europe. Former Traffic Manager of American Radio Relay League. Lieut. Commander U.S.N.R. Inventor and Designer Radio Apparatus. Consultant Radio Engineer. Now in charge of R. T. I. Radio Training—and you will like his friendly manner of helping you realize your ambition.

is kept right up-to-date with last minute information. In a few weeks you can be doing actual Radio work, making enough EXTRA MONEY to more than pay for your training. In a few short months you can be all through—ready to step into a good paying job or start a business of your own. A BIG JOB—BIG MONEY—A BIG FUTURE. There is no other business in the world like it.

**Investigate—Send For R. T. I. Book Now**

Don't waste a minute. Find out what the great Radio Industry, which has grown faster than the Automobile and Motion Picture business, has to offer you. Find out what other men are earning. SEE HOW EASILY YOU CAN GET STARTED. Get the facts about Radio, Television and the Talking Pictures, first hand, in the big R. T. I. FREE BOOK. Learn what this R. T. I. "Three in One" Home Training can do for you. Mail the Coupon for FREE BOOK NOW.

**Radio & Television Institute**  
 Dept. 914  
 4806 St. Anthony Court, Chicago



**R.T.I. Training**  
 Brings Big Jobs  
 Like These!



**Earned \$500 Extra Money in Two Months**

Your radio course has enabled me to earn over \$500 in two months' spare time work. Understand that this is all spare time work, as I have a permanent position with my father in our store. I give you all the credit for the above and as I said before, I wish to finish the entire course as soon as I can.—Your student, J. NOPPING, Greenville, Ky. R 1, Box 37.



**Salary Raised 331-3% Since Enrolling**

You may be interested to know that I am now Radio Service Manager for the H. N. Knight Supply Co. who are distributors for Eveready Radio Receivers in the State of Oklahoma, and Texas. Furthermore, with an increase in salary of about 331-3% since I enrolled with your school. Thanking you for your interest you have shown in me, and your wonderful course, I am, EARL F. GORDON, 618 East 6th St., Oklahoma City, Okla.



**Makes \$25 a Day**

Haven't forgotten you. How could I when I make as high as \$25.00 per day and have made \$600.00 in two months from Radio work. That's not so bad when I'm only 19 and in a small town. I just looked over the catalog you sent me before I enrolled, and you did about all you said you would and about as much more.—FLOYD KNISLEY, R. F. D. 2, Box 91, St. Joe, Ind.

**RADIO & TELEVISION INSTITUTE**  
 Dept. 914, 4806 St. Anthony Court, Chicago  
 Send me Free and prepaid your BIG BOOK "Tune In On Big Pay" and full details of your three-in-one Home Training (without obligating me in any way).

Name.....  
 Address.....  
 City..... State.....

**R. T. I.** TRAINS YOU AT HOME FOR A GOOD JOB OR A PROFITABLE PART TIME OR FULL TIME BUSINESS OF YOUR OWN

# Alloys— a New Basis of Wealth

By Alfred M. Caddell

*Financial Editor*

**T**HE title of this article, I'll admit, is somewhat misleading. Alloys are not a new development in science and industry, but they most certainly are an increasingly valuable one.

Huge industries have already been founded on the mixture of metals and still larger enterprises are in the offing. Recently, a new steel merger came into being, the third largest steel company in the world, and among its most valuable assets are numbered processes for making stainless steel and other basic mineral compounds.

An alloy may be regarded as a marriage between metals, the properties of one element greatly influencing the properties of another element. For instance, a very small percentage of vanadium added to steel will bring about a steel of greater toughness and malleability. Manganese added to steel will bring about lightness with strength. Chromium added to steel will lend anti-rust properties to the compound. Allegheny metal is the name of an alloy which was developed in Germany during the war, when armament plants were seeking the hardest possible substance suitable for gun lining. At about the same time, the English also worked out the formula. After the war the commercial advantages of this alloy began to assert themselves.

This alloy is non-rusting, untarnishable, non-corrosive and not affected by weather in any way. It is also one of the hardest metals known to the steel industry. It is made of refined steel combined with about 18 per cent. of chromium, 8 per cent. of nickel and smaller proportions of carbon, manganese, silicon, phosphorus and sulphur. The process of combining these elements—a rather complicated one—gives the alloy its remarkable properties. Allegheny metal in itself represents a fast-growing industry capitalized in the millions. The automobile industry is becoming one of its chief customers.

Bronze, brass, German silver, pewter, britannia metal, babbitt metal, various solders, all serve as the foundations of industries that mount into huge totals of wealth. Bronze and brass are perhaps the oldest of all alloys, typical bronze being a mixture of copper and tin, and brass a compound of copper and zinc. This class of alloys varies greatly in composition. Manganese bronze, for instance, one of the variations noted above, is finding an ever increasing use in the making of steamboat and motorboat propellers.

Copper, steel and aluminum have served more or less as basic metals from which alloys are obtained by uniting other elements with them in specific proportions and by specific processes. Of outstanding importance in the development of aviation are the aluminum alloys.

Copper is perhaps the commonest of alloying elements used with aluminum, with magnesium and manganese playing important parts in rolling and forging alloys, and with silicon, nickel and iron used extensively in alloys for the foundry. Duralumin is the best rated alloy from the standpoint of strength. Alclad, another aluminum alloy, has outstanding non-corrosive qualities. Both duralumin and alclad are used extensively in the construction of airships, an industry which has barely gotten under way. Alclad, for instance, weighs only one-third as much as carbon steel of the same strength. Thus it is admirably fitted for aerial use.

In aircraft use and more particularly in the construction of power plants, it has been found profitable to pay even a very high price for any appreciable saving of weight. In fact, the present relatively high cost of aviation motors, it is said, is due to the extensive use of alloys—more than fifty per cent. of the weight of the average aviation motor is made up of aluminum alloys.

Where metallurgical research will take us in the fields of industry is most difficult to say. But the investor in industrial securities can well afford to follow such developments with the greatest care.

## Questions and Answers

Conducted by Alfred M. Caddell

Information on securities will be furnished readers of "Science and Invention" free of charge by mail and through these columns. A 2-cent stamped, self-addressed envelope should be included in your letter. Address your inquiries to the Financial Editor, Science and Invention, 381 Fourth Avenue, New York City.

**Question**—Kindly give me your opinion of International Business Machines. L. L. L., Toledo, Ohio.

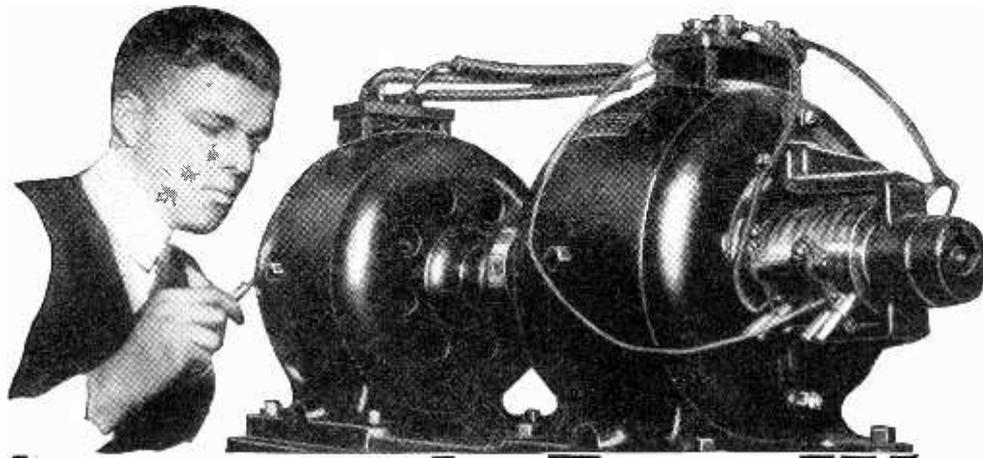
**Answer**—The earnings record and growth of International Business Machines have been excellent. Earnings have increased every year since 1921, and a larger cash dividend has been paid in each year since 1919. The stock pays \$6 a share in cash per year and also distributes 5% in stock. The trend in factories, banks, officers, etc., is steadily toward labor saving. There is no let-up of business in sight and consequently this company should register steady progress of a more or less continuous nature.

**Question**—I am considering the purchase of Chicago Pneumatic Tool common. What is the outlook for this company? A. C. B., Dallas, Texas.

**Answer**—This company is the largest manufacturer of pneumatic tools in the world, manufacturing so-called hand tools, air compressors, gas and oil engines of the Diesel and semi-Diesel types, rock drills and other appliances which are sold to a large and diversified number of customers. Capital readjustment was effected in 1928 which brought about a better type of set-up. Earnings have increased since 1921 in varying degree and substantial working capital has likewise been added each year. The stock has recently moved ahead on comparatively small buying orders, reflecting a limited floating supply. In view of the steady growth of this business, the future of which seems entirely sound, this stock may be regarded as a conservative speculation. Up to date no dividends have been paid on the common.

**Question**—I hold Standard Oil of New Jersey, Phillips Petroleum, Associated Gas & Electric "A" and Commonwealth & Southern. How do they rank? L. P. D., Albany, N. Y.

**Answer**—All good. The oil stocks are of the best, able to withstand the ups-and-downs of conflicting markets. The utilities have excellent merit. Steps are now under way to eliminate minor holding companies in the Commonwealth & Southern group, thus effecting a more workable set-up.



# Amazingly Easy Way to get into ELECTRICITY

Don't spend your life waiting for \$5 raises in a dull, hopeless job. Now . . . and forever . . . say good-bye to 25 and 35 dollars a week. Let me show you how to qualify for jobs leading to salaries of \$50, \$60 and up, a week, in Electricity —NOT by correspondence, but by an amazing way to teach, RIGHT HERE IN THE GREAT COYNE SHOPS. You become a practical expert in 90 days! Getting into Electricity is far easier than you imagine!

## Learn Without Lessons in 90 DAYS By Actual Work—in the Great Shops of Coyne

Lack of experience—age, or advanced education bars no one. I don't care if you don't know an armature from an air brake—I don't expect you to! I don't care if you're 16 years old or 48—it makes no difference! Don't let lack of money stop you. Most of the men at Coyne have no more money than you have.

### Railroad Fare Allowed

I will allow your railroad fare to Chicago, and if you should need part-time work I'll assist you to it. Then, in 12 brief weeks, in the great roaring shops of Coyne, I train you as you never dreamed you could be trained on a gigantic outlay of electrical apparatus . . . costing hundreds of thousands of dollars . . . real dynamos, engines, power plants, autos, switchboards, transmitting stations . . . everything from doorbells to farm power and lighting . . . full-sized . . . in full operation every day!

**No Books—No Printed Lessons**  
No books, no baffling charts . . . all real actual work . . . right here in the great Coyne school . . . building



**Prepare for Jobs Like These**  
Here are a few of hundreds of positions open to Coyne-trained men. Our free employment bureau gives you lifetime employment service.  
Armature Expert, to \$100 a Wk.  
Substation Operator \$60 a Week and up  
Auto Electrician \$110 a Week  
Inventor . . . . . Unlimited  
Maintenance Engineer up to \$150 a Week  
Service Station Owner up to \$200 a Week  
Radio Expert up to \$100 a Week

### Now in Our New Home

This is our new, fire-proof, modern home wherein is installed thousands of dollars' worth of the newest and most modern Electrical Equipment of all kinds. Every comfort and convenience has been arranged to make you happy and contented during your training.

real batteries . . . winding real armatures, operating real motors, dynamos and generators, wiring houses, etc., etc. That's a glimpse of how we make you a master practical electrician in 90 days, teaching you far more than the average ordinary electrician ever knows and fitting you to step into jobs leading to big pay immediately after graduation. Here, in this world-famous *Parent school*—and nowhere else in the world—can you get this training!

### Jobs—Pay—Future

Don't worry about a job, Coyne training settles the job question for life. Demand for Coyne men often exceeds the supply. Our

employment bureau gives you a lifetime service. Two weeks after graduation, Clyde F. Hart got a position as electrician for the Great Western Railroad at over \$100 a week. That's not unusual. We can point to Coyne men making up to \$600 a month. \$60 a week is only the beginning of your opportunity. You can go into radio, battery, or automotive electrical business for yourself and make up to \$15,000 a year.

### GET THE FACTS

Coyne is your one great chance to get into electricity. Every obstacle is removed. This school is 30 years old—Coyne training is tested—proven beyond all doubt—endorsed by many large electrical concerns. You can find out everything absolutely free. Simply mail the coupon and let me send you the big, free Coyne book of 150 photographs . . . facts . . . jobs . . . salaries . . . opportunities. Tells you how many earn expenses while training and how we assist our graduates in the field. This does not obligate you. So act at once. Just mail coupon.



### Get This FREE Book

Mr. H. C. LEWIS, President  
COYNE ELECTRICAL SCHOOL, Dept. 40-27  
500 S. Paulina St., Chicago, Ill.

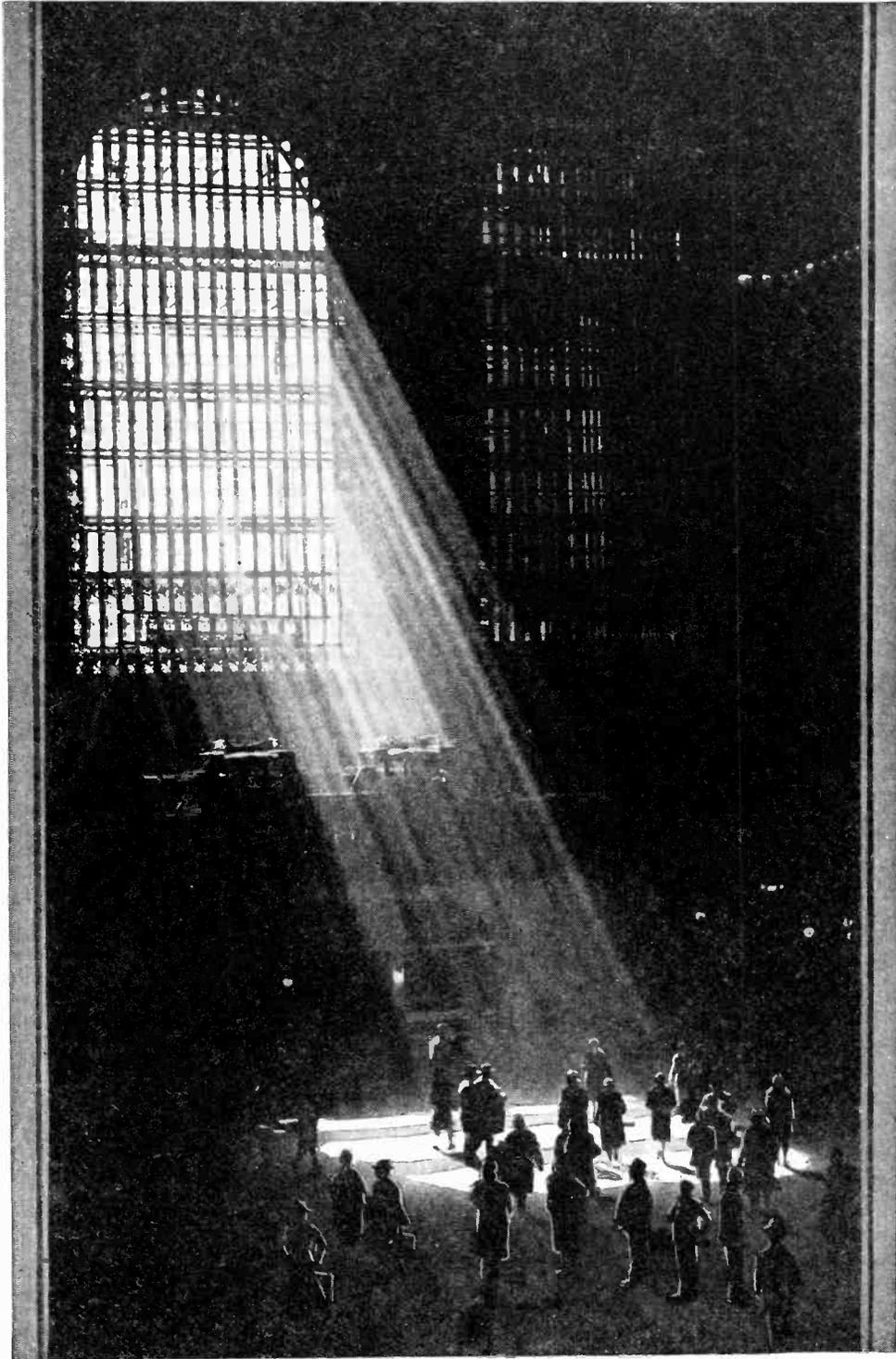
Dear Mr. Lewis:  
Without obligation send me your big free catalog and all details of Railroad Fare to Chicago, Free Employment Service, Radio, Aviation Electricity, and Automotive Courses, and how I can "earn while learning."

Name.....  
Address.....  
City..... State.....

**COYNE ELECTRICAL SCHOOL**  
H. C. LEWIS, Pres. Established 1899  
500 S. Paulina Street • Dept. 40-27 • Chicago, Illinois



# *The* Grand Concourse



Ewing-Galloway

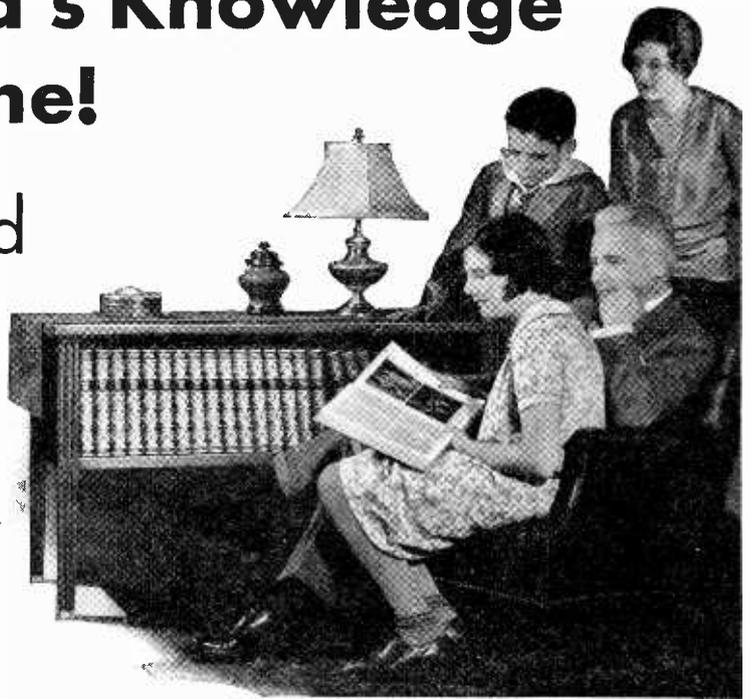
*An atmosphere almost cathedral-like characterizes this photograph of the Grand Central Terminal, New York.*

# Bring the World's Knowledge into your Home!

## Give yourself and your children

this completely NEW

# ENCYCLOPAEDIA BRITANNICA



### FOR OLD AND YOUNG ALIKE

Children love to browse through these fascinating volumes. The new Britannica assists with school work, brings out unsuspected talents, helps children "find themselves." THE MAHOGANY BOOKCASE TABLE SHOWN ABOVE IS INCLUDED WITH EACH SET

**O**PEN the windows of your mind—today. Bring into your home at one stroke the knowledge, the wisdom, the practical experience of 3,500 world-famous leaders of thought and action. Give your family—your children especially—the greatest knowledge book of all times—the new Encyclopaedia Britannica.

**A \$2,000,000 "home university"**

**F**RESH from the presses, made new from cover to cover at a cost of more than \$2,000,000, here is a Britannica that marks a new epoch in home education.

Never before has knowledge been made so instantly accessible—so easy to grasp.

Authorities from 50 different countries write its thousands of articles—bring to your home the learning of the great universities, the discoveries of science, the practical wisdom of successful men and women in all walks of life.

### All the world's wonders

15,000 superb new illustrations, many in color, give vividness and charm to the fascinating pages of the new Britannica—give you the whole world in pictures.

A magic book—that's what you'll say about this new Britannica. Now,

in these 24 marvelous volumes, more swiftly, more easily than ever before, you can explore any science, any industry, any phase of knowledge that you please—all without leaving your own home.

Ask any question, and the new Britannica tells you the answer. Yet the new Britannica is more than a mere answer-book. It is a book of richer opportunity—a vital force for self-advancement. *With the Britannica always at hand you can make even your minutes help you to success.*

### New opportunity for all the family

**E**VERY member of your family can find practical everyday help in this marvelous book. For men eager to get ahead it is a real aid to greater earning power. For women it is a guide in all the activities of the home and every outside interest. For children it provides an endless fund of fascinating things to make and do.

Give yourself and your family the chance to profit by this modern knowledge book.

### SPECIAL OFFER New low price—\$5 down

**M**ASS production on a scale never before possible gives you these books at a third of what they would otherwise cost, for less than any wholly new Britannica in 60 years.

And while this offer lasts an initial payment of only \$5 will bring the entire set together with the handsome bookcase table to your home. You can pay the balance on one of the easiest time payment plans ever devised.

### Send for FREE booklet

Act now! Get this NEW Britannica at the present low price. Send for our free illustrated booklet. It contains specimen pages, maps and color plates, and gives full information. Fill out the coupon and mail today.



**ENCYCLOPAEDIA BRITANNICA, Inc.**  
342 Madison Avenue, New York City

Please send me by return mail, without any obligation on my part, your 56-page illustrated booklet describing the new Britannica together with low price offer, etc.

Name.....  
Address.....  
City..... State.....

**SEND FOR FREE BOOKLET TODAY**

**Free ~ 1000 Page Encyclopedia of Facts!**

**3000 Subject Headings**

**Most Widely Consulted Reference Book in America!**

Now, for the first time, SCIENCE & INVENTION offers you this triumph in book-making—this complete and unabridged

**WORLD ALMANAC and BOOK OF FACTS**

**FREE!**

Contents Virtually Limited Only by the Extent of Man's Knowledge!

Has Outsold Any Similar Volume the World Over!

**E**NTIRELY at our own risk, we have arranged to ship you ABSOLUTELY FREE this 1,000-page "1930 WORLD ALMANAC AND BOOK OF FACTS"—the veritable storehouse of information in daily demand in every workshop, home and office—the world's most famous reference library which no busy mechanic, experimenter, business man, educator, or man or woman in any walk of life can afford to be without!

**An Unprecedented Indispensable GIFT**

The contents treated is virtually limited only by the extent of man's knowledge. More than 3,000 subjects! A glance at the following gives but a faint conception of its vast completeness, scope and amazing interest:

- |  |  |
|--|--|
| All About Radio and the Wireless               | Elements of Physics                    |
| What Eclipses Will Occur in 1930               | Marriage and Divorce in Various States |
| Law of Contracts, Wills and Business Procedure | How Many Tons in a Carload of Wheat?   |
| Tables of Time and Distance                    | The Great Disasters of History         |
| What Produces the Aurora Borealis?             | How Can You Avoid Lightning?           |
| How Does Bankruptcy Law Operate?               | What Are the Known Elements?           |
| What Is the World's Fastest Train?             | What Is the World's Greatest Bridge?   |
| What Is New York's Costliest Building?         | What Is the Metric System?             |
| Tables of Temperature and Precipitation        | How Fast Does Light Travel?            |
| Complete Chronology of the Past Year           | How Long Do Animals Live?              |
|  | Hanging Gardens of Babylon             |
|  | Seven Wonders of the World             |
|  | Women—Interesting Facts About Them     |

Complete chapters are devoted to Aviation, Radio, Scientific Progress, Intrepid Explorers, Chemistry, Biographies, Noted Inventions, etc. Science, Banking, Commerce, Industry, Sports, Countries and Governments—production of Factory, Field and Mine—Aeroplane data, Astronomical Tables, Velocity Tables, Poison Antidotes, Zodiac, Weather Forecasting . . . nothing has

escaped the corps of editors who searched the whole field of human activity for every mite of information useful to you.

**Entertainment that Brings Bigger Pay**

Of course you are vitally interested in all the amazing news, new inventions, discoveries, patents, ideas and stories as they forecast the astounding world of the future in SCIENCE & INVENTION every month.

Radio, Aviation, Electricity, Carpentry, Engineering, Auto Mechanics, Television, Projection and Filming Talkies, Magic, Still Photography, New Patents, Chemistry . . . SCIENCE & INVENTION shows you the miracles of their latest developments and gives you a liberal education in all fields. With its more than 200 highly instructive pictures in every issue, it will fascinate you, teach you, and pave the way to fatter pay envelopes!

**Send for your FREE Copy at ONCE!**

To persuade you merely to try it entirely at our risk, we offer you the new complete "WORLD ALMANAC AND BOOK OF FACTS" FREE with Eleven big issues, almost a full year's subscription to SCIENCE & INVENTION, at the special introductory price of only \$2. You risk nothing. If you are not more than delighted with both the magazine and gift we absolutely guarantee to refund your money. There are only 5,000 of these 1,000-page Gift Almanacs left. To make sure of getting your copy—

**Mail Coupon Before It's Too Late!**

SCIENCE & INVENTION, Dept. 2504-Q  
MACKINNON-FLY PUBLICATIONS, Inc.  
381 Fourth Avenue, New York, N. Y.

Please send me ENTIRELY FREE the 1,000-page "1930 WORLD ALMANAC AND BOOK OF FACTS" postpaid by return mail and enter my Special Introductory Subscription for Eleven Months of SCIENCE & INVENTION at only \$2.00. I save 75c on the regular single copy price and get the complete "WORLD ALMANAC" FREE. If not more than delighted, you will cheerfully refund my money.

Name .....

Address .....

City and State .....

*Renewed subscription will be extended from expiration*

**FREE—The Book You Need Most**

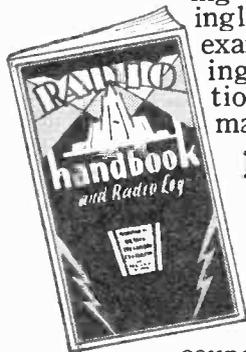
# 4 of the 40 Easy Ways to Make \$3.00 an Hour

**T**HE four plans shown are but a sample of the many ways in which our members are making \$3.00 an hour upwards, spare time and full time, *from the day they join the Association.* If you want to get into Radio, have a business of your own, make \$50 to \$75 weekly in your spare time, investigate the opportunities offered the inexperienced, ambitious man by the Association.

## Our Members Earning Thousands of Dollars Every Week

The Association assists men to cash in on Radio. It makes past experience unnecessary. As a member of the Association you are trained in a quick, easy, practical way to install, service, repair, build and rebuild sets—given sure-fire money-making plans developed by us—helped to secure a position by our Employment Department. You earn while you learn, while you prepare yourself for a big-pay Radio position.

The Association will enable you to buy parts at wholesale, start in business without capital, help you get your share of the \$600,000,000 spent annually for Radio. As a result of the Association, men all over the country are opening stores, increasing their pay, passing licensed operator examinations, landing big-pay positions with Radio makers.



## Mail Coupon Today for the FREE HANDBOOK

It is not only chock-full of absorbing information about Radio, but it shows you how easily you can increase your income in your spare time. Mailing the coupon can mean \$50 to \$75 a week more for you.

**Radio Training Association of America**  
4513 Ravenswood Avenue Dept. RN-4, Chicago, Illinois

## In Your Spare Time in RADIO

**Below** are a few of the reports from those now cashing in on the "40 Easy Ways"



**Clears \$3,000.00** Frank J. Deutch, Pa.—"Since joining the Association I have cleared nearly \$3,000.00. It is almost impossible for a young fellow to fail, no matter how little education he has, if he will follow your easy ways of making money."

**\$1,100.00 in 6 Weeks** J. R. Allen, Calif.—"Have done over \$1,100.00 worth of business in the last 6 weeks. Next month I am going to open up a store of my own. I never knew that money could come so fast and easy."

**\$25.00 a Week Spare Time** N. J. Friedrich, N. Y.—"I have averaged \$25.00 a week for the last 7 months even though I am not a graduate but just learning."

**Training Lands Him Job** R. C. Kirk, N. C.—"Your training has been very valuable to me. I landed a job with the big department store out here a few weeks ago because I had my membership card with me. There were a large bunch of applications ahead of me."

## ACT NOW If You Wish NO-COST Membership

For a limited time we will give to the ambitious man a No-Cost Membership which need not—should not—cost you a cent. For the sake of making more money now, and having a better position in the future, mail coupon below *now*. You'll always be glad you did.

Radio Training Association of America  
Dept. RN-4, 4513 Ravenswood Ave., Chicago, Ill.  
Gentlemen: Please send me by return mail full details of your Special No-Cost Membership Plan, and also a copy of your Radio Handbook.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

Published by Experimenter Publications, Inc., 381 Fourth Ave., New York City, N. Y.

B. A. Mackinnon  
President

H. K. Fly  
Vice-President

Arthur H. Lynch, EDITORIAL DIRECTOR

MURRAY GODWIN  
Managing Editor

JOSEPH H. KRAUS  
Field Editor

T. O'CONNOR SLOANE, Ph.D.  
Associate Editor

ALFRED M. CADDELL  
Financial Editor

AUGUSTUS POST  
Aviation Editor

GEORGE R. BROWN  
Radio Editor

## Editorial

### The Great God of Science—Heat

TO most of us the word heat casually conveys little more than an idea of warmth. We think of it mainly in terms of bodily comfort or cooking, and are generally well satisfied to have scientists and engineers deal with other uses of this important agency.

When Moissan, the celebrated French chemist, began experimenting with electric currents to produce heat, little could he have realized the almost unlimited industrial expansion that was to follow in the wake of his investigations. Not content with startling the world by making real diamonds by an artificial process, he went on to discover new substances and laid the foundation of industries which have exercised a profound influence on the course of human destiny. Substances of great industrial value, which were scarce because they were not amenable to temperatures of the blast-furnace, became conveniently available in quantity and in a high degree of purity. A fresh impetus was given to industry and new factories sprang up wherever power was available for the generating of electricity.

To appreciate the importance of the electric furnace and the research work which preceded its development, let us consider the temperatures available by other means. The temperature of a blast furnace probably does not exceed 1,600 degrees Centigrade at its hottest point. The Bunsen flame, fed with the proper mixture of gas and air, provides heat up to 1,870 degrees C.; 2,000 degrees C. is produced by a mixture of oxygen and hydrogen, and 2,400 degrees C. by a mixture of oxygen and acetylene. Great use has been made in industry of the oxy-acetylene torch.

But by none of these means can the maximum temperature of the flame be communicated to the substance on which it plays. By one means and another heat quickly becomes dissipated. However, the conversion of electricity into heat is brought about somewhat differently. The passage of a current through a conductor is attended by the production of heat, and the greater the proportional resistance which the conductor offers, the greater is the intensity of heat produced. Utilizing this principle, Moissan constructed a furnace, through the walls of which were inserted carbon rods. Then a high-voltage electric circuit was connected to these rods which met just above the substance under experiment, and upon being separated the electricity bridged the gap between the carbon points in the form of arcs and produced a temperature which has been estimated to have reached

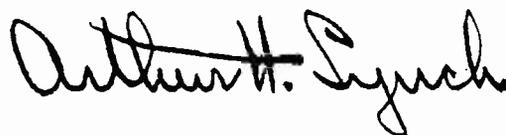
3,500 and possibly 4,000 degrees C. What Moissan had produced was in reality a glowing crater.

In the presence of this terrific heat it was discovered that certain metals would not only melt but boil. Many substances, such as chromium, manganese, tungsten, molybdenum, titanium, vanadium and silicon heretofore had been chemical curiosities, obtainable only at great expense. Now we find them in abundance in every-day use. By combining them with steel in the electric furnace metallurgical chemists have given us some wonderful alloys.

Automobiles, airplanes, various parts of machinery, tools, guns and the like owe their progress in development to a large extent to the quantity and cheapness of substances which improve the quality of the steel used in their construction. Chromium confers on steel toughness, tungsten and molybdenum hardness, titanium soundness and vanadium strength when added in the proper amounts; manganese in quantity greater than 8 per cent. gives exceptional hardness combined with ductility, and destroys the magnetic properties of steel. Silicon lends elasticity for the making of springs.

And aluminum! The commercial practicality of aluminum owes its existence entirely to the electric furnace. Though occurring in abundance throughout nature, it was virtually impossible to refine it with the comparatively low heats available prior to the electric arc method of obtaining high temperature. Without aluminum and its various alloys many industries, and consequently much progress, could never have been made.

We might continue almost indefinitely, each achievement in the field of alloys and in many other fields of endeavor emphasizing the tremendous importance that must be attached to the development of the electric furnace. But apart from the extent of this major development, we must give heed to the importance of all research. One discovery alone, no matter how apparently insignificant at the moment it may appear to be, may prove to be the opening wedge of an almost endless number of subsequent developments.



"Those Who Refuse to Go Beyond Fact Rarely Get as Far as Fact" - - - - HUXLEY



**“Here are the keys...  
drive it for five days  
before you decide!”**

*“That’s the kind of demonstration I want!”*

*“That’s the demonstration everyone gets who buys a used car backed by the Studebaker Pledge!”*

Which do *you* prefer—one-half hour’s ride over the boulevards—or five days at the wheel *yourself*?

Under the terms of the famous Studebaker Pledge, you get five days’ driving trial with the used car of your choice—with this further assurance—if the car you choose does not satisfy, you may return it within five days and apply your payment on *any* car in your

Studebaker dealer’s stock, *new or used!*

More than 150,000 thrifty motorists last year bought Pledge-backed used cars—and were satisfied. They bought because they know a good used car is a better buy than a cheap car bought new. Most Pledge-backed used cars have been thoroughly reconditioned—they look and run like new!

The Studebaker Pledge also provides a 30-day guarantee on all Certified cars. It also gives you the honest representation of plainly marked prices.

When you buy *your* used car—a family car, a business car, or a “second” car—see your Studebaker dealer first. See that you get the protection of the famous Studebaker Pledge—the fairest used car sales policy in the market.

**Pledge to the Public on Used Car Sales**

- 1 Every used car is conspicuously marked with its lowest price in plain figures, and that price, just as the price of our new cars, is rigidly maintained.
- 2 All Studebaker automobiles which are sold as CERTIFIED CARS have been properly reconditioned, and carry a 30-day guarantee for replacement of defective parts and free service on adjustments.
- 3 Every purchaser of a used car may drive it for five days, and then, if not satisfied for any reason, turn it back and apply the money paid as a credit on the purchase of any other car in stock—new or used. (It is assumed that the car has not been damaged in the meantime.)

© 1928 The Studebaker Corporation of America



**INVEST 2c  
you may save \$200**

Spend 2c now for your copy of this interesting and instructive booklet, “How to Judge a Used Car”—it may save you as much as \$200 on the used car you buy. Mail the coupon—*now!*

THE STUDEBAKER CORP. OF AMERICA  
Div. 174, South Bend, Indiana

Please send me copy of “How to Judge a Used Car.”

Name.....

Street.....

City..... State.....

**STUDEBAKER**  
*Builder of Champions*

# Has your favorite service station man seen this demonstration?

AT the right is the demonstration machine which engineers from the Ethyl Gasoline Corporation take from place to place to prove how Ethyl "knocks out that 'knock'" and develops an engine's maximum power.

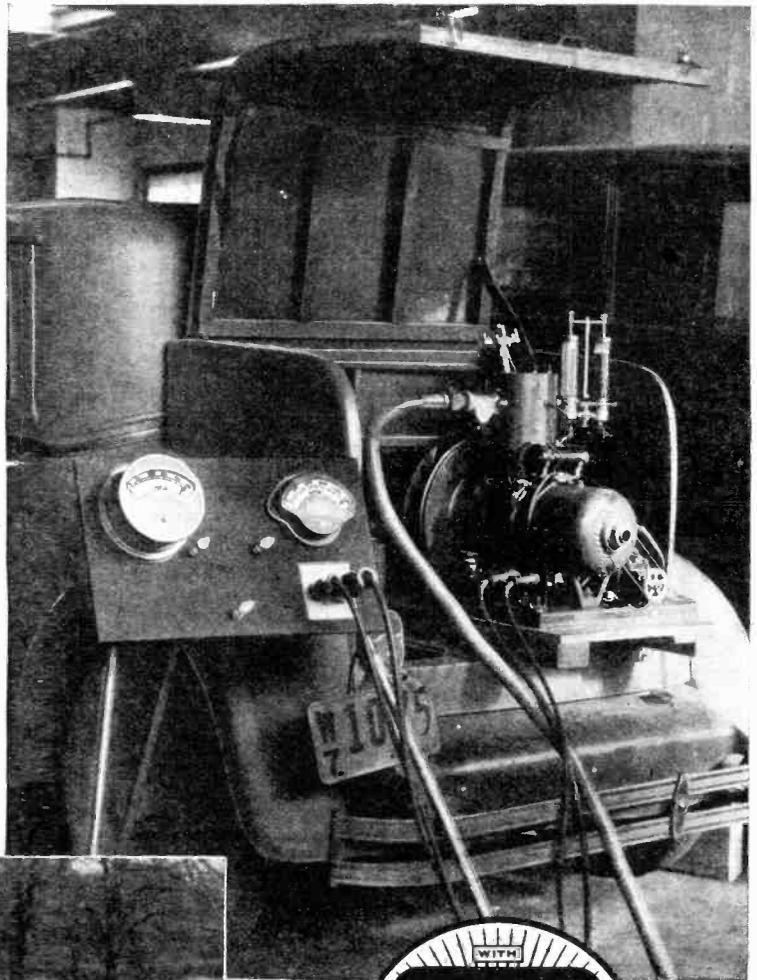
In those two vials at the right of the cylinder is the fuel. One contains ordinary gasoline, the other Ethyl Gasoline.

By turning the valve between them, ordinary gasoline flows into the combustion chamber. The engine "knocks"; its speed decreases; the power begins to drop.

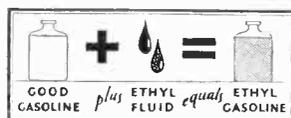
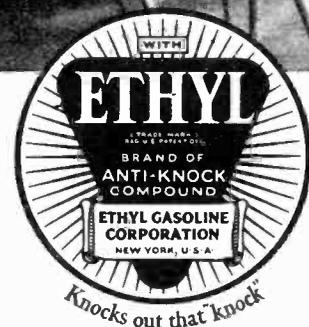
Then the valve is turned in the opposite direction to feed Ethyl into the chamber. The engine quiets swiftly. "Knock" goes out. R. P. M.'s (engine revolutions per minute) increase. And the engine delivers the power of which it is capable.

That's why thousands of service station men advise you to use Ethyl in your own car. They know that *any* car performs better with Ethyl Gasoline in its tank.

Ethyl Gasoline Corporation, New York City



Fitted into the rear of this car is the "knock" demonstration machine. (Above at right) The machine ready for action



Wherever you drive—whatever the oil company's name or brand associated with it—any pump bearing the Ethyl emblem represents quality gasoline of high anti-knock rating.

# ETHYL GASOLINE

# SCIENCE *and* INVENTION

Volume XVII. Number 12

APRIL 1930



## Tesla Maps Our Electrical Future

*Simple Daylight Television, Baby Electric Planes, Cosmic Rays of Tremendous Intensity Foreseen by Scientific Wizard*

By H. Winfield Secor, E. E.

**D**O you use an alternating-current induction motor? A high-frequency coil? A filamentless vacuum lamp (such as the neon lamp)? . . . At least you know these things and benefit by their use, as most of us do who live in this modern age of wonders. And you will be interested to know that not only these but many other modern electrical methods and appliances are conceptions of the brain of Dr. Nikola Tesla, perhaps the greatest master of electricity alive today.

Fundamental—that is the word that tells best why Dr. Tesla's name is less commonly heard than that of Edison. For practically half a century Dr. Tesla has occupied himself with the roots and essences of his chosen subject. How essentially necessary to modern industry, offices, and homes is alternating current! For most industrial requirements, direct current is not suited at all. Long-distance transmission of such a current is wasteful and impracticable, as no simple, efficient machinery is available for generating and transforming it at high voltages. Alternating current, on the contrary, lends itself admirably to high voltage generation and to transformation into current of any strength or volume as well as into direct current, at the point of use. . . . Without alternating current, in short, we could not proceed with modern life. Yet more than



*One of Dr. Tesla's striking experiments. A glare of light produced in a filamentless bulb by wireless power transmitted from a loop carrying terrific currents oscillating eighty million times per second.*

forty years ago Dr. Tesla discovered the principle of this form of electricity, invented machinery for generating and transforming it, and introduced it to a world which until then had been limping along with direct current as best it could.

Dr. Tesla's service in this immense field opened up by him is summed up strikingly by Dr. A. B. Behrend, in his book on the alternating-current induction motor:—"Were we to eliminate from our industrial world the results of Mr. Tesla's work, the wheels of industry would cease to turn, our electric trains and cars would stop, our towns would be dark, our mills dead and idle. So far-reaching is this work that it has become the warp and woof of industry."

Because Dr. Tesla knows the principles of electricity and has checked his knowledge in practice, he is able to speak with certainty about electricity not only of today but also of tomorrow. . . . His forecast of the electrical future is not that of an imaginative "philosopher," but of an experimenter and calculator. He is sure of what can be done, because he knows what has been done—by himself. Some results of some of his conclusions he imparted to me in a recent interview.

"Neon lamps are in the public favor and are being used for store windows and in signs (*Continued on page 1124*)

# Super-Motor

*for the*

*Highways for Modern Motor  
of This Automotive Age . . .  
wide Adequate Rights-of-Way*



*Two 40-foot pavements on a 204-foot right-of-way make Grand River Road a thoroughly modern motorway. At this intersection 35,955 vehicles pass each 24 hours, on busy days.*

**W**HEN the Governor and Judges laid out the 200-foot main arteries and 120-foot intermediate thoroughfares of the original plan of Detroit, there was no means of knowing in what measure or for what purpose they would be utilized by subsequent generations. Unfortunately the vision of a great future was lost in the first decade, but in that period a few sections of the wide thoroughfares of the plan became established in the city.

Have they become a nuisance and a burden to the taxpayer in the six generations that have elapsed, or have they served to the limit the different needs that each generation found for them?

The answer lies in the enormous structures that now adorn Washington Boulevard; in the teeming department store activities of lower Woodward Avenue; in the magnificent upbuilding that has come to Cadillac Square; in the great hotel, theater and private club development about Grand

**By J. Lee Barrett**

*President of the Detroit Automobile Club*

Circus Park, radiating into the short sections of Madison and Bagley Avenues and Broadway that are left in the plan; but more than all, in the eight-mile length of East Jefferson Avenue, which has met all the transportation demands that the ensuing generations have put upon it with its concentration of industries, apartment houses and recreation centers.

However, with the development of the automobile and with increased traffic congesting Detroit's main arteries,

*The Outer Drive consists of two 36-foot pavements, on a 150-foot right-of-way. Boulevard lights have been installed.*



# ways Motor Age

*Traffic Are the Most Pressing Problem Here Is What Detroit Is Doing to Pro- for the Rushing Motor Cars of Today.*

road commissions and city officials realized that a unity of effort would be necessary in order to maintain the heavy traffic on Detroit's streets. Consequently, in 1925 the City Plan Commission presented to the Common Council a plan known as the Master Plan embracing not only the streets within the city limits but superhighways extending into three counties. Superhighways outside of the limits called for a width of 204 feet and main arteries within the municipalities, for a width of 120 feet. This plan being a scientific development received by road commissioners from the three counties and City Plan commissioners, was approved by the Council and by the people of Detroit and an additional one mill was added to the tax levy to provide funds for this work.

For the past four years a large portion of this Master Plan has been developing rapidly. These 204 feet superhighways are designed to offer a space on a single level for the free movement of through automobile traffic at high speed as well as for local traffic and provides an exclusive reservation for the rail rapid transit lines that the expansion of the city will require for the mobilization and distribution of its armies of workers. The future city will be able to put its transit facilities on the surface at a great economy in more than three-fourths of its transportation area, because of the measures that are being taken now to acquire the right of way in advance of development.

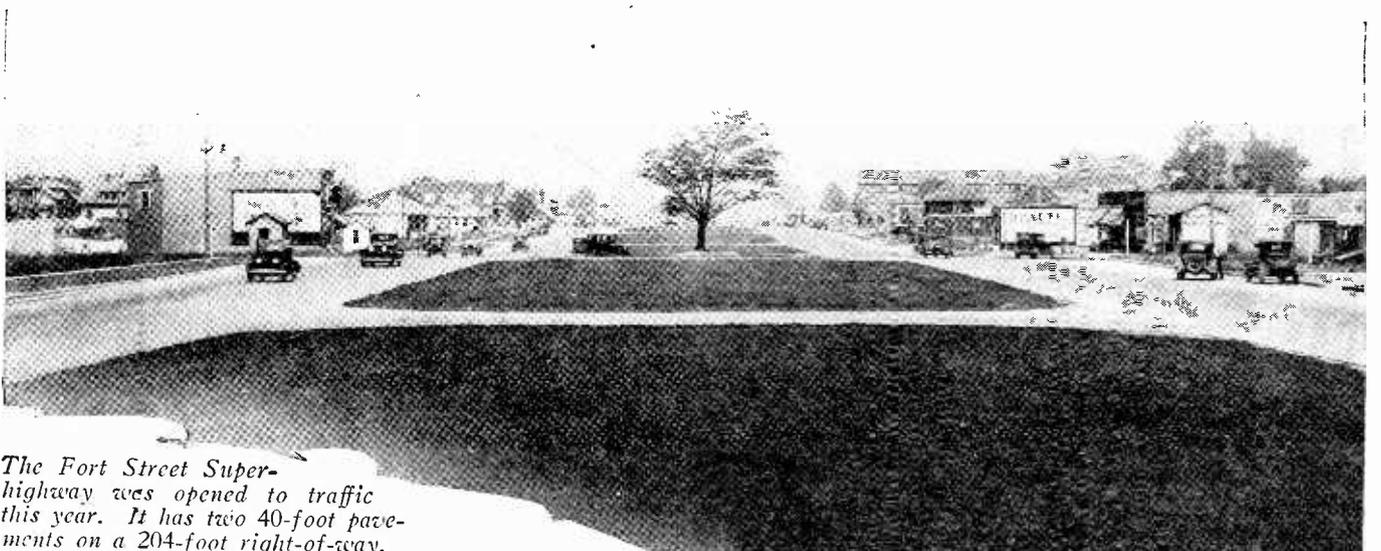
These projects have advanced much more rapidly in the districts surrounding Detroit than in the city itself



*Woodward Avenue Superhighway connects Detroit with Pontiac, more than 25 miles away.*

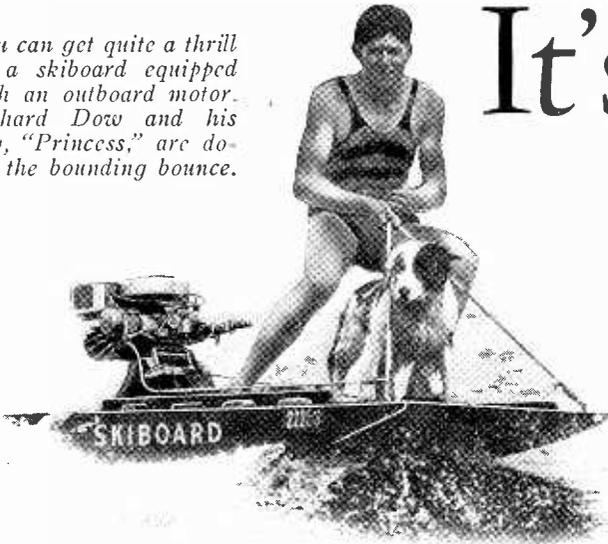
where the plan is hampered by business development which has already grown up on these main arteries. Some opposition has been advanced due to the special assessments which are levied against the property improved—by the widening thoroughfares.

At present, Detroit has five main arteries centering in the business district with two cordons, one circling the city at the three and one-half mile circle, the other known as the Outer Drive circling the city at the eight-mile circle, the latter being a 204-foot boulevard providing for cross-traffic between the five main arteries. (Continued on page 1133)



*The Fort Street Superhighway was opened to traffic this year. It has two 40-foot pavements on a 204-foot right-of-way.*

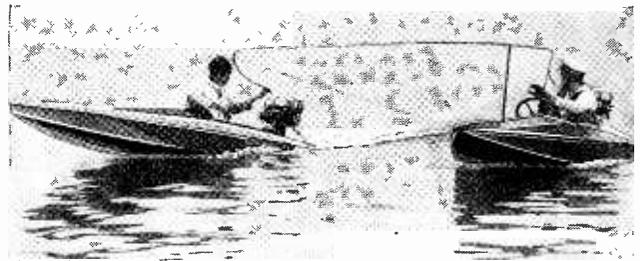
You can get quite a thrill on a skiboard equipped with an outboard motor. Richard Dow and his dog, "Princess," are doing the bounding bounce.



# It's Outboard Time!

**EVERYONE** has seen an outboard motorboat being propelled at a high rate of speed. Very few know that the outboard engine can also be applied to some unique constructions.

## Gas Your Outboard As You Go

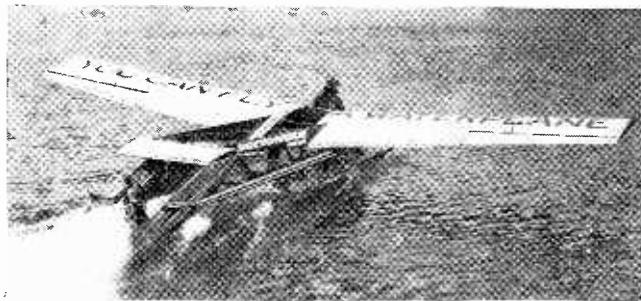


## Skiboard Skims the Deep

**T**HOSE who have not experienced the thrill of standing on a skiboard towed by a swiftly running outboard motored craft or by a fast power boat have often evinced a desire to try it. Such pleasure had never been reduced to the ultra-simplified form of attaching the outboard motor directly to the skiboard until Richard Dow decided to put the thought in practice, and now on any sunny day he can be seen giving his dog a speedy ride on this unique craft. Both seem to be enjoying it.

## You Can Be a Naviator Now

**A**NYONE can "fly" this waterplane. The sign on the wings says so. This vessel was designed for even greater thrills than ordinary outboard motorboat racing provides. It has been claimed that this motorized Mother Carey's chicken can make 65 miles an hour without flying any more than several feet above the surface of the water. As a matter of fact,



if the motor mounted on the rear pontoon were not in the water all the time, the monoplane would lose headway until the engine were submerged again. Ailerons supply stability and an elevator fin gives an up and down motion. The waterplane is steered by a submerged rudder and was built in Alameda, California.

## At Last—the Pneumarine!

**T**HIS stepped hydroplane hull furnishes itself with a pneumatic riding cushion as it goes along. Two streamline funnels at the fore part of the vessel drive air beneath the vessel, relieving the suction between the water and the



bottom of the boat and increasing its speed. The dotted white lines show pipes communicating with the bottom.

**D**URING the outboard motorboat races at Oakland, California, a new system of refueling was tried and found very successful.

Dr. F. T. Barron equipped his outboard motorboat with a pipe line to the end of which a flexible hose was secured. Then as Oran Fageol was putting his vessel through the pace, Dr. Barron pulled up alongside and transferred gasoline to Fageol's boat while both were running at full speed. It is likely that refueling records for outboard motorboats will soon be attempted

and probably boats in such classical races as the Albany to New York feature could receive fuel en route in this fashion.

## Like a Porpoise at Play

**A**USTRALIA has also taken to the outboard motor craze. At the Royal Motorboat Championship held by the Royal Motor Yacht Club,



aerial acrobatics were indulged in by the holder of Australia's outboard motorboat championship. Those who attended the carnival were surprised to see an outboard motor craft literally bounce out of the water as it sped along. A cameraman was on hand to photograph the bouncing boat.

# What's New in Radio?

What's Sunshine to Us May Be Static to Him

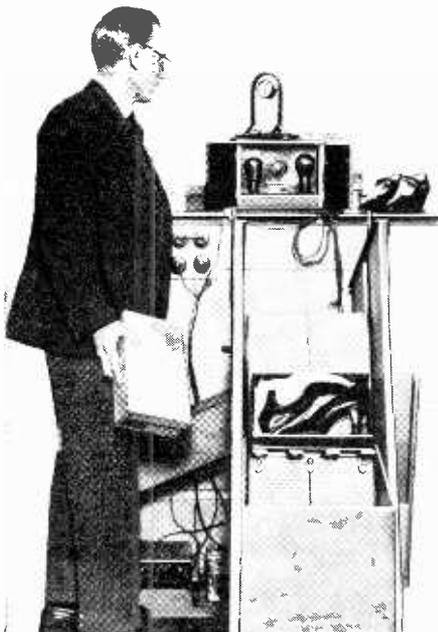


**P**ROFESSOR PAUL DE MARS of Tufts College is shown making an observation during the extensive investigations he has been conducting to determine the effect of the sun and the upper atmosphere on radio transmission and reception. Everyone who has a radio no doubt has noticed the wide variation in the effectiveness of reception from winter to summer and from day to night. With this machine, especially designed for this investigation, Doctor De Mars hopes to be able to determine the most advantageous conditions for

broadcasting, and also to recommend to the radio industry means of preventing improper reception due to unfavorable atmospheric conditions.

## Call Off Your "Dogs"

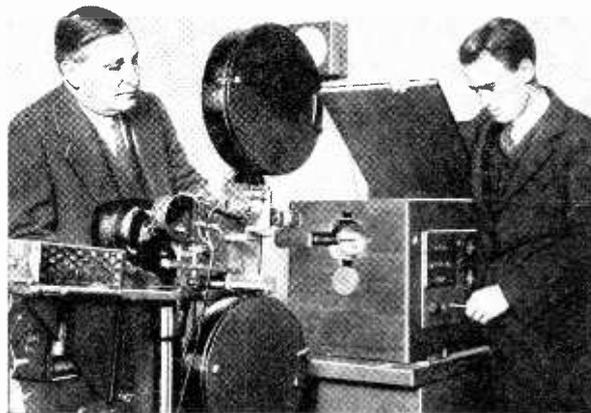
"**S**IZE 6, No. 5143," a salesman in this Regent Street Shoe Shop in London might call into the microphone. The request would be amplified and received through a loudspeaker in the stock room. And the shoes are sent to the showroom on an endless chain. Here we see a salesman about to take the shoes from the chain. Below is the microphone and the sound system which conveys the order to any of the other departments in the building. Here's one job less for the errand boy to perform.



## Radio Teaches Them "Ups and Downs"

**E**MBRYONIC flyers who would learn the fine points of the art of flying now have an added instructor in the form of radio communication. At the Heston Airdrome in England the student pilot is first given instructions by the teacher who then communicates with his pupil, in the air, by means of a radio system located in a nearby tower. Captain V. H. Baker, chief pilot of the Heston Airdrome, is shown here giving some advice to his apt and pretty pupil, Miss Betty Cleaver. You will notice the earphones, worn by Miss Cleaver, which are attached to the receiving set contained in the plane. Perhaps pilots will not relish the removal of the personal touch from the teaching of pupils like this one.

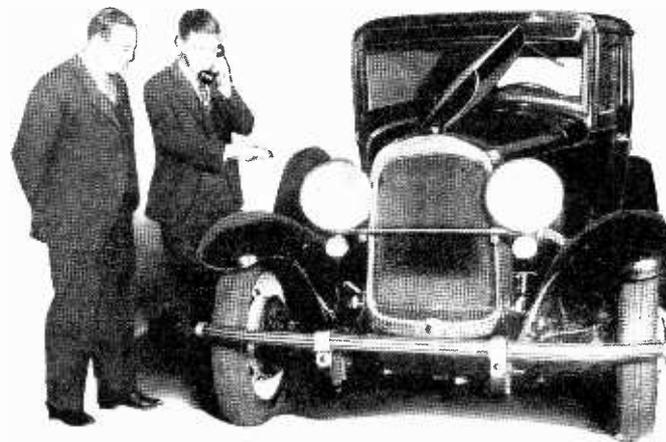
## Mormon Youth Aims to Simplify Television



**P**HILO FARNSWORTH, twenty-three-year-old Mormon inventor of San Francisco, has recently perfected a television which uses no scanning disk. According to the backers of this invention, television now becomes as simple a matter as learning the alphabet, for most of the movable and noisy parts have been relegated to the same limbo as the crystal detector radio sets.

## Back Seat Drivers?—Here's Outside Driver!

**R.** H. MAXWELL of the Westinghouse Company recently gave a demonstration to A. W. Picketts of the Willys-Overland Company at the automobile show in New York in the controlling of an unoccupied motor car by speaking directions



to it through a telephone control. By means of the "electric eye" the car was made to respond to such matter-of-fact commands as, "Back up, please," "Turn lights bright," and a few others. However, this apparatus is quite temperamental and depends for its response on the quality of the voice of the commander.

# The Long Arm of



*Airplane mechanics keep police aircraft in perfect trim for patrol and emergencies.*

*When the Modern Police  
nal Today, Aviation, Motor  
at His Elbow to Assist Him  
This Article Surveys the  
Science on the New*

By Mary

**W**HAT is a policeman?

The answer was easy—once. Not so now. The reason? Our forces of the law have called science in to help them make crime difficult and apprehension sure. And scientific police methods are creating motor mechanics, thumbprint specialists, and ballistic experts where only policemen grew before! Further, aside from these specialists, a new kind of patrolman has emerged—a man who knows the essentials of scientific criminal-hunting and is able to apply them.

New York is a good example of the changes that are taking place in police departments under scientific rule. The New York Police College is utilizing the latest scientific equipment for all the phases of police work—from gathering evidence to discussion of explosives and their action; from the study of ballistics in connection with the identification of bullets to ground work and flying instruction for the aviation force. The school accommodates 2000 men who have come from all of our forty-eight states to train for the latest profession, the profession of policeman.

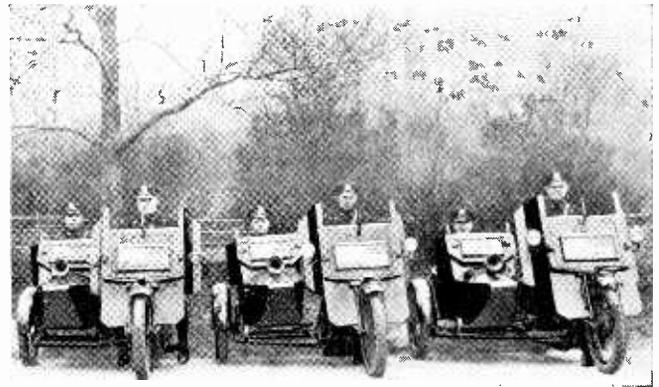
Science determines a rookie's entrance into the police field. A department physician examines every candidate; they must be physically perfect, mentally alert and intelligent. Fingerprints are taken. Once accepted, the rookie receives a training that is rigid and extensive.

Each recruit must become acquainted with criminal law and court procedure. He studies the famous cases of criminal history, often under tutelage of the very men who have helped solve them. He is told how to interrogate suspects, when to make arrests, what constitutes legal evidence . . . no phase of his work from apprehension to conviction is omitted.

Play, too, forms an important part of the official training. Calisthenics, wrestling, rough and tumble fighting, and jiu-jitsu are taught so that the policeman will be capable of defending himself against wrongdoers. A complete course in marksmanship—the construction and care of firearms, the ability to shoot straight and to disarm your opponent—is included as a further means for defense

and protection. The modern holdup man with his pistol has rendered this imperative.

As a matter of fact, the only way to combat crime is to know all the underworld's methods. For this reason a museum is set aside for the display of weapons. Each recruit is taught their use—whether they be three-pronged crowbars



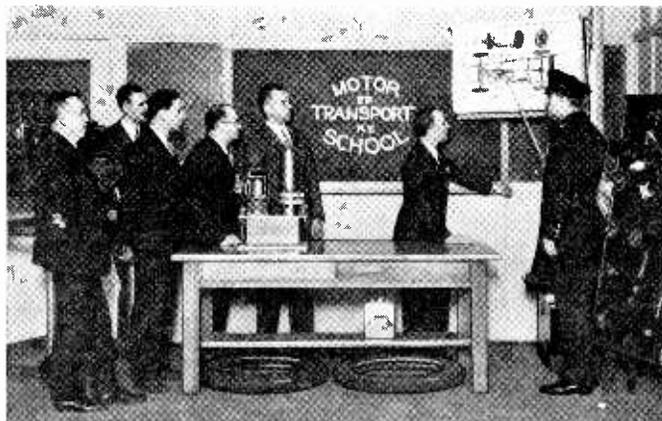
*Armored motorcycles stand in readiness to hunt down high-speed criminals.*

or can openers, rope and wire ladders used for scaling walls, sawed-off shotguns, miniature pistols, wood and lead mallets for noiseless tapping of safes, or cane guns. Many such weapons are made doubly dangerous by ingenious camouflage. Open up a common fountain pen—it will fire a 32-calibre

bullet. Lift a pearly knife, touch its blade—a bullet will spurt forth. A bullet-proof vest, from which the gunman is rarely separated, is on display; such a garment provides one of the best means of identification.

Bullets themselves provide an excellent means of identifying criminals, for no two pistol bores are identical. When a gun is fired the bullet records all imperfections of the inside barrel; thus the bullet identifies the gun. Microscopes, micrometers, spring gauges, all play their share in ballistics for the recruit.

Fingerprints, of course.



*Under Captain James Connelly these men teach students the working principles of police motor transport.*

# Science

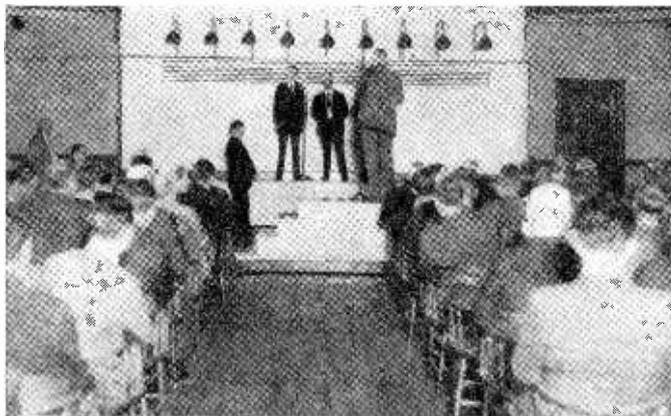
*man Starts After a Crimi-Mechanics, and Ballistics Are in Trapping the Misdoer . . . Many Rôles Played by York Police Force*

Jacobs

present the one infallible, unchangeable source of recognition. Let the criminal scar his finger tips, file them down, mutilate them; with chemicals—nature's pattern persists. There is no escape, all fingerprints come within one of the nine human types. Accompanying photographs of fugitives are detailed views of his fingerprints; these have been telephoned abroad, when occasion demanded, to aid in his capture.

All wrongdoers are fingerprinted immediately upon reaching headquarters—before they parade in the lineup—that daily procession of suspects and criminals who must furnish details of their careers for the recruits and detectives stationed in the audience. Microphones enable the questions and answers to be heard distinctly, for future reference. And by seeing these culprits daily, policemen become familiar with the various offenses and types of offenders.

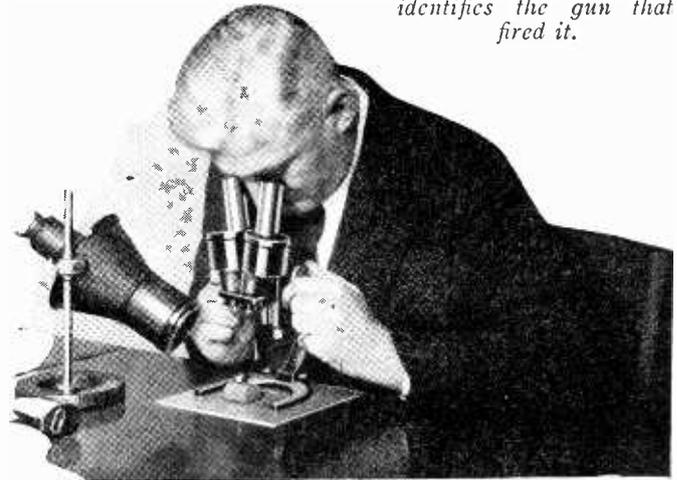
Practical application of chemistry, biology and physics, so far as they affect police work, is provided. Policemen



*Suspects and criminals are questioned by the Deputy Chief Inspector under the gaze of detectives, in the daily lineup.*



*The ballistic laboratory is equipped for complete study of projectiles and weapons used by criminals.*



*By the marks left on a bullet the ballistic expert identifies the gun that fired it.*

must be able to make minute examinations of hair and blood, dust particles, poisons, stains, counterfeit coins and notes, disguised and imitated handwriting. Photometry and luminescent analysis are considered in laboratory work.

After the general course of training, the future guardians of the law are classified according to their capability and aptitudes for special training.

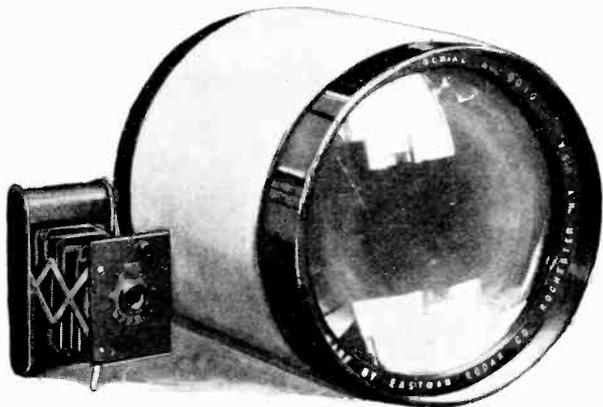
The Motor Transport School gives thorough instruction in construction, care, repair and operation of motor vehicles; practical demonstrations and road tests. All New York motor policemen must pass the state automobile license tests. The Motorcycle Squad, which works together with the mounted officer, in handling traffic, receives schooling in operating motorcycles.

In the School of Horsemanship the mounted policemen are trained to ride properly, to care for injured animals. A veterinary surgeon gives lectures on the anatomy and health of the horse. . . . The horses, too, come in for their share of instruction before ready for use. They must become accustomed to the sound of revolver shots, explosions, and seeing fires.

The School of Aviation is about the finest of its type in the United States. Actual laboratory work in the construction of planes, explanations of the various kinds of propellers, discussions of the controllability of planes, and their stability, are stressed. Work in manufacturing plants where planes are being constructed is included for the prospective aerial policeman; both the Curtiss and Roosevelt fields serve as training bases. The engine mechanics division of this school covers fueling systems, scientifically analyzing fuels and oils used for power. Pupils must pass a rigid test and qualify as commercial mechanics before they may take part in this phase of police activity. Dual and solo flying, the Department of Commerce rules for operating planes over cities, even meteorology, are part of the New York Police College training for its young aviators, pioneers in the first regular patrolling city air police force.

Aerial policemen have a double responsibility—to the aviator and the pedestrian. Whether a citizen is walking on the street, riding in his car, standing in front of his house, or doing stunts in his plane—safety is provided him. Private property must be protected against any damage from flying planes; reckless flying and other infractions of flying regulations must be stopped. Every other department of police activity may call upon the Aerial Unit for aid whenever the emergency requires.

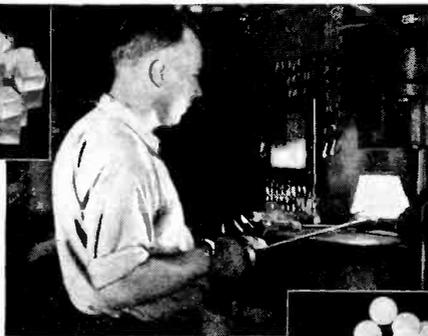
# Brains of Silver— Eyes of Glass



*Modern Production of Camera's Vital Features Makes Possible Your "Vest-Pocket" Photography*

*The largest photographic "eye" ever ground in America forms a remarkable contrast to a folding camera of vest-pocket size. It was made for the army air service.*

Photos courtesy Eastman Kodak Co.



*Cubes of optical glass are softened in a furnace and molded in a press. They emerge in tablet form, ready for annealing and grinding.*



**A** FILM coated with an emulsion of silver and a lens of polished optical glass are the very vitals of the folding camera with which you make picture records of interesting moments in your life today. It is only since the process of making these "brains" and "eyes" of our cameras has been perfected that amateur photography as we know it has been practicable.

The problem of the film—of the "brain" that records and holds what the lens has seen—was most difficult. In the early "wet-plate" days, the amateur sallied forth with a trunk-size camera and a whole laboratory of equipment, together with a tent in which to house it during his breathless experiments. . . . For experiments they were. The process of shooting a scene and developing a plate was a succession of emergencies, and the photographer who consistently got good results was regarded as little less than a magician.

Dry plates did away with the tent and the ponderous field equipment. But they were heavy in themselves and far too frail to encourage a rapid increase of amateur camera men. In 1889, however, the nitro-cellulose film base was discovered, and amateur photography began to come into its own.

Incidentally, but by no means unimportantly, the same discovery made possible the motion picture. The transparent, flexible nitro-cellulose film was the one essential needed to enable Thomas Edison to carry his cinematographic experiments to a successful conclusion. So 1889 marks the date when the movies began to come into their own, too.

How far photography, moving and still, has come since 1889 may be judged by the fact that 5,000,000 pounds of cotton are consumed annually in making basic film at the Eastman works alone. And the consumption of silver bullion for film coating at the same plant is one-tenth of that used for all purposes by the entire country. Purity and cleanliness are prime considerations in processing cotton for basic film manufacture. Washing and drying

*The polished eyes of the first film cameras looked out on many a gay and roguish group.*



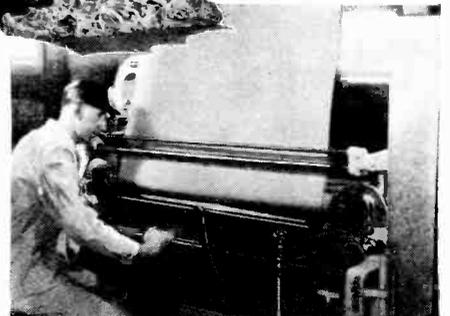
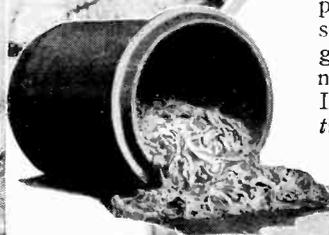
*The engraving gives an idea of the equipment necessary for field photography in "wet-plate" days.*

is carried out over a period of weeks, and impurities of the more persistent sort are removed with caustic soda in rotary vats. The cleansed cotton is made soluble in alcohol by impregnation with nitric and sulphuric acids. Centrifugal action removes excess acid from the nitrated product. After being immersed in water, the cotton is freed of all moisture by centrifugal wringers, operating at high speed.

In huge drums of two-ton capacity the cotton is sealed with a quantity of wood alcohol and rotated for several days. The solution which results has the consistency of extracted honey. Cleansed by a special process, this mixture is poured upon revolving polished wheels, where it becomes film of uniform thicknesses. A period of aging follows, and the film is ready for the emulsion which makes it photographically sensitive.

Silver bullion in 42-pound bars is dissolved in nitric acid to give the active element of the emulsion. In solution this (Continued on page 1127)

Shredded emulsion is heated until it liquefies and then is spread evenly by mechanical means upon broad sheets of basic film.



# America's New Motors Pass *in* Review

*More Cylinders, European Body Types Characterize 1930 American Models*

By Murray Godwin



*The trend of American cars toward Continental smartness is well exemplified in the Studebaker Dictator light brougham for four passengers and driver.*

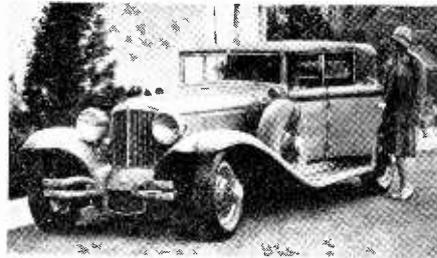
**A**MERICANS will drive fleetier, trimmer, more powerful cars from now on, a survey of the 1930 models shows. . . . And in large part they will be cars displaying a definite trend toward the European in body design. The American-style body of yesterday seems generally to have been cast aside as something that had stood about all the "refinement" that it could take. In some cases Continental ideas of motor body lines have met with all but complete acceptance, and it would be difficult to find a new American car which does not display some European feature or line.

The movement toward more power has gone hand-in-hand with a movement toward smoother operation, and more often than not the result is made apparent in an increased number of cylinders. Several well-known makers, previously stressing six cylinders as the logically correct number for the medium-priced car, have gone into the eight-cylinder field in earnest. Among them are De Soto and Dodge. Leading the movement toward the ultimate number of cylinders, of course, is the Cadillac V-16, delivering twice as many power impulses per revolution to the crankshaft as any other current American automotive power-plant, and a third more than the Packard V-12, discontinued several years ago.

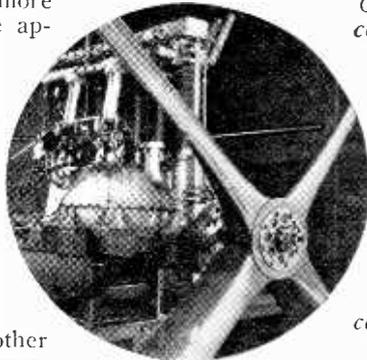
More fundamental than the more-cylinders trend is the definite establishment of the front-wheel-driven car in the American automotive field. This form of drive, which has seen considerable use on the track but is comparatively unknown on the road, appears this year in the Ruxton, the Cord, and the Gardner. The first-named is the only product of the company's making; the latter two are ad-



*Radiator shutters with thermostatic control in the Studebaker President and Commander eights.*



*One of America's front-drive cars, the Cord, is shown above.*



*On the left is an airplane power plant incorporating the Elcar lever-motor principle.*



*The new Franklin is powered by an airplane type motor, like all the new Franklin line.*



*The Cadillac 16-cylinder engine is thoroughly enclosed. A double dash conceals all piping and wiring.*

ditions to the already established lines of Auburn-Cord and Gardner. There are obvious advantages in front-wheel drive: the long propeller shaft, driving through two universal joints to the ring gear, is eliminated, and the elimination of the ring gear and its large housing permits the center of gravity to be lowered. It is interesting to note that front-wheel drive is actually the most ancient form as well as the most modern. Not only does it bring the motor car back to the horse-and-buggy principle, but to the principle of Nicholas J. Cugnot, who in 1769 or thereabouts built a tri-wheeled motor carriage in which traction and steering were both accomplished through the single front wheel.

Front-wheel drive and steering were also applied to motor cabs in Paris in the late 'nineties, and front-wheel drive with rear-wheel steering to electric cabs in New York. Front-wheel drive in its modern form has been a feature of several European cars for a number of years. It is apparent, therefore, that it is a practicable method of gaining traction, if rightly applied.

Even more fundamental than front-wheel drive is the unique lever motor now used in the Elcar. Here, for the first time in many years, appears a practicable change in the basic mechanism of the internal combustion motor itself. A lever is introduced between the end of the connecting rod and the crankshaft, which is turned by a second rod, extremely short, connected with the lever at dead center. The lever action multiplies the power by two between piston and crankshaft—that is the first advantage of this application of the Archimedean principle. But it is not the only one by any means. The length of stroke permissible is greatly increased, for the connecting rod proper has only a trifling non-vertical play, hence a bore-to-stroke relation of 3"—8" is made practical. Eccentric cylinder wear is practically eliminated, and power is more efficiently applied. The long stroke gives more time for combustion. (Continued on page 1130)

Loose insulating material is being blown into hollows in the walls of this Fort Wayne home. The process does no harm to the finish and is thoroughly effective. (Johns-Manville.)



# Insulation—a for All

*From Summer Sun and  
Protects You and Your  
Second of a Series, Mr.  
of the Home*

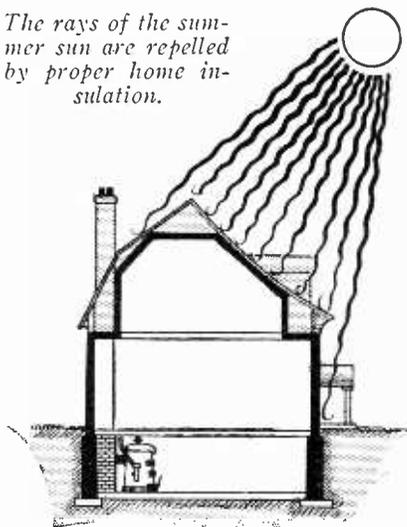
By S. Gordon

**H**AVE you regarded home insulation as a subject for Fall? . . . It's a mistake. There's no better season for thinking about insulation than right now—and no better time, either, for carrying out the insulation plan your home needs.

It's true that insulation keeps winter furnace heat inside the house where it belongs. The Bureau of Standards has stated that it saves from twenty to forty percent of the fuel bill—the exact figure depending on the types of wall construction and insulating material employed. . . . But insulation serves also to repel the heat rays that in summer beat upon the roof of your home. The insulated house is actually cooler in summer as well as warmer in winter. And insulation therefore is a fit subject for any season—and a paying investment in the bargain. For in fuel economy alone it pays for itself within a few years after it has been installed.

An existing house can be thoroughly insulated by methods recently developed for blowing insulating materials into the hollow spaces in the walls. This process adds somewhat

*The rays of the summer sun are repelled by proper home insulation.*



*Top floor ceilings are readily insulated with fillings of rock wool. (Johns-Manville.)*

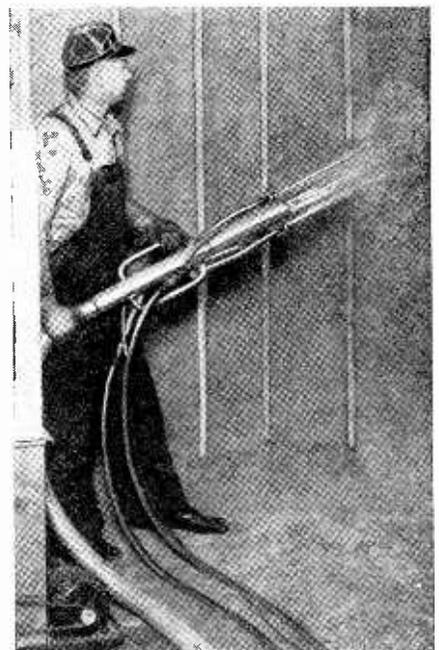
to the expense, of course, but not enough to make the plan impractical by any means. In following this method the work is usually done from the outside and does not damage plaster or decorations in any way, nor need it deface the exterior of the house.

For those who are planning new homes for erection this summer, now is the time to study the possibilities offered by insulation. Not only is insulation readily installed dur-

ing construction, but if the new home is well insulated in side walls and roof the heat requirements will be less and a smaller heating system with much smaller radiation capacity will be adequate. Moreover, in constructing a home it is sometimes possible to replace some of the common structural materials with insulating materials which will serve equally well from the structural point of view, and will provide insulating value in addition. Unless strictest economy is essential however, it is best to add insulation to the other structural materials. In this way the superior insulating qualities of the insulating material are added to the inherent insulating value of the other structural materials in the walls, and thus

maximum insulating efficiency is provided.

In discussing insulation for the home, it is convenient to consider it from the standpoint of winter conditions. Its direct benefits are more tangible at that time, in that they are reflected in a dollars and cents saving in fuel. Moreover, insulation that is effective in winter will be effective in summer, for the simple reason that insulation which prevents the escape of heat from the house to the outside in winter will prevent the summer heat from



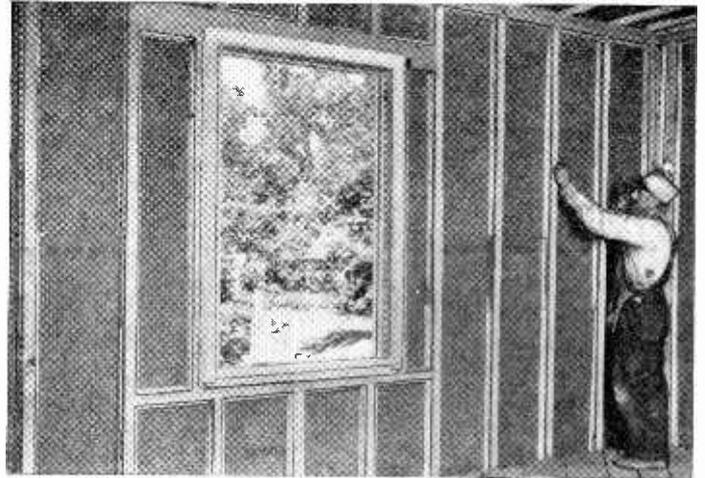
*Blown-on insulation hardens, forming a coat. (Sprayo-Flake Company.)*

*List of Manufacturers' Literature Announced*

# Paying Investment Seasons

*Winter Cold Good Insulation Family. In This Article, the Taylor Makes a Pointed Survey Insulating Field.*

Taylor



*Many householders are able to perform this simple and efficient insulating job. (Flax-Li-Num Insulating Company.)*

entering through roof and walls. Assuming that a house is to be insulated, several questions arise as to what insulating materials should be used, where it should be installed, and what will be its effect.

First of all, the purpose of insulation is to retard the transmission of heat. To a certain extent practically all materials that go into the walls or roof of a house provide some degree of insulation. The insulating value of any material is determined by its ability to conduct heat. Lumber one inch thick will conduct heat four times as readily as a good insulating material of the same thickness. Therefore, a one-inch thickness of this insulating material is equal in its insulation value to lumber four inches thick, a brick wall 20 inches thick, concrete 33 inches thick, stone 72 inches thick, or plaster 13 inches thick.



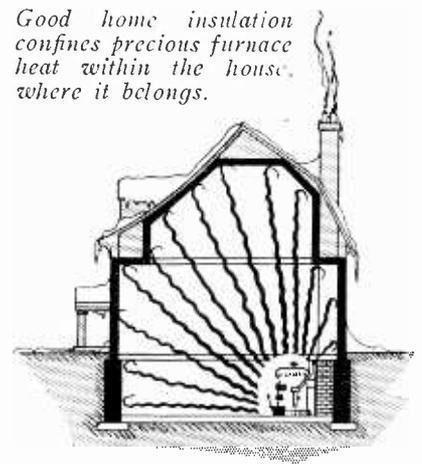
*An insulating quilt of balsam wool is easily installed. (Wood Conversion Company.)*

total insulation value may be practically doubled, which means that only half as much heat can pass through it as through the uninsulated wall. In some wall construction, the addition of insulation may show an even greater improvement than this.

Insulation in the walls and roof is not the only preventive of heat loss in winter. The infiltration of cold air around doors and windows and the comparatively high conductivity of glass windows are important contributions. The Bureau of Standards Circular C-376 (a

copy of which can be obtained for five cents from the Bureau at Washington, D. C.) shows that a fuel saving up to 40% can be made by provision of insulation in all exterior walls and roof. Weather-stripping to minimize cold and infiltration, and storm windows to reduce heat losses through the glass, will bring about additional fuel savings which, with insulation, bring the total fuel consumption down to approximately 40% of the amount which would be required to heat the same house without these improvements. From these figures it is evident that proper insulation is the most important factor in eliminating heat losses. Weather-stripping and storm windows have about equal value as to heat savers and both together are about half as effective as good insulation in walls and roof.

Insulation of the top of the livable portion of the house is of the greatest importance. It is here that the heat losses are greatest in winter and it is here that the heat enters most readily in the summer because of the direct exposure of the roof to the beating sun. The insulation may be placed in the roof



*Good home insulation confines precious furnace heat within the house, where it belongs.*



*Flexible insulation between studs adds to home comfort. (Flax-Li-Num Company.)*

Dead air spaces in walls are good insulators also. Thus, the heat-retarding value of the wall of a frame house is greater than the sum of the retarding values of the materials which make it up because there is a dead air space between the exterior and interior surfaces. But, by adding insulation to this wall, its

*in March Issue Will Be Found on Page 1147*

# Help Your Trees Get *their* Vitamines

By Evelyn Smith

President, Amawalk Nursery

*Out of Her 20 Years' Experience in Developing the Largest Big-Tree Nursery in the World Miss Smith Instructs the Amateur in Spring Trimming.*



The field grown elm may be safely cleared of dead branches and cross limbs at almost any season of the year.

THE average householder gets an attack of tree-trimming fever in its most virulent form early in the spring. If the sun and the pruning shears are simultaneously bright and shining, only definite self-control is going to prevent him from getting right out to trim something. Unless he curbs this fever by the application of definite tree knowledge, he may do incalculable damage to his helpless trees.

It is almost a pity that the average man believes himself to be at heart a naturalist, merely because of this yearning to get out into the sunshine. For every time he cuts off a branch of a tree under the delusion that he is benefiting it, he is likely to rob the tree of a certain amount of digestive food greatly needed by the roots.

Keep in mind the fact that every tree is a complete unit in itself, with each leaf a manufacturing plant. Without a goodly crop of leaves, the roots must perish, for they take in crude water from the soil, send it up into the tree through the sap wood, out into the

branches into the leaves, where with the aid of the sun and the chlorophyl, it brings about the production of digested sap or carbohydrates (sugar and starch). From here it flows to the cambium layer and is distributed over all parts of the tree. Disturb the balance of this process by ruthlessly depriving it of the branches and you disturb the balance of the entire tree.

Basically the reason for spring trimming is that the branches can be seen more easily before the foliage is out, and the true shape of the tree determined. The small householder should study his trees well before allowing the pruning shears to make their first snip. He should be acquainted with the family characteristics of the tree and not attempt to make a white pine resemble a cedar in shape nor a Douglas fir grow like an arbor vitae. Destroying these family characteristics will destroy the beauty value as well as the lumber and commercial value of the tree.

All dead branches and cross limbs may be safely cleared out in the spring, taking care to do this in the early spring, when growth is dormant, rather than later when foliage is ready to burst forth after a day or two of sunshiny warmth. Maples, however, should be trimmed in late spring, to prevent bleeding of the sap. Oaks, elms, locusts, copper beeches and other ornamental trees may be trimmed at almost any season of the year without undue injury to the tree.

Fruit trees, on the other hand, are usually trimmed in the winter, partly for the reason that farmers and fruit growers have more leisure at this time. The scientific fruit grower, however, is coming more and more to do some summer pruning and to determine the size of his next year's crops by the production of the current year. He has learned how to thin and trim the trees and to know to an apple or a peach just what his trees can stand in the way of production without weakening themselves.

And mark the difference between pruning, trimming and shearing. Pruning, cutting away dead limbs and the cross branches that show up so clearly in the spring, may be done easily enough by the amateur if he does not permit his pruning shears to become too reckless in cutting extravagance.

A light trimming of the tops to preserve the symmetry may also be done by the tree owner in the spring, providing he has an eye to balance and knows the family characteristics of the tree.

Shearing is (Continued on page 1140)



Late Spring trimming prevents the bleeding of sap in this nursery-grown avenue of maples at Evelyn Smith's Amawalk Nursery, Amawalk, N. Y.



Evergreens, sheared in accordance with their natural form, possess heightened beauty.

# Once He Made STEAM AUTOMOBILES Now—VIOLINS

*Successful in Business, Freelan O. Stanley  
Occupies Himself Wholly with  
His Chosen Art*

By William T. Miller



*Mr. Stanley is never so happy as when at work on one of his violins.*

**I**NVENTOR, promoter and manufacturer by vocation, but by avocation a maker of fine violins—this is the combination which makes the story of Freelan Oscar Stanley one of unusual interest. Few people have been able so happily to balance work and play.

Much is known of Mr. Stanley's steam automobiles, photographic dry plates and X-ray research; but little is known of his violins. Yet the diligence that he has devoted to their making has matched his efforts in the business and professional worlds. In fact, long before dreams of industrial conquest had taken root in his brain, he had conceived and built his first violin.

At the age of ten Mr. Stanley made a child's sized instrument with his own hands, and then, with painstaking thoroughness, taught himself to play. When he was sixteen years old he made two violins, each showing excellent workmanship. One of these he sold for ten dollars—the other he has always kept.

Scion of "Down East Yankee" stock, Freelan O. Stanley and his twin brother, Francis E., were born in Kingsfield, Maine, June 1, 1849. Both attended the Farmington State Normal School after early training in the rural schools. For several years Mr. Stanley was principal of the high school in Columbia, Pennsylvania.

Even as a school teacher his passion for craftsmanship asserted itself. During his spare time he made several violins, which were so admired and commanded such a price in comparison with the salary he was drawing that he was tempted to make a business of his violins. And although he did enter another business after several

years of teaching, the art of violin-making remained his cherished hobby. He returned to his native state of Maine and in the little town of Mechanics Falls began the manufacture of drawing instruments.

Meanwhile, his brother, Francis, had become the leading photographer in Lewiston, Maine, and for his own use had developed a special process photographic dry plate. The destruction by fire of Freelan Stanley's factory in Mechanics Falls brought the brothers together in business. In the early '80's they started manufacturing the Stanley dry plate, and in 1890 they moved their plant to Watertown, Massachusetts. During the next few years, Freelan Stanley spent much time in his laboratory. Notable among his achievements was the focusing of the X-ray, a discovery which made possible practical surgical photography. He organized a

company which produced a complete X-ray outfit selling at \$50.

Later Freelan Stanley and his brother, ever alert to scientific progress, began to experiment with the "horseless carriage." Their first machine was built in the Orient Bicycle Company factory in Waltham and was powered with a two-cylinder double-action steam engine. Their daily experimental trips through the suburban streets in this vehicle brought orders for twenty-five machines before production was started in the Sterling-Elliott plant (where hickory wood bicycles were made). This was next door to the Stanley Photographic plant.

A group of New York capitalists saw the possibilities in the young industry, and headed by J. Brisbane Walker, then editor of the *Cosmopolitan Magazine*, took over the Stanley process and started manufacturing cars in Bridgeport, Connecticut, founding the Locomobile Company of America. The arrangements permitted the Stanley brothers to start manufacturing again after a two-year recess. So in 1902 they built a larger factory in Watertown and began to manufacture a steam-driven automobile—one of the outstanding machines of its type in the world. Freelan Stanley personally drove one of his cars to the summit of Mount Washington—the first man to make the trip in an automobile.

In 1904, Eastman bought the patents and processes for the Stanley dry plate, and during the next dozen years the Stanley brothers devoted themselves to the development of their automobile interests.

After the accidental death  
(Continued on page 1129)

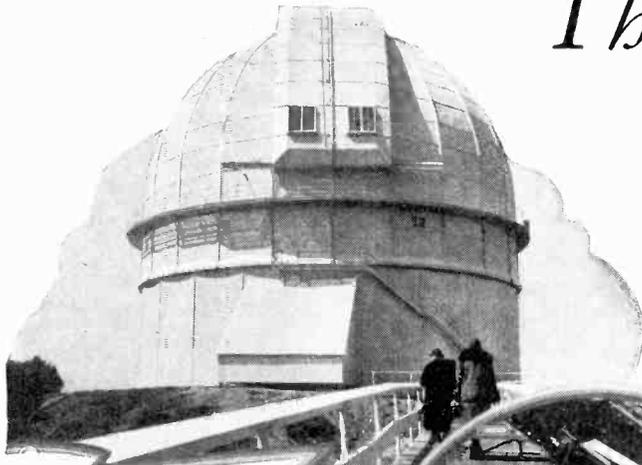


*Years ago, with his brother Francis, Mr. Stanley built his first successful steam car.*

# The Marvelous

## Telescopes Enable Astronomers to

By Joseph

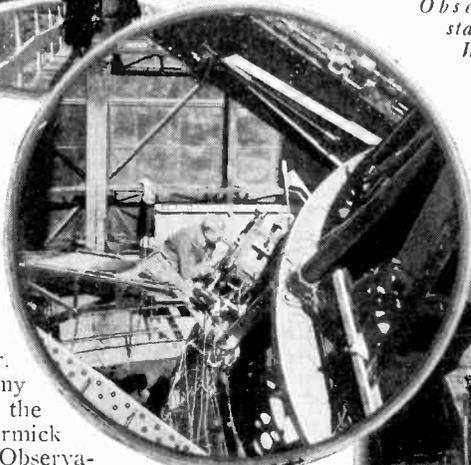


Ewing Galloway  
Exterior view of the Mt. Wilson Observatory, which contains a 100-inch reflector.

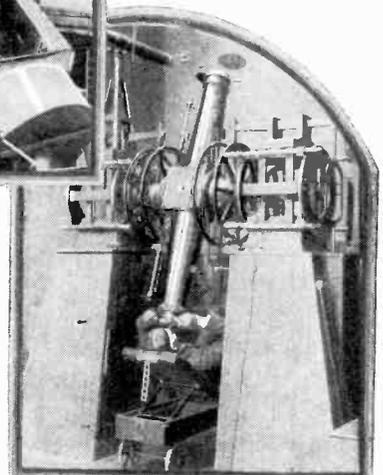
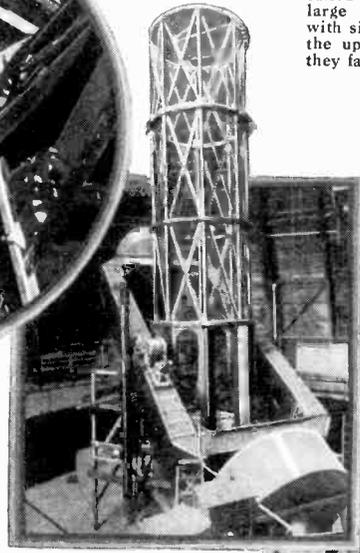
Observing the stars in the Mt. Wilson Observatory.

Did you know that there are two kinds of telescopes—refracting and reflecting? In the first, light passes through a lens which converges the rays to a focus where the image is magnified by a second lens or group of lenses called the eye-piece. In the second, a large concave mirror of glass coated with silver throws the rays back toward the upper end of the telescope, where they fall on the eye-piece.

**DR. SAMUEL ALFRED MITCHELL** was recently honored for his announcement that he had completed measuring the distance to 1000 stars. Dr. Mitchell is Professor of Astronomy at the University of Virginia and the director of the Leander McCormick Observatory. The McCormick Observatory is on top of Mt. Jefferson and this announcement, coming from the famous astronomer, is a great contribution to the science of astronomy. The McCormick Observatory thus leads the world in measuring distances to the stars by the parallax method and is 100 ahead of its nearest competitor, the University of Pittsburgh.



The present world's largest telescope, a 100-inch reflector at Carnegie Institution, Mt. Wilson, California. Below: The most accurate time-piece in the world, where observations are made through a 6-inch transit circle—Naval Observatory, Washington.



In measuring the distances to stars, there is only one direct way of performing the work. This is known as the trigonometric method and consists in taking photographs of the same star from opposite ends of the orbit of the earth as it moves around the sun. This gives the astronomer a known base line from which he can compute the stellar distances. It takes about half an hour to expose the photographic plate. After this has been done with about 20 plates for the same star, the parallax is measured.

By calculation the astronomers are then able to get the distance to the stars they are measuring, not in feet or miles, but in light years. Light travels at the rate of 186,000 miles a second.

The tube of the 40-inch refractor at the University of Chicago is 63 feet long.

Even the boys on the street are interested in astronomy. Here is a typical city sidewalk telescope, where for ten cents one can observe sunspots.



Ewing Galloway

Adjusting the great equatorial at Greenwich Observatory.

Widow of the great astronomer Flammarion.

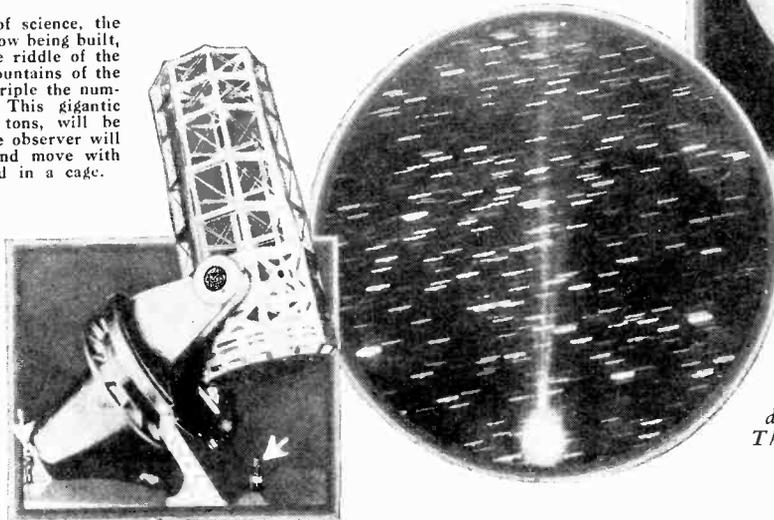
# Eyes of Science

## Measure Distance to 1,000 Stars

H. Kraus

With the newest "eye" of science, the world's greatest telescope now being built, we may expect to solve the riddle of the canals on Mars and the mountains of the moon, and will be able to triple the number of observable stars. This gigantic telescope, weighing 1,600 tons, will be balanced like a watch. The observer will sit inside the structure, and move with the instrument, like a bird in a cage.

The huge new world's telescope now under construction. Arrows point to men shown for comparison. Below, a board fastened to the end of the telescope to record spots of the sun. This is how Father Ricard, of Santa Clara, California, called the "Padre of the Rains," gets his information.

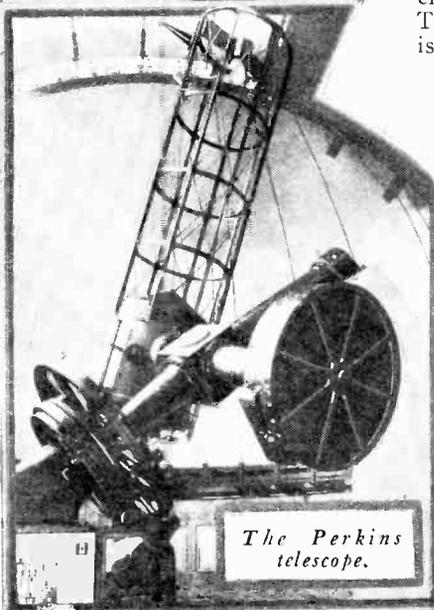
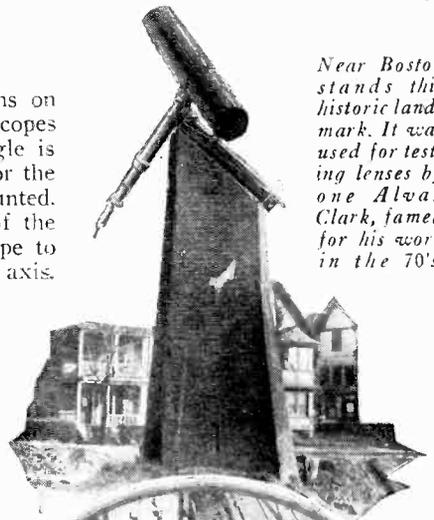
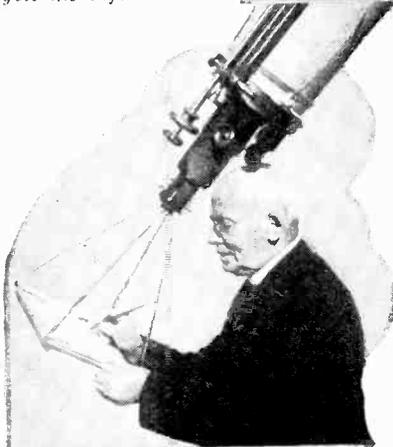


An interesting photograph of the moon. The new telescope will enable us to see moon areas as small as a city block.

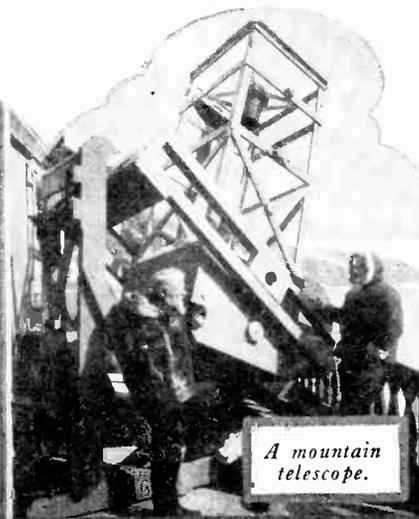
A wanderer of the skies, the comet Wilk. The central beam of this comet is at least a million miles long. The white dashes across the picture are stars. The photograph was taken at the Yerkes Observatory.

IF the reader will look at the illustrations on this page, he will note that all of the telescopes are mounted at a peculiar angle. This angle is called the equatorial, and is predetermined for the position where the telescope is to be mounted. The angle is exactly equal to the latitude of the observer's location. This causes the telescope to be mounted exactly parallel to the earth's axis, and enables the observer to follow the path of any heavenly body with remarkable precision, and without the necessity of manipulating too many controls. In the new gigantic telescope, with a mass of 1,600 tons, the astronomer located in the instrument itself, moves with the telescope. He need merely press a button to swing the entire structure noiselessly back and forth. The cost of the new telescope at Mt. Wilson is estimated at \$12,000,000.

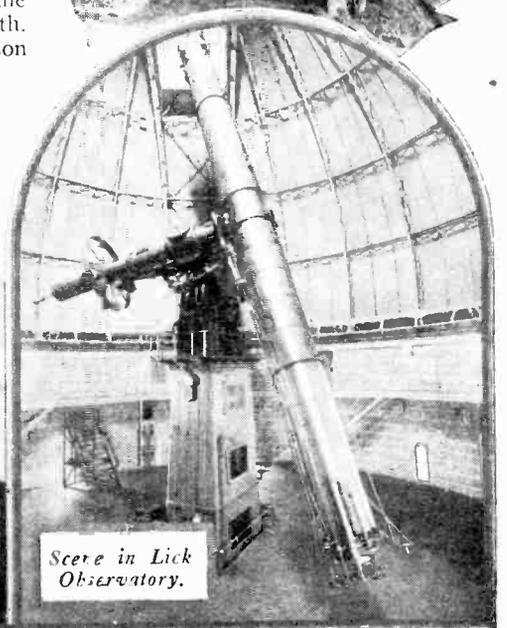
Near Boston stands this historic landmark. It was used for testing lenses by one Alvan Clark, famed for his work in the 70's.



The Perkins telescope.



A mountain telescope.



Scene in Lick Observatory.

# A Great Lake City

## and Its Applied Science



At Wisconsin avenue a bridge raises to permit sizable lake freighters to pass up the Milwaukee River through the heart of the city.

MILWAUKEE has acquired ownership of all the lake frontage within its limits—a great advantage from the standpoint of both scientific development and beauty. One especially modern example of the former: Milwaukee's Maitland Field, an airport municipally owned and operated, is situated on the lake shore only ten blocks from the postoffice and Federal building, instead of in the wilds, as might have been the case had the lake front been in many private hands. . . . Another example—Milwaukee's harbor facilities are developed as and where needed, without the necessity of condemnation and purchase. On the beauty side: Milwaukee devotes all lake shore not needed for commerce to parks, recreation fields, and motor drives.

Within easy motoring distance Milwaukee has three other airports, one owned by the county, one by the Holterhoff Flying Service, and one by Curtiss Flying Service, Inc. . . . Five steam roads, two

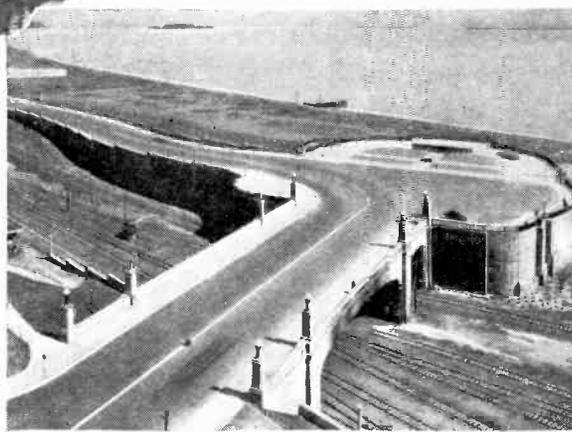
Milwaukee from the air. In the foreground stands an efficient sewage disposal plant, which produces 100 tons of fertilizer daily.



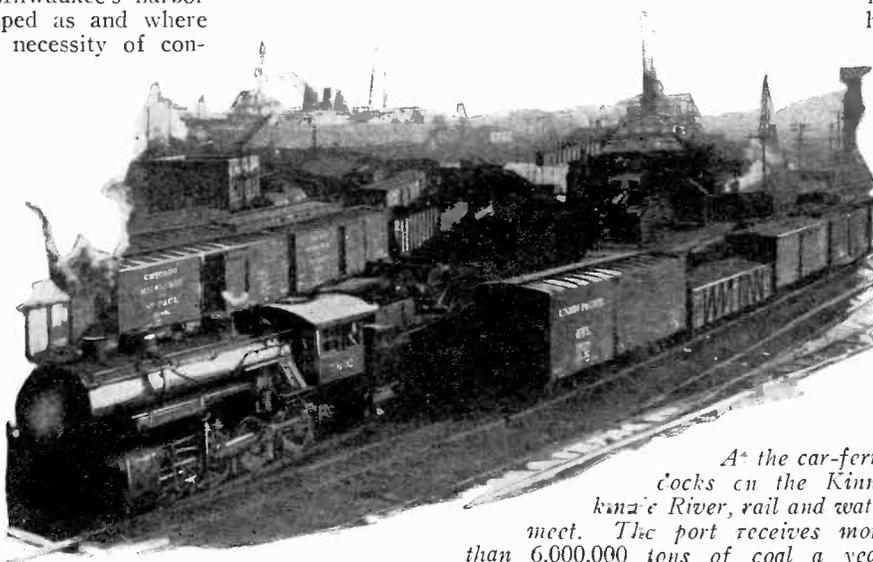
car ferry systems, bus lines, and local and interurban electric lines serve the city's ordinary transportation needs. Nearly 150,000 motor vehicles were registered in the county during last year, and for 1930 the total is likely to be larger.

Generally as well as in its lake shore development Milwaukee is carrying out seriously the task of scientific city planning, and has received much attention from students of municipal affairs on this score. Nor does science stop at the city hall door: Milwaukee has established an amortization fund to wipe out municipal indebtedness, and the efficiency of its civic activities is shown by its high credit rating and its extremely low insurance rates, as also the admittedly high grade of its educational facilities.

Milwaukee's industry scores in both variety and magnitude. . . . It is among the greatest heavy machine construction centers of the world. It builds the largest steam and water turbines for electrical generation. It has produced the largest hydroelectric unit ever attempted. It rates high in the manufacture of flour milling machinery, steam shovels, dredges, cranes and hoists, refrigerating equipment, concrete mixers, tractors, saw-milling (Continued on page 1149)



Lincoln Memorial Bridge connects Juncau Park with a lake shore drive. Between the bridge and the water are public athletic fields.



At the car-ferry docks on the Kinnickinnic River, rail and water meet. The port receives more than 6,000,000 tons of coal a year.

# In the Spotlight of Science

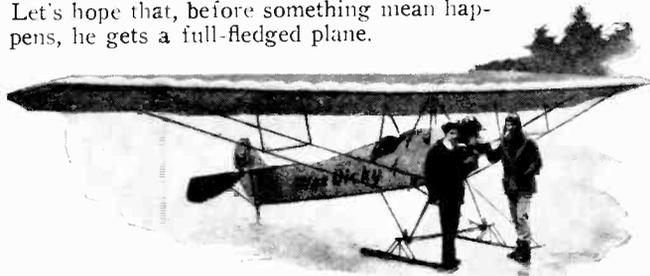


**Red Nose Gives High Sign**

**W**HEN you make an after-dark call at the Milwaukee county airport, a red-nosed high sign tells you that you've arrived. . . . The county has made an installation there of a Zepp-shaped wind cone which serves the double purpose of indicating the field and giving the night flyer the lowdown on the direction of the breeze. The tail of this interesting indicator is white, and the nose, as hinted, is red. Naturally, the cone is illuminated.

**Scrapheap Becomes Snowbird**

**S**TOVE BOLTS and door hinges were the unapproved aids with which Leo Tremblay of Concord, New Hampshire, assembled a plane of his own design. For a power-plant he used a motorcycle engine, and when the job—a parasol monoplane—was finished he mounted it on skis, so that he could take off and land with it on the ice. . . . Concord airport officials admired Leo's achievement to the extent of offering to defray for him the cost of a flying course which would make him a full-fledged pilot. Let's hope that, before something mean happens, he gets a full-fledged plane.

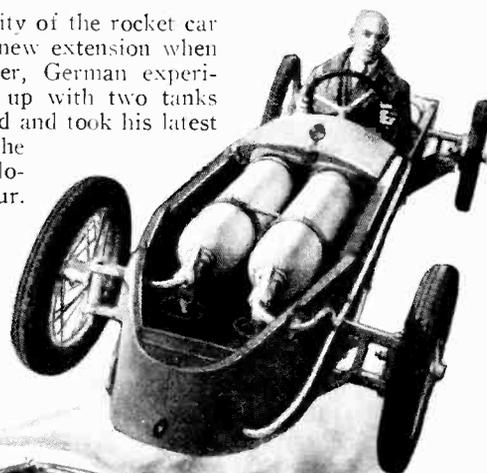


**Thumbs Down on Daydreams!**

**"S**HY and sensitive individuals with a feeling of inferiority very frequently are a type which later break down with dementia praecox," says Dr. K. M. Bowman, who has conducted a four-year study of the subject in the Boston Psychopathic Hospital. According to Dr. Bowman's conclusions, persons who cannot cope with the practical world learn to take refuge in fantastic worlds of their own. The ultimate result is loss of contact with the world of fact.

**Just Charge It at the Soda Fountain**

**T**HE flexibility of the rocket car idea got a new extension when Dr. Max Valier, German experimenter, fueled up with two tanks of carbonic acid and took his latest vehicle down the road at 90 kilometers an hour. . . . Previous experiments by Herr Fritz von Opel,



also a German, had been carried out with rockets charged with explosive—in the ordinary sense of the

word. Later, Herr von Opel, following Dr. Robert Goddard, proposed the use of a liquid propellant, expanded by combustion. Dr. Valier's departure into the field of the non-combustible expanding liquid propellant opens up the interesting possibility of a soda fountain and motor filling station in one. However, it is not an advance but a step backward to the day when hordes of inventors entered the automotive ring with cars propelled by compressed air—all of them quite impractical.

**Not Einstein! He'd Blow a Tube!**

**A**T last we're on our way to detecting brain static, if not to eliminating it. Dr. Milton Metfessel, renowned specialist in speech defects, has made practically perfect a light- or sound-wave mechanism through which cerebral impulses register in the form of photographic designs or amplified sound, depending on the method employed. . . . Contact is made with the tongue of the subject, which offers a sensitive area for the detection of impulses that otherwise would go unnoticed. So now those persons we dislike may have a chance to discover where that rattle comes from . . . or that roaring sound.

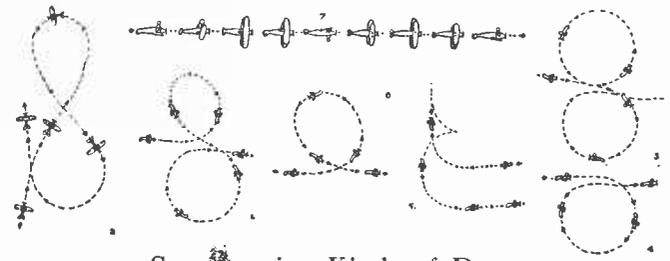


### Champion Flyer Cuts Scroll-Saw Figures in the Sky

AFTER tailspinning 3000 out of a possible 4000 feet with jammed controls, Gerhard Fieseler brought his plane out of it by making a barrel roll with an inverted loop. . . . By accident or intent the camera caught him just as he performed this acrobatic maneuver, and the picture was hailed as the most remarkable ever made in the air. . . . Fieseler is looked on as Germany's finest flyer. In 1929 his remarkable ability won him a medal. In the line drawing are diagrammed figures first flown by him: 1, is an inverted vertical eight; 2, an inverted horizontal eight; 3, a vertical eight; 4, an inverted outside downward loop; 5, a tailslide ending in a half outside downward loop; 6, an inverted upward outside loop; 7, an outside barrel roll. . . . We



Americans have seen plenty of sky-writing, but Pilot Fieseler undoubtedly could show us several new wrinkles in the art. He seems a veritable scroll-saw craftsman of the air. . . . "Wrinkles," you will note, is no exaggerated term when it is applied to the art of stunting as practiced by Gerhard Fieseler. In Figure 5—the tailslide ending in a half-outside loop, he actually does describe an aerial wrinkle, and comes out of it to take a "header" toward the earth. The vertical eight stunt contains no wrinkles, but it makes up for that with its sweeping and precarious curves. Outside loops are simply meat and drink for the German.



### But You Can't Convince a Soprano

IOWA UNIVERSITY makes a bid for new fame for that state by giving to the world the tonascope. When you sing into the horn of this admirable contraption, it registers in graph form the characteristics of your vocal effort. . . . If there are imperfections that can be ironed out, the record guides you in correcting them; and if your effort is simply one big imperfection, it offers you written evidence to that effect. The trouble is that tone-deaf sopranos will invariably be convinced that the neighbors have tampered with the machine. . . . The tonascope should prove an admirable complement to the Metfessel machine for recording the state of one's mind (see previous page). Mental and vocal harmony might be had together.



### Seventy-nine Kinds of Dogs

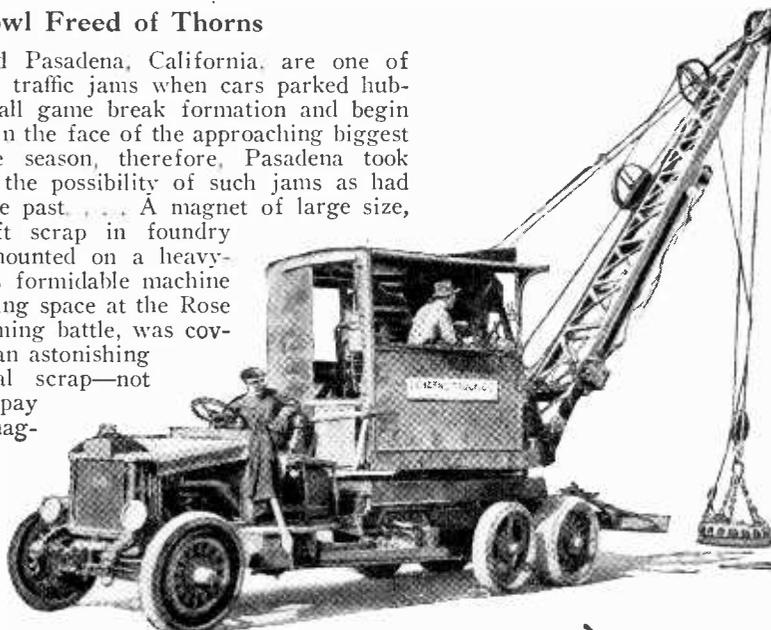
SCIENTISTS in ages to come will be able to view seventy-nine varieties of dogs, as of 1930, when Yale completes the canine museum it has planned. The finest of each distinct breed will be represented, in both skeleton and mounted form. . . . Among those now present are the Black and Tan, Newfoundland and Irish Wolfhounds, Cocker Spaniels, Bulldogs, and Bloodhounds.

### Sodom Uncovered

THE ruins of the ancient and notorious city of Sodom are believed to have been uncovered by an expedition sent into Transjordan by the Pontifical Biblical Institute. Excavations show several tiers of ruins, indicating that the city was destroyed twice. . . . The main section of the city is about 1,965 feet long and 1,310 feet wide. The houses are in a fair state of preservation, and a vast amount of pottery, small animal figures, and bone implements and jewelry has been found in them. Ditches filled with ashes are thought to have been crematoriums. The character of the findings seems to date the city as belonging to the first bronze age. . . . The theory is that the original inhabitants of the city came from Mesopotamia. Sodom once formed one of the five famous cities of Pentapolis, existing before Abraham's time.

### Rose Bowl Freed of Thorns

FLAT tires, decided Pasadena, California, are one of the chief causes of traffic jams when cars parked hub-to-hub during a football game break formation and begin to roll toward home. In the face of the approaching biggest football event of the season, therefore, Pasadena took measures to eliminate the possibility of such jams as had marred big days in the past. . . . A magnet of large size, like those which shift scrap in foundry yards, was secured, mounted on a heavy-duty truck. With this formidable machine every inch of the parking space at the Rose Bowl, scene of the coming battle, was covered. The result was an astonishing accumulation of metal scrap—not enough, probably, to pay the cost of truck and magnet operation, but enough to bring about a vast reduction in the number of tires punctured and the consequent delays in clearing the field of cars.





**A Living World of Toys**

**L**ADISLAS STAREVITCH, Polish film producer, probably has carried the art of toy animation as near to perfection as it will ever get. . . . In the Starevitch film plays, tiny figures, executed with masterly realism, perform impossible feats with extraordinarily convincing effect. The Starevitch casts include animals, imaginary figures, and types taken from life. One of this director's achievements was the production of an entire mediæval talkie satire with toys playing all the rôles. . . . Though Starevitch's complex performances are beyond the reach of the amateur, the home movie maker can achieve interesting results by following the lines suggested by Don Bennett in the March number.

**Under Cover**

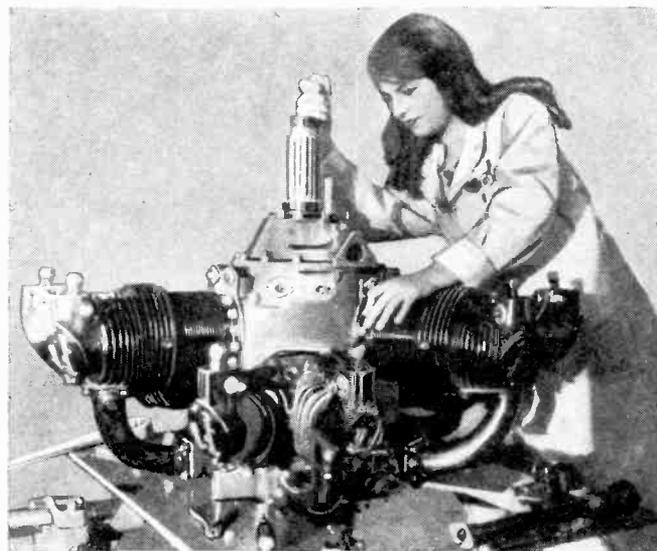
**F**OLDING rainguards for theater patrons are being distributed free in wet weather by a theater group in New York. The new "umbies"—as some unidentified person has



called them—have no ribs, can be carried easily under the arm. . . . And if you leave one somewhere it will be only a paper loss. That alone will amount to a considerable advantage for the average umbrella user.

**She Knows Her Engines**

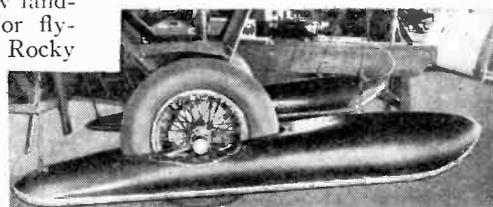
**P**RETTO BELL is the name of the country's youngest aviation student, enrolled at the age of twelve in the Curtiss Flying Service school at Los Angeles. Department of Commerce will not permit Miss Bell to fly until she is fourteen, nor will they grant her a license until she completes her sixteenth year. Nonetheless, she is preparing for the future by intensive work both aloft and on the ground, and her instructors say she will be able soon to handle a plane safely. . . . Miss Bell's bright prospects are typical of those of the very youthful element in aviation throughout the country. Especially in the glider field the progress made by youngsters is amazing. A glider school conducted on the east coast last summer reports that American youth, from seven to fourteen years old inclusive, show a uniform



gift for learning how to manage gliders of the primary and secondary type. And many of them display unmistakable evidence of future proficiency in the power flying field. The next generation to a large extent will be a generation of pilots.

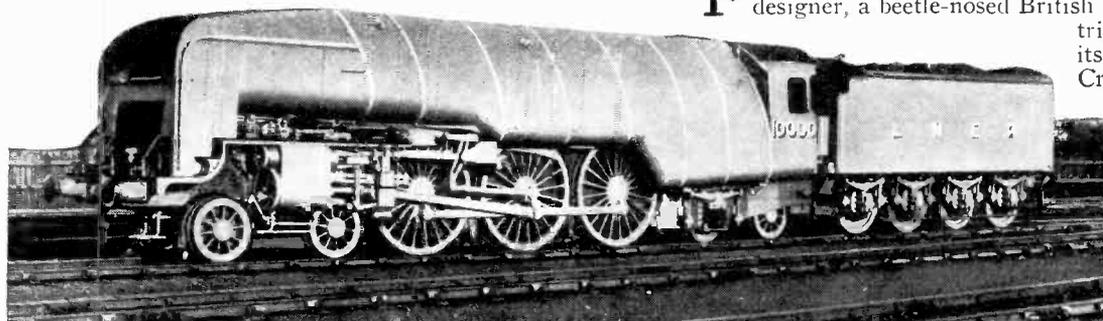
**Slotted Skis for Mail Planes**

**P**ONTOON-LIKE skis, slotted to permit an airplane's wheels to reach through them, have been produced to make deep-snow landings possible for flyers on the Rocky Mountain mail route. The skis are claimed to absorb the landing shock of planes weighing 8¾ tons. . . . Only one possibility now remains to be probed in the landing gear line—that is the three-way combination of skis, pontoons, and wheels. A puzzling combination to name!



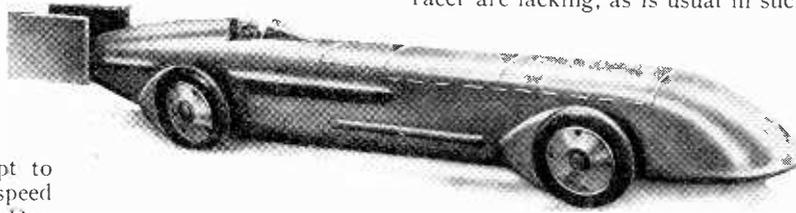
**Hidden in the Milk Yard**

**F**ASTEST engine in the world, in the opinion of its designer, a beetle-nosed British locomotive made its first trial trip at night, and at its destination, King's Cross station, was hidden in the milk yard for an inspection by chiefs of the London and Northeastern Railway. . . . The big locomotive is hooded like a gigantic racing car and is extremely powerful and heavy.



### New Sunbeam Will Burn Up Sand at Daytona

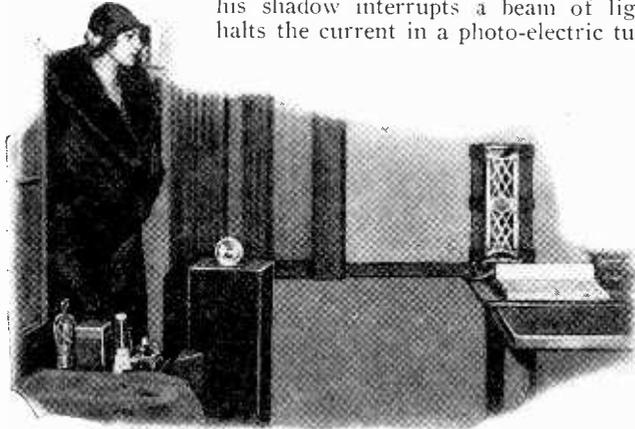
**SIR HENRY SEGRAVE'S** Golden Arrow has a worthy appearing successor in the new Sunbeam built for Kay Don, who will use the car in an attempt to surpass the present land speed record. . . . Details of the Don



racer are lacking, as is usual in such cases, but it is apparent that streamlining has been carried out in the design to a degree somewhat beyond any previous attempt in this direction. The designer is Louis Coatalen.

### Automatic Welcome

**T**HE visitor's welcome at New York's Museum of Peaceful Arts no longer depends for its cheeriness on the mood of a man. As the visitor enters, his shadow interrupts a beam of light, halts the current in a photo-electric tube,



and evokes from a sentinel "thyatron" a jovial greeting. Changing a record equips the thyatron to serve as a watchman, policeman, or even salesman. . . . The actual effect of the light interruption is to change the voltage of the thyatron, and start a synchronous motor. A contractor wheel attached to the motor shaft controls a phonographic record, which automatically stops when the word of greeting—or thanks, or warning—has been completed. According to the Automatic Merchandising Corporation, developer of the new device, the thyatron is to find wide use in conjunction with the delivery of wares from slot machines of the robot type, in the retailing of branded and packaged articles.

### Champion Ocean Dachshund Recuperates

**T**HE giant floating drydock at Southampton is hardly long enough to kennel the lean and massive Bremen, Germany's dachshund entry in the current race for the trans-Atlantic record. The Bremen laid up after its titanic championship efforts and rested in drydock until it was thoroughly overhauled and cleaned. The immense force exerted by the propellers and the corresponding resistance of the seawater resulted in chipped propeller blades, plainly visible in the close-up. . . . The pigmy proportions of the workmen indicated in the general view is a clue to the size of the ocean's fastest ship. Naturally, however, it is the extraordinary length and slimmness of the German champion that count in the race, not the massiveness.



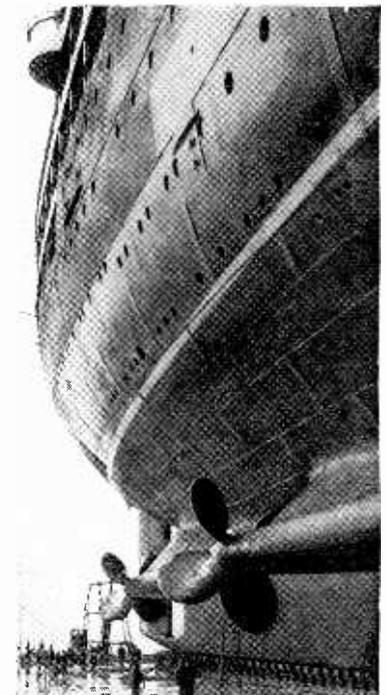
### What's Your Thermal Efficiency?

**E**XHIBITED at the Carnegie Institute at Washington was an apparatus for testing the heat-producing power of the human body and securing general data on the physical condition of patients. . . . The patient's head is encased in a steel and glass helmet, connected with a known quantity of oxygen. The amount of gas consumed has a direct relation to the amount of heat produced by the patient. Equipment now in existence provides means of determining with practical accuracy the efficacy with which nearly every physical process is carried on. With one device produced by Science the efficiency of the patient's metabolic powers can be indexed within very fine limits.

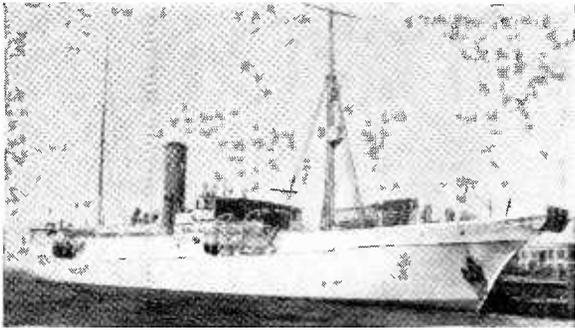


### A Microscopic Jungle

**I**T took Herman C. Meller four years to make the glass-blown model of a single drop of water, magnified a million times, which now is on display at the Museum of Natural History in New York. . . . And perhaps after some of us view Mr. Meller's work, all the health maxims in the world will not drive us to drink H<sub>2</sub>O again. For the model shows the savage rotifer that devours fellow organisms with his pincerlike jaws, and the bladderwort plant which absorbs stray animal matter—not the pleasantest things to imagine as occupants of a glass of cold water.



# Deep Sea Surgeons Mend World's Nerves



The cable ship *Lord Kelvin* was one of the stars of the cable-mending drama.

*Out on the Wintry Ocean the Cable Ships Fish for Cables Snapped by Seaquakes, and Repair Them, so That Trans-Oceanic Communication Can Go On*

LATE last winter a violent seaquake snapped ten of the twenty-one trans-Atlantic cables like threads. Three of the ten Western Union trans-Atlantic cables were silenced.

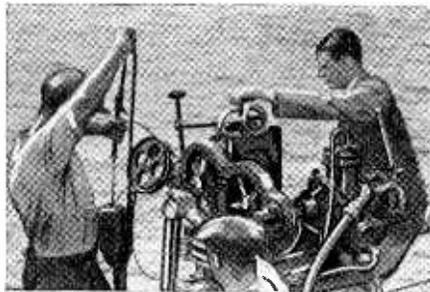
Men, aided by every contrivance known to science, have pitted themselves since that time in an unequal battle to mend those cables, against the violence of the Atlantic.

Each ice-encrusted and battered cable ship returning to port has had a story to tell of heroism in the face of great hardships and danger to be added to the romantic tales of old salts who spin yarns of the exploits of fearless cable crews.

How cable repair work is accomplished in the face of such difficulties may best be illustrated by telling how

as the cables were laid, it was possible for experts to figure the location of each break.

The exact position of each break was wired to a cable ship and the race to



On a special machine the broken cable is made whole again.

the scene began. One of the first to reach its goal was the *Cyrus Field*.

The ship dropped a deep sea cutting grapnel to the ocean bottom and dragged it by a line at right angles to the cable. It picked up the end nearest Bay Roberts, attached it to a large buoy which it left floating at that point, and then steamed away to grapple for the end nearest New York.

Violent storms and other urgent work prevented the *Cyrus Field* from raising the other end. The Western Union Cable Ship *Lord Kelvin*, then working with the *Dominia* to repair the 1924

New York-Azores cable, broken in two places 1060 and 1175 miles due east from New York and three and a half miles below the surface, went to complete the work begun by the *Cyrus Field*.

The *Lord Kelvin* seized upon the first moderate weather to grapple for the cable. It soon picked up a piece of cable, but attempts to signal in each direction proved it to be broken both ways. The ship pulled this piece of cable on board.

"The terrific force of the seaquake was indicated by the condition of the cable," Captain M. H. Bloomer,

of the *Lord Kelvin*, radioed to the company. "The cable was mangled for 1,500 feet from the end," he reported. "Nearly all of the heavy sheathing wires with which the cable is spirally armored were broken and the ends were turned back; the core of the cable was 'squashed' in six-foot sections at frequent intervals."

The *Lord Kelvin* then grappled to the westward and was successful in picking up the end nearest New York the first time the ship passed over the cable. This was due to the fact that the cable had not been buried by the seaquake. The ship then spliced cable to the New York end and laid 100 miles of new cable to the point where the *Cyrus Field* had left the Bay Roberts end attached to the buoy. Because of the stormy weather and low visibility the ship found it necessary to buoy the new cable it was laying until it could locate the *Cyrus Field's* buoy (Continued on page 1139)

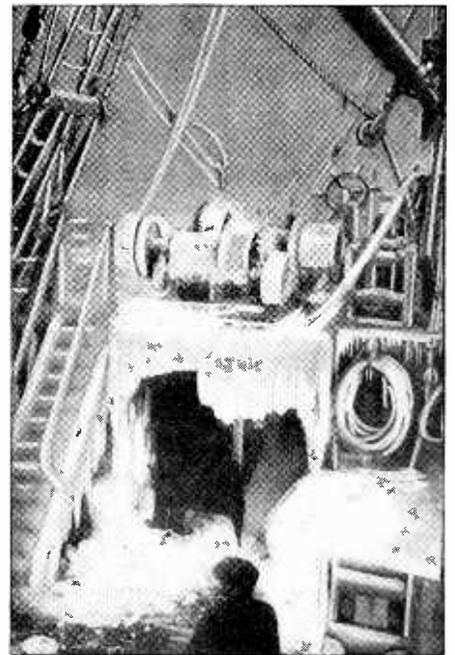


To guide the repair ship, a buoy is lowered with the end of the broken cable attached.

one of these cables was repaired.

The most powerful narrative of this struggle to reach shore thus far is the story of how the Western Union Cable Ships *Cyrus Field* and *Lord Kelvin* mended the high-speed cable laid in 1926 and broken by the seaquake in two places, 956 miles from Hammels, L. I., the New York terminus, and 327 miles from Bay Roberts, N. F.

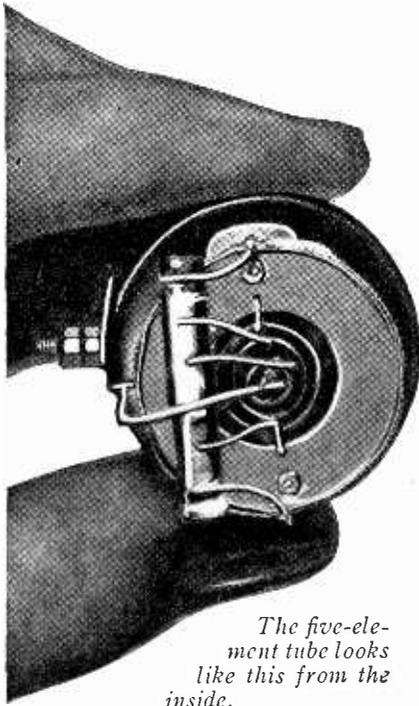
By use of a galvanometer, electrical resistance of the broken cables from shore to shore was measured. Since electrical resistance is in proportion to the length of the conductor and similar tests were made and charted each mile



Like a ghost ship from the icy northern seas, the *Cyrus Field* came home.

# Here Comes the PENTODE

*Another Element Is Added to the Vacuum Tube. An Interesting Development, But the Center of Much Discussion. We Present Both Sides of the Argument by Two Men Who Are Prominent in the Tube Industry*



*The five-element tube looks like this from the inside.*

By Ernest Kauer

President, Ceco Manufacturing Co.

THE public has been asking for receiving sets which do not employ so many tubes. This new development will make it possible to build sets which satisfy that demand. Bringing, as it is bound to do, more simplicity into radio manufacture and receiver operation and maintenance, it will reduce manufacturing cost, material costs, and, costs to the radio public."

The new tube is a sort of double screen-grid, having a screen around the plate, as is the case with the screen-grid of the present; also another screen between the control grid and the cathode. The insertion of the second screen permits a greatly increased amplification three or four times as great as the screen-grid.

Mr. N. O. Williams, Chief Engineer of the Ceco Company, says, in connection with this new tube, "The screen-grid is a very wonderful tube, but the radio industry has not been able to develop a receiving circuit which permits the use of the tube's full efficiency. Nor is such a circuit likely to be developed. There are too many difficulties in the way.

The easier method has been to center research on the development of a newer tube which would make possible the building of a circuit capable of getting out of the tube all the power and

The AC Pentode is a vacuum tube consisting of a standard indirectly-heated cathode, a space-charge grid surrounding the cathode, a control grid, a plate, and a screen-grid. It is designed for either the radio frequency or audio frequency circuits. The new element—the space-charge grid—has a potential of 10 to 20 volts.



*Franklin Snow Huddy, engineer, places the new pentode in a special set.*

valuable attributes inherent in it. This is what we have done in the case of the pentode.

By Lee de Forest

Vice-Pres. De Forest Radio Co.

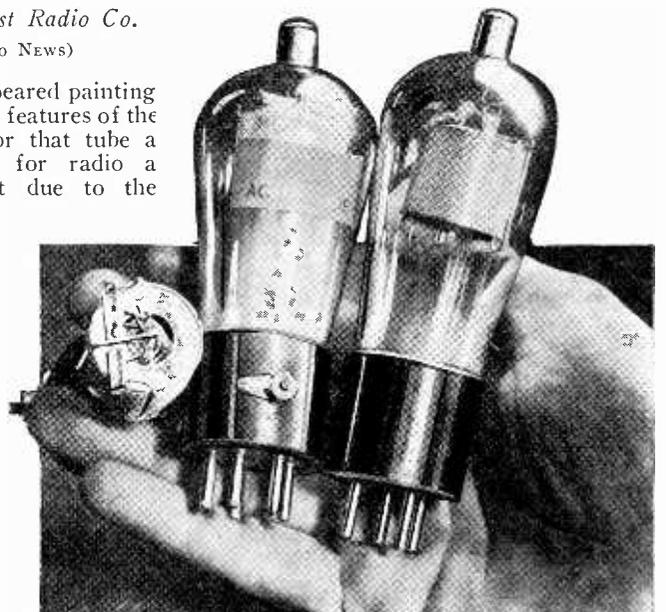
(Courtesy of RADIO NEWS)

Statements have appeared painting in glowing terms of the features of the pentode, predicting for that tube a brilliant future, and for radio a startling improvement due to the latest vacuum tube. My own opinion is that such statements issue for the most part from the press bureaus of manufacturers looking for a new selling point.

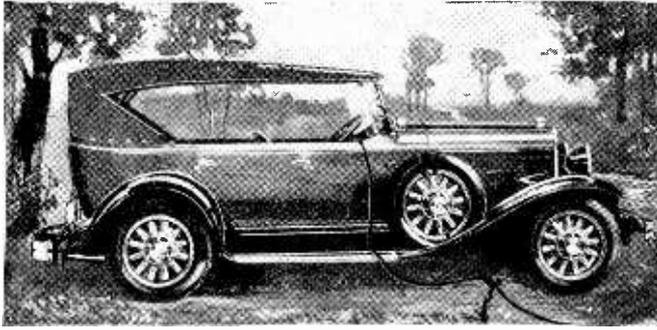
Personally, I have great doubts about the pentode being such a great improvement over the screen-grid tube. True the pentode has great undistorted output and eliminates one stage of radio frequency amplification. But its disadvantages are many.

The great number of broadcasting stations at present on the air, one crowding on top of the other, makes the reduction of tuned circuits, resulting in the use of the pentode, a distinct disadvantage by lessening selectivity. Moreover, the pentode will cost more to manufacture. Although the consumer will have less tubes to buy, he will have to pay more for those he purchases. And if but one element burns out, the entire tube will have to be discarded. Nor is it easy to manufacture the pentode with uniformity. It is a hard tube to handle, and causes the receiver to misbehave. At least these have been the difficulties in the past. Maybe they have been met in one degree or another.

The pentode may find use in one-tube transmitters, but for the present and immediate future I predict that there will be no reason for the public to defer the purchase of new radio receivers.



*The five-element tube differs from the screen-grid tube in appearance. The pentode has a connection through the side of the base for the space-charge grid, besides the usual connections of the screen-grid tube.*



In this snappy Chrysler, a flip of a dashboard switch and the turn of a dial give you radio entertainment.

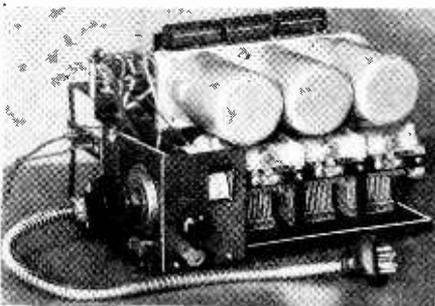
# Radio Rides the Roads

*Tourists Take Heart! Music at Your Fingertips! Receivers May Now Be an Integral Part of Your Car*

By George R. Brown

**Y**OU can picnic and tour with musical accompaniment this summer. You can flip a switch on the dashboard of your car and hear strains of the latest song or the wisecracks of your favorite radio comedian. You can inject a note of gayety into the picnic without the trouble of a wheezy phonograph, if you install the latest radio receiver in your car. No more musicless days and nights; no more winding of phonographs; no more slightly stale ukelele parodies to listen to.

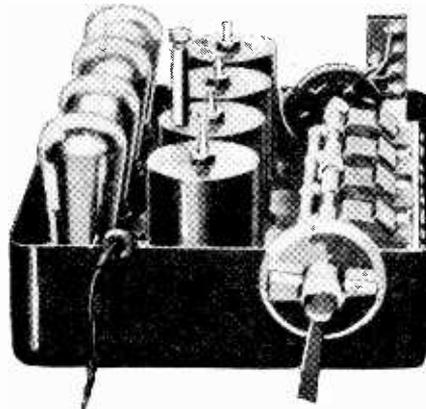
The auto radio receiver is the latest achievement of radio science, and with the new models available you can be assured of good reception. You need not fear the noise from your motor, you need not bother with additional batteries, for all of these sets are designed to cope with the problems of auto radio—they are *not* just radios installed in autos. Ignition troubles, tube noises, and similar head-aches encountered by the radio fan who would install a receiver in his car have all been removed by engineers. Now you merely sling your antenna on the roof of the car, place your set beneath the cowl, connect your battery leads, turn the switch, and there you are—radio riding the roads. Several cars are being manufactured with antennae built into the roofs. Many of them have been made ready for ignition shielding. These include Cadillac, La Salle, Franklin, aChrysler, and Dodge. Several companies are producing receivers which may be installed in *any* car. They are Automobile Radio Co., National Co.,



The National Company offers this set as an example of a compact and efficient auto radio receiver.

Silver-Marshall Co., Delco-Remy Co., and Wireless Egert, Inc.

We do not recommend your installing your present radio in your car. This is not because we are in league with the manufacturers of radio sets but



The Transitone radio is now being installed in many makes of cars.

because we know that it will provide only a constant source of annoyance to the driver. You may have a set which was left behind in your hurry to buy an electric set; don't use it in your auto. It will be too much of a drain on your storage battery. It will be noisy. It will give very poor selectivity. It will break tubes because it is not designed for the constant bouncing which it will experience on the road.

The new sets designed for automobile installation will do everything that your old set will not do. They are practically noiseless. They have good selectivity. Their tubes will not break. They will not drain your car storage battery. They are compact. They assure maximum amplification due to the use of screen-grid tubes. The tubes are subject to less microphonic noises because they are alternating current tubes used in a battery circuit.

There are many problems relative to the efficient operation of auto radios. Not the least important of these is that of proper shielding from ignition and motor interference. There are three systems which have been used to good advantage in this connection. One is the complete shielding of the entire ignition system by cables in metallic housings, with shielded spark plugs applied to the motor. Another is the more simple proposition of including resistances in series with the spark plugs, and one in series with the central contact on the distributor. Another, and perhaps the cheapest and simplest, is the use of a separate storage battery from the car battery.

A second problem is the correct designing of a circuit so as to obtain maximum amplification with the small antenna available. It has been found that two stages of tuned radio frequency, using the screen-grid tubes, provide sufficient signal amplification. This should be followed by a hi-mu detector feeding into a resistance-coupled audio tube, having as a second stage a standard 112 output tube. It has been found that resistance coupling is not only a space-saving factor but also gives a very good reproduction curve.

One of the most important considerations in the installation of an auto radio receiver is that of proper suspension. This is absolutely essential, otherwise broken tubes (*Continued on page 1142*)



You sit beside your campfire and enjoy the music.

# Make a Chemical Nest of Serpents



*Dissolve a drop of mercury in concentrated nitric acid. Use a large flask for dark brown fumes are given off.*

THE cyanogen compounds are peculiar, especially in their relation to the organic and the inorganic fields. The simplest union of carbon and nitrogen gives us (C<sub>2</sub>N<sub>2</sub>) cyanogen, an extremely poisonous gas. This is formed by two cyanide radicals (CN). Cyanogen acts, chemically, like chlorine, thus it unites directly with metals, often with the accompaniment of fire.

The metallic salts of hydrocyanic acid are almost indispensable in the electroplating industry. Here the gold or silver forms a double or complex salt which permits the perfect electroplating of the noble metals on base metals. When silver nitrate is dissolved in water and potassium cyanide solution is added, silver cyanide is formed as a white, curdy precipitate. On further addition of potassium cyanide solution, the precipitate dissolves and forms a complex of potassium silver cyanide.

Probably the most peculiar salt of all is mercuric thiocyanate, an insoluble powder which, on ignition, forms one of the most voluminous ashes. Dried pellets of this material are known as Pharaoh's serpents and these, when lighted, burn slowly producing long curled snake-like tubes of ash.

Dissolve mercury in nitric acid to



*You can detect nitrogenous material in a compound with the aid of metallic sodium.*

*Filtering off the precipitate of mercuric thiocyanate.*



*After the precipitate is formed, mix it with some gum arabic, and then form into pellets.*

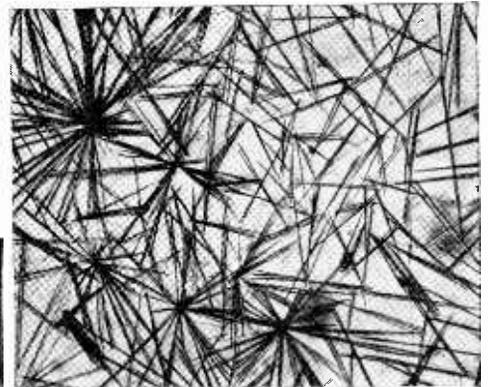
*These pellets may be ignited after they are dry. They will yield a voluminous ash in the form of a writhing serpent.*

make mercuric nitrate. In the meanwhile make a solution of sulfocyanide of ammonium by taking 10 cc of carbon bisulphide, 40 cc of concentrated ammonia and 40 cc of alcohol (denatured) and mixing. At first the mixture will be milky. Then it will turn to yellow,

## You Can Conjure "Snakes" From a Simple Cyanogen Compound

By Dr. E. Bade

change to orange and finally to red. When all of the carbon bisulphide has been dissolved, which takes about two hours, place in a beaker and boil gently in a water bath until the red color has disappeared. Then evaporate, still on the water bath to the point of crystallization. Then pour the liquid slowly and in small portions into the mercuric nitrate solution. Collect the resulting precipitate and wash once or twice with a



*Needles of mercury fulminate enlarged fifty times.*

little water. Then dry. Take the dry powder and mix with a little gum arabic or better, gum tragacanth, and mold into pellets or small cones. Dry on a piece of glass and when dry they may be ignited. But take care not to inhale the vapors.

Quite a number of the more complex metallic cyanides form very interesting salts with unique properties. Mercury fulminate is such a product. It is prepared by warming a solution of mercuric nitrate with alcohol. After the brown fumes have been developed, the salt is obtained as silky needles. Or it may be made by dissolving one gram of mercury, placed in a large flask, with 9 cc of concentrated nitric acid. Then, after cooling, 6 cc of alcohol, 90 percent in strength, is added. After shaking, 6 cc of alcohol (Continued on page 1134)

# Dancing Down the Centuries

*Loved by Lowly and Great, the Puppets  
Play on . . . Here You Learn How to Make  
and Manage Them*

By Jo La Spina

**D**O YOU like puppets and puppet plays? . . . If you do, you share an emotion that links you to children, to simple peasants, and to the greatest minds of the world. For the greatest minds no less than the country folk of Italy have found delight in the antics of the eternal—and universal—marionette.

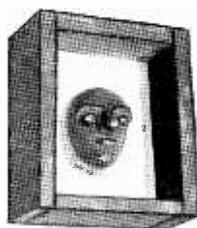
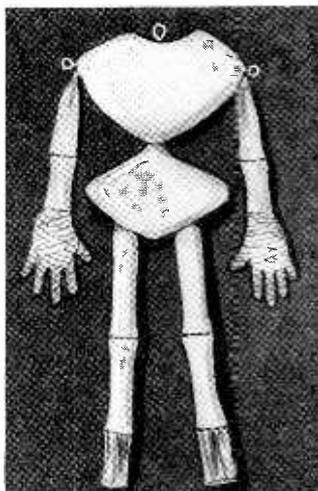
Perhaps your acquaintance with puppets has been gotten through Tony Sarg or Jean Gros, the most renowned manipulators of marionettes in America. Each year the roadshows of these puppet masters circulate through the East and Middle West, playing repertoires which are often elaborate and which nevertheless are performed without the slightest hitch. The marionettes, with their ventriloquial voices and jerky movements, have a fascination peculiar to themselves, and a realism quite as convincing in its way as that achieved by talented human actors.

Or perhaps you have happened upon the puppet shows which thrive in the Italian quarters of large American cities. The Italians are tireless in their devotion to the puppet play, and pursue it in their adopted land with the same ardor they display in Italy. Often their shows are simply improvised by the puppet masters as they go along, but sometimes they follow an established pattern of intricate type. . . . Some of you may even have seen puppet shows conducted by the author, though the likelihood of this is limited by the fact that he is still young and not as widely known as several other puppet masters. However, he has spent a good share of his life thus far in fashioning puppets and manipulating them for the entertain-

ment of others. In the process he has gained considerable enjoyment for himself, and he believes that you will find it enjoyable too.

Making a puppet is a rather easy and very interesting task. The author will describe its essentials to you.

It is a simple matter to get some plasterline clay—a variety which never



*The head is cast from plaster. The body is constructed in one of the two ways illustrated.*



*The puppet master controls most of his actors' movements from one hand. This is Jo La Spina himself, who shows you the details of the multiple control on the continuation page.*

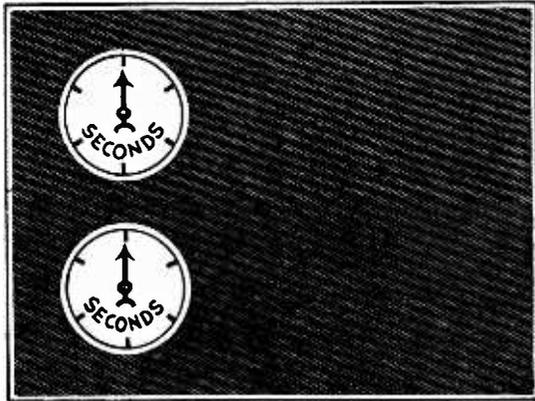
hardens. This is usually sold in art stores and large department stores. You model the puppet's head with this clay. Make the indentations for the eyes, and lips, shape the ears and nose, and fashion the shape of the head. When this is completed

place the head in a wooden box with the back of the head to the bottom of the box. Leave an inch around the head, and fill the box with plaster of paris. When this becomes hard, brush some vaseline along the hardened plaster. Mix another quantity of plaster and cover the entire face which is exposed.

Within an hour, break open the box and the cast will split in the center. After taking the soft clay away, you will have two halves of a mould. Next get some newspaper and cut into strips of an inch or two square. Place them in a pan of warm water until well soaked. Mix some white paste with water until a creamy consistency is reached. Then place each strip of paper in the dry mould, until seven or eight layers have been built up. Spread a layer of paste over each strip of paper, except the first layer. Place (Continued on page 1136)



# When Speed Makes Time "Run Slow"



Viewed from either of the planets on which they stand, the clocks in this diagram appear to agree; the planets are traveling at equal speed. (From the Einstein Relativity Film.)

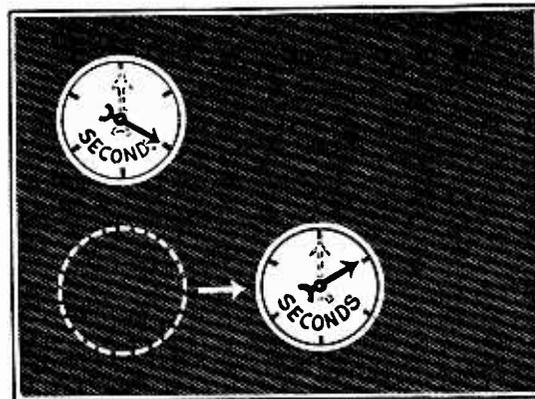
**L**AYMAN—You have emphasized again and again that all motion is relative. Instead of adopting your viewpoint, why not climb into the aviator's carriage and watch the earth fly past in the other direction at 161,000 miles a second? If, as you say his watch is slow, he then could see that ours is running fast, and if he is smaller, we of course should appear larger. Consequently, he could prove that it is himself—not the earth—that is moving. Is this not a refutation of relativity?

**Relativist**—It would be indeed, if what you say is true. But note that I said his clocks *appear to be*, not *are*, running slower. The curious point of the matter is that he, on looking at my watch, will infer that it is running at half speed, compared to his own. And we appear contracted.

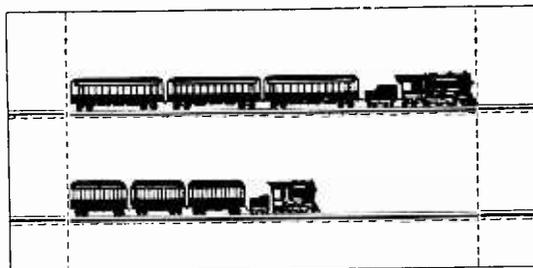
**L.**—That seems a very curious paradox. If you and I compare watches, how can they both be slow with respect to each other? How can we both seem smaller to each other?

**R.**—If you and I are both standing on the same platform, whether it is moving or not, there is no distortion. But if

light is not transmitted instantaneously. You are unconscious of any distortion because all of your standards of length and time have suffered similarly. From your point of view, then, the distortion is only an illusion of mine that arises from my viewing your rapid motion



When one of the planets hurtles past the other at high speed, its clock, viewed from the other planet, seems to run at a slower rate. (Einstein Relativity Film.)



To a stationary observer objects moving at sufficient speed appear shortened. (Einstein Relativity Film.)

you are shooting past me at 161,000 miles a second that is a different matter. I cannot see you as you really are, partly because of your speed and partly because

across the intervening space. In view of these facts it is not particularly surprising that I shall seem similarly distorted to you. It is much as though we were looking not at each other, but at each other's images in one of those warped mirrors always to be found in an amusement palace. If you appear shorter than you really are, that is no reason for supposing that I shall appear taller to you.

**Physicist**—Why does the velocity 161,000 miles a second figure so prominently in your statements?

**R.**—Only because the distortion is exactly half for that speed. I chose it for

the purpose of a simplified illustration.

**L.**—Would not a fast moving automobile experience such a contraction?

**R.**—Of course. But for the familiar velocities, the contraction is extremely small. An airplane racing at 400 miles an hour will be shortened by a ten billionth of an inch—about a hundredth of the diameter of an atom. While the aviator's clocks run slower, more than 100,000 years would have to elapse before they would be slow by so little as a single second.

**L.**—Then why do you make so much fuss about a trifle?

**R.**—When we come to the speeds of the planets and stars, the effect is just appreciable. Where Newton's laws predict no distortion, we find distortion, and it seems to conform to Einstein's laws. There is another point, too, where there is a difference.

With the spectroscope we can measure the velocities of stars and groups of stars. Individual stars, in our Milky Way system, appear to be

moving with speeds anywhere from 6.8 up to 20 miles a second. Of course, some are moving more slowly and some more rapidly than these figures, but the range of velocity is not great.

It is rather difficult to measure the speeds of the spiral nebulae, clusters of millions, perhaps billions, of stars; they are so faint and so far away—a million and more light-years distant. Sometimes it is necessary to take a "time exposure" of some forty hours' duration, in order to get a properly exposed plate, even when the light gathering power of the great Mount Wilson 100-inch telescope is employed. But the difficulties have been and are being surmounted. The velocities of a number of spirals are now known with considerable accuracy. They range (Continued on page 1135)

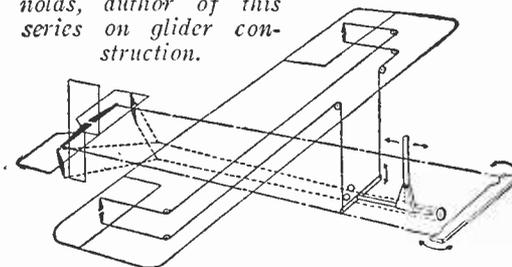
# One More Step to the Take-Off



Lieutenant H. A. Reynolds, author of this series on glider construction.

Here the Author Covers the Controls and Launching Hook Stage in the Construction of SCIENCE AND INVENTION'S Primary Training Glider; the Fourth Article Covers the Finishing Touches

By Lieutenant H. A. Reynolds  
Syracuse, N. Y., Glider Club



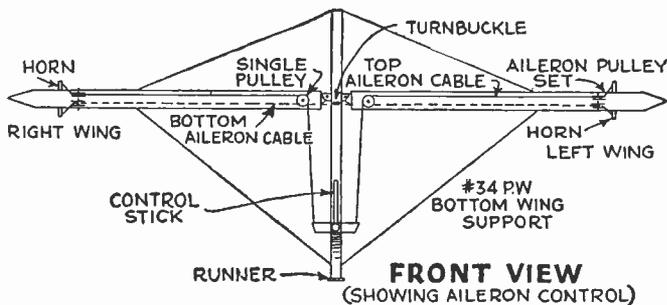
CABLE CONTROL DIAGRAM

THE control stick assembly is constructed next, and the original all-metal assembly presented by Mr. Northrup, in the July, 1929, issue of SCIENCE AND INVENTION, is the strongest and most economical one for our purpose. It comprises two seamless steel tubes connected by metal yoke. All metal parts for this unit can be fashioned at home. If it is convenient the control stick yoke and elevator sheave yoke can be welded in position on the horizontal tube by a professional welder. The aileron lever which is slipped over the rear end of the horizontal tube can also be welded in place at this time. This is done in up-to-date auto-repair shops at low cost and is very strong when correctly done. If it is not possible to weld them, the connections may be riveted through the rivet hole positions shown in the drawing. Great care is necessary in securing the yokes and aileron lever to eliminate all possible play between them and the horizontal tube which might result in lost motion in the control of the glider.

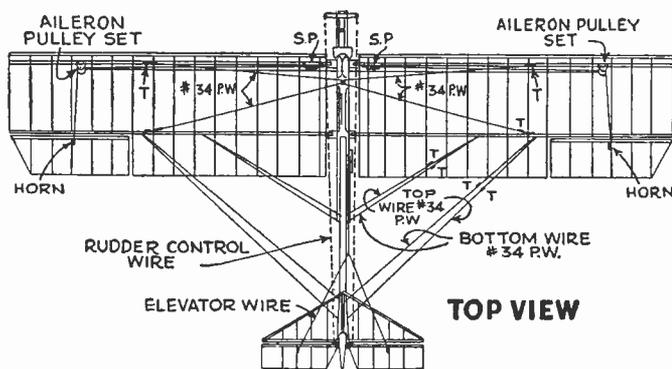
Connecting the flexible elevator control cable to the pointed lower end of the control stick has presented quite a problem. But the control stick connection link offers an easy solution. Make one link of No. 10 carbon steel to the dimensions shown in the drawing. The 13/64" hole in the center is for connection to the control stick and the 1/4" rivet in the fork at each end is for the flexible elevator control cable attachments.

### Launching Hook

THE launching hook is made of No. 10 carbon steel as shown in the launch-



FRONT VIEW (SHOWING AILERON CONTROL)



TOP VIEW

ing hook drawing. Make a paper pattern of the side view and lay it on the metal. The two sides cut to this pattern can be riveted securely with 1/4" rivets at the hook section. It is a good plan to make both sides of this fitting double, for if the hook fitting should bend and let the ring on the rubber launching rope slip off, a serious accident to the ground crew might result. The writer had one

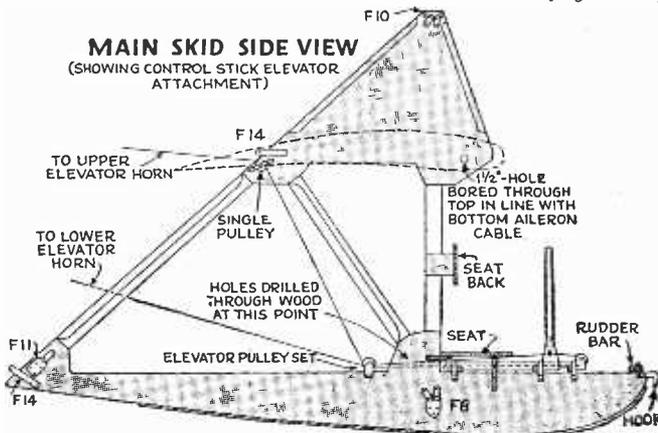
launching hook bend in this manner. Fortunately the metal ring flew clear of the prostrate ground crew, who, nevertheless, piled up like ten pins.

The seat, seat back and seat brackets are cut and sanded to the dimensions specified in the drawings. The seat assembly and seat back are the last

units to be installed on the glider, so after giving them a good coat of varnish they may be temporarily laid aside. Do not attempt to put them on at this time as their exact position is not yet determined.

### Elevator Control Pulleys

ONE set of elevator control pulleys are made with No. 14 carbon steel sides and two free rolling aluminum pulleys. These are bolted to the top of the runner on the main skid section about three or four inches back of the plywood covered strut ends. Then the control stick assembly can be set in position and with a (Continued on page 1145)

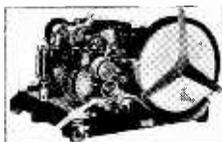


# The way I see it—

By Murray Godwin

## Late Springs Banished

**W**ITHIN the next few months the familiar glass-domed stock ticker will be replaced throughout the country by a new quotation printer having twice the speed of the old. Already the work of replacement is well advanced. . . .



In the old ticker a separate wire supplies impulses which continually rewind a clock spring that serves as the power-plant, while selective and printing signals come in over a wire of their own. The new job will be operated by a motor drawing current from a local source, and the single wire to the ticker itself will carry signals only. Speed in the old ticker was limited by the fact that it performed the functions of selecting and printing in succession; the new ticker simultaneously prints one character and selects the one to follow—it has a new and thrilling bit of information in storage all the time. The number of impulses needed to print a character is reduced from sixteen to eight by the new machine, and its speed-increasing factors make possible a printing rate of 500 characters per minute, as against the former rate of 200-odd. . . . Three years of experiment by Western Union and other engineers were necessary to bring the ticker into tune with turnover as financial circles know it today.

## Come, River, Milk the Cow

**A**LWAYS strong for giants and for fairies who do people's work for them, the Irish at last—with the aid of a German wizard—have found giant and fairy both in the waters of the Shannon. . . . After centuries of doing nothing more arduous than inspiring ballad makers, the old river



is soon to enter on a period of use and romance that will make it pre-eminently the river of all Ireland. Six 30,000 kw. generators in the Siemens-Shuckert powerhouse will develop current to light huts in Sligo and churn butter in Kerry and Louthe. In many a cottage electric light will supersede tallow candles. In many a household, current from the Shannon hydrostation will wash clothes which previously were washed in the Shannon itself. . . . Here is as much magic, surely, as any Irish story-teller ever dreamed of, and it covers far more territory in its effects.

## The Bird on Lizzie's Roof

**T**HE idea of launching planes from speeding carriages, discussed a few months ago in *SCIENCE AND INVENTION*, has been worked out with such simple means as a motor car equipped with a roof platform, at Old Orchard Beach in Maine. Chocks prevented the wheels



of the plane (a Moth) from rolling; the tail skid rested on a frame extending from the rear of the car. As the driver of the car increased his speed, the pilot of the plane opened up his throttle. When the car hit 52 m.p.h., the pilot removed the chocks by pulling a trigger control, gave her the gun, and took off so easily and smoothly that the operator of the motor car was not aware of the fact. Aviation men, impressed by the low speed necessary for the take-off, see in the near future thousands of small plane owners freed to a great extent from the inconveniences attending the use of regular flying fields. . . . As a promising ground flyer, I confidently predict that automatic chocks and extension tail-skid rests will be listed as available equipment for next year's Ford—at least in the closed models. The year after that you will be thrilled, in the course of a suburban drive, by having a small boy shout at you, "Hey, Mister, there's a sport plane on your roof!" For by that time enterprising pilots will be landing their ships on motor cars also.

## To the Ostrich Goes the Plume

**S**CIENCE, of a very crude and applied sort, has discovered why the ostrich hides its head in the sand. It seems that all these years the silly bird has been aching to give the world the horse laugh and has taken this means of concealing it until it could loose an outburst that would shake the world. . . . Now the laugh is out, and it's a world-shaker sure enough. Just when the market for diamonds was getting into desperate shape, the gizzards of African ostriches began to reveal themselves as repositories of an abundance of these once precious stones. Evidently the birds had developed a knowledge of the excellent grinding qualities of diamonds, and have made a point of using them wherever they are to be found. . . . As if this were not sufficient, prospectors—perhaps guided by the ostriches—have found a new diamond field in the Transvaal, where the stones are described as being "as plentiful as pebbles" and as lying practically on the surface of the soil. Thus catastrophe has come to the diamond industry, over which wars have been fought and on which vast fortunes have been built. Despite government restrictions on marketing the stones, the new sources are bound to swell the supply to enormous proportions, and the consequence will be a swift drop in diamond values everywhere. . . . So keep your eye on Woolworth's.



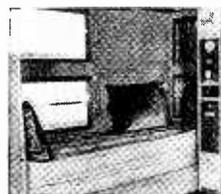
## Darkness and Tossing Horns

**A**FTER sitting in on a seance at the Hotel Governor Clinton while Medium Frank Decker contested for the *SCIENCE AND INVENTION* \$21,000 spiritism prize, I came to the conclusion that Joseph Dunninger probably produced his end of the phenomena by supernatural means. Mr. Decker, who had a grapevine twist on Mr. Dunninger during the latter's performance, went on record to the same effect. As champion of Science against Spirits, Mr. Dunninger declared he makes use of physical means only, of course, but I prefer to judge by what I observed in the darkness, amid the tossing horns. . . . It's fun being arbitrary, anyway, and there is no use of becoming an editor if you don't exercise your right to be arbitrary whenever you get a chance. . . . Not that I feel very keenly about the existence or non-existence of spirits with a yen for horn tossing. The fact is, I am a slow-witted creature, and things on this side of the Beyond are still a good deal of a puzzle to me. I feel that I must understand considerably more about this world before giving the Spirits a turn.

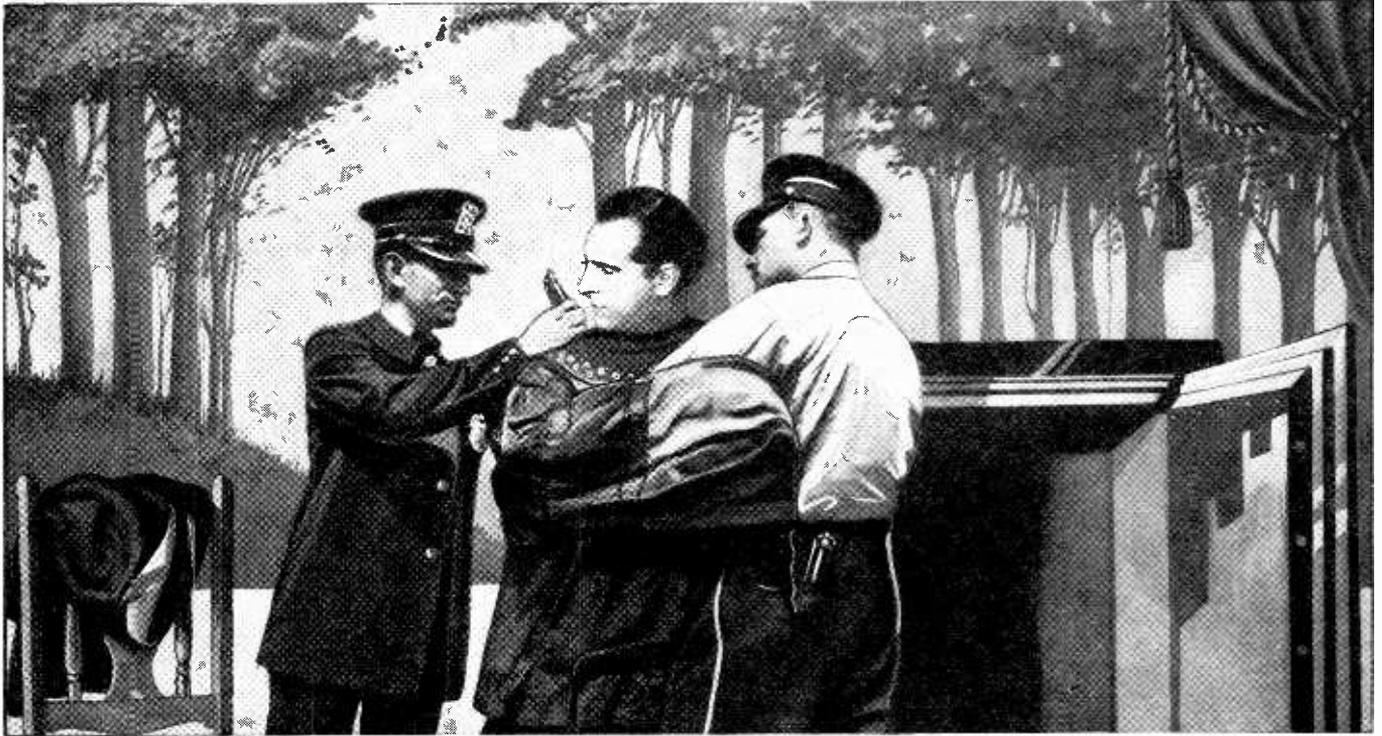


## Accordion-Plated Luxury

**C**RSS-CONTINENTAL highway vehicles have certainly come a great way since the Forty-niners ambled across the plains. The 1930 style of caravan coach has running water, electric lights, and imperially upholstered lounges which are convertible into luxurious beds. When you pull out of the road for a spell of sleeping, eating and loafing, you extend the width of your rolling palace simply by letting out a few pleats in the accordion sides. This gives you an apartment as wide as a railway coach for your hours of ease. . . . The supremely appropriate name for a coach of this type, naturally, is the *Concertina*. That is what I intend to call mine.



# When the Fates Fooled Dunninger



By  
Dunninger

*Tricksters Who Constantly Toy With Fate Sometimes Find That Fate Plays Pranks on Them. In This Story by Dunninger About His Own Experiences, Dunninger Leaves the Only Two Tools Necessary for Opening a Safe From the Inside, a Screw-driver and a Flashlight, in His Coat Pocket; Then Has Himself Locked in the Safe Without His Coat. With the Supply of Oxygen Failing . . . Read What Happens.*

TO anyone who wishes to succeed as a magician I give the same advice . . . practice and study, then practice again. Some take the advice; others do not. For the fact remains that to reach the top in magic, mind reading or kindred arts, one must give the best there is in him. He must aim to be original, if not in the experiments selected, at least in the presentation of them. If you are a patter magician, be sure of the type of patter you use. Don't rewrite or copy the other fellow's material. Have patter especially written around your tricks. It costs very little proportionately, and the results are well worth the expense. But to get to my experiences.

Many years ago I purchased the entire stock of magic from the Crest Trading Company and circulated extensively throughout the world. For months I was deluged with orders for magical apparatus and tricks. I was surprised at the vast number of people interested in magic. I employed quite a staff filling and mailing out orders. Among the orders received were some that afforded me many laughs.

For instance, one fellow in South America sent in an order for what is

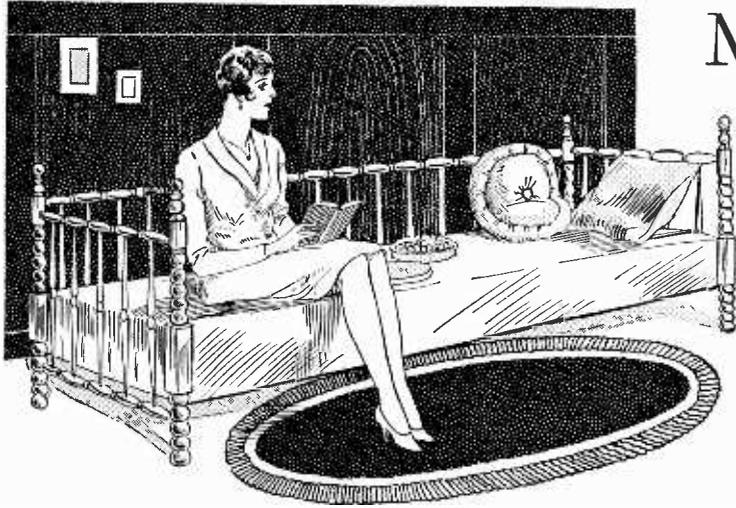
known to magicians as a pigeon pan. The effect in brief to an audience is a highly nicked pan, something on the order of a chafing dish, placed on a table into which several eggs are broken. These are then seasoned with salt and pepper. These ingredients are mixed together and a cover placed on the pan. A few magic words, or a revolver is fired, and when the cover of the pan is removed, live pigeons fly out of it.

The effect is startling and sure-fire. Well, to get back to my story . . . the fellow who ordered it immediately wrote me that he received the pan and was pleased with it, but the pigeons had not, as yet, arrived. Naturally, no pigeons are included with the trick, as a pair can easily be procured anywhere. Feeling in a jesting mood, I answered the would-be magician's letter and told him that I had sent the pigeons out to him through my window, with his name and address tied around their necks, but due to the storms, perhaps, the pigeons had sought shelter and would eventually arrive. Some weeks later the fellow wrote back informing me that although he had slept for several weeks with his windows wide open the pigeons hadn't put in their appearance.

Another order came for a production bowl to produce candy. The customer wrote that he only wanted a bowl that would produce, by magical means, creamed chocolates, as his sweetheart preferred that kind of candy. He also wanted to know if I would guarantee the quality of the candy the bowl would magically produce!

The levitation of a woman in mid-air was also advertised in my list and a South American, who had fallen in love with the Goddess of Magic, sent an international money order for the effect, explaining that when I sent the apparatus I should be sure to send along a blonde woman with the outfit because he claimed that blondes were more to the liking of the people of his country!

Just before I closed out the entire stock I received a long letter from a woman who wrote she was poor but honest, and although she couldn't afford to purchase, for cash, a money-catching wand which I had advertised, she would send me letters of reference if I sent her the wand and she would in return forward me one-half of all the money she could catch. She also asked how many half dollars she would be able to (Continued on page 1159)



# Make an Attractive DAY BED for Your Home

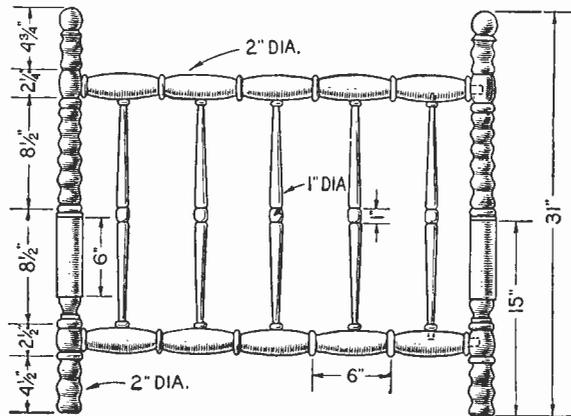
By H. L. Weatherby

“W E’D love to have you stay over — but there isn’t room.”

How often have you said this? Why not *make* room? A studio or day-bed will fit into almost any room of the house, and can be made to harmonize with the general tone of furnishings or decorations. For sleeping accommodations in the informal living-room, you can add a back, some deep, decorative cushions, and you have a davenport or settee. In the library, den or studio, for waking hours you have an inviting lounge for reading. For the regular bedroom, you can make a single bed, or twin beds for daily use.

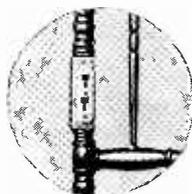
With only a fair knowledge of turning and general woodworking the amateur mechanic can make a studio or day-bed that will require no apology.

Two different designs are furnished. The one having considerable more turning is a little more difficult to assemble, and

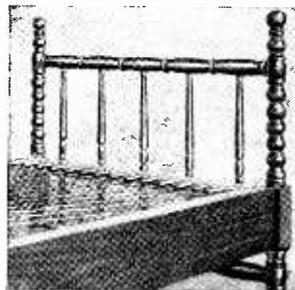


of course calls for more lathe work. It is fashioned after the old-fashioned spool beds of our grandparents’ time, that are so popular now; and will look well in any part of the house. Detail dimensions are not furnished in either case, because it was felt that they were not needed. The other design fits into the bedroom better than any other part of the house, perhaps; but with a colorful spread and bright cushions it is most inviting wherever it may be placed and its use is obvious.

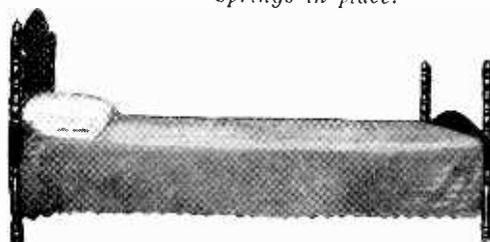
Before beginning construction of either, it would be well to secure springs. Often there is an old folding cot, with a good set of springs, around the house that has outlived its usefulness. A steel army cot with good springs may be secured from an army supply store, or springs for a single bed may be purchased from the furni-



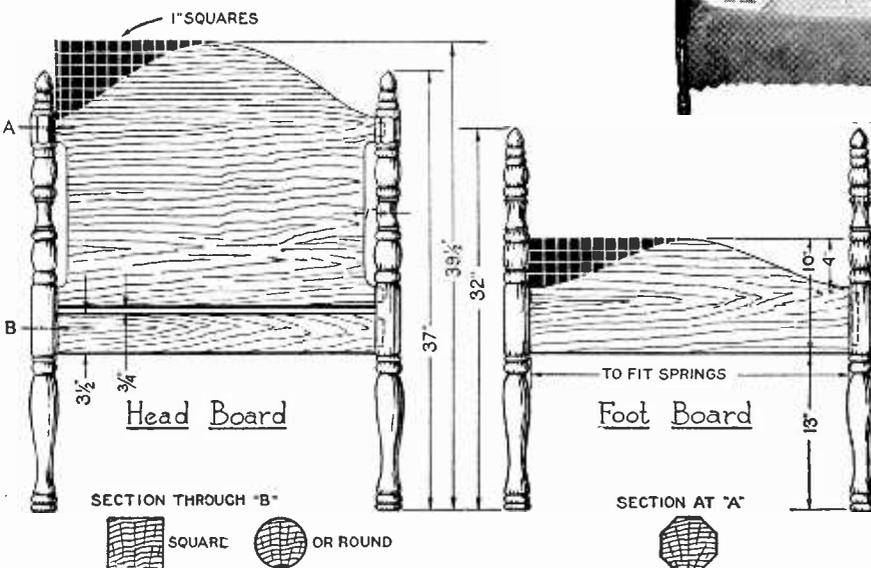
Sockets for holding the bed rails of the day-bed are placed on the vertical posts. The spool-type bed, completely assembled, is shown above.



Four blocks are placed on the bed rails to hold the springs in place.



Here is the completely assembled day-bed, made up, inviting one to a comfortable rest.



ture stores. In case a cot is used, the legs must be removed, leaving only the springs attached to the frame. The width of the bed will of course depend upon the size of the springs secured and construction may go ahead from this point.

The four posts should be turned first. In case the lathe is not long enough to accommodate these full length, they may be turned in two sections and glued together. Round tenons, and holes bored for mortises, will give the best results. This same method will have to be used in case a long back rail is used; constructing it in two, three, or more sections, and great care must be taken to keep it (Continued on page 1136)

# From Old Lancaster Come These Suggestions for Tea Table and Foot Stool

THE table sketched at Fig. 1 may be made without much labor or expense, and would prove to be one of the most serviceable of the lighter pieces of furniture which could be provided for the home.

It is equally useful for serving afternoon tea, supper by the fireside, or tea in the garden, while, being made to fold, it may be easily moved, and would occupy but little space. The table could be made in any of the cabinet hardwoods. Elevations with the principal dimensions are shown at Figs. 2 and 3, a plan at Fig. 4 and working details at Figs. 5 to 10.

The sides (A Figs. 5 and 6) are 27½" long by 4" wide by ½" thick. Hand-holes are cut at the top ends, and the bottom ends are framed into feet (B), which are 9" long by 1½" wide by ¾" thick. The sides are joined by two cross framing rails (C and D), 23¾" long by 2" wide by ½" thick, tenoned in place, and the bottom rail is strengthened with two bracket pieces (E), 6" long by 3" wide by ½" thick, shaped as shown at Fig. 7, tenoned into the sides and screwed to the rail.

The two folding leg frames which support the table top are made with a leg (F) and a back upright (G), framed with two rails (H), as shown at Fig. 8. The leg is 25½" long, either turned or tapered at the bottom end. The upright is 16½" long, and the two rails 9" long by 1" square. The leg frames are pivoted to the framework by driving screws through the top and bottom cross rails (C and D) into the ends of the uprights (G), as shown at Figs. 2, 4 and 8.

The table top (I) is 28" long by 24" wide by ½" thick, made in three portions,

## Fireside Footstool

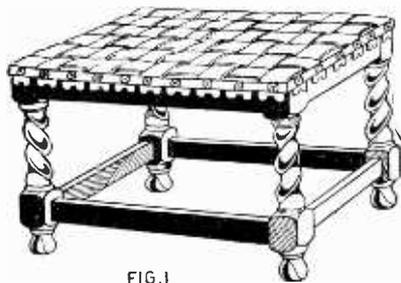


FIG. 1

THE sketch (Fig. 1) and the elevations (Fig. 2) show a footstool measuring 12" in height, 16½" in length and 10" in width, but those dimensions may be easily adjusted to meet individual needs. The stool should be in oak, the legs being 12" long by 1½" square. They are framed with four top rails, two 15½" long and two 9" long by 2" wide by ¾" thick, and four bottom rails, two 15½" long and two

By  
J. E. Lovett

as shown at Figs. 2 and 4. The middle portion is fitted over the sides, and screwed through the top cross framing rail. The flaps should be strengthened with 2" by ½" battens and hinged to the middle portion with a square joint, as at Fig. 9, or a rule joint as at Fig. 10.

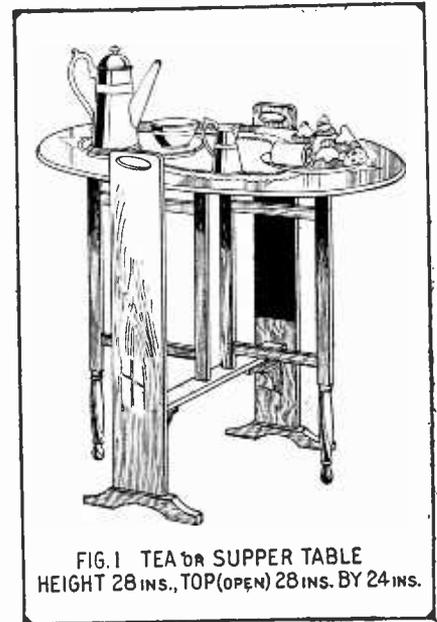


FIG. 1 TEA OR SUPPER TABLE  
HEIGHT 28 INS., TOP (OPEN) 28 INS. BY 24 INS.

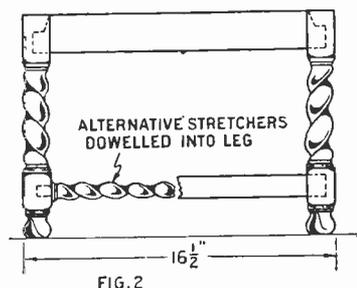
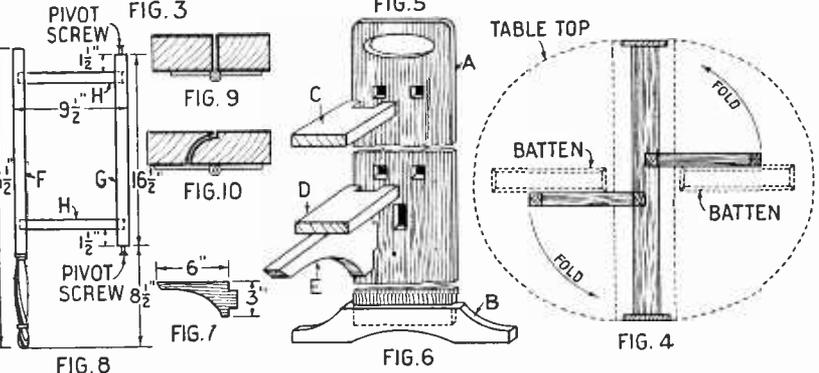
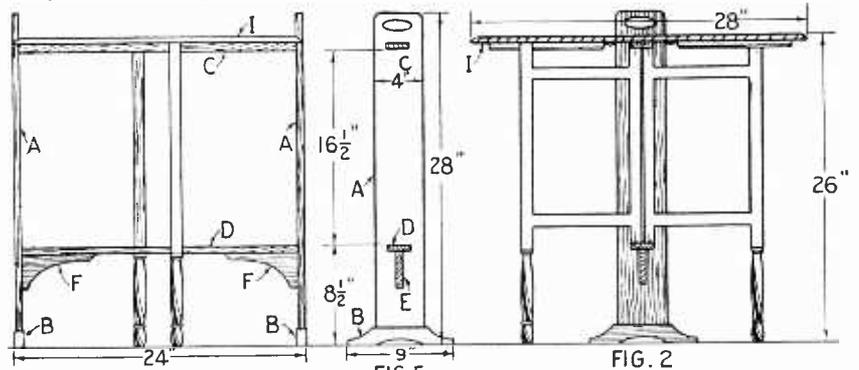


FIG. 2

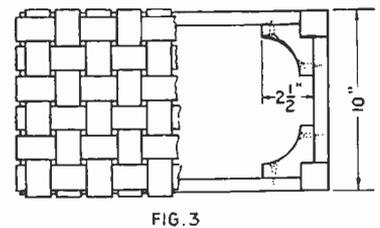


FIG. 3

9" long by 1¼" wide by ½" thick. The top rails are framed in flush and level with the legs, but the bottom rails are framed in quite central. Turned twist stretchers could be used instead of the flat bottom rails, as shown at Fig. 2, their ends being dowelled into the legs. Small blocks screwed in the corners between the top rails (Fig. 3) will greatly strengthen the work.

The leather used for the top should

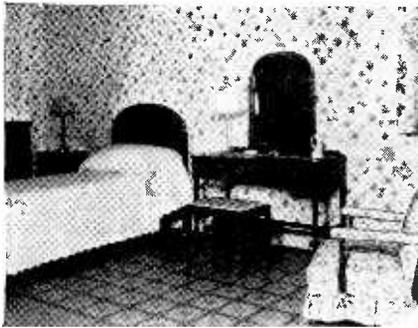
be in strips about 1⅜" wide, six 18½" and ten 12" long being required. The strips are interlaced and tacked to the top rails (Figs. 1 and 3). One end is, fixed first, the interlacing correctly arranged, and then they are pulled up and fixed at the other end. The ends of the strips may be cut square or to a pattern, and a finish is formed with a leather band from ½" to ¾" wide, fixed with ornamental nails.

# Floors *that* Clean Themselves



*Mrs. Frederick discusses the new scientific methods which have made the old-fashioned floor scrubbing and cleaning back-numbers*

By Mrs Christine Frederick



*Tasteful linoleum harmonizes with bedroom furniture and decorations, and presents an easily cleaned surface.*  
(W. & J. Sloane)

THE most wearying and undignified piece of work women were ever called upon to do is *floor scrubbing and cleaning*. To this day there are office buildings in New York whose floors are scrubbed by towseled, hard-looking scrub-women, on hands and knees, their hands drenched in dirty scrubbing water in wooden pails almost corrosive with hard yellow soap, full of rosin. But they prove the exception; now we use the expression, "I would scrub floors rather than do this or that," because we feel floor scrubbing ranks with breaking stones on the road—the last work a man descends to.

Once, speaking at a western Farm-Grange meeting, in the years before modern equipment was in general use, I startled the farmers and delighted their wives by a bit of acting. I had been told by these wives that the farmers would not buy modern home equipment. So, dressed in an elaborate evening gown, I suddenly dropped down on hands and knees on the platform in the middle of my lecture, and went through the motions of floor-scrubbing. "Isn't it dreadful to ask a woman to do this kind of work?" I asked from my embarrassing position on the floor; "when modern science makes it quite unnecessary? Do you cut your wheat by hand with a cradle scythe? No! You buy a modern reaper! Why make beasts of burden of your wives?" The farmers blushed to the roots of their hair. Then I rose and showed how the long-handled mops, and other devices, also modern floor surfaces, made the old floor-scrubbing methods utterly unnecessary.

Nowadays we have a higher standard of cleanliness than ever before, but in order to keep it we must first have the right floor surfaces or coverings, and also up-to-date tools. The old soft

wooden or board floor, usually painted, is the hardest to take care of, and this was the kind women scrubbed so assiduously, because it never *looked* clean.

They often covered it with some cheap form of oil cloth, which soon was equally unsatisfactory and also constantly called for cleaning. Naturally, not a great many women could afford hardwood floors, waxed, because the waxing process until a few years ago was hard work and expensive. The wax had to be both rubbed on and polished by hand.



*The modern pail and tray for cleaning purposes provide partitions for polishes, cleansers, brushes and cloths.*  
(Lewis & Conger)

Now have come marvelous electrical units which scrub, wax and polish by electricity, without requiring any more human energy than a vacuum cleaner in application. They open a complete new era in woman's work and are producing decided changes in construction and floor coverings. When the old type of floor was widespread, women took to carpets, covering the entire floor. Then as wealth grew, we could afford hardwood floors and used rugs. With the coming of the vacuum cleaner carpet cleaning was made easier; women favored cleaned carpets again. Remarkable new floor-polishing machines are to be had, so we are having more hardwood floors, kept freshly waxed, and scattered with small rugs which we can lift out of the way easily to apply the floor polisher. Result—mirror-like floors! The whole operation is light work and simple.

Linoleum floors, too, are coming into favor even for bedrooms for they

provide a note of color and decoration, and are not as expensive to install as good hardwood. Linoleum may easily be kept in a fine polished, clean state with these automatic waxers and polishers. I personally have linoleum on my living room and dining room floors and find the floor cleaning and polishing problem reduced to a minimum of time and energy. The floor polishing machine will neatly and evenly apply wax (using the new liquid type which helps much to cut down labor), and a moment's shift on the machine to apply the polishing brushes more than equals the strength and energy of ten hausfrau at work. And a woman can do this in a nice frock, standing up, and without fatigue!

Even for occasional clean-up of debris very efficient dustpans with long handles, as well as mops, furnish relief from stooping.

The old mop and scrubbing brush were the first to be changed to the long handle to make their application quite as effective as a brush in the hand of a woman on her knees. Some women always remain skeptical about this, clinging to the idea that there's no cleaning that is really thorough excepting the down-on-hands-and-knees kind. "They're all right for a well-kept floor," they often say, "but what about some

of my really dirty floors?" They should see one of these lusty floor polishing machines, with the whirling brushes on. How the dirt will fly!

The oil mop is a  
(Continued on  
page 1152)



*Equip your vacuum cleaner with a sanitary pulp-felt bag which empties through a wide top in a few seconds. It is cheap enough to destroy after each cleaning, but may be re-used several times.*

# Beauty, Comfort and Health in New Scientific Devices



### Anti-Thumb Sucker

**Y**OU can make Baby cease his favorite indoor sport. Get him this device—an aluminum casting to be attached to the under-thumb with adhesive tape. It allows perfect freedom of movement in eating or playing. . . . But just let Baby try to close his lips over his thumb for a good suck! Cloth tape may be sewed over the tape to prevent the older child from removing the casting.

### Pedal the Dust Away

**W**HY bother with a dust-pan and constant bending to get rid of dust and dirt? Just put your foot on a lever in the wall—a spring door will automatically open and you sweep all refuse into a dust chute. The door will close automatically so that drafts will be eliminated. A removable dust-bin container is provided. Any danger of fire through spontaneous combustion is eliminated by its all-steel construction.



### It's a Table—a Fan—a Heater

**A**N attractive crinkled dark-brown table for tea, smoking equipment, books or refreshments—and underneath its cover is a coil of wire surrounded by a jacket, an electric fan and a motor. Touch a switch and immediately you get an abundant supply of either heated or cooled air. Because the Thermador ejects warm air in hori-



zontal waves and its fan draws this air back toward the floor, heat centers in the living zone of a room, doing away with floor drafts. It is particularly good for nurseries.

### For a Literary Cook

**H**OW'D you like to grill some steak? Make a welsh rarebit? By merely removing this lampshade and inverting the base, you may cook, fry, toast, and at the same time, take the chill out of the room. You get an asbestos pad with each outfit. Safety is guaranteed, for the projecting grill switch prevents the heater's being used in a downward position. If you desire, the light may be turned off while the grill is in operation. Or toast may be kept warm placed under its rays. The lamp itself is regulation size, 16 inches high. The grill is rated at 600 watts. Either direct or alternating current provides its power—the same current as for your ordinary lamps and lights. It can be used in almost any room of the house—sick room, nursery, dining room, kitchenette. The lamp has a crystalized enamel finish; the shade is of parchment or silk.

Names and addresses of manufacturers gladly supplied upon request.



### Here's a Beauty Wand!

**G**IVE yourself a facial massage with an electrically warmed wand. Merely rubbing it over your face will cause wrinkles to vanish. Crows' feet, toothache, neuralgia can be treated at home. A specially shaped bulb attached to the end of a circular bar transmits a continuous unvarying heat. It is shaped to permit rotation inside the mouth or outside, and has been made absolutely safe.

Because of the wand's convenient shape and lack of bulbs it has a wider application than usual heat generating appliances. Just the affected parts and not surrounding ones are reached. The principle upon which it works is simple—through absorption, the wand stimulates cellular activity in rebuilding broken-down cells. Gradually, these are brought back to their normally healthy state.



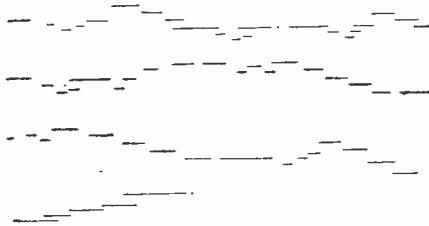


\$5 First Prize

### Your Attic Garden

AN indoor hotbed can be very easily made in your attic—particularly if it has a dormer window on the south with a brick flue nearby. Early plants that require careful watching may be planted here and transplanted into the garden when they sprout an inch or two. There is no danger of their being frost victims on a cold spring night. Lay some boards over the ceiling rafters around the flue and build two or three boxes there. Tared building paper laid on top of the boards will eliminate moisture reaching the ceiling plaster underneath. Partially fill the boxes with wet earth and plant close rows of seeds.

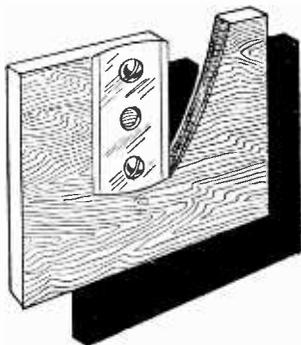
D. V.



### Recording New Songs

TAKE any slip of paper and jot down marks to represent notes, when you hear a catchy tune. Make long marks for long notes, short marks for short ones. Place them under and above, as sketched, to indicate their relative position on the scale. This system can be employed in the dark.

J. C. PRATT.



### A Twine Cutter

FOR cutting twine at home or at a wrapping counter, take a piece of thin board and cut as illustrated. Insert a double-edged safety razor blade, allowing a protecting piece of wood over the edge of the blade. Screws may be turned through the holes of the blade and attached to any convenient place.

VERNON V. JOHNSON

# WRINKLES

### To Remove Iodine Stains

THE annoying brown stain of iodine, or the blue color it forms with starch may be instantly removed by dissolving some sodium thiosulphate in water, and treating the spot with this solution.

ARTHUR STICKLER.

### Dry Cleaning Clothes

TO clean dirty clothes without washing, rub them with a mixture of ammonia and Fuller's Earth. Rub off with a dry, clean rag.

SEAVAX FRANROZE DESAI.

### To Make Indelible Ink

TO make indelible ink that cannot be erased without destroying the paper, add a strong solution of prussian blue in distilled water to gall ink. The color of the ink will be a greenish blue, but will turn black. BENJAMIN HELLER.

### Keeping Brushes New

TO keep paint brushes fresh and new, regardless of the paint used, dip the brush into a can of linseed oil, after thoroughly cleaning it with common benzene or kerosene. Then wrap it in newspaper. The hair will remain clean, soft and pliable. HENRY KACINSKY.

### Repairing Tiles

WHEN a piece of tile falls out of the wall and breaks beyond repair, you can replace it with a substitute that will look like another tile. Fill the hole with white plaster molded to the shape of the original piece. Give it a few coats of water glass.

FRANK SCHMULOWITZ.

### Keep Clocks Clean

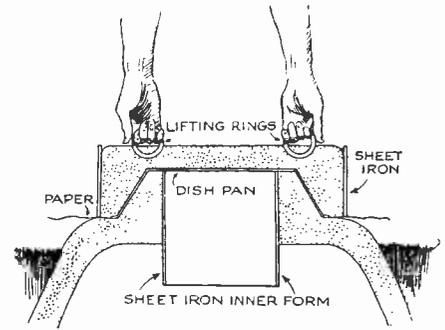
DIP a piece of absorbent cotton about the size of an egg in kerosene. Place it in the bottom of the clock and shut the case. The fumes of the kerosene will loosen the dirt particles of the machinery, which will fall upon and thus be automatically collected in the cotton. Remove the dirty cotton after a few days.

SEAVAX FRANROZE DESAI.

### A Clean Windshield

RAIN and sleet make it almost impossible to see through the windshield of a car. Rubbing a little of the following compound over its outside surface will prevent all streaking. Shave some white soap with a knife (preferably Ivory Soap). Add 4 or 5 drops of glycerin and about the same amount of water—enough to form a smooth paste.

ARTHUR STICKLER.

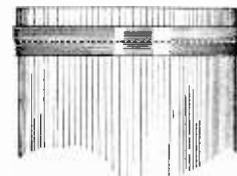


### A Fool-Proof Reservoir Cap

THIS was used for a cistern, which was brought up to the top of the ground by plastering with three thick coats of concrete and a little lime directly to the walls of the excavation. Temporary forms were put in place and for the inside form for the neck a sheet of galvanized iron was used as shown. Soft concrete was packed about this up to the top and then a tin dish pan was forced over it upside down and turned first this way, then that, to smooth the surface. By lifting off several times any air spaces could be easily filled in with concrete again. Strips of paper were then placed as shown and a wide strip of sheet iron bent to form a low cylinder was made for the outer form for the cap. This was set in place with strips of paper underneath to prevent the concrete of the cap from bonding with the concrete of the cistern neck. It was then filled in with concrete to the top and two iron rings inserted for lifting purposes. The top was smoothed off, then the whole job was left for several days to cure.

When cured, the cap was first lifted off, then the pan came off, exposing the opening of the cistern. The pan was not damaged.

DALE R. VAN HORN.



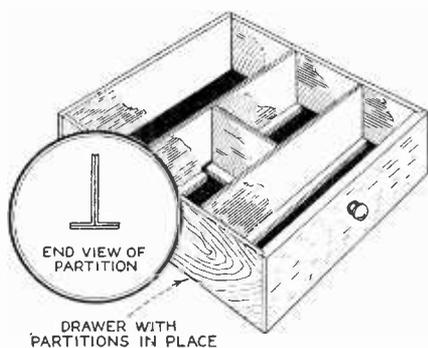
RUBBER BAND MAKES AIR-TIGHT SEAL FOR CANS

### Sealing Tin Cans Hermetically

A WIDE rubber band, stretched taut, put about the can with the cover in place, so as to overlap, provides an excellent air and water tight seal. It can be used for experimental work or sealing cans of food stuffs, and is instantly removable. An old inner tube will furnish the band for a large can.

DALE R. VAN HORN.

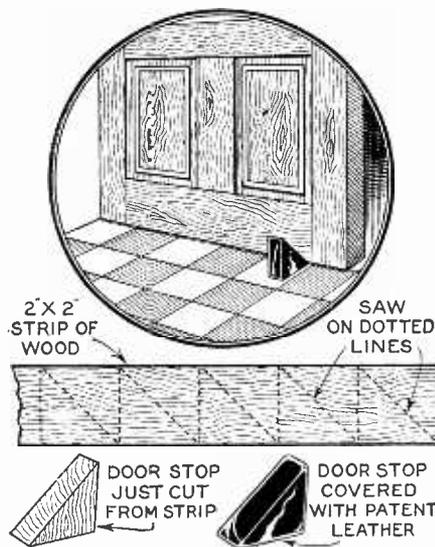
# and RECIPES



### Divisions for Drawers

CUT two pieces of cardboard the length of the drawer and about one inch deeper. Paste them together, with the bottom edges folded backward. Glue to it a piece of cardboard the size of the bottom of your desired partition. If you cover these drawers with cretonne, oilcloth and a final coat of shellac, they will be sanitary, durable and decorative. Binding the edges with colored gummed-linen binding tape will add a finishing touch.

NANKI FIELD.



### Make Attractive Door-Stops

TAKE a 2x2 inch strip of wood and cut blocks from it on a 45 degree angle. Cover with patent leather or other durable material.

EUGENE D. YATES.

### Digging Holes With a Hose

When laying pipe under ground and it becomes necessary to go under a sidewalk, do not tear up your sidewalk but use the following method: Take your garden hose and fasten a piece of pipe on it about ten feet long. Turn on the water and start digging with it. The water washes the dirt away so fast that it will surprise you how fast you can get under a sidewalk. This is much better than digging with a shovel and it does a better job.—T. G. Cady.

### A Permanent Label

IF you want a waterproof label for a bottle, one impervious to all handling, why not apply the label and then give it a coat or two of shellac?

FRANK SCHMULOWITZ.

### Cement for Glass or Cork Stoppers

A good cement for glass or cork stoppers can be made by mixing lead oxide (litharge)  $\frac{1}{4}$  oz. and concentrated glycerine  $\frac{1}{2}$  oz. Paint this around the glass or cork stopper on the bottle. It soon dries and becomes hard. It may easily be scraped off when necessary to open bottle.—Benjamin Heller.

### Some Handy "Kinks"

FINGERNAIL Polish Remover is a much quicker and more complete means of removing lacquer from the hands than lacquer thinner. Also it does not burn the hands as the thinner does.

TO clean light-colored felt hats, mix salt and cornmeal in the proportion of 1 teasp. of salt to 2 tablesp. of cornmeal. Place hat on a paper, and rub briskly with the mixture, using a soft cloth. When the mixture looks dirty, brush the hat thoroughly with a stiff, clean brush and you will find a marvelous change in your hat.

TO size rugs, thoroughly clean and dry, then place on floor, upside down. Stretch to right size and then tack on all four sides, using plenty of tacks. Take 50 cents worth of powdered glue and dissolve in a quart of lukewarm water. When thoroughly dissolved, stir in 4 quarts of boiling water. Apply to back of rug with an old broom and leave tacked down till dry. Above recipe makes enough liquid for a 9 x 12 rug.—Mrs. H. E. Chrisman.

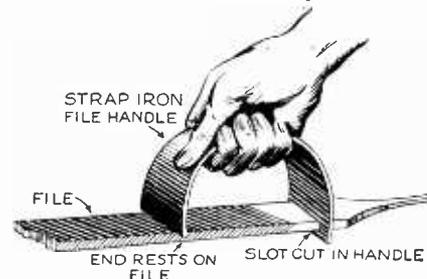
DIFFICULTY is always encountered in plucking small stubs and feathers from chickens. An ordinary pair of eyebrow tweezers is an excellent instrument for this purpose.—Alyse Hoffman.



### An Inkwell Stopper

AN ordinary marble placed over the opening of an inkwell of the type sketched will prevent the entrance of dust and flies. It is easily rolled aside and so presents no obstacle to writing.

VERNON V. JOHNSON.



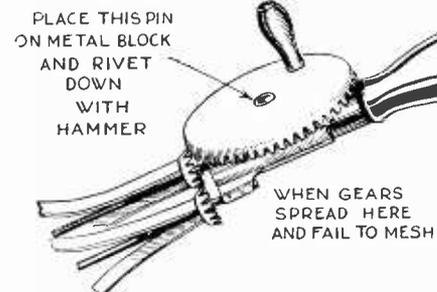
### Make Your Own File Handle

GET a strip of medium-weight strap iron 5 or 6 inches long and bend to form a "U", with one side half-inch longer than the other. Rest the shorter side on the upper file surface, and fit the file point through a slot made in the long end.

D. R. V.

### To Fill Plaster Cracks

USE vinegar instead of water in mixing your plaster of paris. The resulting mass will be like putty and will not set for twenty or thirty minutes. If you use water the paris will set before you can readily apply it. Push this into cracks and smooth off with table knife.—A. H.



### Repairing the Egg Beater

THE gears on egg beaters often spread and fail to mesh. To repair, simply place the center pin or axis of the large gear over a piece of metal and rivet the head tighter with a few taps of the hammer.

HI SIBLEY.

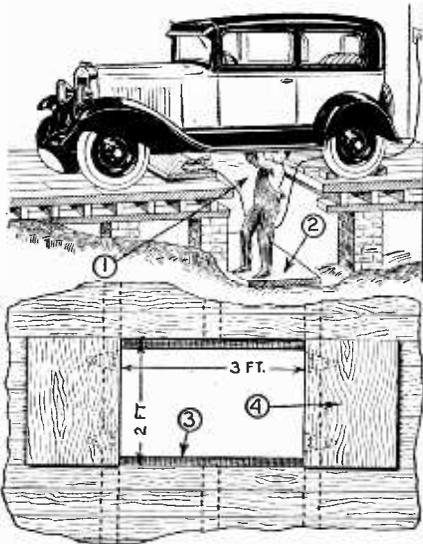
**\$5.00**

will be paid each month for the best wrinkle or recipe submitted to the editors and which they accept and publish in these columns. All other ideas accepted and published in this department will be paid for at regular rates. Address your ideas to—*Editor Wrinkles and Recipes.*

# HINTS for the MOTORIST

*Timely Tips for the Owner and Driver*

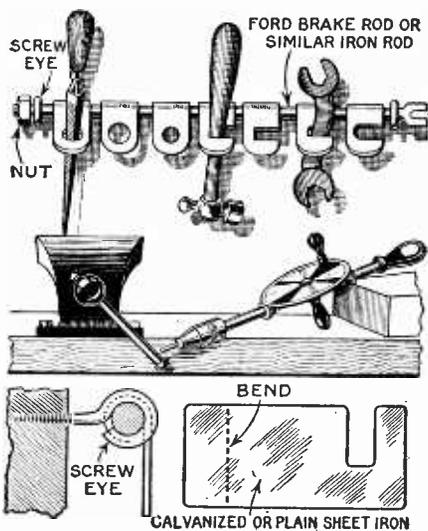
## Make Your Own Repair Pit



A FRAME garage may be altered to give all the advantages of a pit, and without the disadvantages. An opening is made through the floor, about two feet by three feet, and is framed around with hinged covers of heavy oak. A platform under this affords a working space for the owner, and a place to set tools and parts. This pit substitute is clean, well ventilated and can easily be made in an hour or so of spare time.

## Rack Your Tools on an Old Brake Rod

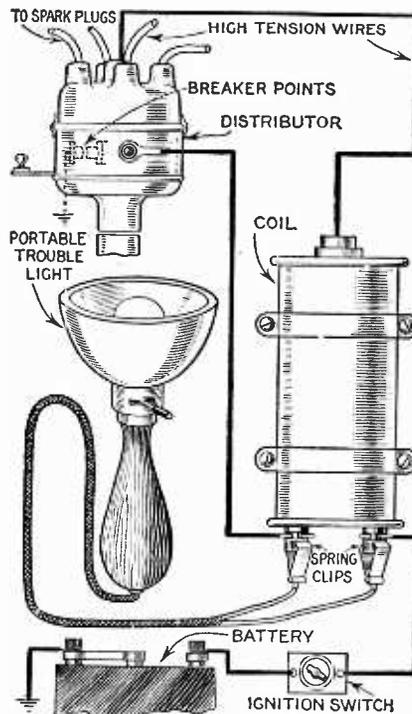
THE garage work bench will be more useful for spring-time work if an orderly arrangement of the tools is provided. About eighteen inches above and directly to the rear is a tool holder made of sheet iron hangers on an iron rod. Some hangers are fitted with cir-



**DO YOU KNOW—**  
 play in spring shackles causes side sway and wheel "shimmy"? Adjustment is provided for the shackles on all the springs and this adjustment should be used when shimmy or unsteady steering occurs.

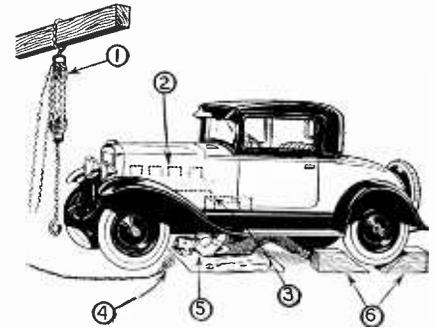
cular opening for such small tools as files and screw-drivers. Open side hangers provide for larger tools as drills, wrenches and hammers. This arrangement makes every tool available instantly without lost time in searching around boxes or drawers.

## Test the Distributer with a Portable Light



A SURE and certain means of testing the ignition is by means of an electric light in circuit with the distributor. The spring clips of the portable car light are attached to the terminals of the coil, which connect to the distributor and the switch. When the car is run slowly or the motor is turned over to the starter, the light flashes for each contact of the breaker points. A miss due to faulty parts, lost motion in the breaker or other cause, is immediately evident. Where this test shows no defects, the one remaining item in the ignition circuit which must be at fault is the coil, which should be subjected to an independent test.

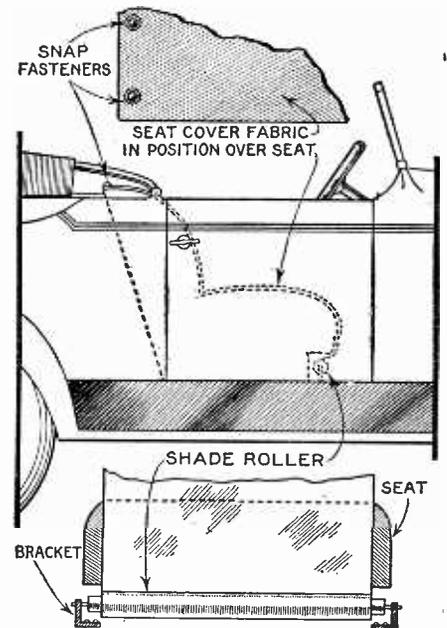
## Safety Hints for Repair Work



HERE are several important precautions for car repair work. One, disconnect a lead from the storage battery while working. This prevents anyone from starting the engine. Two, use blocks under a wheel, to avoid the axle toppling off a jack. Three, watch out for gasoline. A broken extension light may produce a spark which will ignite the gasoline. Four, do not hold the head directly under the work in hand. Dirt in the eyes, or a slipping wrench striking the face, may result. Five, use gloves as far as possible when handling piston rings. Ugly cuts can result from sharp edges. Six, take no chances with light chain or rope garage hoists. Seven, put good blocking under the raised axle.

## Keep Dry in the Open Car

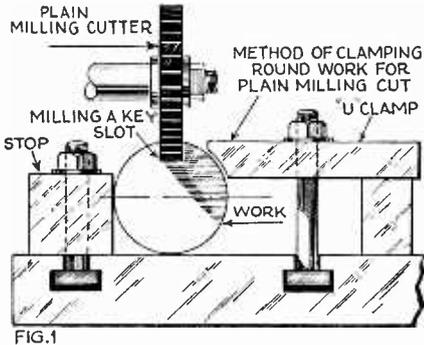
AN ingenious means for providing a dry seat covers for the open car is the application of waterproof seating-cover from a shade roller. Small snap fasteners, as used for curtains, hold the upper edge in place.



# Tips *for* the Young Machinist

## Plain, Side and Angular Milling Machine Work

By George A. Luers



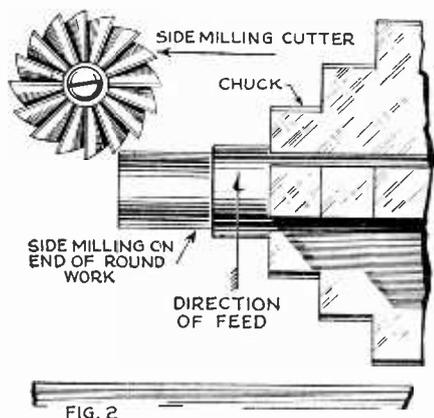
Here is an easy method for milling a key slot.

### Milling a Key Slot in Round Stock

IN the set-up for this job it is necessary to support the shaft against rotation or end movement. This is accomplished by bolting a stop on the milling machine bed, placing the work against this and using a clamp on the side opposite, so that the pressure of the clamp will force the work against the machine bed and also against the stop. The table feed moves the work along the circumference of the cutter, while the width of cut is varied by adjusting the table sidewise.

### Cutting a Polygon with a Side Mill

TO mill a square or any other polygon, a hexagonal bolt head for example, the quickest method is to place the job in a jaw chuck having a circular feed and graduated for spacing. In Fig. 2, an example of milling squares on the end of circular stock, hold by a chuck bolted to the milling machine bed, is shown. The work is fed up by moving the machine bed with the vertical feed screw. Each side is

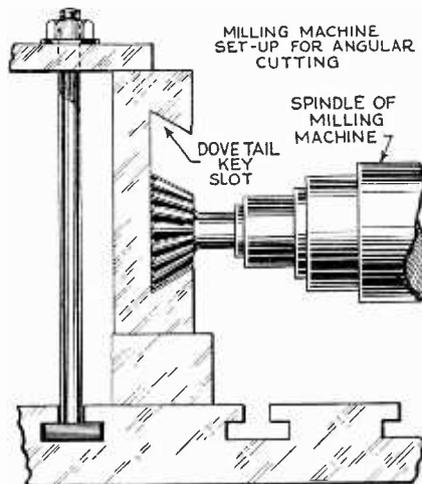


A square or hexagonal bolt may be easily milled in the above manner.

cut, until the four faces have been machined. Measurements are made for size and the second cut is made, continuing until the correct size is obtained. Using this method, the side mill makes the shoulder even and square with the flats.

### Angular Mill for Dove-tail Slots

IN the cutting of various key slots, with angular engaging faces, only angular cutters can be used. Of course, it is possible to shape a similar slot on the shaper; however, the milling machine will give the most accurate job. Fig. 3 shows an example of cutting a dove-tail slot. The angular mill for this job is usually either a 60 or 45-degree tool. The space between the two angular sides can most frequently be cut out quicker by plain milling, or at least the most of the metal can be rough cut to leave only a small amount of metal to be removed by the angle cutter.

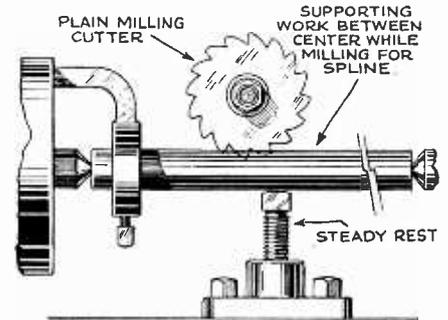


A simple means for milling a dove-tail slot is given here.

### Shaft Splining Supported by Centers

A JOB frequently required of the milling machine operator is that of splining or cutting a key slot the length of a slender shaft.

A set-up for doing this job is shown by Fig. 4. In this work one or more steady rests are placed under the shaft to prevent the part from springing away from the tool. The work is held between centers and a dog prevents rotation. Light cuts are taken to pre-



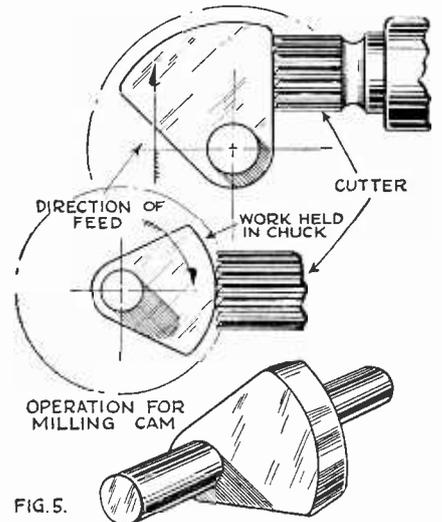
This is the way to spline a slot in a slender shaft.

vent deflection of the shaft. Measurements are made before removing the job from the machine, and if the depth of cut is deficient additional steady rests are placed under the shaft. The tool is again cut through the slot.

### An Easier Way to Cut a Cam

IN the illustration shown by Fig. 5 is a common type of cam. The work is lathe turned first, and before milling appears as a shaft with a disk at the center.

To mill this the work is held in index centers and a side cutter or end mill used. The sides are milled by use of the table feed and finally the surface next to the hub is cut, using the index center feed. In this job the operator must plan to set the work up, so that the vertical and horizontal movements of the table and the index head of the chuck or center will bring the work in correct relation to the tool, as the tool cannot be moved to the work.



Cam milling is not difficult when done in the above manner.



# THE SAFETY

Conducted by  
Readers' Opinions and Comments

## A Perpetual Motion Watch?

I RECENTLY bought a wrist watch which is marked "Harwood, selfwinding watch, Swiss made." The dealer says that the



watch keeps on moving forever, provided I do not put it aside over 24 hours.

Will you please explain the mechanics of the watch? Is it perpetual motion?

W. K. LEE,  
Penang, China.

(The selfwinding watch is not perpetual motion. It operates substantially the same as an ordinary pedometer. In a pedometer there is a weight suspended by a spring. This weight moves down at each step because of the concussive blow produced by the heel of the user's feet. This pendulous movement operates a wheel, geared to the indicating hand and shows on the dial how many miles the individual has walked. In the case of a watch, a similar motion is produced, except that when a person walks, he swings his arm back and forth and this swinging motion causes the spring in the clock to be wound up. If the person kept his hands in his pockets or set the watch aside for 36 hours, it would fail to operate until again worn. Wearing the watch four hours will wind it for 36 hours.—EDITOR.)

## Special Contests

REFERRING to the suggestion of J. G. Q. in the January number, I think it is an excellent idea. Scientific apparatus, to carry on his experiments would lure every amateur into putting forth his best efforts. Naturally much benefit to all concerned must result.

The co-operation of manufacturers of this apparatus could no doubt be secured and the expense of such a contest much lessened.

However, I must differ with your correspondent on one or two points. In the first place, instead of one Big Prize, I would advise several smaller ones to be apportioned somewhat like this: First Prize, value about \$100.00; second, \$75.00; third, about \$50.00 to \$25.00; then five or ten prizes amounting to about \$10.00 or less, such as books, small outfits, etc.

My second objection is to his set of questions. The terms he sets forth are all right in a contest of experts, but this one is inaugurated to aid the general student and amateur; therefore, I suggest that a more general and comprehensive knowledge of the underlying principles of the several sciences be required.

Nevertheless, I leave it up to you to settle these differences in the way you see

fit. The one big issue is the starting of these contests, so let's go!!!

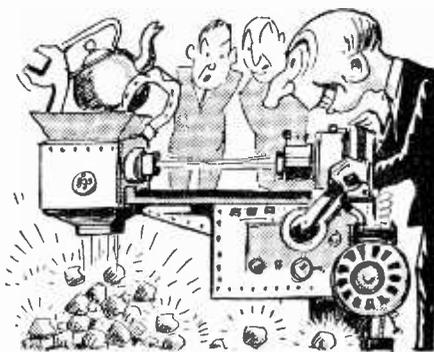
SCIENCE AND INVENTION, as usual, is leading the field in this matter which is surely giving science the biggest boost it has had in a long time.

E. W. SMITH,  
Ottumwa, Iowa.

(In the January issue J. G. Q. made a suggestion that SCIENCE AND INVENTION Magazine conduct contests on such subjects as bacteriology, chemistry, pharmacy, mathematics, physics, electricity and so on. Judging from the comments, it would not seem that such a series of contests would be of interest to the average reader. The majority would rather have articles by authorities and duplicate the experiments outlined than compete against authorities for prizes.—EDITOR.)

## Making Gold!

IN the New Zealand "Truth" published on September 19th, 1929, an article appeared concerning the manufacture of gold by the chromadyne process, sponsored by the Christchurch syndicate. This publication challenged the syndicate to give a demonstration before scientists of repute. Being a chemist, I was naturally curious in first learning of this remarkable and seemingly improbable process. Chromadyne is supposed to be a new ray that transmutes the elements used to gold, in accordance with the statements of the inventors. It seems remarkable, if the process is a hoax, that Dr. Marsden should be given a demonstra-



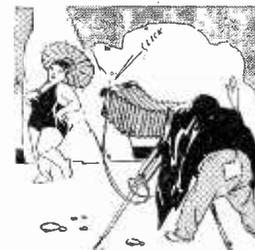
tion of the method, as he is essentially a government official, being the Secretary of the Department of Industrial and Scientific Research, and a physicist. The news clipping states that he returned with samples of the chemical and the gold allegedly made by the secret process. What do you think?

F. BISHOP,  
Wanganui, New Zealand.

(So many different systems for the making of gold from baser materials have so repeatedly hoaxed the public that any scientific proof would have to be convincing to more than one man, even though he be an official governmental physicist. We do not believe that the New Zealand "Truth" will have any difficulty in upholding their position. Gold has not yet been made by any process either by mixing chemicals or acting on chemicals by some unknown imaginative ray.—EDITOR.)

## Likes Movie Articles

I HAVE purchased quite a number of copies of SCIENCE AND INVENTION at newspaper stands and think it A1. I am very much interested in the articles by Don Bennett on "Movie Making" as I am planning to purchase a camera in the near future. I take quite a number of still photos and have a very good collection of them which I took during my travels as radio operator on various vessels. His articles show that he thoroughly understands the topic he writes about and are very helpful to the fellow who is starting in with his camera.



R. MADDEN,  
San Francisco, Calif.

## We Stand Corrected

I WAS interested in "An Intricate Problem" on page 919 of the February issue of SCIENCE AND INVENTION, and submit an answer.

The circumference of the earth at the equator in feet is equal to  $\pi D$ , where D denotes diameter in feet. The length of wire suspended 6 feet above the earth's surface in feet is equal to  $\pi(D + 12) = X$ . This is equal to  $\pi D + 12\pi = X$ . X denotes the length to be found. Then  $X = 25,000 X 5280 + 12\pi$ . (You gave the value of the circumference as 25,000 miles). The stretched wire is therefore 12 $\pi$  longer than the circumference of the earth which you gave. Since you state the value of  $\pi$  to be 3.14159, the extra length of wire would be 12 times this figure which is 37.69908 feet. The analysis proves that the value of the extra length of wire depends entirely on the numerical value assumed for  $\pi$ . With  $\pi$  as 3.141592653589793 we would get 37.699111-843077496 additional feet of wire required.

PROFESSOR F. E. AUSTIN,  
Hanover, N. H.

(We wish to thank you and the many other readers of SCIENCE AND INVENTION Magazine who found this problem so fascinating, for their deluge of answers simplified the editor's mode of calculation.



Hence a difference of slightly more than one and one-half ten thousandths of a foot less than the amount of wire that should actually be used. We wish to thank our critical audience for not letting us get away with even such a small error.—EDITOR.)

# VALVE

Joseph H. Kraus

Will Be Welcomed by the Editors

## Piles Them Up

I FEEL I must write and thank you for the splendid design of lantern type floor lamp article No. 8 of the Wood Turning Series, which I have just had the pleasure of finishing. Owing to my being unable to obtain the size of the material as specified, I adopted the method of gluing many smaller pieces of wood together. This may be of interest to others desirous of making a lamp under similar conditions.

Needless to say, you have another regular reader of SCIENCE AND INVENTION.

E. DURLING,  
British Columbia, Canada.



## It Moves When It Doesn't

I HAVE been following with interest your articles on "Relativity and Common Sense." They have stimulated me to do a little thinking of my own. As a result I have been struck with an idea that is puzzling me. I would like you to try to explain it.

Hitherto I had always thought of space and time as being infinite; that is, never ending. When I speak of space, I do not mean inhabited space necessarily, but rather just space in terms of three dimensions. Whenever I would try to set a limit to space (or time), I would always tell myself that more space (or time) must exist after that. So this theory satisfied me for some time.

But one evening last week, someone asked me the time. It happened to be one minute before nine o'clock, so I told him it was nine o'clock. And then the idea struck me that it could never be nine o'clock. As the minute hand moves toward the twelve mark, the fraction of the minute before the hour slowly decreases. But there always remains a fraction of a minute before the twelve mark is reached, however small it may be. True, it steadily decreases, but assuming our system of numbers to be infinite in length, there always remains a small fraction of time to be "overcome" before the hand reaches twelve. This leads to the conclusion that the hand never does reach the twelve mark! Or for that matter we can say the hand does not move at all, for it must move an infinitely small fraction of a minute before it moves at all. Since this fraction is infinitely small, we may say that it does not move at all. But with our own eyes we see the hand move and we see it pass the twelve mark.

Either our system of "counting" is wrong or space and time are purely man-made terms. If the first be true, we cannot measure space nor time; therefore we cannot say that they are infinite. If the latter be



reaches twelve. This leads to the conclusion that the hand never does reach the twelve mark! Or for that matter we can say the hand does not move at all, for it must move an infinitely small fraction of a minute before it moves at all. Since this fraction is infinitely small, we may say that it does not move at all. But with our own eyes we see the hand move and we see it pass the twelve mark.

true, well there is no use thinking about anything that exists only in our imaginations. At any rate, I am very much confused and would like to be straightened out.

DANIEL DAVIS,  
Library, Pa.

(The question that puzzles you is as old as Greek philosophy. Unfortunately, I haven't the library facilities to refer you to the original sources, but your problem is closely akin to the following:

A fox is chasing a hare. Though his speed is greater than that of the hare, the argument always pops up. "As he approaches the hare, the distance between them decreases, but there will always remain a small distance that will never be covered."

The fox in the above story is the minute hand of your clock, chasing after the "hare" hour hand. Since we both know that the fox catches the rabbit, we must try to discern the fallacy in our reasoning.

Our figuring, in the above, amounts to dividing the small space that separates the fox and the hare into an infinite number of pieces almost zero in length. From the fact that the number is infinite we have concluded that the total time necessary to travel the total distance is infinite. Here is the fallacy. When we divide a space into an infinite number of pieces, each one becomes infinitesimal in length, and therefore, it may be traversed in infinitesimal time. Just as the infinite number of infinitesimal spacial lengths sum up to a finite distance, so the infinite number of infinitesimal moments sum up to a finite interval of time.

PROFESSOR DONALD H. MENZEL.)

## The Egg In The Bottle?

PLEASE reveal to me the trick of putting an egg in a small size bottle without breaking it. I first saw it in Ripley's "Be-



lieve It Or Not." He says, soak the egg in vinegar until the shell has become soft, then squeeze it in the bottle. I have done this with about a dozen eggs, but it will not work. The shell will become soft all right, but just try to get it into a bottle without breaking it. I have filled the bottle with hot water to create a vacuum by pouring it out quickly, and this will not work either. The suction always bursts the egg. There is some detail left out. It can be done I know. I feel sure you people can solve the trick.

JOHN D. T. DAVIES,  
East Palestine, Ohio.

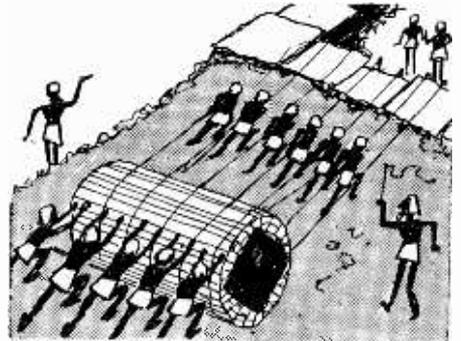
(The mouth of your bottle is too small. Soak an egg in vinegar until the shell becomes soft; then take a candle and drop it into



the bottle so as to burn up the oxygen in that bottle, and in addition heat the air; and then if you will place the egg over the bottle, extinguishing the flame, you will find that the egg slides into the bottle nicely. The hot water system will work.—EDITOR.)

## How Pyramids Are Built

I N the October issue of SCIENCE AND INVENTION I have read about the building of the Pyramids which are counted as one of the wonders of the world.



I do not think that they were built in the way some reader suggested; i.e., by navigation, etc. In those days these great engineering feats were done only by man power. My suggestion is:

First of all, those builders put a very strong foundation on all four sides, say up to a certain height. Then they put useless pieces of stone, earth and other rubbish alongside the wall of the foundations and made an inclined road. Then on that road they dragged the big, huge stones by means of ropes, etc., and placed them on the foundation. Then in the similar way again they raised the inclined road and put the third and fourth layers of stone and hence finished the pyramids. This is how some of our very big stone temples are built in Southern India.

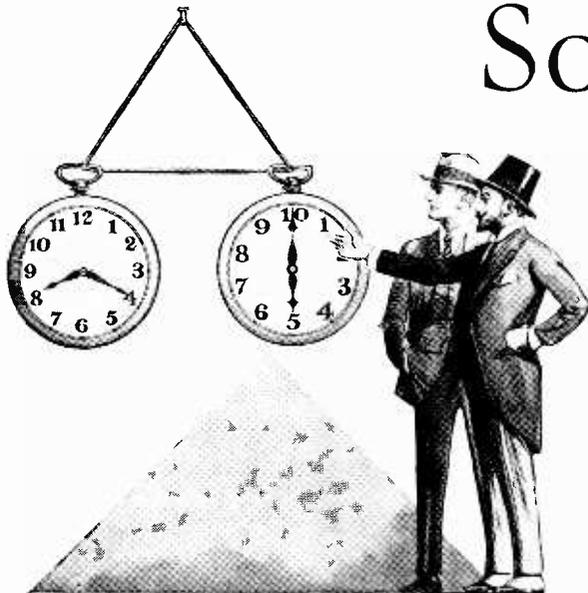
S. N. GADAG,  
India.

(A long mound of dirt was undoubtedly the mode of aiding construction that was used in the building of the pyramids. It was not essential that the mound be built of rubbish when it was so easy to build up the mound with the material available at the time and then permit the winds to destroy the mound. The only other method that could possibly be used without very great inconvenience would have been to haul the large stone slabs on rollers, up the sloping sides of the pyramid. Most authorities conclude that the ramp system was the most practical.—EDITOR.)

## Bunk?

ON page 850 in your January number you offer \$21,000.00 for spirits. Is this a bonafide offer or just another Dunninger trick? It occurs to me that Mrs. Harry Houdini paid Arthur Ford of New York \$10,000.00 because said Ford correctly gave the lady the message Houdini and wife wrote out and deposited in a lock box. Now if you are so mighty in earnest about spirits, read up on what Dr. L. R. G. Crandon and Mrs. Crandon (Margery) have produced these last five years, address 10 Lime St., Boston. They now are in England and were

(Continued on page 1157)



# Solve these Brain Teasers and Win a Prize

By *Sam Loyd*

## A Question of Time

*THE Puzzle King presents the fourth of a series of problems the solving of which show if your mathematical ability is bolstered up by logical reasoning. Prize winners of the January puzzles will be found listed on page 1141.*

**A** FRENCH advocate of decimal divisions in our weights and measures says he is going to improve upon our old Babylonian method of dividing time, by inducing mankind to adopt his ten-hour clock. He divides the day into ten hours, each hour 100 minutes, and each minute 100 seconds.

The sketch shows how this decimal time-piece would appear at the noon hour. The hour hand travels once around the dial each day, the minute hand going ten times as fast; so you see, five o'clock decimal time

**Twenty-five Dollars in Prizes**

**A FIRST PRIZE** of \$10 will be awarded to the person sending correct answers to the two puzzles accompanied by the best expressed analysis of the Time Problem.

**A SECOND PRIZE** of \$5 will be awarded for the next best analysis and correct answers to the two puzzles.

**TEN PRIZES** of \$1 each will be awarded to the ten persons who send the next best analyses of the Time Problem, together with correct answers to the two puzzles.

Answers must be received not later than noon, April 15th, addressed to "Puzzle Editor," SCIENCE AND INVENTION, 381 Fourth Avenue, New York City.

All contestants must abide by the decisions of Sam Loyd, who will examine all papers and award the prizes.

Papers of identical merit, tying for any one of the prizes, will each receive the full amount of the prize tied for.

would be twelve o'clock noon on the regulation clock.

The regulation clock in our sketch shows the hands as usually presented on the signs swinging in front of jewelry shops. The hands are at equal distance from 6, and the time is something in the neighborhood of twenty minutes past eight.

Here is our problem: If on the regulation sign clock the time is a. m., how would you translate that exact time to the decimal clock? In other words, what would it be in decimal time?

## Mixing Paint

**I** DISCOVERED Keegan, our village paint merchant, mixing up a quantity of his popular fire-proof paint.

"This is really a very scientific concoction," I was informed by Keegan, who readily admits that he is considerable of a chemist.

"Yes," he continued, "it took twenty years' of experimenting before I hit upon the ex-

act proportions of paint and asbestos to produce a perfect blend."

"You will note that my primitive, see-



saw scale is in perfect balance. Now, the balance bar, which weighs one-half as much as the bag of paint, has four-fifths of its length on one side of the fulcrum, or balance point, so let me see you figure out the weight of that asbestos, just the quantity to mix with that 10-lb. bag of paint."

Keegan's proposition is fair, so let us tell him how much asbestos he blends with a 10-lb. bag of paint.

# MAGIC

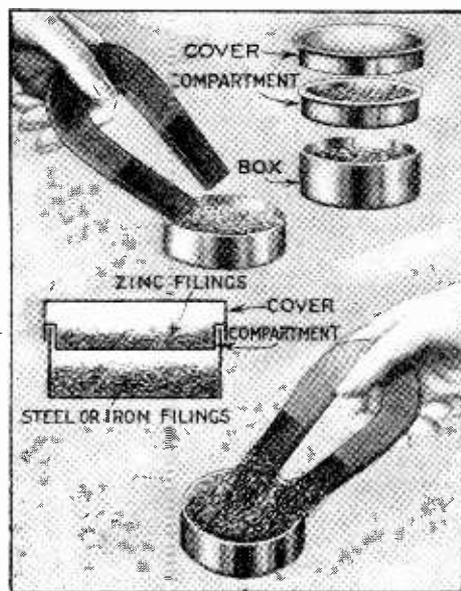
By *Huminger*  
No. 80 of a Series



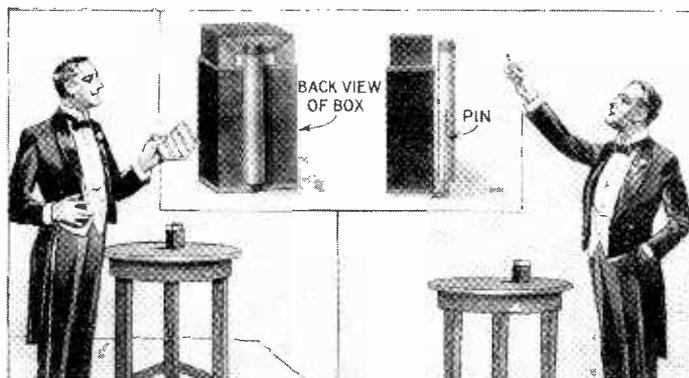
BLACK METAL



## Magnetic Control



A HORSESHOE magnet is passed for inspection. The wizard then hands members in his audience a small pill-box filled with metal filings. Strangely the metal filings are not attracted to the magnet. The magician then passes his hands over the steel, and plunging it into the box he causes the metal filings to adhere to it. Secret: The magnet is of the ordinary variety, the pill-box is double. The top compartment contains zinc filings; the bottom compartment used by the magician contains steel or iron filings. The spectators test the first compartment. The magician uses the second.



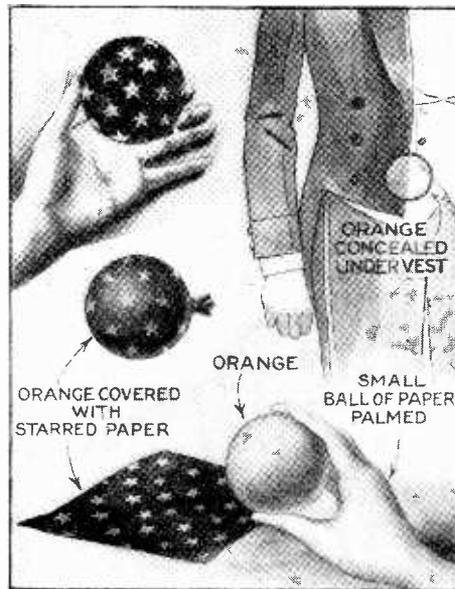
## The Plate Eater

THE magician patters about East Indian tribes who feast upon stones, metal and the like. He picks up a large white china plate, and without hesitation, apparently, bites off a large piece. The action produces a loud snap as though plate breaks. The magician then seems to swallow the piece chewed out and holding the plate in front of his stomach, he rubs the missing section with his fingers whereupon the plate is once again mysteriously restored to its original form. Secret: An irregular flat piece of metal is slid over the edge of the plate just before the magician puts the plate into his mouth. This makes it seem that a piece has been chewed out of the plate when the latter is held in front of the coat. The snap is produced by clicking a coin against the back of the plate, and restoration, by palming the metal piece.



PLATE RESTORED

## Mystic Ball



THE magician passes a sphere for inspection. This proves to be a black ball decorated with gold stars. Returning to the platform, he bares his arms to the elbows, rolls the ball between his palms, and when again displayed it is found to be an orange. Secret: The ball itself is the size of an orange and has been decorated to conform with the pattern on black paper, which is used to cover an orange concealed beneath the vest. The ball is substituted for the orange and the paper is removed under cover of the palm.

# Let's Laugh

ALL jokes published here are paid for at a rate of \$1.00 each; \$3.00 is paid for the best joke submitted each month. Jokes should be scientific. Write each joke on a separate sheet of paper and add name and address to each sheet of paper.

### SURE CURE

The druggist instructs his new clerk: "See this bottle? This is what we always use for filling prescriptions which we cannot read."—*L. Lansberg.*

### FREE-WILL OFFERING



A farmer's wife shipped a crate of eggs to a wholesale house in a city, but before doing so she wrote on one of them: "I got 2 cents for this egg. What did you pay for it?" And she

added her name and address.

A year later she received an answer. It was written on the highly embellished stationery of an actor. "My dear madam," he wrote, "while playing the part of Hamlet, out West recently, I received your egg for nothing."

—*Mrs. H. E. Chrisman.*

### TOO TRUE

TEACHER—What is the mechanical advantage in having a pump with a long handle?

FRESHMAN—So you can have someone to help you pump.

—*Ruth H. Johnson.*

### ONE GOOD TURN—

PILOT (to lady inspecting his plane) — And this, madam, is the motor.

LADY—But if its fastened like that, how can it turn over?

—*Floyd E. White.*



### INFANTS DON'T KNOW THE DIFFERENCE

FLAPPER—Mother, the nurses in the hospital here are worse than thieves! I've seen two mixing water with milk for the babies' bottles.—*H. Freeman.*

### THE CUT-UP

First Prize \$3.00



HE (twice nicked by the razor) — Hey, barber, gimme a glass of water.

BARBER — Whatsa matter, hair in your mouth?

HE — No, I wanna see if my neck leaks.

—*Jerome Kukla.*

### GREAT SANDWICHES

MANDY—Must I give Rastus one of dem musta'd plastahs again today, doctah?

DOCTOR—Yes, Mandy, I think you had better.

MANDY—Whell, he says to ox yo' kin he have a slice of ham wid it, to kill the taste.

—*J. Tallarico.*

### THIS BURNS ONE UP

BOOB—It's a lye.

BIGGER—What's a lie?

BOOB—Potash.

### EDUCATION

MRS. GOTTRICHQUIKK (to visitor) — Yass, our little son Jamie is learning French and algebra, you know. Jamie, tell the lady how to say "Good morning" in algebra.

### SPLENDID YARN

CLERK (showing customer golf stockings) — Wonderful value, sir. Worth double the money. Latest patterns, fast colors, hole-proof, won't shrink, and it's a good yarn.

CUSTOMER — Yes, and very well told.

—*Mildred Taylor.*

### QUITE RIGHT

MARY — I have a cold in my head.

JACK — Well, you have to have something up there. —*Victor Lamping.*

### TRY IT SOMETIME

WIFE — So you did have your hair cut?

HUSBAND — No, dear, I just had my ears moved down a half an inch.

—*La Verne Anderson.*

### WOE IS ME, WHOA!

PASSENGER (after the first night on board ship) — What's become of all my clothes?

STEWARD — Where did you put them last night?

PASSENGER — I hung them in that cupboard over there. The one with the little round glass door on it.

STEWARD — That isn't the cupboard. That's the port-hole.

—*Frank Lindenfelser.*



### AND SUCCEEDED

FIRST WORM — How did your wife get to acting so crazy?

SECOND DITTO — Oh, she tried to have the last word with an echo!

—*Warren Rose.*

### DID HE EXPECT ICE CREAM?



The little boy from the slums was being shown around the dairy farm. He watched the process of milking with interest, but after tasting a glass of the fresh milk he said, "You'll have to let it run for a while. This is warm."

—*H. Freeman.*

### Sciency Simon—Scientist



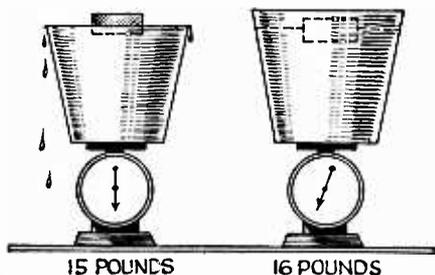
SCIENCE LESSON  
NO. 41  
**A** MOVING BODY HAS INERTIA, OR THE TENDENCY TO MAINTAIN ITS MOTION ... WHEN GETTING OFF A MOVING VEHICLE, ONE SHOULD ALWAYS FACE FORWARD, SO THAT, AS HIS MOMENTUM CARRIES HIM ALONG, HE WILL BE ABLE TO MAINTAIN HIS BALANCE ... IF HE FACES IN THE OPPOSITE DIRECTION, HIS INERTIA WILL BRING ABOUT THE SAD RESULTS SHOWN IN THE LAST SCENE

W. LEMKIN

Ask Archimedes

(2348) Robert Johnson, Philadelphia, Pa., writes:

Q. 1. Reading an issue of your magazine, and seeing that you have a department devoted to questions and answers, I would like to ask the following question. If a pail containing water weighs 15 pounds, and an object weighing one pound is placed in the water, does the



*This is not an intricate problem, but it is probably as interesting as that described in the February issue.*

pail weigh 16 pounds or 15 pounds?

A. 1. The weight of the pail in this instance depends on certain conditions. One of these conditions is the amount of water in the pail. If the pail is completely filled, and the object placed in it floats, then, according to Archimedes law, this object should displace its own weight of water. The overflow would naturally lessen the entire weight of the pail, and consequently, the weight would be 15 pounds and not 16. If the object placed in the water sinks to the bottom, it will displace the liquid equivalent of its specific gravity. In this case the pail would weigh more than 15 pounds, this factor depending on the density of the object placed in the water. If the pail was not filled to the top when an object was placed in it, the entire weight would increase in accordance with the additional weight of the object.

Now It Is and Now It Isn't

(2349) Martin Gardner, Tulsa, Okla., writes:

Q. 1. I have recently read an article on handwriting and forgeries in which it is stated that ink eradicators do not remove the ink, but merely bleach it, and that ink so bleached can be easily brought out by a process of "fuming" known to all handwriting experts. Can you give me a description of this process, what chemicals are used, and how it is performed?

A. 1. The article was correct. Ink eradicators do not remove ink, but bleach it. Two liquids are usually used. One of them is a mild acid and the other a strong bleaching agent in the form of a hypochlorite. Sometimes the ink may be brought to something near its original state by merely heating the paper or cloth on which the ink is recorded. If the ink has an iron base it may be brought back to its original state by fuming with sulphuric acid.



Try This on Your Rifle

(2350) David Watkins, Kansas City, Mo., writes:

Q. 1. During one of our physics classes this question came up. A train is traveling north at the rate of 100 m.p.h.; a gun is fired from the train at the same rate in the opposite direction. What happens to the bullet? I maintain that the bullet falls to the ground from the gun. My reasons for this conclusion are as follows: the bullet while in the gun has an initial velocity of 100 m.p.h. due north. This bullet has a rate of 100 m.p.h. toward the south. When



*Another problem, but it is merely theoretical. Is the speed of the bullet possible?*

the gun is fired the bullet has a rate of 0 m.p.h. The gun literally goes off and leaves the bullet. Then the force of gravity goes into effect and the bullet falls to the ground. I hope to see a solution of this problem in an early issue of your magazine.

A. 1. Your solution is perfectly correct. In shooting a bullet from a rifle under ordinary conditions, there are two forces entering into its flight. One is the force of gravity, downward, and the other is the velocity imparted to it in a horizontal direction by the rifle. In this case, the velocity of the train is 100 miles an hour in one direction, and the velocity of the bullet is 100 miles

The Oracle is devoted to questions of general interest. Write legibly on one side of paper. Send diagrams or sketches on separate sheets. A nominal charge of fifty cents is requested from those who desire a quick answer by mail.

an hour in the opposite direction, consequently these two forces neutralize each other. The only force, therefore, that enters into the flight of the bullet is gravity. This would cause the bullet to drop almost immediately to the ground. As the object drops with a speed of 32 feet per second, it would seem to the human eye that the bullet hit the ground almost immediately.

Ten Years After

(2351) H. C. Long, Tishomingo, Miss., asks:

Q. 1. There is a certain star that is so far from the earth that it takes the light from this star 10 years to reach the earth. Should this star cease to shine tonight, would the people on this earth know it ten years from tonight?

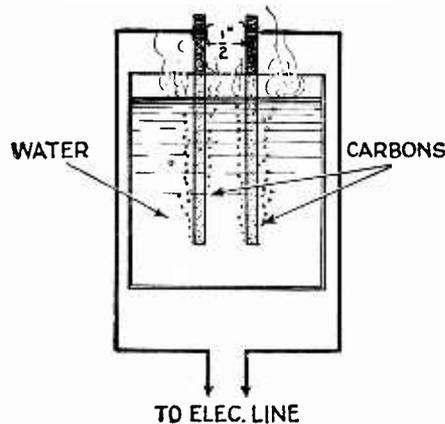
A. 1. Granted that the light ceased instantaneously, the people on the earth would have no indication until ten years after the extinction.

One Way of Getting Hot Water

(2352) James J. Atkinson, Pelham, N. Y., asks:

Q. 1. What is the most efficient form of converting water into steam by electricity?

A. 1. Tests seem to indicate that from the standpoint of efficiency, the heater employing two electrodes immersed in a liquid gives the most economical results. These electrodes can be made of carbon, or any metal that will not be attacked by electrolytic action. The heater is non-operable if the water used is distilled or if rain water is employed. A slight quantity of some impurity is necessary. This impurity need not be replenished, because it does not pass off in the form of steam or gas. One obvious advantage of a heater of this type is that as soon as the water boils off, the current is automatically interrupted. By



*We know of no simpler method of obtaining hot water than is shown above.*

properly proportioning the plates in respect to size, and with reference to their distance from each other, it is possible to connect the heater directly to the 110 volt power lines supplying either alternating or direct current. Aluminum electrodes  $\frac{3}{4}$  of an inch wide separated  $\frac{1}{2}$  inch, and 10 inches long will not pass too much current so as to blow fuses. A small quantity of salt will render the water conductive, if rain water is used.

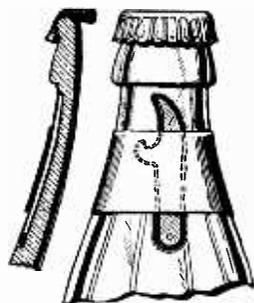
# Yankee Brains *at* Work



## Sniffing Simplified

No. 1,732,674, issued to Roger J. Deyer. The inventor's object was to provide a device which might be used as a deodorizer or humidifier. It comprises an electric heating element for vaporizing the liquid on a wick and a means of preventing the liquid from flowing into the base.

## An Aid for the Soda-Pop Addict



No. 1,725,726, issued to Lucy Cotton Ament. The object is to provide a means for equipping soda bottles or the like with a metal opener. It comprises a bottle built with a recess and a metal opener to fit into the recess and be secured by paper tape.

## Non-Backfiring Window

No. 1,741,525, issued to Ernst Kreissig. Provides a spring-counterbalancing means of preventing a window from sliding up due to faulty sash-weights. It consists of two members reinforced by springs which press against a slidable member, rendering it immovable when placed in a certain position.



**Notice to Readers:**

**A**N appreciable period of time elapses between the filing of a patent and the date upon which the patent is granted. During this interval inventors frequently move. We regret that it is quite impossible for us to supply the correct addresses of persons whose inventions appear on this page, nor can we furnish information about when the product may appear on the market. Attorneys who prosecuted the patent cases can furnish the most reliable data. Copies of patents are available at ten cents each from the U. S. Patent Office, Washington, D. C.

## Save Our Subs

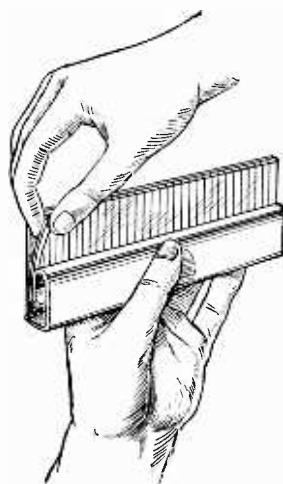
No. 1,740,231, issued to Edward Ellsberg. The invention relates to the rapid salvaging of sunken submarines. It consists of a means for equipping the boats with hooks, built into the hull while construction is proceeding, and in addition outlines the correct means for obtaining the maximum strength from these hooks. It also provides for pontoons which may be used to raise the sunken boat from its position.



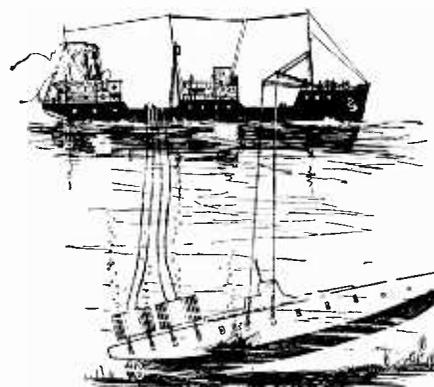
## Recipe Rack for Young Cooks

No. 1,729,126, issued to George H. Reimer. The invention relates to card index boxes for holding recipes. It consists of a rectangular box for containing individually removable cards, and external projecting members to secure these cards in an upright position at the edge of the box.

## A New Coat for Lucifer

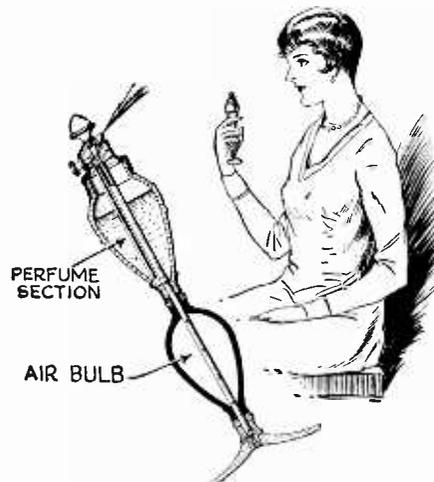


No. 1,739,822, issued to Egar Bouchard. The inventor's object was to improve the construction of paper match books, and so arrange them as to cause the match to light when withdrawn from the book. It consists of a rectangular piece of material divided into a number of matches, a protruding edge of abrasive material folded over the tips of the matches and so arranged that it will ignite the matches when they are withdrawn—one at a time.



## For the Ladies

No. 1,740,373, issued to Arthur J. Shaukis. The invention seeks to improve atomizers so that they will be non-leaking and air-tight, and in addition be more compact and efficient. It comprises two compartments, one for air and one for liquid, a base from which leads an air tube topped at the exit by a nozzle.





**Open this  
FREE BOOK**

*and you open  
the door to*

**SUCCESS  
in  
RADIO**

**Y**OU, too, can be trained for a big-time radio job . . . Clip this coupon now and send for this **FREE BOOK** . . . Read it page by page . . . see for yourself why thousands of fellows just like you are now making from \$50 to \$100 a week . . . why many others earn as high as \$10,000 to \$15,000 a year and even more. This free book gives you 40 fascinating pages of pictures and text, all about RCA Institutes, the only school that is endorsed by the Radio Corporation of America . . . The school that actually sends you radio instruction direct from RCA . . . the very source of radio achievement!

**Easy to Learn Radio  
At Home in Your Spare Time**

Let the RCA Institutes Home Laboratory Training Course give you the real inside facts of radio . . . quickly and easily. Use your spare time to train for success with the remarkable

outlay of screen-grid apparatus given to every student of this course. You learn how to solve every radio problem such as installing, repairing and servicing fine sets. This is the training that will help *you to make money in radio!*

**RCA Graduates in Big Demand**

For more than 20 years, there has been a well-paid position in Radio waiting for practically every graduate of RCA Institutes. This is a record unequalled by any other school. Only the vast resources of RCA could give you this practical training . . .

**Send for this Free RCA Book  
"Radio . . . the Field  
of Unlimited Opportunity"**

Start today on the road to Success in Radio . . . Send for this **FREE BOOK**. Every page is packed with pictures and text telling you all you want to know about RCA Institutes, the oldest and foremost Radio training organization in the world. Radio can easily be **YOUR ROAD TO SUCCESS** . . . That's why you should

**Clip this Coupon NOW!**

**RCA INSTITUTES, INC.**

Formerly  
Radio Institute of  
America



RCA INSTITUTES, Inc.  
Dept. EX-4, 75 Varick Street, New York

Gentlemen: Please send me your **FREE** 40-page book which illustrates the brilliant opportunities in Radio and describes your laboratory-method of instruction at home!

Name.....

Address.....

**PATENTS SECURED  
TRADE-MARKS REGISTERED**

High-class professional services for Inventors and Trademark users is necessary for **Proper Protection**. We offer you our facilities on reasonable terms. If you have an invention send us a model or sketch and description and we will give you our **Opinion** whether your invention comes within the provisions of the Patent Laws. Our book **"HOW TO GET YOUR PATENT"** and Record of Invention Certificate sent on request. *Delays are Dangerous in Patent Matters.* We Assist our Clients to Sell their Patents. **TERMS REASONABLE. BEST REFERENCES.**

**RANDOLPH & CO.**  
PATENT ATTORNEYS  
Dept. 172, Washington, D. C.

Name .....

Street .....

City .....

**PATENTS  
TRADE-MARKS**  
**"DO NOT LOSE YOUR RIGHTS  
TO PATENT PROTECTION"**  
Before disclosing your invention to anyone send for blank from "EVIDENCE OF CONCEPTION" to be signed and witnessed.  
LANCASTER, ALLWINE & ROMMEL  
Registered Attorneys  
255 OURAY BLDG. WASHINGTON, D. C.  
Originators of forms  
"Evidence of Conception"

**\$165,000**

**REWARD for an IDEA**

That sum was paid to the inventor of "Kiddle Kars." Here is a remarkable book which tells you what inventions are **NEEDED** in every field. Don't waste your ideas. Send today for

**1000 NEEDED INVENTIONS**

Prepared by Raymond F. Yates, famous inventor, former managing editor of Popular Science Monthly, who knows what manufacturers want. New, revised 1930 edition, contains valuable chapters on Aviation and Television. This book may start you toward a fortune. Send no money. Just write a postcard. Pay mail man only \$1.50 plus postage when book arrives. Money back after ten days if desired. Limited offer. Write now. Get started in right direction. (Outside U. S. \$1.70 cash with order.)

**Bureau of Invenitive Science**  
74 Wisner Bldg., Rochester, N. Y.

**PATENTS**

WRITE FOR FREE INSTRUCTIONS  
Send drawing or model for examination.  
**CARL MILLER, Patent Attorney**  
Former member Examining Corps, U. S. Patent Office  
261 McGill Building, Washington, D. C.

**PATENTS**

**BOOKLET FREE HIGHEST REFERENCES  
PROMPTNESS ASSURED BEST RESULTS**

Send drawing or model for examination and advice.

**WATSON E. COLEMAN, Patent Lawyer**  
724 9th Street, N. W., Washington, D. C.

**PATENT ADVICE**

CONDUCTED BY JOSEPH H. KRAUS

In this Department we publish such matter as is of interest to inventors and particularly to those who are in doubt as to certain patent phases. Regular inquiries addressed to "Patent Advice" cannot be answered by mail free of charge. Such inquiries are published here for the benefit of all readers. If the idea is thought to be of importance, we make it a rule not to divulge all details, in order to protect the inventor as far as it is possible to do so.

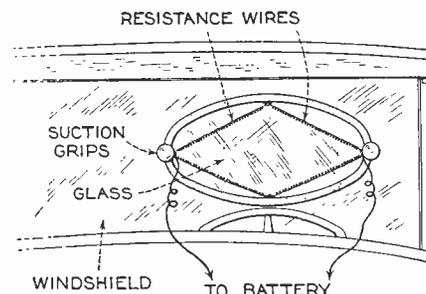
Should advice be desired by mail, a nominal charge of \$1.00 is made for each question. Sketches and descriptions must be clear and explicit. Only one side of sheet should be written on.

**NOTE:**—Before mailing your letter to this department, see to it that your name and address are upon the letter and envelope as well. Many letters are returned to us because either the name of the inquirer or his address is incorrectly given.

**Clear Windshields**

(1210) W. R. Johnson, Lincoln, Neb., suggests a means of heating the glass of a windshield by means of an electrical heating element operating on a car's electrical system and placed near the edges of the glass for the purpose of preventing the accumulation of moisture and for melting snow and sleet formation.

A. 1. This suggestion is not new, and is poorer than a great many of the systems



already devised. One of the simplest consists of a large rubber gasket in which is set an oval-shaped piece of glass. The gasket is fitted with a diamond-shaped resistance coil substantially as indicated in the diagram. The gasket is held in place by the usual rubber suction devices. This idea is far superior to yours. The heat is not in direct contact with the glass, and is evenly distributed over the important visual part. In your method heat is applied to the edges of the glass, and as glass is a relatively poor conductor, there is a greater likelihood of breakage should the glass be wet by a cold drop of water after current to the resistance wire has been turned on for some time. The mid portion of the glass through which the operator must look is the coldest part and more likely to accumulate moisture and sleet. We suggest no action.

**Can He Patent?**

(1211) F. H. Reynolds, Temple, Texas, asks if he can take out a patent on an electrical apparatus already patented, but a decided improvement on the original. He wants to know how he can go about it, how much it will cost and if it would be necessary to have a model made.

A. 1. Your letter does not contain sufficient information to warrant a definite answer. You state that your idea is an improvement of the original, but do not advise if it is a radical departure of the same.

If it is merely an improvement on an existing machine you can get a patent on the improvement, provided, of course, that the improvement has not been heretofore covered. If you then build the new machine with your improvement you will

have to pay royalty to the present holder of the patent should he agree to sell such an interest to you. If he refuses, you can do nothing but offer your improvement to him. If the holder of the patent does not take your improvement under consideration, there is nothing that you can do with the idea.

Our suggested procedure would be to place the entire matter in the hands of a reliable patent attorney; let him make a search and advise you on costs. Charges will depend largely on the amount of work the attorney must do, the number of drawings that have to be made, possibility of interference, etc.

Most patents are taken out with drawings as a foundation. In the majority of cases, even the experimental model is not constructed. On occasion, the patent office calls for a model, whereupon you would have to build the same. This is rare.

**Two Games**

(1212) Wallace Nordwall, Duluth, Minn., asks for our opinion on two games; one of which is a ball shooter for small pool and billiard tables, and the other is a horseshoe pitching game, with small shoes and spring actuated pitching devices.

A. 1. Neither of the ideas which you have advanced is strictly new. The billiard shooter is a relatively old stunt and has been devised for use on small \$1.00 pool tables. While the hand instrument is slightly different than those now employed, its effect is practically identical. In the modern styles two hands are used, one hand guiding the cue and the other pulling back on the cue and releasing it, whereupon a spring drives the cue forward and it hits the small billiard ball. This type is more nearly like the original game than your single-handed shooter and hence better than yours.

The table horseshoe game is not very practical because it reduces the necessary  
(Continued on page 1124)



At the right is a view of my drafting and specification offices where a large staff of experienced experts are in my constant employ.



All drawings and specifications are prepared in my offices.

# PATENTS

My Offices  
Just Across Street  
From U. S. Pat.  
Office



## Protect Your Ideas

### Take the First Step Today—Action Counts

If you have a useful, practical, novel idea for any new article or for an improvement on an old one, you should communicate with a competent Registered Patent Attorney AT ONCE. Every year thousands of applications for patents are filed in the U. S. Patent Office. Frequently two or more applications are made for the same or substantially the same idea (even though the inventors may live in different sections of the country and be entirely unknown to one another). In such a case, the burden of proof rests upon the last application filed. Delays of even a few days in filing the application sometimes mean the loss of a patent. So lose no time. Get in touch with me at once by mailing the coupon below.

### Prompt, Careful, Efficient Service

This large, experienced organization devotes its entire time and attention to patent and trademark cases. Our offices are directly across the street from the U. S. Patent Office. We understand the technicalities of patent law. We know the rules and requirements of the Patent Office. We can proceed in the quickest, safest and best ways in preparing an application for a patent covering your idea. Our success has been built on the strength of careful, efficient, satisfactory service to inventors and trademark owners located in every state in the Union.

### Strict Secrecy Preserved—Write Me in Confidence

All communications, sketches, drawings, etc., are held in strictest confidence in strong, steel, fireproof files, which are accessible only to authorized members of my staff. Feel free to write me fully and frankly. It is probable that I can help you. Highest references. But FIRST—clip the coupon and get my free book. Do THAT right now.

### No Charge for Information On How to Proceed

The booklet shown here contains valuable information relating to patent procedure that every inventor should have. And with it I will send you my "Record of Invention" form, on which you can sketch your idea and establish its date before a witness. Such evidence may later prove valuable to you. Simply mail the coupon and I will send you the booklet, and the "Record of Invention" form, together with detailed information on how to proceed and the costs involved. Do this NOW. No need to lose a minute's time. The coupon will bring you complete information entirely without charge or obligation.

## Clarence A. O'Brien

Registered Patent Attorney

Member of Bar of: Supreme Court of the United States; Court of Appeals, District of Columbia; Supreme Court, District of Columbia; United States Court of Claims.

PRACTICE CONFINED EXCLUSIVELY TO PATENTS, TRADEMARKS AND COPYRIGHTS

## Inventors Write for these Free Books



### Mail this Coupon NOW

CLARENCE A. O'BRIEN  
Registered Patent Attorney

533 Security Savings & Commercial  
Bank Bldg., Washington, D. C.

—or—  
Suite 1106, Woolworth Bldg.  
New York City

Please send me your free book, "How to Obtain a Patent," and your "Record of Invention" form without any cost or obligation on my part.

Name .....

Address .....

(Important! Write or print plainly, and address office nearest you)

**Have You A New Idea?  
Would You Like  
To Patent It?**

**—Is the Delay Due To  
LACK of FUNDS?**

**If so, we can help you**

**WRITE** us immediately for free information regarding our time payment plan for the benefit of inventors which should enable you to proceed without further delay.

MAIL THIS COUPON NOW

INVENTORS FINANCE CORPORATION  
Dept. C. Union Trust Bldg., Washington, D. C.

Please send me particulars with reference to above plan, and information about the way to proceed.

Name .....

Address .....

City ..... State .....

**NEW YEAR - NEW IDEA**  
**PATENT YOUR IDEAS**  
Call or send me a sketch of your invention. Phone LONGacre 3088  
**FREE** { Inventors' Recording Blank  
Confidential Advice  
U. S. and Foreign Patents secured by  
**Z.H.POLACHEK** Reg. Patent Attorney  
Consult. Engineer  
1234 Broadway, New York

**PATENTS** AS one of the oldest patent firms in America we give inventors at lowest consistent charge, a service noted for results, evidenced by many well-known Patents of extraordinary value. Book, Patent-Sense, free.  
Lacey & Lacey, 644 F St., Washington, D. C. Estab. 1869

**PATENT YOUR INVENTIONS**  
**EDWARD GOTTLIEB**  
Attorney in Patent Causes  
5 Beekman Street  
New York  
Inventions Developed—Representative for Blair Tool and Machine Corp.

**Patents Trade-Marks**  
**Edward C. Sasnett,**  
Atty.-at-Law, Registered Patent Atty.  
Formerly a Principal Examiner  
U. S. Patent Office  
516-E McGill Bldg., Washington, D. C.

**INVENTORS**  
We have been in business 30 years. If your invention or patent has merit, send details or model, or write for information. Complete facilities. References. Adam Fisher Mfg. Co., 205-D Enright, St. Louis, Mo.

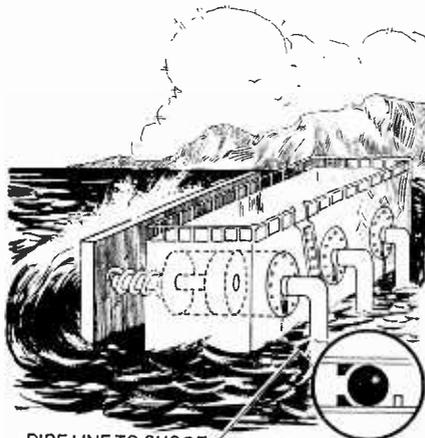
**INVENTORS MODELS**  
Mechanical Specialists for over 20 years. Rendering Complete Service to the man with an Idea.  
**Labor-Saving Machinery Designed & Built**  
Circular - References - Guarantee - Free  
**BERNARD & HELLER - 31 East 17th St. NYC.**

skill and is another of the many shooting products now found on the market. If an individual is desirous of pitching horseshoes, he can find the rubber horseshoes quite effective, non-destructible, and non-damaging. We doubt very much that a market for either product can be obtained, even if you manufactured the same yourself and would not advise patent procedure.

**Wave Motor**

(1213) W. B. Jaruis, Marshfield, Ore., submits an idea for a wave motor consisting of a large concrete structure provided with piston-like devices moving back and forth in cylinders. Waves dashing against the plate drive it back and operate the pumps. The compressed air so produced is to be employed for developing power.

A. 1. Hundreds of systems for developing power by the force of ocean waves or by the undulating movement of those waves have been devised, patented, and some have even been experimentally tried.



The difficulty with all methods of this nature is that the inventors do not take into consideration the terrific pounding produced by the waves, the variability of the source of power, the damage that can be done to the various parts of the apparatus by debris, tree stumps, flotsam, and the damage that can be done by large cakes of ice, freezing temperatures and the like.

While waves always do present a source of power it is quite impossible to build a structure that will constantly withstand the terrific bombardment upon the surface.

One of the simplest of methods that uses the power of ocean waves as a source of compressed air supply, consists of an ordinary steel tank submerged a considerable distance from shore. The bottom of the tank is open. As the waves rise and fall, a greater or lesser quantity of air is compressed in the steel tanks and a pulsating form of energy is set up. This alternating compression and decompression of the air can be used for actuating engines which in turn produce power. Inasmuch as almost the entire steel tank is under water at all times, the method presents a rather safe way of utilizing power from ocean waves, but even here a good anchor is costly.

There are very few organizations that would be interested in exploiting a product of this nature, and as a consequence, we would advise against patenting procedure.

**Tesla Maps Our  
Electrical Future**

By H. Winfield Secor

(Continued from page 1077)

quite extensively," said Dr. Tesla, "but I had similar filamentless, gas-filled electric lamps in my laboratory at Houston Street over thirty years ago. I even had these lamps standardized to 50 candle-power each, and used them instead of the orthodox illuminating devices. It seems that I was also far ahead of my time in the use of filamentless tubes, bent in the shapes of characters and other forms, as now extensively used. The light from properly filled vacuum tubes is of indescribable beauty, hygienic and more economical, and the lamps last forever. For these reasons, I predict that very shortly the old-fashioned incandescent lamp, having a filament heated to brightness by the passage of electric current through it, will entirely disappear and that we will shortly be using new filamentless, gas-filled lamps in our homes, offices and factories throughout the world."

I asked Dr. Tesla what he thought of the eventual development and form of television apparatus.

"The present day television inventors are on the wrong track," said Dr. Tesla, "and we shall see in a future not distant, a very simple means of transmitting the living daylight image over a wire or by wireless, without the use of any scanning disc, special synchronizing means and all the bewildering paraphernalia now employed to give an image the size of a postage stamp, and one that is far from satisfactory at that. I have made discoveries many years ago which give me every reason to believe that television of the future will have all of the complicated parts located at the transmitting or central station, and all that the subscriber will have in his home or office to receive the reproduced image will be practically nothing but a screen, together with a suitable wave or station selector."

Among some of the interesting and revolutionary inventions perfected by Nikola Tesla, and which are little known to the public, we find such radically new apparatus as that for the wireless transmission of power, bladeless turbines, airplanes that rise and descend vertically, Tesla high frequency transformers, and the Tesla viscosity speedometer. The higher-priced American cars are fitted with the Tesla speedometer, which registers the speed in miles per hour; and also for the engineer's use there is the tachometer, or revolution counter, using the unique principle applied by Tesla, viz., the viscosity or drag of the air between two discs or cups. One of the accompanying diagrams shows the principle of this extremely simple and accurate speed indicator.

I asked Dr. Tesla if his speedometer was to be used on some of the American cars being built in very large numbers, and he stated that he had received inquiries from Ford and other quantity producers of automobiles, and as soon as the manufacturing price could be made to conform with the low cost necessary for the cheaper-priced cars, they undoubtedly would be fitted on these cars. This speedometer is based on the fact that when one disc is driven by a flexible shaft from the engine transmission, the drag of the air particles between this revolving disc and a closely positioned second disc is such that the latter will be turned through part of a circle, proportional to the speed of the driven disc. It is only necessary, therefore, to calibrate the second disc in revolutions per minute or miles per hour,

to have a perfect speed indicator.

In the Tesla steam turbine no blades of the usual type found in such machines are employed at all. Instead there is simply a series of smooth discs similar to a number of phonograph records, mounted on a shaft with a small space between them. When gas, steam or water, for example, is allowed to strike through or between these discs from the nozzle, the friction of the fluid on the surfaces of the discs causes a rotation of the same and their attached shaft. As much as twenty horse-power per pound of weight of rotor can be developed by his turbine. Dr. Telsa took out patent in every important country in the world on this unique type of prime mover and it represents the very simplest form of apparatus for converting energy yet discovered.

Aircraft of today are far away from the ultimate form, thinks Dr. Telsa, and the airplane of tomorrow will, he believes, be driven by wireless electric power transmitted from the central station or stations located at various spots on the earth. In this respect it is interesting to mention that Telsa has shown, thirty years ago in patents and in textbooks, the complete system for transmitting and receiving wireless power, with all the tuning circuits, transformers and other details.

Tesla upholds the startling theory formulated by him long ago, that the radio transmitters as now used, do not emit Hertz waves, as commonly believed, but waves of sound. He says that a Hertz wave would only be possible in a solid ether, but he has demonstrated already in 1897 that the ether is a gas, which can only transmit waves of sound; that is such as are propagated by alternate compressions and rarefactions of the medium in which transverse waves are absolutely impossible. Dr. Hertz, in his celebrated experiments, mistook sound waves for transverse waves and this illusion has been continually kept up by his followers, and has greatly retarded the development of the wireless art. As soon as the experts become convinced of this fact they will find a natural and simple explanation of all the puzzling phenomena of the so-called radio.

### Sees Wireless Power Transmission

Dr. Tesla bases his vast amount of work on the wireless transmission and reception on the marvelous phenomenon of terrestrial resonance, which he discovered in 1899, and his "magnifying transmitter." He considers the whole earth as a huge wire or conductor, and having determined its constants in electrical units, he has designed the proper wireless transmitter needed to set the globe into powerful electrical vibrations, so that at any point of its surface. If we desire to operate lights or motors according to Telsa's power transmission theory, all we have to do is to connect an electrical capacity, such as an antenna or other suitable system of conductors through the apparatus. This capacity then absorbs its proper quota of oscillating electrical energy of the transmitter. We have today only radio signals or radio-telephone speech, but if Tesla's theory is right, and many engineers think that it is, eventually we shall have no more power transmission lines running from central stations for hundreds of miles to supply us current for our electric fans, toasters, stoves and lights. We shall instead have an electrical capacity in the form of a ball or cylinder perhaps, placed in our attic or possibly in the ceiling of the house and when connected through a Tesla transformer to the earth, we will pick up the desired electrical energy to operate our

(Continued on page 1126)

# PATENTS TRADE-MARKS AND COPYRIGHTS



**VICTOR BUILDING**

Our New Building Nearly Opposite U. S. Patent Office Specially Erected by Us for Our Own Use

## OUR OFFER: FOR THE PRODUCTION OF YOUR INVENTION

**YOUR FIRST STEP**—The inventor should write for our blank form, "RECORD OF INVENTION." Before disclosing your invention, a sketch and description should be made on our "Record of Invention Blank", signed, witnessed, then returned to us and we will place it in our fireproof secret files. **We will also give our opinion** as to whether the invention comes within the Patent Office definition of a patentable invention. This "Record of Invention" will serve as "proof of conception" until the case can be filed in the Patent Office. **There is no charge or obligation for this service.**

## Write for Our Five Books Mailed Free to Inventors

*Our Illustrated Guide Book*

### HOW TO OBTAIN A PATENT

Contains full instructions regarding U. S. Patents, Our Methods, Terms, and 100 Mechanical Movements illustrated and described.

### OUR TRADE-MARK BOOK

Shows value and necessity of Trade-Mark Protection. Information regarding TRADE-MARKS AND UNFAIR COMPETITION IN TRADE.

### OUR FOREIGN BOOK

We have Direct Agencies in Foreign Countries, and secure Foreign Patents in shortest time and at lowest cost.

### PROGRESS OF INVENTION

Description of World's Most Pressing Problems by Leading Scientists and INVENTORS.

### DELAYS ARE DANGEROUS IN PATENT MATTERS

**TO AVOID DELAY: YOU SHOULD HAVE YOUR CASE MADE SPECIAL IN OUR OFFICE** to save correspondence, secure protection and early filing date in Patent Office. You should send us a model, sketch or photograph with a description of your invention together with \$25.00 on account. We will make an examination of the U. S. Patent Office records and if it is Patentable we will prepare the official drawings immediately and forward them for approval. If the invention is not patentable we will return the fee less the cost of the examination.

### PAYMENT OF FEES IN INSTALLMENTS

It is not necessary that the total cost of a patent be paid in one payment. We permit our clients to pay for their applications in three installments as the preparation of the application progresses in our office.

**ALL COMMUNICATIONS AND DATA STRICTLY SECRET AND CONFIDENTIAL. INTERFERENCE AND INFRINGEMENT SUITS PROSECUTED.** Our Large, Comprehensive Organization has been established for 30 years and offers Prompt, Efficient and Personal Service by experienced Patent Lawyers and Draftsmen. We shall be glad to have you consult us or to answer any questions in regard to Patents, Trademarks or Copyrights without charge.

### WE ASSIST OUR CLIENTS TO SELL THEIR PATENTS

**Highest References—Prompt Service—Reasonable Terms**

FREE  
COUPON

WRITE TODAY  
**VICTOR J. EVANS & CO.**

Registered Patent Attorneys: Established 1898

MAIN OFFICES: 715 Ninth St., Washington, D. C.

BRANCH OFFICES: 1007 Woolworth Bldg., New York City; 1640-42 Conway Bldg., Chicago, Ill.; 514 Empire Bldg., Pittsburgh, Pa.; 828 Fidelity Phila. Trust Bldg., Philadelphia, Pa.; 1010 Hobart Bldg., San Francisco, Calif.

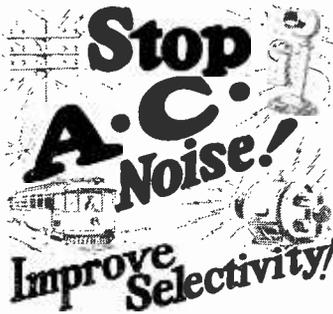
Gentlemen: Please send me FREE OF CHARGE your books as described above.

Name.....

Address.....

# Tesla Maps Our Electrical Future

(Continued from page 1125)



RADIO reception may be made much more enjoyable by plugging in a Falck Claroceptor between the light socket and your set. By blocking out the line interference noises, this wonderful device also helps selectivity and distance. Tested, proved. Thousands now in successful use all over America. No change required in your set. Only equipment of the kind. Compact size: 3½ x 5½ x 2½". Made by pioneer radio manufacturer. At radio parts dealers, or write us for new free folder.

**Falck** \$7.50  
(With Cord and Plug)  
**CLAROCEPTOR**  
Manufactured by ADVANCE ELECTRIC CO.  
Dept. S.I., 1260 W. Second St., Los Angeles, Calif.  
JOBBER AND DEALERS—GET OUR PROPOSITION

## NOW—Become an Electro-Technician By this Amazing New Method

Train the NEW PRACTICAL WAY!  
Prepare to meet the tremendous demand for Electro-Technicians in all branches of electricity. Splendid opportunities. BIG PAY for trained men. Now is the time to start.

**BRINGS SCHOOL TO YOUR HOME**  
Home Shop-Laboratory worth over \$60.00 yours without extra cost. Enables you to "learn by doing." Not by texts alone—but with patented new Unit Board System. Brings full-size Electrical Equipment right into your home. Train this fascinating new way under supervision of engineers of America's great Electrical School.

**FREE 48-PAGE BOOK**  
Write today for FREE illustrated 48-page book giving full details of how you can become an ELECTRO-TECHNICIAN by the wonderful new Home Shop-Laboratory Method. No obligations. Mention age.  
Dept. 27, EXTENSION DIVISION

**SCHOOL of ENGINEERING of Milwaukee**

**Complete WOODWORKING SHOP FOR INCOME OR HOBBY**

FIVE FOOT WORKSHOP INCLUDES:  
Planer, Circular Saw, Lathe, Disc Sander, Buffer, Grinder, Drill Chuck, Motor, V Belt Pulleys, Sub Base, Cable with Plug. Under the magic of Workace Electric Woodworker raw lumber is easily converted into useful and valuable articles. Man or boy will enjoy Workace. Simply plug into electric light socket. \$9.00 down will bring it. Send now for offer.

**J. D. WALLACE & CO.**  
California & Wilcox, Chicago  
11 W. 42nd St., New York  
268 Market Street, San Francisco

**9.00 DOWN \$89.00 CASH**

**WORKACE Electric WOODWORKER**

household devices. It will be a simple matter to connect a meter with this arrangement, so that the energy can be measured and paid for in the regular way to the central station owners.

Flying around the world with a Tesla powered airplane is a possibility of the near future. The plane will not have to store every bit of available space with gasoline and oil, nor will it have to carry a heavy engine or engines. A light electric motor will spin the propellers, if indeed we use propellers at all for tomorrow's aircraft; the necessary high frequency electrical energy for operating the motor will be accumulated by a suitable electrical capacity or antenna carried by the plane or other form of aircraft, whatever it may be. A recent patent granted to Dr. Tesla describes one method of causing a plane to rise and descend in a vertical line. As soon as we have a plane which can accurately and regularly rise and descend vertically, the day of the aerial taxi will be here, for we can then land or take off from any flat building roof in our great cities, no matter how small the roof may be. Dr. Tesla says that his flying machine can be condensed into a cube of less than 6 feet on a side, and its weight will be less than 250 pounds. It can be run through the streets and put in a garage, if desired, just like an automobile.

### Tesla's Artificial Lightning

One of the most interesting experiments in all electrical phenomena which has intrigued the writer for many years is the production of gigantic electrical discharges. We read every now and then about high voltage discharges in the neighborhood of a million volts or so, produced in the great laboratories of the large electrical manufacturing companies for testing insulators and the like; but no one up to the present time has even approximated the gigantic artificial lightning displays produced by Nikola Tesla in his famous Colorado wireless broadcasting plant forty years ago. Electrical experimenters who have studied Tesla's researches and seen some of the photographs of his stupendous electric discharges will remember that some of these measured 100 feet in length, the size of a man's arms, producing a roar comparable to that of Niagara, and which could be heard 12 miles away. College and electrical students in general, today, often build Tesla coils, which produce high frequency electric sparks of anywhere from one to three and sometimes 4 feet in length. A moment's reflection on the huge electrical discharges produced in the famous Tesla Colorado plant (in which he used 1500 kilowatts) just mentioned, will show the magnificent piece of engineering which was accomplished by him, when most of the present-day engineers were in their swaddling clothes. In those days Tesla built high frequency transformers over 50 feet in diameter, and in the production of some of his world-startling electrical phenomena he utilized the whole electrical output from a central station, involving the instantaneous discharge of millions of volts and thousands of amperes.

Tesla's theories are generally radically opposed to those entertained by the majority of scientists on many subjects, absorbing the interest of the public. He denies the existence of an electron as pictured by science and says that it has never been isolated. He thinks that some of the investigators have mistaken a hydrogen

molecule for an electron, a rather comical error when considering that the former is assumed to be 125,000,000,000,000 times bigger. He deprecates the popular idea of deriving motive power from the disintegration of atoms, or change of elements, and characterizes such schemes as worse than those involved in perpetual motion machines. He holds that radio-activity is due, not to forces in the substances themselves, but to a cosmic ray, the discovery of which he announced in 1897. In other words, an element like radium emits radiations merely because the cosmic ray impinges upon it, producing these secondary effects.

The element itself has no such energy, it all comes from the cosmic ray. Tesla says that he has proved the existence of this ray by mathematical analysis and experiment, finding both in perfect agreement. It would seem to follow, from Tesla's theory, that the radiation from radiums, or similar bodies, would change from place to place on the globe; and this has recently proved to be an actual fact, as determined by a Russian investigator.

Tesla assured the writer in a recent interview, that through a new discovery he has perfected rays of tremendous power, penetrating through miles of solid substances, will become available shortly, by the use of his high potential cathode tube, without a target.

Truly it may be said that Nikola Tesla was 100 years ahead of his time, and there is not the slightest doubt that his name will go down to posterity as one of the greatest inventors and electrical discoverers of all time. Hundreds of patents cover Tesla's inventions,\* and many thousands of his transcending ideas in the fields of mechanical and electrical invention have never been patented at all, but his ideas are recorded in his own private files.

\*See Tesla's Patent Numbers, and also Sewall's "Wireless Telegraphy." Also "Experiments With Currents of High Potential and High Frequency," by Nikola Tesla, 1890 and "Problem of Increasing Human Energy," Century Magazine of June, 1900.

### Inexpensive New Lathe

THIS very interesting and inexpensive lathe embodies features not found in any tool of its type. The bed of this lathe is channel steel with a support in the center of the bed to give added rigidity and stability. The bed is 30 inches long and will take wood-turnings 6½ inches in diameter and 28 inches long, but if it is desirable to turn longer pieces, another bed can be added. The entire lathe can be obtained piece-meal, so to speak, for the individual parts are separately sold. Both head and tail stocks are movable along the bed and clamp down solidly. The tool rest is very sturdy and adjustable three ways, and a gall thrust bearing on the head stock carries the end thrust. Its best operating speed is 1750 r.p.m.



Photo courtesy Walker Turner

## Brains of Silver Eyes of Glass

(Continued from page 1084)

product is added to a mixture of gelatin, potassium bromide, and potassium iodide, heated to a proper temperature. The precipitate of silver salt is held in suspension by the gelatin, thus forming a true emulsion.

The emulsifying process is carried on in steam-jacketed vessels, lined with silver and equipped with agitators. Soluble salts formed must be washed carefully away. The emulsion is chilled into jelly, shredded, and cleansed with cold water, after which it is melted and coated on the basic film.

This completes the manufacturing process proper. There remains only the setting or hardening, which takes place in chilled rooms.

Optical glass for camera lenses arrives from the manufacturer in slabs. Faults are marked and are eliminated by grinding. Following this, the slabs are ground on all surfaces to remove bits of clay left from the molding process. Next they are sawed into strips on milling machines equipped with diamond-impregnated saw discs, and the strips in turn are sawed into cubes of standard sizes.

The cubes are softened in a gas furnace and pressed into discs on a pneumatic press. In an electric oven the discs are heated gradually to a temperature of about 1000 degrees, to relieve strains incurred in the pressing process, and cooled at a rate no less gradual, so that no new strains may occur.

Cooling completed, the discs are examined for strains under a polariscope, and if found satisfactory are inspected for pressing defects in a liquid whose refractive index approximately equals their own.

Grinding-shells, conforming in shape to the character of the surface wanted, are used with emery powder to fit the discs for their photographic function. Gradually the discs become lenses, conforming exactly to the shape of the grinding-shells. Lenses which are small or which have a very flat contour are ground several at a time, affixed to a metal blocking tool coated with pitch. Much of the finer work on anastigmat lenses must be done by hand.

In polishing, rouge takes the place of emery, and grinding-shells are lined with felt or wax. Wax-lined shells are used for the finer lenses. Considerable experience is needed for the precise adjustment of a polishing machine, since the curves of both sides of the lens must be exactly the same. A difference of even 1/30,000 of an inch will show itself in circles of color or rings.

### \$21,000.00 for Spirits

For more than six years this publication has offered prizes totaling \$21,000.00 for genuine demonstrations and proofs of spirit manifestations which we cannot duplicate by scientific and well-known means.

Up to the present time not one manifestation has been presented which by even the greatest stretch of the imagination could be considered genuine.

How many more years must this prize be offered? Spiritualists, please answer!



## YOU CAN CHOOSE IF YOU WILL

**C**HANCE governs the general trend of too many lives. By chance many people live in a certain place, attend a certain school, take the opportune job; they chance upon certain associates, books, and thoughts.

But by courage and determined effort they could choose often times where to live, what to study and, to a large extent, what to accomplish.

Hundreds of thousands of ambitious

people are studying at home in their leisure time. Increased earning capacity is the objective that many are attaining. But whether the attainment be greater efficiency in business, or a more interesting social life, or the real joy of developing a more cultured point of view, the studies that lead to these objectives are available, wherever one lives, through Columbia Home Study Courses. The range of subjects is wide.

## COLUMBIA UNIVERSITY

Offers Home Study Courses of College  
Grade in the Following Subjects:

Accounting	Chemistry	Fire Insurance	Marketing
Algebra	Child Psychology	French	Mathematics
American Government	Classics	Geometry	Personnel Administration
American History	Composition	German	Philosophy
American Literature	Dramatic	Government	Photoplay Composition
Applied Grammar	English	Grammar	Physics
Astronomy	Various Languages	Greek	Psychology
Banking	Lyric Poetry	Harmony	Psychology in Business
Biblical Literature	Contemporary Novel	High School Courses	Public Speaking
Biology	Drafting	History	Religion
Botany	Drama	Investments	Secretarial Studies
Boy Scouting	Drawing and Painting	Italian	Short Story Writing
Business Administration	Economics	Juvenile Story Writing	Sociology
Business English	Economic Geography	Latin	Spanish
Business Law	English	Library Service	World Literature, etc., etc.
Business Mathematics	English Literature	Literature	
Business Organization	Essay Writing	Magazine Article Writing	
	European History		

**I**N this country we are in the midst of an adult education movement. University home study courses are one of the important factors in this progressive movement, for they offer expert guidance under educators qualified to direct.

Our courses have been prepared by our instructors to meet the special requirements of study at home. While all basic material essential to the full understanding of each subject is fully covered, sufficient elasticity is allowed to permit adaptation to the individual needs of the student. Everyone who enrolls for a Columbia course is personally taught by a member of the University teaching staff. Special arrangements can be made for group study.

The University will send on request full information about these home study

courses. A coupon is printed below for your convenience. If you care to write a letter briefly outlining your educational interests our instructors may be able to offer helpful suggestions. Mention subjects which are of interest to you, even if they are not listed here, as additions to the courses offered are made from time to time.

**HIGH SCHOOL AND COLLEGE PREPARATORY COURSES**  
COLUMBIA University Home Study Department has prepared courses covering the equivalent of four years of High School study. This complete High School or College Preparatory training is available to those who can not undertake classroom work. We shall be glad to send you our special bulletin upon request.

COLUMBIA UNIVERSITY, University Extension—Home Study Department, New York, N. Y.  
Please send me full information about Columbia University Home Study Courses. I am interested in the following subject:

.....  
Name ..... Occupation .....

Street and number ..... City ..... State .....

Sc. & Inv. 4-30



## The Boss Didn't Even Know My Name

"HE SAID my face was more or less familiar and he remembered seeing me around, but he didn't even know my name until the I. C. S. wrote him that George Jackson had enrolled for a course of home study and was doing fine work.

"Who's George Jackson?" he asked. Then he looked me up. Told me he was glad to see I was ambitious. Said he'd keep his eye on me.

"He did too. Gave me my chance when Frank Jordan was sent out on the road. I was promoted over older men who had been with the firm for years.

"My spare-time studying helped me to get that job and to keep it after I got it. It certainly was a lucky day for me when I signed that I. C. S. coupon."

How much longer are you going to wait before you take the step that will bring you advancement and more money?

It takes only a moment to mark and mail this coupon and send it to the International Correspondence Schools at Scranton. Isn't it better to do this today than to wait a year or five years and then wish you had?

### Mail the Coupon for Free Booklet

INTERNATIONAL CORRESPONDENCE SCHOOLS  
"The Universal University"  
Box 6215-F, Scranton, Penna.

Without cost or obligation on my part, please send me a copy of your 48-page booklet, "Who Wins and Why," and tell me how I can qualify for the position, or in the subject, before which I have marked an X:

#### TECHNICAL AND INDUSTRIAL COURSES

- Architectural Draftsman
- Building Foreman
- Concrete Builder
- Contractor and Builder
- Structural Draftsman
- Structural Engineer
- Electrical Engineer
- Electrical Contractor
- Electric Wiring
- Electric Lighting
- Electric Car Running
- Telegraph Engineer
- Telephone Work
- Mechanical Engineer
- Mechanical Draftsman
- Machine Shop Practice
- Toolmaker
- Patternmaker
- Civil Engineer
- Surveying and Mapping
- Bridge Engineer
- Gas Engine Operating
- Automobile Work
- Aviation Engines
- Plumber and Steam Fitter
- Plumbing Inspector
- Foreman Plumber
- Heating and Ventilation
- Sheet-Metal Worker
- Steam Engineer
- Marine Engineer
- Refrigeration Engineer
- R. R. Positions
- Highway Engineer
- Chemistry
- Pharmacy
- Coal Mining Engineer
- Navigation
- Assayer
- Iron and Steel Worker
- Textile Overseer or Supt.
- Cotton Manufacturing
- Woolen Manufacturing
- Agriculture
- Fruit Growing
- Poultry Farming
- Mathematics
- Radio

#### BUSINESS TRAINING COURSES

- Business Management
- Industrial Management
- Personnel Management
- Traffic Management
- Accounting and C. P. A.
- Coaching
- Cost Accounting
- Bookkeeping
- Secretarial Work
- Spanish
- French
- Salesmanship
- Advertising
- Business Correspondence
- Show Card and Sign Lettering
- Stenography and Typing
- English
- Civil Service
- Railway Mail Clerk
- Mail Carrier
- Grade School Subjects
- High School Subjects
- Illustrating
- Cartooning
- Lumber Dealer

Name.....  
Street.....  
Address.....  
City..... State.....

Occupation.....  
If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada



**CARBON ARC HEALTH LAMP**  
Stand Model . . \$12.50  
Table Model . . \$8.50

The Mann Ultra-Violet Projectors at new low prices. Stand model is 51 inches high and adjustable to any desired height. All models use the big, standard 8mm carbons and are as efficient as projectors costing \$100.00. More convenient to use. The powerful Ultra-Violet rays from the Mann Projectors aid and maintain health, relieve pain and build up vitality.

Ultra-Violet rays are the greatest aid to health Science has discovered in the last hundred years! The Mann Projector should be in every home. A few minutes daily use means new vigor and strength. Both models are complete with carbons, sockets, etc. Only \$1 required with order. Pay postman balance on arrival, plus postage. Try it! If not more than delighted with results return lamp and your money will be promptly refunded.

DESCRIPTIVE LITERATURE FREE ON REQUEST  
**ULTRA MANUFACTURING CO.**  
121-D N. Francisco Ave. Chicago.

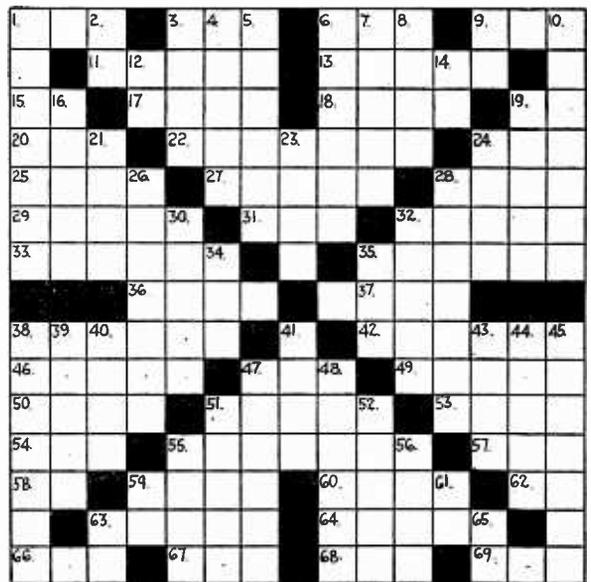
# How's Your Geography?

A Cross-word Puzzle by RICHARD H. TINGLEY, C.E.

### ACROSS

1. Popular nickname of two towns, one in Canada, one in Michigan; of a canal; of a falls; a river, and a railroad, all between Lakes Superior and Huron.
3. River in Persia flowing to the Persian Gulf.
6. A plan or representation of the geographical features of the earth, or of some portion of it.
9. Poetic name of the country Columbus set out to find.
11. The largest province in British India.
13. Superficial dimensions of the geographical divisions of the earth.
15. An island off the west coast of France near La Rochelle.
17. A "Cove" in Allegan County, Michigan, opening into Lake Michigan.
18. Greek island of the Cyclades group in the Aegean Sea, anciently known as "Ios."
19. An ejaculation of surprise or wonder. Exclamation sign after it.
20. Contraction of "I have."
22. City in New Haven County, Connecticut, noted for the manufacture of Britannia ware.
24. Wine, in French.
25. Greek word for thread; a combining form used as a prefix in English words.
27. Russian naval station of the Baltic Sea.
28. Abominable; also the name of a brother of Odin of Norse myth.
29. A gridiron; also, to broil.
31. Copper or bronze coin current in Japan.
32. An Indian tribe of Arizona. There are two towns in that state named after this tribe, the towns taking the singular form of the word.
33. A narrow passage of water connecting two larger bodies of water.
35. A "Point" on the Thames River near New London, Conn., a landing place for boats.
36. A mountain in Dauphin County, Penna.; a "resort" mountain in Orange County, N. Y.; on the Hudson River; a river in Idaho and Utah—all named after an animal of the genus *Ursus*.
37. A river in South Africa tributary of the Orange River.
38. Large lake in Maine, the habitat of a certain variety of salmon known by the name of the lake.
42. An island in New York City.
46. A province in Abyssinia.
47. A wager.
49. Town in Catania province, Sicily.
50. Town in Macon County, Missouri.
51. Man's thinking apparatus.
53. The place in Greece where the original Olympic Games were played.
54. The reputed ancestor of man.
55. The "Cracker State."
57. The capital of Ladakh, British India, in the valley of the Indus near the Himalayas. An important trading center.
58. Abbreviation of "mountain."
59. An island in the Aegean Sea off Asia Minor; also a town on the mainland of the same name.
60. A river in Italy; also a city in Nevada.
62. An Egyptian solar deity.
63. A Seraglio.
64. Images and sacred pictures venerated by Greek Catholics.
66. That great body of salt water which covers a large portion of the earth's surface.
67. An affected way some girls named "May" have of spelling the name.
68. Abbreviation of the name of the highest branch of the Congress.
69. The goddess of dawn.

7. Town in Wayne County, Penna., also, a "spirit of Air," in Shakespeare's "Tempest."
8. A common laborer, in the country of our neighbor on the south.
9. An ancient city near Babylon on the Euphrates River noted for its asphalt.
10. A characteristic of desert lands, but not yet of the U. S.
12. Above.
14. To wit.
16. To turn inside-out.
19. Cathedral city in Italy.
21. A Mohammedan prince; one of several ways of spelling it.
23. Distinguishing part of name of a town in England famous in nursery rhyme; a town in Middlesex County, Ontario; a town in Muscatine County, Iowa; a "grove" in Racine County, Wisconsin—all named after the patron saint of lawyers.
24. A World-War famous "ridge" in France.
26. The "Cotton State."
28. A small town.



30. City in Belgium where the Germans were halted in August, 1914.
32. An island off the coast of Ecuador, in the Pacific Ocean; a city in Argentina, South America, and a "Rio" between Uruguay and Argentina (article omitted).
34. A town in Hoo-Nan province, China; also the first part of many names of places in that country; also, an "ism" of China.
35. A ridge of sand and gravel formed in one of the geological eras, from Dane-Norwegian language.
38. An island off the coast of Attica, Greece, where Themistocles defeated the Persians under Xerxes in a naval battle in 480 B.C., one of the most notable battles in history.
39. The land of the Pharaohs.
40. The French way of spelling "Baden," in Germany.
41. A Cape on the North Carolina coast.
43. A river in Northumberland, England.
44. An Indian tribe; after which a Great Lake, a city in Pennsylvania, and a canal in New York State have been named, the places taking the singular form of the word.
45. A county seat of Hillsborough, New Hampshire at the junction of the Merrimac River and a river of the same name as the city, both being named after an Indian tribe.
47. One of the so-called "Southern tier" of counties of New York state.
48. A river in Mesopotamia on which is Bagdad.
51. Village in Cuyahoga County, Ohio; the seat of a Methodist Episcopal university.
52. A close female relative.
55. Abbreviation of the name of a country with which we were at war in 1918.
56. Soon.
59. Abbreviation of the name of the "Creole State."
61. A city of ancient Egypt sometimes known as Heliopolis (Genesis 41-45).
63. Abbreviation of "Hawaii."
65. Symbol for a direction half way between south and east.

Solution on page 1149

### DOWN

1. Fountains of water coming from the ground, after which many resort and other places have been named, as "Saratoga," "Hot," etc.
2. Large river in Siberia.
3. Capital of Meath County, Ireland, which contains the ruins of a castle built by King Henry II.
4. A Mohammedan noble or prince. One of several ways of spelling it.
5. A town in Worcester County, Mass., and a city in Washington County, Vermont, the plural form of the name.
6. Town on the Missouri River in North Dakota named after an Indian tribe.

# Once He Made Steam Automobiles—Now Violins

By William T. Miller

(Continued from page 1089)

of his brother in 1918, Freelan Stanley withdrew from active control of his automobile concern and devoted more time to his numerous other business interests and to academic work. At the present time he is chairman of the Trustees of Hebron Academy in Hebron, Maine, and spends several days there each week during the school season supervising the affairs of the institution, making the trip of several hundred miles "down east" from Boston, regardless of the weather.

But what happened to Freelan Stanley's hobby during these years of business conquest? Despite his business and teaching activities he has persisted in his love for violin making. And he is still his happiest when one of his lovely instruments is taking form in his hands.

Not more than a mile or so from the place where the Stanleys started in the automobile business, Freelan Stanley has built a beautiful brick colonial mansion, surrounded by shaded lawns, and gravel drives. In keeping with the house is a large garage, and adjacent is a modern workshop where Mr. Stanley and his nephew Carlton make violins. There is no production line here, and no time-schedule for work.

Through the years Mr. Stanley has made a study of his hobby. He has visited European cities famous for their violins, and obtained first hand knowledge of how the masters worked. In Cremona, Italy, where Stradivarius and Amati plied their trade long years ago, he obtained pieces of rare spruce wood, and from Germany he obtained slabs of maple. Incidentally, Mr. Stanley points out that some of the best wood for violins may be found in old furniture which has seasoned through the centuries.

The first Stanley violin was made with a jack knife, but the studio where Mr. Stanley works today is equipped with the best tools that money can buy, and he has developed special processes which require jigs of his own invention. Back of his love for his hobby, Mr. Stanley admits, is not only the appreciation of good music, but the desire to make an instrument capable of enduring and of producing faultless tones.

## IMPORTANT

TO NEWSSTAND READERS

IN order to eliminate all waste and unsold copies it has become necessary to supply newsstand dealers with the actual number of copies for which they have orders. This makes it advisable to place an order with your newsdealer, asking him to reserve a copy for you every month. Otherwise he will not be able to supply your copy. The dealer will then be in a position to supply copies to you regularly every month. If you are interested in reserving your copy every month, do not fail to do this. It costs you nothing to do so.

# 9 1/2 % Guaranteed Dividend

## Once a theory now tested by experience



Postal Life Building Owned by the Company

## The Postal Way and Its Economies

The POSTAL LIFE INSURANCE COMPANY is employing a method tested by more than one try-out, indeed by the experience of years. These years show the Company growing by its Non-Agency method in substantial proportions and nation-wide prestige.

What was once its theory in a prophecy of its future, is now an established fact. Its distinctive economies are outstanding in the chapters of its twenty-four years of history, resulting in savings for policyholders.

## Passing Out of the Doubting Thomases

The taking out of insurance volitionally, overcoming resistance to initiative and the resistance of high-pressure competition, has been demonstrated. The Doubting Thomases, who in the beginning spoke derisively of the Postal method and its 9 1/2 % dividends guaranteed to policyholders, have passed out of hearing. The contention has been sustained that by the POSTAL WAY there was warrant for the self-imposed reduction. That insurance operations can be well conducted within the reduction is now not questioned.

## YOU and YOU and YOU

Its non-agency door once opened has been kept open—it is to be kept open through the years. You and You and You are thus enabled to be your own agent and reduce the cost of your insurance.

We have been wont to say that the method we employ is the Direct method. A laboratory method goes along with it, improving and conforming it.

A theory is splendid if it can be proved by experiment. Every successful business is an experimental laboratory improving an old way and testing out new theory. Thus have the Postal's twenty-four years been years of increasing success. Conditions in the Company that have contributed to low cost of insurance will continue to improve. *The life-prolonging service of its Health Bureau also helps to keep insurance cost down, as well as to make living worth-while, while one lives.*

The Company is subject to the supervision of the Insurance Department of New York and the regulations of the United States Postal Service everywhere.

Every form of insurance from the low-priced "Start-off" policy to the investment forms of Endowment Insurance is provided through its organization.

### Here's How Easy It Is

Call at the Company's office, use the coupon, or write and say, "Mail Me Insurance Information." Be sure to give your FULL NAME, YOUR OCCUPATION and EXACT DATE OF BIRTH.

Information as to any form of Life or Endowment Insurance will be gladly furnished you. Your inquiry will receive prompt attention by mail.

# POSTAL LIFE INSURANCE CO.

WM. R. MALONE, Pres., 511 Fifth Ave., Cor. 43d St., N. Y. City



SI-4-30

## Postal Life Insurance Company

511 Fifth Avenue, New York

Without obligating me, please send full insurance particulars for my age.

Name .....

Address .....

Occupation .....

Exact date of birth.....

Amount .....

# ELECTRICAL ENGINEERING

BOOKS SENT FREE

New Edition Containing 100 Pages on  
**A-C RADIO!**

**8 FLEXIBLE MAROON VOLUMES**  
4300 pages, 3200 illustrations, deluxe gold stamped binding. Index in each book, general index in Vol. 8. Covers every subject in Electricity—Light, Power, Transmission, Generators, Motors, Switchboards, Radio, Telephone House Wiring, Railways, etc.

We're glad to send a set to your home to examine and use as your own for 15 days—to show you that here is the most up-to-date and complete work on Electricity ever published. Written by CROCKER of Columbia U.—MILLIKAN of Calif. "Tech."—HARRISON of General Electric and 26 other noted Electrical Engineers. Starts off with elementary Electricity in simple, non-technical language for the beginner and includes every Engineering branch for use of experts on the job.

## Complete Electrical Reading Course

Electricity, the biggest industry in the world, continues to grow the most rapidly. And it offers better jobs, bigger salaries and a brighter future than any other field. *Every dollar, every hour invested in learning Electricity will come back to you a thousand-fold.* Learn in spare time with these books at one-fifth the cost of trade courses. Outline for organized study, quiz-questions and a year's free consulting membership in the American Technical Society included without extra cost. If you mail coupon immediately.

**Look it up!**  
Thousands of these sets are used as REFERENCE books by men employed in electrical, building construction and allied lines. The JIFFY INDEX puts the answers to 20,000 questions right at your finger tips.

**AMERICAN TECHNICAL SOCIETY**  
Dept. E-425  
Drexel Ave. & 58th St., Chicago



**American Technical Society**  
Dept. E-425 Drexel Ave. & 58th St., Chicago

Please send for 15 days' free trial 8-volume set of Electrical Engineering just off the press, subject to return if I wish to. (I pay the few cents express charges on receipt of books; you pay express if returned.) If I decide to keep them, I will pay \$2.00 after 15 days trial, then \$3.00 a month until \$34.80, special advertising price, is paid, after which books become my property. Year's Consulting Membership to be included free.

Name.....  
Address.....  
Employed by.....  
Employer's Address.....

**CLASS PINS 35¢**  
FREE CATALOG SHOWING 200 DESIGNS  
PIN SHOWN, SILVER PLATE 35¢ EA., 12 OR MORE, \$3.50  
DOZ.; STERLING SILVER OR GOLD PLATE, 70¢ EA.  
12 OR MORE \$6.50 DOZ. 1 OR 2 COLORS ENAMEL;  
45825 3 OR 4 LETTERS; DATES 1930-31-32-33.  
BASTIAN BROS. CO. 942 BASTIAN BLDG., ROCHESTER, N. Y.

**SOMETHING DIFFERENT**  
No Flint. No Friction.  
**MAKE UP TO \$40 A DAY**  
Showing My Mystery Lighter to Men. What Makes It Light? All Guaranteed. No Flint or Friction. New Principle of Ignition. Sample With Sales Plan 25¢. Sample Gold or Silver Plated, \$1.00. Agents write for proposition.  
**NEW METHOD MFG. CO.**  
Desk S. 1-4 Bradford, Pa.

**Learn Public Speaking**  
At home—in spare time—20 minutes a day. Overcome "stage-fright," gain self-confidence, increase your salary, through ability to sway others by effective speech. Write now for free booklet, *How to Work Wonders With Words*.  
North American Institute, Dept. 1424  
3601 Michigan Avenue, Chicago, Ill.

## America's New Motors Pass In Review

By Murray Godwin  
(Continued from page 1085)

Strain on cylinder block and crankcase is decreased; the usual solid casting of the latter is replaced by a frame with removable plates, rendering rods and levers completely accessible. The small size of the cylinders in proportion to power rating makes streamlining easy and effective, and there is less heat to be carried away. Adapted to airplane use, an aircooled engine operating on the lever principle is said to have carried a plane fifteen miles an hour faster than the same ship could travel behind a radial job of equal power rating.

The Elear lever motor develops peak power at a low speed, and a car equipped with one is claimed to handle in city traffic at 100 r.p.m. A faster rear axle therefore can be used, with a consequent lessening of motor wear. Less vibration, easier shifting, and smoother riding are among the other advantages claimed for this very interesting automotive powerplant, and also a remarkable saving in gasoline and oil.

## Insulation—A Paying Investment

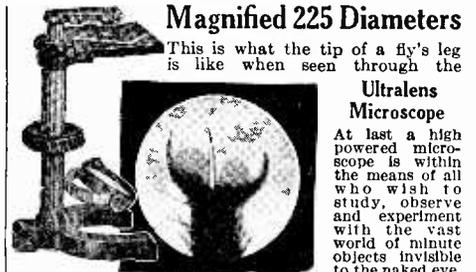
By S. Gordon Taylor  
(Continued from page 1087)

itself or in the attic floor, depending on whether the attic is to be used for livable purposes. If it is not so used, insulation may be placed between or on top of the joists of the floor. If the attic of an existing home is floored, a few of the floor boards may be removed and loose insulation dumped into the space between joists. If the attic is finished and is heated, the insulation should, of course, go into the roof, and the method of insulation will depend on the conditions.

Even where the owner does not care to go to the expense of insulating the whole house, he would do well to insulate the roof or attic floor thoroughly, because authorities estimate that over half of the heat losses through exterior surfaces of a house take place at the roof. In an existing house the owner can do this job himself without difficulty. The insulation of the side walls of an existing house is scarcely a job to be undertaken by the owner because special equipment is required for blowing it in. There are insulation contractors in most localities who are equipped to do this work.

In selecting insulating material the home owner or home planner is offered a wide choice in which he will be aided materially by the Bureau of Standards' circular mentioned above and by literature distributed by manufacturers, a list of which appears on page 1147 of this issue. Many of these booklets provide a most comprehensive treatment of the whole subject of insulation, providing all the information necessary to enable the home owner to not only select the insulating material best suited to his requirements, but also to determine in advance the saving in fuel which will result.

For an existing house where it is necessary to deposit the insulation in the hollows of the walls with blowers, the choice of materials is limited to those marketed in



**Magnified 225 Diameters**  
This is what the tip of a fly's leg is like when seen through the Ultralens Microscope  
At last a high powered microscope is within the means of all who wish to study, observe and experiment with the vast world of minute objects invisible to the naked eye. Such fun it is, as well as educational. No technical training required. Gives enormous magnification and perfect definition. Send \$5.00 for complete outfit. Send for descriptive literature.

**ROAT & LOHMAN, Dept. 203, Milton, Pennsylvania**

**SELL ROSECLIFF SHIRTS**  
*Make Steady Money*  
Showing Samples Men's Shirts Ties, Underwear brings you big cash commissions. One Year Guarantee. No substitutions. Free silk initials. More exclusive Rosecliff features establish leadership. Write for your FREE Outfit NOW!  
**ROSECLIFF SHIRT CORP.**  
Dept. X-4  
1237 Broadway, N. Y. *Outfit Free*

**Print Your Own**  
Cards, Stationery, Advertising, Labels, paper, circulars, tags, etc. Save money and time. Sold direct from factory only. Junior Press \$5.90, Job Press, \$11, Rotary \$149. Do popular raised printing like engraving with any of our presses. **Print for Others, Big Profits.** Pays for itself in a short time. Easy rules sent. Send for catalog of presses, outfits, and all details. The Kelsey Co., B-47, Meriden, Conn.

**MODEL AIRPLANES**  
Construction Sets to build 2 ft. flying models, Sikorski—\$2.75, Vought-Corsair—\$3.00, Curtiss-Hawk—\$3.00, Savoia-Marchetti—\$2.50. Full size blue-prints included. If ordered separate, 50¢ a piece. National Moth latest R. O. C. 60c. 32-page catalog 5¢.  
More models and all supplies described.  
**National Model Aircraft & Supply Co.**  
29 North Ave., Dept. S, New Rochelle, N. Y.

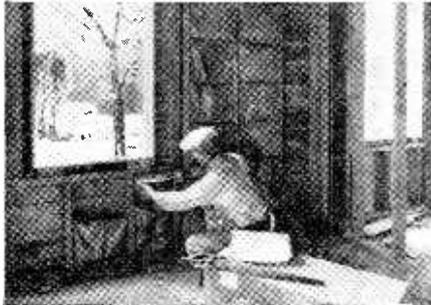
**WE MATCH PANTS**  
To Any Suit!  
Double the life of your coat and vest with correctly matched pants. 100,000 patterns. Every pair hand tailored to your measure; no "readymades." Our match sent FREE for you O. K. before pants are made. Fit guaranteed. Send piece of cloth or vest today.  
**SUPERIOR MATCH PANTS COMPANY**  
115 So. Dearborn Street, Dept. 389 Chicago

**"STAMMERING**  
*Its Cause and Cure*  
You can be quickly cured if you stammer. Send 10 cents, coin or stamps, for 288 page cloth bound book on Stammering and Stuttering. It tells how I cured myself after Stammering and Stuttering for 20 years.  
**BENJAMIN N. BOGUE**  
12953 Bogue Building, 1147 N. Illinois St., Indianapolis

**GEARS**  
In stock—immediate delivery  
Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send us your blue-prints and inquiries.  
Write for Catalog No. 40  
**CHICAGO GEAR WORKS**  
769-773 W. Jackson Blvd., Chicago, Ill

loose form. But in new construction there is a wide range of selection. There are the soft flexible blankets filled with fibrous or other materials; the rigid or semi-rigid boards and sheets; the loose materials; and one which is blown onto the inner wall structure in the form of a pulp which hardens to provide a complete insulating coating between studs.

In applying insulation one effective method is to so locate it that there is an



Fireproof insulating material in block-shaped packages fits snugly between the studs. Excellent insulation at low cost. (Johns-Manville.)

air space on either side, thus taking advantage of the insulating qualities of the material itself plus those of the two dead air spaces. If the space between sheathing and lath is 4 inches, insulation nailed to the studs, midway between sheathing and lath, will divide the large air space into two smaller ones, each of which has an insulating value approximately equal to that of the original space. This type of installation adds about 50% to the insulating value of the material itself. The flexible blanket type of insulation lends itself most readily to this treatment. Loose materials require little labor to install and most of them have extremely high insulating value because of the usual method of application they completely fill the spaces between studs to form what amounts to a four inch thickness of insulation, as compared to the usual thick-



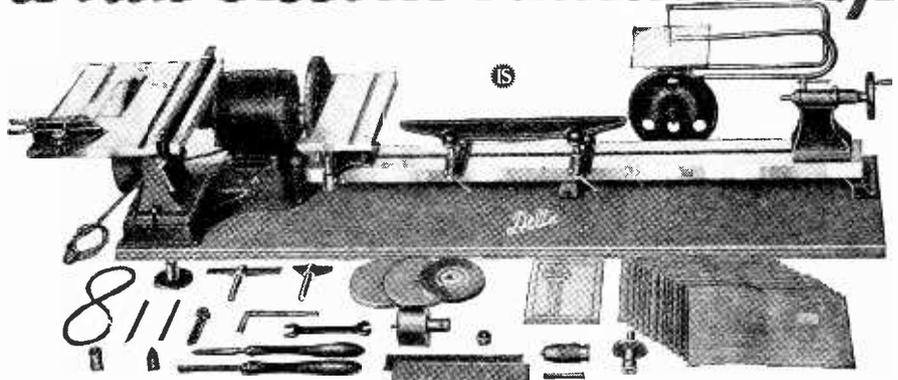
Corkboard lining will keep this attic cool in summer and easy to warm in winter. (Armstrong Cork Company.)

ness of one inch or less for most blanket or board types. Some of these loose materials come in paper packages of just the right size to fit between studding without removing from the packages.

Stiff or board type insulation may be installed across the face of the studs, in place of lath, and the plaster applied directly over it. Or it may be employed in place of wood sheathing. Some types are not as good plaster bases as wood or metal lath but all provide added insulation and the cost is partly offset by the elimination

(Continued on page 1132)

# Make Things Quickly and Easily with the NEW 1930 Delta Electric Handi-Shop



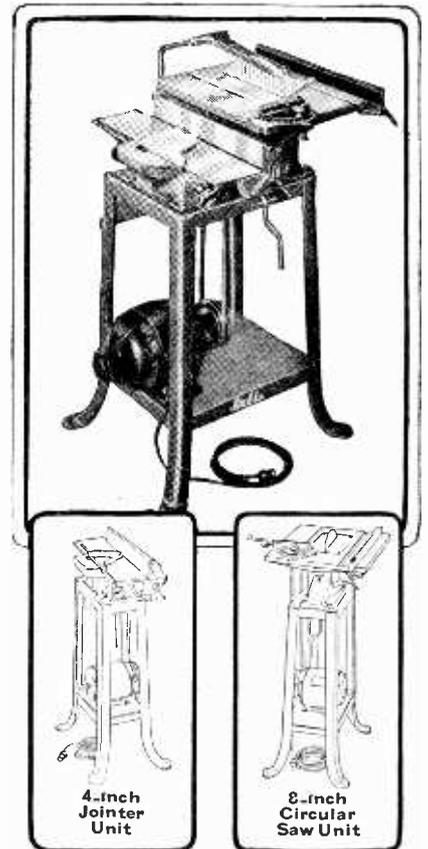
Craftsmen, artisans, farmers, mechanics—all who use wood in their daily labors or spare-time hobbies—are delighted with the sturdy construction splendid efficiency, and moderate cost of this Delta equipment. They appreciate keenly in the "Handi-Shop" such exclusive constructional features as the Patented Tilting Tables, Automatically-Oiled Bronze Bearings, Heavy U-Shaped Lathe Bed, Circular Saw Raising Lever to mention but a few. Send coupon for complete description of this remarkable workshop. You will understand then why men who know prefer "Delta."

## New Woodworking Units

The introduction of the Delta Jointer and Circular Saw Units marks a new era in moderately priced wood-working equipment. Now, for the first time, are available sturdy, practical machines in compact, convenient form at price levels astonishingly low. The individual units are built ruggedly to give years of heavy service. Both incorporate many special features of great value. The combination unit affords a compact, convenient arrangement which permits sawing and planing in one quick operation. Either Jointer or Saw can be operated separately or both together. Welded steel stand of convenient height. All three units are furnished with or without motor, as desired.

## 10 DAY TRIAL EASY TERMS

For complete details and full description of the new 1930 Delta line, send coupon for FREE illustrated literature. Shows many items of interest to those who work with wood. You will learn, also, how you can try any Delta equipment for 10 days under actual working conditions at our risk. Choice of three convenient payment plans. Mail coupon TODAY!



4-inch Jointer Unit

8-inch Circular Saw Unit

## Delta Specialty Co.

Division of  
DELTA MANUFACTURING CO.

1661-67 Holton St. Dept. C-430 Milwaukee, Wis.

DELTA SPECIALTY COMPANY, Dept. C-430  
Division of "Delta Manufacturing Co."  
1661-67 Holton St., Milwaukee, Wis.

Please send me FREE, illustrated literature describing 1930 model "Delta" Woodworking Units. Also details of 10-Day Trial Offer and Easy Payment Plans. (Check special information desired.)

- Handi-Shop
- 4" Jointer Units
- Combination 4" Jointer and 8" Circular Saw
- I am interested particularly for home use
- I am interested for shop and professional use
- Moulding Cutter
- 8" Circular Saw Unit

Name.....  
Address.....

## Subscription Price Going Up!

Save \$1.00 to \$5.00—See page 1146

\$

### 150 TO 300 MONTHLY FROM ONE DAY BATTERY CHARGING

### 30 DAYS FREE TRIAL

ON ABSOLUTE MONEY BACK GUARANTEE

Start a Big Profit-Making Business of your own—"One Day Battery Charging." Requires small space and practically no investment. Anyone can successfully operate. Charge batteries in 1/3 the usual time at 1/2 the cost. Every car owner a customer. The HB One Day Battery Charger will pay for itself on easy monthly payment plan with practically no expense to you—and bring you a handsome profit besides. Write for full particulars in Bulletin M NOW.

HOBART BROS. BOX S-40 TROY, OHIO

ONLY \$16 MONTHLY—MORE THAN PAID BY INCREASED PROFITS



## Who Else WANTS A GOOD DRAFTING JOB?

During the past few months we have placed *hundreds* of former mechanics, office men, building-trades workers and even beginners in fine Drafting positions — with Contractors, Architects and in big manufacturing plants all over the United States.

These men come to us because they are dissatisfied with their earnings and future prospects. Now they are doing work they like—making good money—and have a real chance to advance still further.



**Starts at \$40 a Week**  
 "Thanks for helping me get a Drafting position with Slyker Co., starting at \$40 a week."  
*Oskar R. Ludwig  
 Gary, Ind.*

### Why We Recommend DRAFTING

It will pay you to investigate Drafting. You'll find many of our most successful Contractors, Engineers, Superintendents and Executives **STARTED** in the Drafting room. The work is interesting and pleasant. The hours are easy. You'll work with a wonderful bunch of fellows. Salaries range from \$35 to \$50 a week for beginners, up to \$5,000 a year and more for experienced Draftsmen. And best of all you can learn easily in your spare time, right in your own home.



"I have obtained a position as a junior draftsman with the Muncie Oil Engine Co. I appreciate your aid in obtaining this position very much."  
*Maurice N. Boreham*

### Jobs When You're Only Half Way Through!

We have recently developed a remarkable placement service which enables us to find good positions for students when only *half way* through the course. These men are making **RAPID** progress because they are combining spare-time study with practical experience on the job.

Over 70,000 Drafting positions were advertised during the past year. Here is one of the biggest fields you can get into. Right now we are making an interesting proposition to ambitious men—mail coupon for complete information.

**American School** Dept. D453, Drexel Avenue and 58th St., Chicago, Ill.

AMERICAN SCHOOL, Dept. D453  
 Drexel Ave. and 58th St., Chicago, Ill.

Please tell me, without cost or obligation, about your training and employment service in line marked X below.

#### DRAFTING

- |   |   |
|---|---|
| <input type="checkbox"/> Architecture           | <input type="checkbox"/> Business Management    |
| <input type="checkbox"/> Building               | <input type="checkbox"/> Accounting             |
| <input type="checkbox"/> Structural Steel       | <input type="checkbox"/> Mechanical Engineering |
| <input type="checkbox"/> Civil Engineering      | <input type="checkbox"/> Shop Superintendent    |
| <input type="checkbox"/> Auto Engineering       | <input type="checkbox"/> Foremanship            |
| <input type="checkbox"/> Electrical Engineering | <input type="checkbox"/> High School in 2 years |

Name.....  
 Street No.....  
 City..... State.....  
 Age..... Occupation.....

## Play the Hawaiian Guitar like the Hawaiians!

**Only 4 Motions** used in playing this fascinating instrument. Our native Hawaiian instructors teach you to master them quickly. Pictures show how. Everything explained clearly.

**Play in Half Hour**  
 After you get the four easy motions you play harmonious chords with very little practice. No previous musical knowledge needed.

**Easy Lessons**  
 Even if you don't know one note from another, the 52 printed lessons and clear pictures make it easy to learn quickly. Pay as you play.



**GIVEN** when you enroll  
**HAWAIIAN GUITAR, Carrying Case and Playing Outfit**  
 Value \$18 to \$20  
 No extra-anything included

**TENOR** and other courses. The same thorough instruction on Tenor Banjo, Violin, Tiple, Tenor Guitar, Ukulele, Banjo Ukulele. Well-known instructors. Write for full information.

**FIRST HAWAIIAN CONSERVATORY OF MUSIC, Inc.**  
 9th Floor, Woolworth Bldg., Dept. 240, New York, N. Y.  
 Approved as a Correspondence School Under the Laws of the State of New York—Member National Home Study Council.

## Insulation—A Paying Investment

(Continued from page 1131)

of the lath. Used in place of wood for sheathing this material provides superior insulation without increasing the cost.

In actually selecting insulation to be installed in a house, consideration should be given to (1) cost of material installed; (2) degree of insulation provided; (3) economy which will result.



Over this semi-flexible insulation a board floor, preferably on furring strips, may be laid. (Flax-Li-Num Insulating Company.)

There are other factors that are also important in selecting insulation material. Fire-retarding characteristics are a decided advantage, for instance. Also material may well be of a type that will repel vermin and rodents. Loose material should be of such nature that it will not pack or settle, leaving the upper walls without insulation. The thickness of insulation is not necessarily a gauge of its insulating quality. One insulator a half inch thick may be of greater value than another twice as thick. Also, doubling the thickness does not necessarily double the insulating value of a given make, therefore the thinner



Stucco conducts heat readily, but insulating material between it and the wood sheathing overcomes this disadvantage. (Samuel Cabot, Inc.)

form may be more economical to use even if its insulating value is somewhat less.

The cost of both labor and material for thoroughly insulating a new home adds from 2% to 5% to the total building cost. The saving resulting from the smaller heating plant requirements will frequently go far toward balancing this cost. Adding the saving in fuel, the insulation will pay for itself within five years in almost every case. Thereafter it will pay dividends indefinitely in the form of fuel saving, and of equal importance in greater comfort.

"An Address of Distinction"



One of the World's Great Hotels

OUTSTANDING not only among the hotels of Chicago... but among all the hotels of the World. Costs compare favorably with other establishments where distinguished standards of service prevail. Rates begin at \$5 per day. Permanent Suites at Special Discounts.

**THE DRAKE HOTEL, CHICAGO**  
 Under Blackstone Management

## A GENUINE 240 POWER MICROSCOPE! Sent for Only \$100 DOWN.



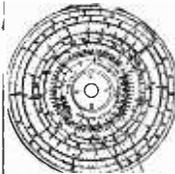
An educational and entertaining instrument that enables all to see and know life invisible to the naked eye. Thrills and fun galore! See tiny bugs grow to proportions of great elephants. See plant and mineral life reveal amazing wonders in form and color. Made just like microscopes used by physicians, scientists, etc. Now only \$3.98. Could easily sell for \$10 and \$20 more. Adjustable lens of 240 power! Send only \$1.00. Pay balance (\$2.98 plus postage) when postman delivers. If not satisfied return within 5 days and your money will be promptly refunded.

### Ideal for Students!

A wonderful help in studying science, botany, etc. Never before has such a wonderful instrument been offered at such an amazingly low price of \$3.98.

DEALERS AND TEACHERS WRITE FOR OUR PROPOSITION!

**R. B. SPECIALTY COMPANY**  
 Dept. D-340 220 E. 3rd St., Cincinnati, O.



## THE MIDGET SLIDE RULE

Instantly adds, subtracts, multiplies, divides, solves proportions, gives all roots and powers. Logarithms, Sines, Cosines, Tangents, Cotangents, etc. Also gives decimal equivalents, lettered and numbered drill and tap sizes.

The Engine-divided scales are on white-finished aluminum and are ground and water-proof. Diameter 4". Price with Instruction Book, \$1.50. Pocket Carrying Case, 50c extra. Cash or C.O.D. Catalogue free. Your money back if you are not satisfied.  
**GILSON SLIDE RULE COMPANY, Stuart, Florida**  
 (SLIDE RULE MAKERS SINCE 1915)

## NEW SCIENTIFIC WONDER



**10c 3-25c BIG FUN BOYS**  
 You apparently see thru Clothes, Wood, Stone, any object. See Bones in Flesh. FREE—PKG. RADIO PICTURE FILMS. Takes pictures without camera. "You'll like 'em." 1 pkg. ea. 25c or less. MARVEL MFG. CO., Dept. 83, NEW HAVEN, Conn.

## LEARN TELEGRAPHY

Be an expert Morse or Continental code operator! **BIG PAY—TELEPLEX TRAVEL—FUN—ADVENTURE!** After a few short weeks of practical study with Teleplex you will be an expert operator. This amazing instrument teaches you right in your own home. Works automatically. No knowledge needed—beginners learn at once! NOT A SCHOOL. Free 10 days' trial. Write for FREE booklet Q-11.



**TELEPLEX CO., 72 Cortlandt Street, New York City**

## Super-Motorways for the Motor Age

By J. Lee Barrett

(Continued from page 1079)

As a result of these well developed streets and highways, the automobile is used probably more than if poorer facilities were available. This has caused another problem in the form of traffic accidents. With more than 400,000 motor vehicles registered in Wayne County in addition to the thousands of tourists visiting Detroit, the city's traffic deaths have mounted to an appalling figure.

Appointment of a special committee empowered to use "every known resource of advertising, education and law enforcement," to cut Detroit's rapidly rising traffic death toll, was announced recently by Mayor John F. Lodge, at the instigation of the Detroit Automobile Club.

That the average of traffic fatalities has increased from 26 to 72 a month is due primarily to the failure of the public to co-operate with enforcement agencies, and carelessness of both drivers and pedestrians and too mild penalties in court cases.

Under the chairmanship of Fred Wardell, president of the Eureka Vacuum Cleaner Co., sub-committees have been formed to cover transportation, publicity, legislation, law enforcement, engineering and accident analysis. The transportation group will devote their activities to street car and bus lines, taxicabs and truck fleets. This committee includes members of the various utility and manufacturing companies with which the group will co-operate. Feeling that the movement is largely an educational one, a representative group of advertising and publicity men will endeavor to sell the public on the fallacy of carelessness in driving and walking on the streets of Detroit, through the medium of the press, radio, poster boards, motion pictures, window displays, and speakers who will appear before luncheon clubs and improvement associations. Under the supervision of the legislative group, a study of traffic laws in other parts of the country and their practicability as applied in this city will be made. The committee on law enforcement has agreed that another police drive is not a solution to Detroit's traffic deaths, although some of the rules, such as driving with improper lights, may be more rigidly enforced.

According to Clarence Wilcox, Corporation Counsel, chairman of the sub-committees, if an investigation proves that a traffic law is unreasonable and impossible to adhere to, an effort will be made to abolish it. The engineering group will investigate various recommendations as to location of safety zones, widths of streets, and other problems of an engineering nature and will supervise any changes which will make the streets safer for all concerned. An analysis of all traffic accidents and suggestions as to the proper steps to avoid future accidents of a like nature, is the duty of a sixth committee.

How to curb this carelessness and create an individual sense of responsibility, not only for personal safety but for the safety of others, is one of the problems to be solved by the new Public Safety League. Undoubtedly, if given the proper support of the people of Detroit, this new effort on the part of those most interested in our traffic problems will reduce accidents to a minimum.

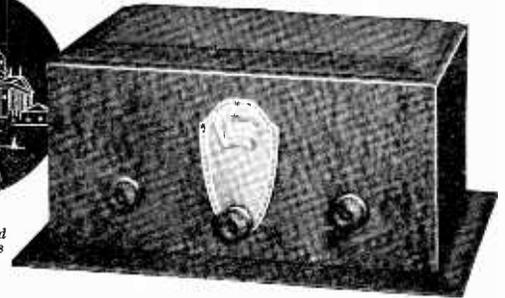
Next month's traffic article will cover Los Angeles.

# Hyvää päivää

(Good Day.)—Finnish



Emperor Nicholas Church, Helsingfors, Finland. Visible many miles at sea.



Not so easy for all of us to read. But it is much easier to hear this cheery greeting and lively music all the way from Finland when you tune in on Helsingfors (Helsinki) with the THRILL BOX.

Words and music from 20 different countries in a dozen different languages may be heard with the NATIONAL Screen-Grid THRILL BOX. This new Radio is full of new and ingenious features for your convenience and pleasure.

Get BOTH Short Waves AND Broadcasts  
Write us today for full details

## NATIONAL

4-Tube THRILL BOX SW-4

NATIONAL CO., INC., Malden, Mass.

Est. 1914



# 1000

## HOTEL POSITIONS OPEN!

**Proof**

Our files are crammed with letters like these, which prove that the hotel industry is the field of big opportunity today.

ALBERT H. LARUE— I am very much pleased by my new position as Manager. I came at a considerable increase in salary and am finding occasion every day to put into actual practice the things I learned from the Lewis Course.

R. J. GROSS— I have been appointed Assistant Manager of the 400-room Apartment Hotel. I can never thank the Lewis Schools enough for their assistance.

Hotels, restaurants, clubs, apartment hotels, hospitals, institutions, schools and colleges everywhere need trained men. Over 70,000 positions as Manager, Assistant Manager, Steward, Room Clerk, Auditor and scores of other executive positions, paying \$2,500 to \$10,000 a year, open annually in hotels of the United States. Nearly one and three quarter billions of dollars' worth of NEW HOTELS, APARTMENT HOTELS, CLUBS and INSTITUTIONS being built this year will need over 200,000 trained men and women. Hotels start you at salaries up to \$3,500 a year, with living usually included.

*Previous Experience Unnecessary*

You can have one of these fascinating, big pay positions thru our Simplified Home Study Plan, we quickly qualify you for a well-paid position. Age is no obstacle—young and old alike have equal chance for success. A common school education is all you need.

**We Put Our Students in Touch With Positions**

We train you and put you in touch with big opportunities. All of your training under the personal supervision of Clifford Lewis, who has been appointed Managing Consultant by over 300 hotels throughout the United States. Our students employed by leading hotels everywhere.

Send today for Free Book, "Your Big Opportunity," explaining our Money-Back Agreement and showing how we can train you for one of these splendid positions.

**LEWIS HOTEL TRAINING SCHOOLS**  
Clifford Lewis, President

Room CE-3401 Washington, D. C.  
*The Original and Only School of Its Kind in the World*

**EARN \$2,500 TO \$10,000 A YEAR**

**Your Big Opportunity**

Lewis Hotel Training Schools  
Room CE-3101, Washington D. C.

Send me the Free Book, "YOUR BIG OPPORTUNITY," without obligation.

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_

**OPPORTUNITY COUPON**

Subscription Price Going Up  
**SAVE \$1<sup>00</sup> to \$5<sup>00</sup>—See Page 1146**

# EXCELLO RADIO



Style No. 154

Genuine Screen Grid radio with dynamic speaker and high grade cabinets for radio or radio-phonograph combinations.

Write today for free illustrated catalog of Radio and Radio Cabinets

**EXCELLO PRODUCTS CORPORATION**  
4832 West 16th Street  
CICERO, ILLINOIS

## Home-Study Business Training

Your opportunity will never be bigger than your preparation. Prepare now and reap the rewards of early success. Free 64-Page Books Tell How. Write NOW for book you want, or mail coupon with your name, present position and address in margin today.

- |  |  |
|--|--|
| <input type="checkbox"/> Higher Accountancy        | <input type="checkbox"/> Business Corres.      |
| <input type="checkbox"/> Mod. Salesmanship         | <input type="checkbox"/> Credit and Collection |
| <input type="checkbox"/> Traffic Management        | <input type="checkbox"/> Correspondence        |
| <input type="checkbox"/> Rail. Station Mgm't       | <input type="checkbox"/> Modern Foremanship    |
| <input type="checkbox"/> Law: Degree of LL.B.      | <input type="checkbox"/> Personnel Mgm't       |
| <input type="checkbox"/> Commercial Law            | <input type="checkbox"/> Expert Bookkeeping    |
| <input type="checkbox"/> Industrial Mgm't          | <input type="checkbox"/> C. P. A. Coaching     |
| <input type="checkbox"/> Banking and Finance       | <input type="checkbox"/> Business English      |
| <input type="checkbox"/> Telegraphy                | <input type="checkbox"/> Commercial Spanish    |
| <input type="checkbox"/> Business Mgm't            | <input type="checkbox"/> Effective Speaking    |
| <input type="checkbox"/> Railway Accounting        | <input type="checkbox"/> Stenotypy—Stenog'y    |
| <input type="checkbox"/> Paper Salesman's Training |  |

LaSalle Extension University, Dept 494-R, Chicago



### TOOL CHESTS

Made by Gerstner Design, finish, construction make them the finest in America. 30 sizes in free catalog.

H. GERSTNER & SONS  
676 Columbia Street  
Dayton, Ohio

### Send To-day for the "Electrical Worker's Friend"

An electrical book of 66 motor drawings with complete instructions for rewinding and reconnecting A. C. motors. Special at **\$3.00**

Or write for full particulars of this valuable book

SMITH & SMITH PUBLISHING CO.  
Dept. B, Valencia, Pa.

## Make a Chemical Nest of Serpents

By Dr. E. Bade

(Continued from page 1100)

are again added. After cooling the needles will separate out.

Another salt is Prussian blue, a precipitate obtained in the detection of nitrogenous material on decomposition of organic matter with metallic sodium. Place a small piece of metallic sodium in a small, hard test tube and heat gently to melt the sodium and so that a little vapor of sodium rises slightly above the melted metal. Then introduce a tiny fragment of substance to be tested for nitrogen and continue to heat until decomposed. Then add a few drops of alcohol to destroy any metallic sodium present and add a few drops of water. Filter and wash the test tube twice with a few drops of water. Then add a few drops of freshly prepared ferrous sulphate solution and a trace of potassium fluoride. This latter substance acts like a catalyst and promotes the precipitation of Prussian blue if nitrogen was present in the sample under test.

The alkyl isocyanides or carbamides are liquids having a lower boiling point than the cyanides and they are characterized by an intolerable odor. Their structural difference is as follows:

Methyl cyanide is  $\text{CH}_3\text{CN}$

Methyl isocyanide is  $\text{CH}_3\text{NC}$

Methyl isocyanide, which boils at 58°C can be prepared by distilling a mixture of potassium hydroxide in alcohol, chloroform and methyl amine. To obtain the characteristic odor, which is enough, heat a mixture consisting of 1/2 a gram of methyl ammonium chloride, 2 cc of alcohol in which a small piece of potassium hydroxide has been dissolved and 3 or 4 drops of chloroform. It can also be prepared by distilling a mixture of silver cyanide and methyl iodide. One slight whiff of this odoriferous product is more than sufficient.

### In Amazing Stories for April

**THE GREEN GIRL** (a serial in 2 parts), Part II, by Jack Williamson. In the concluding chapters the author continues the pace set in the first instalment. The only intelligence we know of now is that which is housed in the human body. But is it really necessary for intelligence to have only such a habitation? Why might it not just as easily send out its influence through some other force. "The Green Girl" will, we are sure, rank high in your favor, among which we unhesitatingly mention "The Moon Pool" and "The Skylark of Space."

**THE CONQUEST OF THE EARTH**, by Isaac R. Nathanson. Although this story about an Andromedan invasion of the earth is by an author who is new to our readers, the story reads like an old favorite. Mr. Nathanson has not only made a careful check on his science, but he has the gift of fiction writing. And we know you will welcome the announcement that there will be more by him soon.

**THE METAL HORDE**, by John W. Campbell, Jr. Here is another interplanetary story by our young scientist author that is even better than his previous ones. We can leave it to Mr. Campbell to give us a unique tale, original in its conception and ingeniously worked out.

**THE FEATHERED DETECTIVE**, by A. Hyatt Verrill. Under this author's skilful handling this tale has an individuality that easily stands with the best scientific detective story. The green turacou and the change of color of its plumage when wet is a much debated subject among ornithologists. Mr. Verrill knows his subject. We feel no more need be said.

# .. I Was the Life of the Party!

I FRANKLY admit that until recently I was about the most awkward blushing wallflower who ever dared to go to a party.

But my life has certainly changed. Instead of overhearing myself referred to as an "old oil can," it seems now as though the fellows and girls can't pay enough attention to me. Now every time the gang throw a party they insist that I come.

Don't think I'm bragging. I remember all too keenly what it felt like to be a lonesome dud in the midst of a lively crowd. And I'm so thankful to a certain Prof. Dunninger for my new found popularity that I am only too glad to give the credit where it belongs.

Some time ago I read an ad just as you're doing now about Dunninger's famous book—"POPULAR MAGIC AND CARD TRICKS." As it cost only 50c with "money-back-if-not-satisfied" guarantee, I thought I'd try it.

I received the book by return mail and was amazed to see how easy it was to do magician's tricks. In short order I became expert in performing a dozen or more mysterious stunts that astounded everyone, myself most of all.

At the next party I went to I gave a one-man show that simply overwhelmed the whole gang. For an hour or more I made cards fly, glass bowls disappear, coins vanish, performed secret mind reading—in short, held my audience dumbfounded and completely mystified!

You, too, can entertain and astound your friends—win greater popularity—experience countless evenings of enjoyment with the more than 200 magic tricks this book explains in simple English and easy to understand pictures.

Never before have you had a chance to get so much real pleasure and value for only 50c. While we still have a few hundred books left—



**Clip  
and Mail  
Coupon  
TODAY!**

EXPERIMENTER PUBLICATIONS, Inc.,  
Dept. 2504-Y, 381 Fourth Ave.,  
New York, N. Y.

I enclose 50c (in stamps, coin or money-order) in full payment for Prof. Dunninger's famous big 100-page book—"POPULAR MAGIC AND CARD TRICKS"—which it is understood will be shipped to me by return mail.

Name .....

Address .....

City and State .....

I enclose 50c additional for which also send me the big complete illustrated book I have checked below:

- How To Win at Bridge
- Flying for Everybody
- New Radio Trouble Finder

# "Your Eye Sees It-



**WOLLENSAK MICROSCOPE**  
**\$ 16.50**

**SOLVE** the mysteries of insect, plant and mineral life with the Wollensak Microscope. Reveal to yourself the beauties of nature hidden from the unaided eye. One of these fine microscopes should belong to every student, dentist, physician, or scientist and should be part of the equipment of home, office, school, or laboratory. It gives a range of magnifications from 100 to 250 diameters in steps of 25. Elaborately finished tilting stand, nickel trim, plush lined case, prepared slide, complete instructions. Ask your dealer, or we will send you one postpaid. *Money back guarantee.* Lower powered Wollensak models \$2.50 to \$8.50. Catalog free.

**WOLLENSAK OPTICAL COMPANY**  
875 Hudson Avenue Rochester, N.Y.

# Electricity!

Learn in Los Angeles

Be an electrical specialist. Gain quick success in this most fascinating and profitable field. Learn at National in the center of tremendous electrical projects costing more than \$100,000,000.00 — unlimited opportunities now.

Practical, intensive training by National's job-experience method in 6 to 9 months. All technical essentials included. School endorsed by leaders in electrical industry. You learn all branches of electricity; radio. Million dollar institution; all modern equipment and training facilities. Life scholarship. No age limit. Free employment service. Over 17,000 successful graduates. 23rd year. Big, illustrated 84-page catalog sent **FREE**. Write today.

**NATIONAL ELECTRICAL SCHOOL**

Dept. 306EE, 4006 So. Figueroa, Los Angeles, Calif.

# AIRCRAFT WELDERS AND MECHANICS WANTED

this Spring

Enroll in our two Big Courses at the present low price of one. Learn Aircraft Welding and Airplane Motor Mechanics Now and get a double-barreled shot at the good aviation jobs this spring.

**AMAZING OFFER for short period**  
Our big combination course offered at the special low price of one. Get in now before the price goes up. Many of our "grads" are now holding excellent jobs in aircraft factories at famous airports. Some are Superintendents, others foremen. Write quick—use coupon.

**NATIONAL AIRCRAFT WELDING SCHOOL**  
216 Aircraft Building, Kansas City, Missouri

Send me facts on welding courses and opportunities open.  
Name .....  
Address .....

# MAKE MUCH MONEY

Making and Selling Your Own Goods. Formulas by experts. Manufacturing Processes. Trade Secrets. All kinds. All lines. Automobile Specialties. Cleaning and Polishing Compounds. Food Products. Toilet Preparations, etc. Send for interesting catalog, special circulars. **FREE.**

**D. THAXLY CO., Washington, D. C.**

# When Speed Makes Time Run Slow

By Donald H. Menzel, Ph.D.

(Continued from page 1102)

from a few hundred up to several thousand miles a second. Of course there is nothing particularly exciting about the size of the figures. The curious thing is that practically all of the nebulae appear to be moving away from us; the farther distant they are, the faster their motion appears to be.

Why do we not find as many nebulae approaching as are receding from us? Why do they apparently shun our society? And why does the rapidity of motion increase with distance?

Let me digress a moment in a fairly close analogy. Try to imagine what might have passed through the mind of Columbus when he sat on the dock at Genoa and watched the ships sail out to sea and fade into the distance. There are two reasons, of course, why the ship grows smaller, (1) because of the increasing distance, and (2) because the ship is continually sinking below the horizon.

Now, if Columbus had believed the earth to be flat, as did most of his contemporaries, he would have had to ascribe all of the shrinkage in size to the first cause. Since the rate at which a ship sinks below the horizon increases with distance, he would have concluded that the ship was continually gathering speed as it faded from view.

This is what Columbus *might* have deduced, if he had believed in a flat earth. But the observations are much more simply accounted for on the supposition that the earth is spherical.

*P.*—You are probably about to say, then, that the astronomer's observations of the nebulae may be taken to indicate that the universe is curved. That the apparently greater speeds may be an illusion, a sort of "horizon effect" in the great curved universe.

*R.*—Right. There are several consistent solutions of Einstein's equations depending upon the amount of matter in the universe. If it were completely empty, it turns out that space and time are practically Euclidean. We are saved the trouble of trying to visualize what this means because, if it were true, we should not be here to think about it. The presence of the tiniest particle makes its presence felt at the farthest regions of space. There is a "puckering," and the universe becomes curved. The amount of curvature depends upon the amount of matter in space.

Einstein studied the problem of a world well filled with matter. In this case space is curved, but the time axis is straight. De Sitter then investigated the question of a universe wherein matter is sparsely strewn. In this case he found that space and time enter the cosmic scheme on an equal footing, i.e., that all are curved—time and space rolled up into a ball, so to speak. Do not try to picture what such a universe would look like because it is impossible. What De Sitter showed was that, if his universe had corresponded to the actual one, the geometrical peculiarities alone would produce an apparent scattering of the distant nebulae, much as the curved earth appeared to "scatter" Columbus's ships. Such a theory is in fair accordance with observation. Dr. Zwicky, of the California Institute of Technology, has recently made an alternative suggestion to explain the recession velocities of the nebulae. It remains for the future to decide which theory, if either, is correct.

# MOULDING A MIGHTY ARM



**Get a 17 Inch Bicep**  
**Complete Course on Arm Building**

**ONLY 25c**

Get an arm of might with the power and grip to obey your physical desires. Within 30 days you can now build your arm from a scrawny piece of skin and bone to one of huge muscular size. I don't mean just a 17-inch bicep but a 15-inch forearm and an 8-inch wrist. This specially prepared course will build every muscle in the arm because it has been scientifically worked out for that purpose. You can develop a pair of triceps shaped like a horseshoe and just as strong, and a pair of biceps that will show their double head formation. The sinewy cables between the biceps and elbow will be deep and thick with wire cable ligaments. In that arm of yours, the forearm will belly with bulk, and the great supinator lifting muscle you can make into a column of power, while your wrist will grow alive and writhe with cordy sinew. All this you can get for 25 cents—send for this course today and within 30 days time you can have a he-man's arm built to be as beautiful, brawny and magnificent as the village blacksmith's.

You can't make a mistake. The guarantee of the strongest armed man in the world stands behind this course. I give you all the secrets of strength illustrated and explained as you like it. 30 days will give you an unbreakable grip of steel and a Herculean arm. Mail your order now while you can still get this course at my introductory price of only 25c.

## RUSH THE COUPON TODAY

To each purchaser will be given a **FREE COPY** of **THE THRILL OF BEING STRONG**. It is a priceless book to the strength fan and muscle builder. Full of pictures of marvelous bodied men who tell you decisively how you can build symmetry and strength the equal of theirs.

**REACH OUT--GRASP THIS SPECIAL OFFER**

**Jowett Institute of Physical Culture**  
30-D Poplar Street, Dept. 17C, Scranton, Penna.

Dear Mr. Jowett: I am enclosing 25c. Please send me the course "MOULDING A MIGHTY ARM" and a free copy of "THE THRILL OF BEING STRONG."

Name .....

Address .....

# A tip . . . from Andrew Carnegie

ASKED to explain his phenomenal success, Andrew Carnegie blandly attributed it to his ability to get men to work for him who knew more than he did.

And that's a formula for success. Nobody who is really successful does all the work himself. He employs other people's minds and efforts.

Do you do the same in the intricate business of running your home and taking care of your family? You can quite easily.

You can employ specialists in diet; you can serve the master dishes of famous chefs; you can have the advice of style authorities in selecting your clothes, of whole electrical laboratories in buying household appliances, by reading the advertisements.

All the newest knowledge—knowledge millions of dollars and years of effort have won—is contained in the advertisements.

If you will use the advertisements in this magazine as Andrew Carnegie used men who knew more than he did, every dollar you spend will be spent wisely, economically, and will return full measure of satisfaction. That's the way to be a success in the greatest business in the world—making a home.



*It pays to read the advertisements*

## Make an Attractive Day Bed

By H. L. Weatherby

(Continued from page 1106)

straight in gluing. The cross rails and the vertical spindles are set with mortise and tenon joints.

In order to insure a good steady finished job, sturdy bed locks must be secured to attach the rails to the head and foot boards. These may be purchased from furniture houses and come in various styles. They may be riveted, bolted or welded to the frame of a set of steel springs, or they may be attached by bolts to a wooden frame and side rails dispensed with. No matter what style of lock is used, it will call for some mortising and fitting, and this should be done before the finish is applied.

The finish will, of course, depend upon the material used and the other furnishings into which the Studio bed is introduced. The writer recommends either mahogany or walnut stain with a rubbed varnish finish, as being highly satisfactory. Where it is possible to finish work in a lathe, the rubbing part ceases to be drudgery. Of course it is entirely feasible to do the finishing on the turned portions in this manner and assemble afterwards. Glue will not stick to a varnished surface. In most cases, however, it would probably be better to assemble before finishing is undertaken.

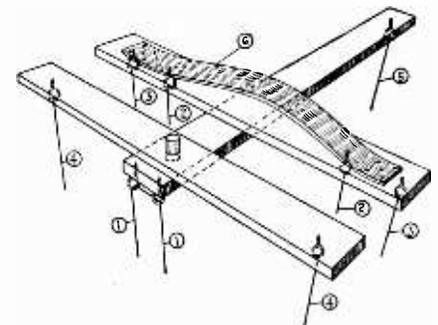
With a comfortable mattress, a bright colored, or old fashioned spread thrown over it, and some inviting cushions on it, the builder will view with considerable pride either of these day beds, when the job is finished.

## Dancing Down the Centuries

By Jo La Spina

(Continued from page 1101)

in a dry corner until the paper has become stiff and dry, then pull out. Fix the two halves together and place the strips of paper so that they connect the two parts. Secure some stiff copper wire, make a loop at one end and push it through the paper head. Then insert another through the top and make a loop at that end. Take some water colors or oil paint and paint the head.



There are two methods of constructing the rest of the marionette. One of them is carving the two separate portions of the body and also the arms and legs from wood, and connecting them by means of eye-screws and leather hinges. This method will become apparent if the drawing to scale is followed and the various parts of the body connected as shown. The second method is to make the marionette from cloth. This may be done by securing a few yards of nainsook (white material) at any dry goods store, and also

**BUICK 4-DOOR SEDAN** **5 CARS GIVEN!**

Ever win a prize? Here's your chance! Every year we spend over \$150,000.00 on prize offers to advertise our business. In this new offer 150 grand prizes totaling \$6555.00 will be given to the fortunate ones who solve our puzzle correctly and win. Here it is—

**FIND THE "DIFFERENT" AUTO!**

The 16 cars in the circle all look alike. 15 of them are exactly alike—but one is different from all the rest. That's the trick for you! Find this "different" car if you can—and mark it. The difference may be in the fenders, bumper, name plate, radiator, or top. Be careful now—because winner must solve puzzle correctly first in order to

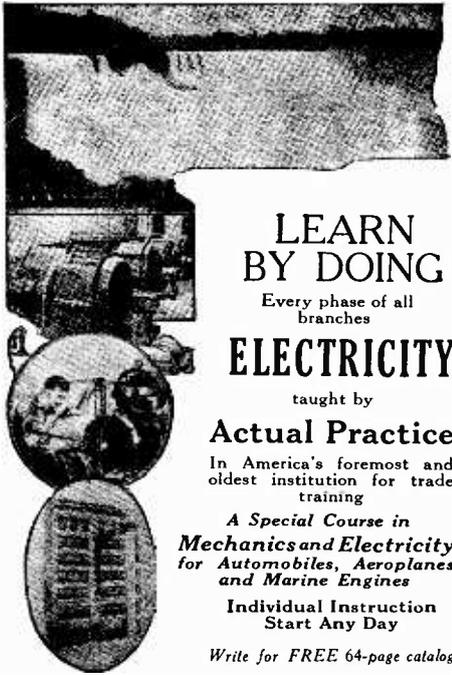
**WIN BUICK SEDAN OR \$2000.00 CASH**

A magnificent list of 150 Grand Prizes—\$6555.00 in all! Lucky first prize winner has choice of new 1930 Buick 4-door Sedan or cash if preferred. Also four other fine new Sedans, radios, victrola, etc., in big prize list. Duplicate prizes awarded in case of ties. All actively interested who have answered correctly will receive prizes or cash rewards.

**\$705.00 FOR PROMPTNESS**

Don't delay—act this minute! Solve the puzzle correctly and receive at once Certificate good for \$705.00 if you are prompt and win first prize, making total first prize worth \$2000.00! This is the only puzzle to solve. Any man, woman, boy, or girl in the U. S. A., outside of Chicago, may submit an answer. 150 of the people who take up this offer are going to win these splendid prizes. Be one of them. Send the number of the "different" auto in a letter or post card today. Nothing to buy, so send no money. But act promptly! **B. J. SLACK,** 500 N. Dearborn St., Room 76 Chicago

**SEND NO MONEY! REPLY TODAY!** **\$705.00 FOR PROMPTNESS!**



**LEARN BY DOING**  
Every phase of all branches

**ELECTRICITY**  
taught by  
**Actual Practice**

In America's foremost and oldest institution for trade training

*A Special Course in*  
**Mechanics and Electricity**  
for Automobiles, Aeroplanes and Marine Engines

**Individual Instruction**  
Start Any Day

Write for **FREE 64-page catalog**

**THE NEW YORK ELECTRICAL SCHOOL**

29 West 17th Street

New York City

**AN EASIER Way to Popularity**



PLAY your way to favor with a sweet-toned, easy-playing Pan-American. You learn popular music quickly. Fun, popularity, increased income! Choose any instrument—Pan-Americans are the only complete line of nationally-advertised, factory guaranteed, moderately priced instruments made. **Free Trial**; write for literature; mention instrument.

**PAN-AMERICAN**  
Band Instrument and Case Co.  
405 Pan-American Bldg.  
Elkhart, Ind.

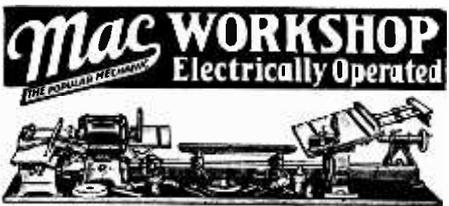
**MAKE BIG MONEY**

Just out. Lights gas instantly without sparks or flame. Sells like wildfire wherever gas is used. Retail for 25c.

**MYSTERY GAS LIGHTER**

Packed on individual cards with instructions. Sample, 5c; rush \$8.00 per Gross or \$1.00 per Dozen. **NEW METHOD MFG. CO.**, Desk S1-4, Bradford, Pa.

**Mac WORKSHOP**  
Electrically Operated



**This Complete Mac Workshop Now Sent on 10-Days Free Trial**

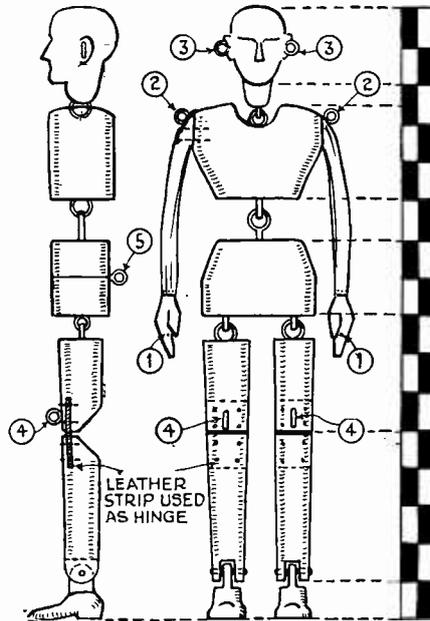
Send now for details about this big, powerful, sturdy equipment. 36" lathe, 8" saw, 4" jointer, 1-3 Horse Power Motor, Jig Saw, and all units for a complete motorized workshop. Easy to operate. Shipped on approval, ready to plug into light socket. Plans and instructions furnished. Unusually low prices and convenient monthly terms. **GET DETAILS**

**Midland Appliance Corporation**  
Dept. 1649 225 N. Michigan Avenue, Chicago  
Please send details.

Name.....  
Address.....

a roll of cheap cotton (absorbent cotton). Each portion of the body, including the chest, lower portion of the body, and the arms and legs, is cut out in two parts. All of these are stuffed with cotton and stitched together. The center of the arms and legs is left unstuffed so as to permit moving. Before the chest is stuffed, insert three wires through the cloth in the form of a triangle. These wires when looped will act as the connecting points for the arms and the head. Connect the various portions of the body with white bias tape. The hands and feet are made of wood and are glued to the legs and arms.

The strings are tied to the screw-eyes on the puppet, corresponding to the numbers given and then connected to the controller. For costumes, the best material available is silk, as it is light and does not interfere with the movements of the puppet. A suitable stage may be made by stringing a wire across a doorway and overlapping three separate black curtains so as to form the usual theatrical curtain. A piece of wall board may be used to form the background.



The art of marionette making and puppet acting has been known for many centuries. Ruins discovered in the tombs of the Ptolemies in Egypt have disclosed dolls and puppets which probably were used to amuse the children of ancient times. Ancient Greece and Rome also were familiar with this form of entertainment though they never adapted drama to it. It was, however, the East—India, Java, and China—which contributed most of the advancement in the art which has amused both children and adults for many centuries. In most of these countries puppet acting was, and still is, relegated to the portraying of religious drama. In Java the puppets are made as large as two feet high and fashioned into many grotesque forms to interpret the symbolism of religious feasts.

Puppet acting was brought into Western Europe in the Middle Ages. It was used mainly to portray religious drama, and rapidly spread to Italy, Germany and France.

**U.S. GOVERNMENT JOBS.**

**\$1260 to \$3400 YEAR**  
Men—Women  
18 to 50

**PICK YOUR JOB**

**Railway Postal Clerks**  
**City Mail Carriers**  
**City Post-Office Clerks**  
**General Clerks**  
**Census Clerks**

**STEADY POSITION**

These are steady positions. Strikes, poor business conditions, lockouts or politics will not affect them. U. S. Government employees get their pay for twelve full months every year. There is no such thing as "HARD TIMES" in the U. S. Government Service.

**\$1,900 TO \$2,700 A YEAR**

Railway Postal Clerks get \$1,900 the first year, being paid on the first and fifteenth of each month, \$79 each pay day. Their pay is quickly increased, the maximum being \$2,700 a year, \$112.50 each pay day.

**Travel On Uncle Sam's Pay Roll**



Railway Postal Clerks, like all Government employees, have a yearly vacation of 15 working days (about 18 days).

On runs, they usually work 3 days and have 3 days off duty or in the same proportion. During this off duty and vacation their pay continues just as though they were working. They travel on a pass when on government business and see the country. When away from home they get extra allowance for hotel. When they grow old, they are retired with a pension. We expect Spring examinations throughout the country.



**CITY MAIL CARRIERS POST-OFFICE CLERKS**

Clerks and Carriers now commence at \$1,700 a year and automatically increase \$100 a year to \$2,000 and \$2,300. They also have 15 days paid vacation. Early examinations will be held in many places. City residence is unnecessary.

**GENERAL AND CENSUS CLERK (Open to men and women 18 or over)**

Salary \$1,260 and \$1,440 to \$2,500 a year. Pleasant general clerical and filing work in the Census and other government departments at Washington, D. C., and other cities throughout the country.

**IS YOUR JOB STEADY**

Compare these conditions with your present or your prospective condition, perhaps changing positions frequently, no chance in sight for PERMANENT employment; frequently out of a position and the year's average salary very low. **DO YOU GET \$1,800 EVERY YEAR? HAVE YOU ANY ASSURANCE THAT A FEW YEARS FROM NOW YOU WILL GET \$2,300 TO \$2,700 A YEAR?**

**YOU CAN GET THEM**

These positions are not hard to get. Country residents and city residents stand equal chance. Experience is unnecessary, and political influence is not permitted. Let us show you how.

**GET FREE LIST OF POSITIONS**

Fill out the following coupon. Tear it off and mail it today—now, at once. **DO IT NOW**—This investment of two cents for a postage stamp may result in your getting a Government Job.

**FRANKLIN INSTITUTE, Dept. G 177, Rochester, N. Y.**

Rush to me entirely free of charge (1) a full description of the position checked below; (2) Free Copy of 32-page illustrated book, "How to Get a U. S. Government Job"; (3) A list of the U. S. Government Jobs now obtainable; (4) Send particulars telling how I can get the position I have checked.

- Railway Postal Clerk..... (\$1,900-\$2,700)
- Postoffice Clerk..... (\$1,700-\$2,300)
- City Mail Carrier..... (\$1,700-\$2,300)
- Rural Mail Carrier..... (\$2,100-\$3,300)
- General Clerk—Census Clerk (\$1,260-\$2,500)
- Inspector of Customs..... (\$2,100-Up)

Name.....

Address.....

Use This Coupon Before You Mislaid It.

# Learn All About AUTOS



## 6 BIG AUTO BOOKS

All Shipped FREE ON APPROVAL

### New 1930 Edition

Whether you are mechanic or helper, expert or student, auto-owner or driver, if you're interested in autos, by all means take advantage of this opportunity to see the latest and most complete work on autos ever published. Written by a large group of America's greatest automotive engineers. Simple enough for men with little schooling to understand, yet in daily use by hundreds of engineers, service-station superintendents and foremen as an authoritative REFERENCE Cyclo-pedia.

**Aviation Motors**  
In addition to being a complete cyclopedia of automobile engineering, these books contain over 700 pages on Aviation Motors, bringing to you the newest and latest information obtainable.

### YOU Can Fix Any Car

You can take out "play" in differential. You can kill the "shimmy" in steering. You can reset TIMING. You can put your finger on engine trouble without guessing or tinkering. You can pull the starter off and fix it. You can adjust and repair transmission, engine, rear axle, bearings. THESE BOOKS TELL HOW, and they tell you how to do any and every auto job right the first time.

Nearly 3,000 pages, over 2,000 illustrations, wiring diagrams, equipment, charts, etc., and so new that they cover all the latest developments such as FRONT WHEEL drives, etc.

### Amazing FREE Offer

There are no strings in this offer, it means just what it says—mail the coupon and the books will be sent to you for free examination. If after 10 days' use, you want to keep them, send only \$2.00, then \$3.00 per month until the special low price is paid. Otherwise return the books at our expense and you will owe us nothing.

### Jiffy Index

You don't have to read the books through, the special Jiffy Index enables you to put your finger on the information wanted in a jiffy.

American Technical Society, Dept. A-425  
Drexel Ave. at 58th St., Chicago, Illinois

I would like to see the new 6 volume 1930 edition of your automobile books but without obligation to buy. I will pay the few cents delivery charges and will examine the books and return them at your expense in 10 days unless I like them, in which case I will send you \$2.00 then and only \$3.00 per month until the special price of only \$24.50 is paid. You are to include free consulting membership certificate in the American Technical Society. Send me your name and address.

Name .....  
Street .....  
City ..... State .....  
Employer's Name .....  
Employer's Address .....



## 3 FOR ONLY 65¢

Boys—send 65c. Big kit includes 3 famous SOLAR Detroit Model Airplane Fliers Club plans and complete instructions for building Biplane, Tractor and Pusher, plus all materials for making all 3—balsa blocks and sticks for blades, spars, ribs, fins; Japanese paper; rubber motor; wire; glue; banana oil—everything. Great fun to build! guaranteed to fly. Send money order TODAY (65c); no stamps.

**COLLINS PLOW COMPANY, Dept. 211, Quincy, Ill.**

# LAW STUDY AT HOME

Become a lawyer. Legally trained men win high positions and big success in business and public life. Be independent. Get all opportunities now than ever before. Big corporations are headed by men with legal training. Earn \$5,000 to \$10,000 Annually.

We guide you step by step. You can train at home during spare time. Degree of LL.B. conferred. LaSalle students found among practicing attorneys of every state. We furnish all text material, including fourteen-volume Law Library. Low cost, easy terms. Get our valuable 64-page "Law Guide" and "Evidence" books FREE. Send for them NOW.

**LaSalle Extension University, Dept. 4384-L, Chicago**  
The World's Largest Business Training Institution

## Book Reviews

By T. O'Connor Sloane, Ph.D.

THE UNIVERSE AROUND US, by Sir James Jeans, M. A. D. Sc. F. R. S. The Macmillan Co., New York, 339 pages.

This monumental work is so delightfully written in a style which, while somewhat familiar, breathes scientific accuracy in every word, that the best way to review it is to tell our readers to get the book and read it for themselves. It is a marvelous account of modern astronomy. It is fair to say that of all the branches of natural science, astronomy is one of the leaders and especially meritorious and remarkable in being so, because astronomers are dealing in their observatories with objects millions and millions of miles away from us. We are told in this work of stars whose temperature is so high, that the atoms of matter are wrecked in the intense heat. Protons and electrons are separated and the star acquires a specific gravity of the nuclei of its atoms which it has wrecked or destroyed. This accounts for the enormous specific gravity of some of the stars. Radiation is described. In the intense heat of the stars and the wreck of atoms, radiation is created or produced and goes off into space. No one can say whatever becomes of it. On account of this, all the stars are losing weight, possibly in some cases with the simultaneous picking up of weight from other sources. Taking our own star, the sun, as an example, it is found that it is losing at the rate of an enormous number of tons of matter per day. Even the earth is losing weight, but on account of its low temperature, the loss is infinitesimal, only a few tons per day. One interesting conclusion reached is that there are very few non-luminous stars, or stars which cannot be seen. This is a very remarkable conclusion because it touches on our planetary system, which has the planets and the satellites all non-luminous, revolving around the sun, and why should not the same thing be repeated everywhere? Yet, Professor Jeans inclines to the belief that non-luminous or obscure stars are very rare. In some books an attempt is made to popularize the subject by giving it a semi-humorous touch and this we say with a particular book in mind. But, as Edward Slosson, whose lamented death occurred very lately, in his chemistry has carried a slight touch of humor through it without lowering it, Professor Jeans, while giving it a thoroughly popular cast, abstains from any attempt to be unduly humorous.

EXPERIMENTAL SCIENCE, being a Series of Simple and Surprising Experiments in Mechanics, and Other Subjects, Heat, Light, Magnetism and Electricity. By A. Frederick Collins, F. R. A. S. D. Appleton and Co., New York, pages XVI—280.

This is quite a charming little book of simple experiments addressed undoubtedly to readers of a scientific turn of mind. The illustrations have been all drawn by the author, and to the writer of this review there is a considerable charm in this system of illustrating simple books of experimental work, which he would like to see followed more extensively. The book treats of six divisions of physics; of course, more or less of the old classic physics, which lend themselves beautifully to experiments. Space does not permit of us giving a full description of the matter in the book. It has an excellent index.

(Additional Reviews on page 1143)

## ✓ FREE BOOKS of BUSINESS HELPS

We publish over 200 Home Study Books, each a complete treatise of its subject. We have one or more for you.

- Commercial Art
  - Lettering
  - Advertising
  - Sign Making
  - Radio
  - Aviation
  - Painting
  - Silk Screen Process
  - Decoration
  - Automobiles
  - Battery Work
  - Electricity
  - Carpentry
  - Building
  - Contracting
  - Sheet Metal Work
- and many other subjects. All fully described in our FREE CATALOG. Check the subjects in which you are interested and write today.

**FREDERICK J. DRAKE & CO., Publishers**  
Room 510—179 No. Michigan Blvd., Chicago  
Drake books are for sale in all book stores

## TOBACCO HABIT BANISHED

QUICK, SURE, LASTING RESULTS

In most cases, *Tobacco Redeemer* relieves craving for tobacco completely in a very few days. An absolutely safe, dependable, and thoroughly reliable treatment. No matter how long the habit, or in what form used, all craving for tobacco usually vanishes when this pleasant, inexpensive treatment is used according to simple directions. Your money returned without argument or question if not satisfied. Write for free explanatory booklet and proof of what *Tobacco Redeemer* has done for men addicted to the tobacco habit. Send post card or letter today.

**NEWELL PHARMACAL CO.,**  
Dept. 884 Clayton Station St. Louis, Mo.

### HOW TO OBTAIN A Better Looking Nose!

Improve your personal appearance



My new Model 25 Nose Shaper is designed to improve the shape of the nose by remoulding the cartilage and fleshy parts, safely, and painlessly. This is accomplished thru the very fine and precise adjustments which only my patented Model 25 possesses. Results are lasting. Can be worn at night, or during the day. Money refunded if not satisfied after thirty days' trial. Write for free booklet to

**M. TRILETY**  
Pioneer Nose Shaping Specialist,  
Dept. 136 Binghamton, N. Y.

## DEAFNESS IS MISERY

Multitudes of persons with defective hearing and Head Noises enjoy conversation, go to Theatre and Church because they use Leonard Invisible Ear Drums which resemble Tiny Megaphones fitting in the Ear entirely out of sight. No wires, batteries or head piece. They are inexpensive. Write for booklet and sworn statement of the inventor who wash himself deaf.

**A. O. LEONARD, Inc., Suite 685, 70 5th Ave., New York**

## Factory to Rider

Save \$10 to \$25 on the Mead Bicycle you select from 44 Styles, colors and sizes.

### 30 Days' Free Trial

We ship on approval. If not satisfied after trial return the bicycle. EASY PAYMENTS. \$5 down on RANGER Bicycles. Lamps, wheels, equipment at half-usual prices. Write for marvelous new prices, wonderful 30 day trial offer and terms.

**Mead Cycle Company** Write us today for free catalog  
Dept. M107, Chicago

## Learn Advertising at HOME

Send your name and address for free booklet giving interesting information and vital facts about Advertising. Find out how we can pay you at home, in your spare time, for the opportunities open in this fascinating business. Practical work. No text books. Old established school. Successful graduates everywhere. Just the Plan You have always wanted. Write today. No obligation.

**PAGE-DAVIS SCHOOL OF ADVERTISING**  
Dept. 1424, 3601 Michigan Ave., Chicago, U. S. A.

Write for Information About the NEW

## H-F-L MASTERTONE

Laboratory-Made Receiver

The year's outstanding Radio Achievement

**HIGH FREQUENCY LABORATORIES**  
28 N. Sheldon St., Dept. 26, Chicago, Ill.

## Deep Sea Surgeons Mend World's Nerves

(Continued from page 1097)

and make the final splice, restoring the fast cable to service.

In this section the cable was 13,200 feet beneath the surface. The Cyrus Field, built for shallow water repair work, had never before picked up a cable lower than 6,000 feet in any weather. Midwinter cable repair in the Atlantic is so difficult it is rarely attempted, especially at such great depths. The feat of the Cyrus Field, and of the Lord Kelvin, which laid 100 miles of cable in weather conditions approaching a gale, was hailed as an engineering achievement.

Such work would be impossible without every aid known to science. The ships, for instance, were aided in locating their positions by electrically driven deep-sea sounding machines which show the depth, nature of bottom and temperature on the ocean floor. Knowledge of the depth aids in finding the location, the character of bottom determines the type of grapnel to be used, and the temperature indicates what allowance should be made for this factor in repairing the cable.

Another instrument used is the Sonic depth finder, which sends sound impulses in the water so that they strike the ocean bottom and are reflected upward again to the surface. The depth is measured by the time it takes for the echo to return.

The great danger of stretching the cable too tightly or allowing too much slack is one of the major difficulties. The rise and fall of the ship on a moderately rough sea may snap the cable. If so little slack is allowed that the cable is suspended between two submarine mountains, the result may be a strain that will cause a break.

Experts in all of the various steps in the work are on board each ship. The joiner who splices the central copper wire or conductor must know his work. Equally difficult is the application of successive layers of copper tape, permalloy or numetal, gutta percha, jute, steel armor and tarred hemp cords.

Even the health of the men who work the hot gutta percha is important. A joiner whose perspiration is acid, for instance, would cause the gutta percha to harden and develop a fault. Even an imprisoned air bubble will later cause trouble, as the pressure is 8,000 pounds per square inch at a depth of 13,000 feet.

### Hangs by a Human Hair

FOR every be-barnacled cable in the ocean depths there is maintained a duplicate on land, not in miles of cable but in "electrical resistance stages" in large numbers. Since moisture affects the delicate balance of this phantom cable, these "stages" are kept in a room like a refrigerator vault in separate compartments in the room constructed of insulating material like ice boxes. This room is maintained without moisture by use of the thermostat, electric fans and lime, which absorbs moisture. This phantom cable makes possible the sending of messages in both directions over one cable, or as the experts say, it helps to "balance" the cable.

To say that operation of the cables of the world hangs by a human hair would be to exaggerate, but the hair does play an important role. The hair hygrometer, which operates by the contraction and expansion of a human hair in the presence of moisture, guides the maintenance of temperature in the phantom cable room so that the delicate balance is preserved.

# ELECTRICITY OFFERS BIG PAY

**NOW YOU CAN LEARN AT HOME**

**HUNDREDS OF COOKE TRAINED MEN ARE MAKING \$60 to \$100 A WEEK**

Why don't you get into Electricity, too? It's today's great Opportunity for you and every other man who is sick and tired of struggling along on small pay. Hundreds of "Cooke Trained Men" who were no smarter than you when they started now make \$3,000 to \$5,000 a year—and some make even more.

### LEARN AT HOME IN SPARE TIME

Learn with the famous L. L. COOKE "Work Sheet and Job Ticket" Method. It's simple, it's thorough, it's practical. It's just like actual shop experience, yet it's all done right in your own home with the Big Complete Outfit of Tools and Apparatus given to you without extra cost. And it's done in your spare time, without quitting your present job or losing a single hour's pay.

### PREVIOUS EXPERIENCE NOT NEEDED

You don't need previous experience—you don't need higher education to learn Electricity the L. L. COOKE Way. If you can read and write, that's enough. This great Training is amazingly clear and simple. There's nothing like it anywhere. It's the Training with hundreds of successful graduates; it's the Training that has put many men on Easy Street; it's the Training for YOU!

### GET STARTED--MAIL COUPON

"Cooke Trained Men" are the "Big Pay Men" everywhere. \$60 to \$100 a week is what many of them are making. That's the kind of a job for you. Get started under the famous L. L. COOKE Money Back Agreement. Act today to increase your pay. Send coupon for Big FREE Book, "Secrets of Success in Electricity." Mail coupon now.

**L. L. COOKE SCHOOL OF ELECTRICITY**  
Dept. 404, 2150 Lawrence Ave., Chicago, Ill.

### FREE BOOK COUPON

L. L. Cooke School of Electricity, Chicago, Ill.  
Dept. 404, 2150 Lawrence Ave., Chicago, Ill.  
Send me entirely free and fully prepaid, your book "Secrets of Success in Electricity," with particulars about your Home Study Course in Electricity.

Name .....  
Address .....  
City ..... State .....

**\$12 A Day**  
"When I enrolled as a small pay laborer I made \$12 a day in Electricity." Bob Korman, 208 S. Maple, New York, Ohio.

**\$65 A Day**  
"But for your course I would still be on small pay instead of making as high as \$65 a day in Auto Electricity." Jacob Leuter, 1923 2nd Ave., Hillsboro, Oregon.

**LEARN BY DOING**

1  
2  
3  
4  
5

**The "Cooke" Trained Man is the "Big Pay Man"**

## How to set up a "POWER" WORKSHOP

This book contains valuable information for those interested in learning how to get the most out of power (electric) tools, either for home workshop use or small shop operations. It tells in simple terms the best method of setting up a home workshop.

Chapters on the use of a wood turning lathe. Use of the dado and circular saw. Operating the jig saw, jointer, belt sander, etc. Wood joints and how to make them, illustrated. Uses for the flexible shaft illustrated. Also eight blueprints with specifications and list of materials of useful furniture easy to make.

**"THE DRIVER MANUAL"**  
By the Manufacturers of "DRIVER" Power Tools

Walker-Turner Co., Inc., 70 York St., Jersey City, N. J.

NAME .....  
STREET .....  
TOWN ..... STATE .....

**8 BLUE PRINTS AND WORKING DRAWINGS OF WORKBENCH & FURNITURE.**

mail 50¢ to-day

# Young Man - Here's Your Opportunity to MAKE BIG MONEY



## The Foley Model F-5 "3-Way" Auto-Saw Filer

Nothing else like it in the world. Files hand, band and circular saws automatically with such mechanical accuracy that they cut faster and stay sharp longer. Better than the most expert hand filing. Easy work to file 5 to 6 saws an hour. No experience necessary—even boys of 11 are operating the Foley.

## No Canvassing

You can get all the business you can handle from carpenters, contractors, schools, saw mills, factories and every other kind of business. Lots of men are making big money filing saws on the Foley. "I have 262 school saws in my shop now besides many others," says Mr. M. S. Gray. Send for free plan that shows you how to build a permanent, well paying cash business of your own. Start in spare time if you wish. Mail the coupon below today.

### Mail Coupon for FREE PLAN

FOLEY MANUFACTURING CO.,  
1504 Foley Bldg., 11 Main St., N. E.,  
Minneapolis, Minn.

Please send me free plan showing how I can make big money and start my own business with the Foley.

Name .....

Street .....

City .....

State .....

Begin Today—Write for My FREE BOOK—I can make a good penman of you in a few days spare time. Write for my FREE BOOK, "How to Become a Good Penman." Illustrations, specimens and tips from others—suggested penmanship for the Franklin System. Your name will be clearly written on a card if you enclose stamp to pay postage. Write today for book.

F. W. Allen, 424 Ridge Blvd., Kansas City, Mo.



## Contentment and Happiness Certain with the COLONIAL DAMPER IN YOUR FIREPLACE

Avoids smoking and cracks in facing that ruin a fireplace. Happiness and contentment in front of an open fire assured when your fireplace is equipped with this perfected draft control. Product of firm famous for twenty-five years. Your architect, contractor or dealer will assure you of the recognized superiority of the Colonial Damper—the only damper made that takes up heat expansion.

Send 10c in stamps for Fireplace Plan Book and Helpful Information.  
COLONIAL FIREPLACE CO., 4631 Roosevelt Road, Chicago

## Help Your Trees Get Their Vitamines

By Evelyn Smith

(Continued from page 1088)

for evergreens and for hedges. All evergreens may be sheared in the spring, if you use great care to preserve the outlines in a distinctive fashion and restrain from too much exuberance in the way of fancy shapes. There are certain flowering hedges which must be done in the spring, although the favorite privet hedge may be sheared at any time in the year. A hemlock hedge is best done in May or June, just as the young growth is starting.

If properly planted in good soil, the average tree is much better left alone by the amateur tree owner. Taste in trees and their development is as individual as is taste in furniture or in motor cars. Select and trim your own trees according to your own requirements and rely on the advice of reliable tree experts rather than on the notions of the neighbors. When your friend tells you that your favorite tree should have some big branches sawed off, remember that cutting a tree branch requires definite knowledge in order not to cut or tear either the bark or the limb. The cut itself must be properly waterproofed and painted to prevent encroachment of wood decaying fungi or other tree diseases. The amateur should no more attempt to tamper with serious tree trouble than he should attempt to do a little surgical work on his own person or to fill his own teeth.

I almost wept last spring when I saw a beautiful apple tree that had been literally done to death by an amateur, whose zeal with the pruning shears had outrun his knowledge of tree culture. The more he proudly pruned, the more he set back the lovely old tree, for he was blithely removing all the new fruit spurs. He thought that because they were a trifle twisted and seemed to be ingrowing that they must be removed. It was useless to tell him that he was ruining what should be one of the choicest trees in his orchard. It was his tree and he thought he knew. But ownership of a tree is no excuse for its maltreatment.

At Anawak we prune our trees each year in order that the branches will not spread too much for efficient handling when shipped; but as some of our trees are from 70 to 75 feet in height and weigh approximately 20 tons this is a prime necessity. Root pruning also requires a regular program and should never be attempted by one who is not thoroughly qualified, for it takes a full year to properly make the root areas smaller, more compact and fibrous and ready for tree moving. It is not a job for the amateur, for when root pruning is done a certain amount of top pruning must accompany it to preserve the proper balance necessary in tree health.

Bear in mind that winter pruning promotes growth and summer pruning retards growth and have your plans for trimming carefully thought out for months ahead. Do no trimming of trees hastily. You can always rake leaves or mow grass or study garden catalogues to mitigate that early spring trimming itch—which is, at the final analysis, only a desire to get out into the fresh spring air and promote your self-respect by having something to show for it.

A beautiful tree is like a beautiful jewel—far too valuable to risk injury from amateur hands in its proper treatment and care.

## Your Trees Should be TRIMMED Scientifically

There is no task to tree-trimming when Bartlett Pruning Implements are used—endless here by expert horticulturists.

POLE SAW No. 44—(curve saw cuts freely) 8 ft., \$4.40. Other lengths up to 16 ft., \$5.60.

LIPPING SHEARS No. 77—(will not wound the bark) 26 inch white ash, highly tempered steel, \$3.50.

POLE TREE TRIMMERS No. 1R—(compound lever, easy cutting) 6 ft. pole, \$5.50. Other lengths up to 16 ft., \$7.20.

Ask for Complete List and Booklet 16

### BARTLETT MFG. CO.

3223 Grand Blvd. Detroit, Mich

## Andy Sannella Talks to Reed Players. Get this Free Book!

On the air tonight, and every night, Andy Sannella is earning a fabulous salary with his Selmer Sax. In his book of "Advice to Saxophone Players," he gives more valuable information than in ten private lessons. This book also contains Talks to Clarinetists by Alexandre Selmer. Send for free copy.

If you will mention the instrument you play, we will send also, free samples of our Alexandre Reeds. They Play!

### Selmer

277 SELMER BUILDING, ELKHART, INDIANA  
(In Canada: 10 Shuter Street, Toronto)

### LEARN TO DRAW!

Remarkable book—"COMMERCIAL ART AND CARTOONING." Explains how to make illustrations for books, advertisements, etc. Also how to become a Cartoonist. NO CORRESPONDENCE COURSE—Book tells all—14 chapters—125 illustrations. Explains Elementary Drawing: Still Life; Pen, Ink, Charcoal and Gray Work; Cartooning, etc. Bound Flexible, 16m. Leather. Postpaid for \$2.00 (C.O.D. 17c extra). OGILVIE PUB. CO., 57 Rose Street, New York. Dept. 139

## CHEMISTS

Catalog illustrating 2500 Chemist's Supplies, 5,000 Chemicals, Minerals, Drugs, etc., and listing 1,000 scientific books sent for 50c. Glass Still as illustrated. Capacity of flask 1 qt. Complete \$8.

### LABORATORY MATERIALS CO.

635 East 71st St. Chicago, U.S.A.

## Be A Detective

Make Secret Investigations Earn Big Money. Work home or travel. FASCINATING WORK. Experience unnecessary DETECTIVE Particulars FREE. Write GEO. STEVE WAGNER, 2190 Broadway, N. Y.

## AVIATION FREE Information

Send us your name and address for full information regarding the Aviation and Airplane business. Find out about the many great opportunities now open and how we prepare you at home, during spare time, to qualify. Our new book "Opportunities in the Airplane Industry" also sent free if you answer at once.

### AMERICAN SCHOOL OF AVIATION

Dept. 1424 3601 Michigan Ave. CHICAGO

AIRPLANE BLUEPRINTS  
Lincoln Sport Plane \$6.75  
Gerber Monoplane \$1.00  
SCIENCE & INVENTION  
381 Fourth Ave. New York City

## Prize Winners and Solutions for January Brain Teasers

By Sam Loyd

### Solution to Sandy MacNab's Palindrome

Inserting the letter T, in four places, makes the line read: "TOO HOT TO HOOT," which, you see, reads the same backward as forward.

### Solution to the 1930 Puzzle

An interesting digital principle applies in solving of this problem to wit:

Any group of digits continually added together, until a single figure results, will invariably have that figure as its root, no matter how the figures are varied in arrangement of rows and columns in the adding process.

The root of 1, 2, 3, 4, 5, 6, 7, 8, 9 and 0 is 9. The root of 1930 is 4. This difference in roots must by some method be reconciled in order to secure a total of 1930 from the given figures. Converting some of the figures into fractions, as permitted, will effect the desired result. Since the fractions thus made are to equal a unit, not less than four can be employed, and not more than five can be spared for the purpose, for the remaining figures will be needed to produce a total of 1929.

The digits in the created fractions (equaling a unit) must have a root of 3 in order to reduce the root 9 to 4.

The fractions 2/4 and 3/6 are found to qualify. Also the fractions 7/8 and 5/40.

1859	2/4	1923	5/40
70	3/6	6	7/8
1930		1930	

Obviously, simple transpositions may be made without disturbing the result, as for example:

1926	7/8	1850	3/6
3	5/40	79	2/4
1930		1930	

### Prize Winners in January Contest

First Prize, of \$10, is awarded to Alvin Ashby, Woodscrest, Utah.

Second Prize, of \$5, is awarded to Alexander G. Murray, 1314 Wilson Boulevard, Clarendon, Va.

The ten prizes, of \$1, are awarded to the following:

George T. Swasey, 18 Stratton Building, Raymond, Washington; B. Frank Tinney, Experiment Station, Charlottetown, P. E. I., Canada; F. W. Ball, Veterans' Home, Napa Co., Calif.; S. William Proctor, 709 West Van Horn, Independence, Mo.; J. J. Donnelly, 1027 Mirror St., Pittsburgh, Pa.; Archie Kaplan, Rivoli Theatre, So. Fallsburgh, N. Y.; R. B. Silence, 408 N. Third St., Marshalltown, Iowa; Charles Novy, 606 Melrose St., Akron, Ohio; Stanley W. Kincart, 4324 Normandy Ave., Cincinnati, Ohio; Oscar Goolsby, First National Bank, Waldron, Ark.

## Have You Noted

the list of manufacturers' literature, pertaining to the S. Gordon Taylor series and the basement plan contest, on page 1147?

Order by Number

# Half a Million People have learned music this easy way

You, Too, Can Learn To Play Your Favorite Instrument without a Teacher

## Easy as A-B-C

MANY of this half million didn't know one note from another—yet in half the usual time they learned to play their favorite instrument. Best of all, they found learning music *amazingly easy*. No monotonous hours of exercises—no tedious scales—no expensive teachers. This simplified method, perfected by the U. S. School of Music, made learning music as easy as A-B-C!

From the very start you are playing *real* tunes perfectly by *note*. Every step, from beginning to end, is right before your eyes in print and picture. First you are *told* how to do a thing, then a picture *shows* you how, then you do it yourself and *hear* it. And almost before you know it you are playing your favorite pieces—jazz, ballads, classics. No private teacher could make it clearer. The cost is surprisingly low—averaging only a few cents a day—and the price is the same for whatever instrument you choose.

### LEARN TO PLAY BY NOTE

Mandolin  
Piano  
Organ  
Violin  
Banjo  
Or Any Other Instrument

Saxophone  
'Cello  
Ukulele  
Cornet  
Trombone  
all your friends.  
Change from a wall-flower to the center of attraction. Musicians are invited everywhere. Enjoy



popularity you have been missing. Start now!

### FREE BOOKLET AND DEMONSTRATION LESSON

If you really do want to play your favorite instrument, fill out and mail the coupon asking for our Free Booklet and Free Demonstration Lesson. These explain our wonderful method fully and show you how easily and quickly you can learn to play at little expense. Instruments are supplied when needed—cash or credit. U. S. School of Music, 304 Brunswick Bldg., New York City.

U. S. SCHOOL OF MUSIC,  
304 Brunswick Bldg., New York City.

Send me your amazing free book, "Music Lessons in Your Own Home," with introduction by Dr. Frank Crane; also Free Demonstration Lesson. This does not put me under any obligation.

Name .....

Address .....

Instrument .....

Have you this Inst.?

# Win \$3,500.00!

To advertise we are going to give over \$7160.00 in prizes. Charles Henfling, between 60 and 70 years old, won \$4245.00 in last offer; Joe Hanslick, 15 years old, won \$300.00; Mrs. D. H. Ziler won \$1800.00. You can win \$3500.00 now.

## CAN YOU FIND THE TWINS?

Be careful! Don't make a mistake! It's not as easy as it looks because two, and only two, of the seven pictures are exactly alike. Find them—mark them—or send numbers on post card or letter. Over 25 prizes this time, and duplicate prizes in case of ties! Send no money. Anyone who answers correctly may receive prizes or cash. You can have cash or Waco airplane, or automobile, or new home. If correct you will be qualified for this opportunity.

**\$625.00 Extra For Promptness**  
—making total prize you can win \$3500.00. Find twin flyers and send answer today. First prize winner gets \$625.00 cash just for promptness. Rush.

**J. D. SNYDER, Publicity Director**  
54 West Illinois St. Dept. 390 Chicago, Illinois

Find the Twins  
7160.00 in Prizes  
Reply Today

## TRUSS USERS

Learn how to close the rupture opening, so the rupture can't come down. Get a Ten Day Test of the herbal muscle- tonic "Plapao", and 48 page illustrated book describing the effective home treatment used by satisfied thousands without delay from work. Awarded Gold Medal, Rome, Grand Prix, Paris, and other proofs of merit. You can make this test which started many others on the road to better health without cost—FREE. Write TO-DAY to Plapao Co., 375 Stuart Building, Saint Louis, Missouri.

## ELECTRIFY YOUR RADIO FOR ONLY \$6.85 COMPLETE

Why discard your present good set when you can electrify it for only \$6.85, and banish the annoyance and expense of buying new "B" batteries?

Over 150,000 Townsend "B" Power Units In Use

Hooked up in a few minutes. Use same tubes—no changes. You'll be amazed at the improvement in reception and distance getting. Send name and address today for full details, proof and Free Trial Offer.

**TOWNSEND LABORATORIES**  
725 Townsend Street Chicago, Illinois

\$300 FOR ROOM & BATH

**HOTEL PICCADILLY**  
45th St. W. of Broadway  
NEW YORK

In the Heart of TIMES SQUARE—

Brand new—Luxurious—Exceptional!

EACH room has bath, circulating ice water, electric fan!

Wire at our expense for reservations.  
F. D. SOFIELD, Managing Director

## 6 Ft. LONG FREE!

Boys! Here's the great Navy model Airship. Large 6-foot air bag with inflators, parachute with automatic release and complete instructions for flying. Will fly for miles at height of 1000 feet. Great chance to study aerial navigation. Send name and we'll send 6 of our new art pictures to dispose of on special 25c offer. Send the \$1.50 you collect and as a reward for this service we will send this wonderful Airship with full instructions free.

C. M. THOMAS, 337 W. Madison St., 4-K-22, Chicago



## GET STRONG with these 6 improved Muscle Builders—All for \$5.00

Realize your ambition and develop muscles of a super-man. **GET STRONG!** Easily master feats which now seem difficult—or if you want physical culture for your health's sake, this equipment is what you need. With this special offer you **SAVE AT LEAST HALF!** We furnish 10-cable chest expander adjustable to 200 lbs. resistance. Made of new live extra strength, springy rubber so as to give resistance you need for real muscle development. You also get a pair of patented hand grips for developing powerful grip and forearms. We include wall exercising parts which permit you to develop your back, arms and legs—real muscle necessity. The head strap permits you to exercise muscles of your neck. Develop leg muscles with foot strap furnished. This gives speed, endurance. In addition you get specially written course containing pictures and diagrams showing how to develop any part of your body. **ACT NOW!**

### Send No Money

Sign name and address to coupon and rush to us. We send everything by return mail. Pay postman \$5.00 plus postage (if you desire). Send money order now and we pay postage.



**GUARANTEE MONEY BACK IF NOT SATISFIED**

**CRUSADER APPARATUS CO.**  
Dept. 404, 44 Parker Ave., Maplewood, N.J.

I accept your offer. Send me everything described in your advertisement by return mail. I will pay postman \$5.00 plus postage on arrival. It is understood if I am not entirely satisfied after examination, I can return the goods and you will refund my money.

Name .....

Street .....

City .....

State .....

Note—No C. O. D. orders to Foreign Countries or Canada.

## Electrical Engineering

Training for men of ambition and limited time. Concise, comprehensive course in Theoretical and Practical Electrical Engineering including Mathematics and Mechanical Drawing. Students construct motors, install wiring, test electrical machinery. A thorough course designed to be completed in one college year.

**THIRTY-SEVEN YEARS** of successful experience assures you maximum training in minimum time.

Send for free catalog

**BLISS ELECTRICAL SCHOOL**  
144 Takoma Ave., Washington, D. C.

## TYPEWRITER 1/2 Price

World's best makes—Underwood, Remington, Royal—also portables—Prices smashed to below half. (Easy Terms.) **SEND NO MONEY!** All late models completely rebuilt and refinished brand new. Guaranteed for ten years. Send no money—big free catalog shows actual machines in full colors. Get our direct-to-you offer payment plan and 10 day free trial offer. Amazing values—send at once.



Free Trial

International Typewriter Exch., Dept. 421, Chicago

## Radio Rides the Roads

(Continued from page 1099)

and the lack of alignment of condensers will result. One of the best methods is to suspend the set under the hood on brackets. It may also be placed under the chassis or under the dashboard. The main consideration is to provide proper shock-absorbing insulation such as rubber or springs.

Most of the receivers designed for auto use are equipped with some form of remote control. This usually consists of a flexible shaft, similar to that used by the dentist, which is attached to the receiver at one end and to either the dashboard or the steering wheel at the other end. This obviates the necessity of having the receiver near the driver, where, no doubt, it would prove clumsy and cumbersome.

It can readily be seen that the problem of radio receivers for automobiles has been carefully worked out by engineers. Most of the manufacturers plan to sell their sets through garage men, who will do the necessary installation. Others plan to sell them in kit form. This, we think, gives the radio enthusiast a chance to do some work on his set and on his car. In later issues we plan to show you the latest sets that are produced, those that may be obtained in kit form, and the correct method of installing such a receiver in your car. It is our belief that for the tourist, the picnicker, and the autoist who travels great distances in the rural districts the auto radio is a welcome source of amusement and entertainment.

## MODEL BLUEPRINTS

Correct—Easy to Follow

- 1-2 Horizontal Steam Engine details... set \$1.00
- 3-4 Boiler construction for above... set 1.00
- 5 880-Ton Bark ..... set .50
- 6-7 Twin Cylinder Steam Engine and Boiler ..... set 1.00
- 8-9 Gasoline Fired Locomotive..... set 2.00
- 10-11 U. S. S. Constitution, "Old Ironsides" ..... set 1.00
- 12 13th Century Man-of-War ..... .50
- 13-14 Chinese Junk ..... set .50
- 15-16 Electrically Driven Automobile... set 1.00
- 17 Roman Ballista ..... .50
- 18-19 Simple Steam Engine ..... set .50
- 20-21 How to Build a Reflecting Telescope. 1.00
- 22 "Santa Maria," complete..... .50
- 23-24 Model U. S. S. Portsmouth..... set \$1.00
- 25 Building a Model Tugboat..... .50
- 26 Twin Cylinder Marine Engine..... .50
- 27-31 U. S. S. Truxton..... set 2.00
- 32 Sopwith Biplane ..... .50
- 33 Speed Boat ..... .50
- 34 Airplane Engine ..... .50
- 35-36 Motor Winch ..... .75
- 37-38 Vertical Steam Engine..... 1.00
- 39 Cannon ..... .50
- 40 Steam Roller ..... .50
- 41 Prairie Schooner ..... .50
- Lincoln Sport Biplane (man-carrying) 6.75
- Gerber Monoplane (man-carrying).. 1.00

Anyone who can read blueprints and is at all handy with tools, will find no difficulty in following the simple explanatory diagrams. Many sport planes and monoplanes built from our plans are flying daily, thus attesting to the accuracy of the blueprint details. Satisfaction guaranteed.

Send Orders to

**BLUEPRINT DEPARTMENT  
SCIENCE AND INVENTION**

381 FOURTH AVENUE

NEW YORK CITY

## BE a FOOT SPECIALIST!



### EARN MORE MONEY

Learn PEODPRACTIC—the new system of correcting foot disorders and deformities without medicine or surgery that's making tremendous strides these days. It's a new unworked profession and offers amazing opportunities in an unlimited field. Dignified, interesting and profitable. No thinking man or woman will willingly neglect foot troubles when they produce so much discomfort and disability and can be so easily corrected.

**LEARN QUICKLY AT HOME IN SPARE TIME!** With but ordinary education and leisure home study you can quickly qualify for this profession with its social, professional and financial advantages.

### EARN WHILE YOU LEARN

The demand for your services will be so great that you can start in your own home and earn the cost of your training while you are studying the course. We teach you how to quickly "cash in" on your knowledge. You can quickly build up a practice and have an office of your own. It's a wonderful opportunity, so act quickly. Clip coupon below, sign name and address, mail today for full information about this wonderful new science. Do it now. No obligation.

CUT HERE

### AMERICAN COLLEGE

Chartered 1915 by the State of Illinois  
Dept. P-4 54 W. Illinois St., Chicago

Name .....

Street .....

Town .....

State .....

## \$100 for a Name AND \$25 EXTRA FOR PROMPTNESS

We want a name for our exquisite perfume and we will pay you \$125 if you suggest the one selected. Even a name you don't think much of may win. A simple name has as much chance as any other.

**Hints:** It may be a single word or more than one flower, like Rose. The name of a place, a Movie Star or any person. Names are almost unlimited. It costs nothing to submit a name. Someone wins \$125.00 for a few moments thought—why not you?

**Any Simple Name May Win**  
Send only one suggestion. If anyone submits more than one name, all names sent by that person will be disqualified. The name found most suitable will receive \$100 cash. If you send the winning name within 3 days after reading this announcement you get \$25 extra for promptness. Contest closes April 30, 1930, and in case of ties, duplicate prizes will be awarded.

We want to hear from you at once. Send your suggestion on any kind of paper. Postage does not count. No obligation. Nothing else to do. You may win \$125.00 for the name you suggest. Do it today.  
**L. M. STONE, 844 W. Adams St. Dept. 111, Chicago**

### Learn to PAINT SIGNS and SHOW CARDS

We quickly teach you by mail, or at school, in spare time. Enormous demand. Big future. Interesting work. Oldest and foremost school.

**EARN \$50 TO \$200 WEEKLY** spare time home instruction, or money \$12,000 from his business in one year. John Vasson, N. Y., gets \$25 for a show card. Crawford, N. C., writes: "Earned \$200 while taking course." Write for complete information.

**DETROIT SCHOOL OF LETTERING**  
179 Stinson Ave. Est. 1899 DETROIT, MICH.

## BE A RAILWAY TRAFFIC INSPECTOR

Earn up to \$250 monthly, expenses paid. Most interesting work with unlimited opportunities. Meet big railway officials; travel or remain near home; pleasant outdoor work. We assist you to a position at \$120 to \$150 per month, expenses paid, after 3 months' spare time home instruction, or money refunded. Rapid salary advances to \$185, \$200, \$250 with experience. You take no risk. **ACT NOW!** Write for free booklet giving full details. Don't delay!

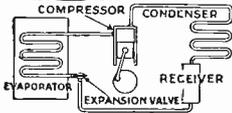
**TRAFFIC INSPECTOR TRAINING INSTITUTE**  
Division 27 Buffalo, N. Y.

## 150 Radio Hook-ups

All the newest hook-ups, described with complete diagrams. Every radio fan and set-owner should have a copy for ready-reference. Includes crystal circuits, single circuit detectors, audio and RF amplifier circuits, superheterodynes and numerous AC and DC receiver circuits. Complete volume only.... **25c**

**MACKINNON-FLY PUBLICATIONS, Inc.**  
381 Fourth Avenue New York, N. Y.

# BIG Money IN ELECTRIC REFRIGERATION



America's newest and fastest growing industry—Electric Refrigeration—needs trained men to fill service, sales, factory and executive positions at salaries up to \$50 and \$200 a week. Amazing

new easy training qualifies you quickly at home in spare time. Endorsed and praised by General Electric, Servel, Kelvinator, Copeland, Zerzone and other manufacturers.

Earn As You Learn New Easy Way

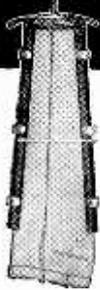
Unlike ordinary schooling, No textbooks. No study drudgery. Charts, diagrams and pictures help you. Easy terms. Money-back agreement. Free employment service. Get big new book of facts—FREE!

**FREE!**

New book containing valuable facts on Electric Refrigeration. See how easily you can win a big pay job. Write TODAY!

UTILITIES ENGINEERING INSTITUTE, 4403 Sheridan Road, Dept. 540 Chicago, Ill.

## \$93 the First WEEK



"I worked 6 days, 6 hours a day, and made \$93 selling the new Stay-Prest Trouser Pressers."



J. W. VARNER, Iowa. With this great invention all men can have freshly pressed trousers every morning and save \$50 a year. It puts in a knife edge crease—takes out wrinkles—removes knee bag. Easily used in just a few seconds. Nothing like it. Well made, looks rich. Retail \$2.50. Big value. Every man wants one or more. A real fast seller and big repeter with 40% profit. Men and women are cleaning up big. Ten easy sales a day net you \$10.00. Almost sells on sight.

Make big profits—others do. Jack Ames \$24 in four hours. Randle sold 25 first day. Mary Roberts made \$10 one evening. Others enjoying big profits in full spare time. So can you. No risk. We start you. **FREE** sample outfit with special offer. Write quickly for office, plan and territory. Stay-Prest Co., Dept. A-44, Central Park Bldg., Cincinnati, O.

## Learn Photography at HOME

Make money taking pictures. Prepare quickly during spare time. Also earn while you learn. No experience necessary. New easy method. Nothing else like it. Send at once for free book, *Opportunities in Modern Photography*, and full particulars. Write quickly for office, plan and territory. AMERICAN SCHOOL OF PHOTOGRAPHY, Dept. 142, 3601 Michigan Ave., Chicago, U. S. A.

Moulds as low as \$1.50 each.



Cast Your Own Lead Soldiers, Indians, Hunters, Wild and Farm Animals

222 Wonderful "True to Life" Models. Easy and inexpensive to make. I furnish all necessary material including enamel. Send 5c Stamp for Illustrated Catalogue. H. C. Schiercke, 1034-72nd St., Brooklyn, N. Y.

## ARTISTIC ENLARGEMENTS

Size 16x20 inches

Surely you have a photo of some dear one, mother, dad, baby, or friend that would enlarge beautifully and bring out the lifelike features perhaps better than in the small picture. The usual price of this work is \$5.00, but our price is only 98c.

**98c**

**SEND NO MONEY**

Just mail photo or snap-shot any size, full figure, bust or group. Within a week you will have your enlargement, size 16 x 20, or smaller, if desired. Guaranteed fadeless. Pay postman \$c plus postage, or send \$1.00, and we pay postage. Money back, if not delighted.

**FREE** With each enlargement we send Free a hand tinted miniature reproduction of photograph. Take advantage of this amazing offer now. Send photo today.

ALTON ART STUDIO, 5654 West Lake St., Dept. 47, Chicago, Ill. Please send.....enlargements from enclosed photo. I will pay postman 98c plus postage for each enlargement. If \$1.00 cash for each enlargement is enclosed with this order, we pay postage.)

Name.....  
Address.....  
Town.....State.....  
Check Size  
Wanted  
 16x20 in.  
 10x16 in.  
 11x14 in.  
 8x10 in.

## Book Reviews

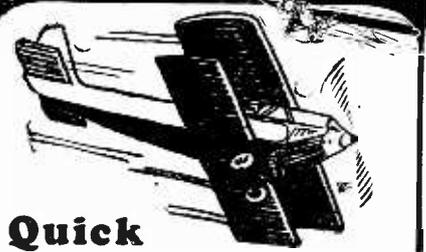
ELEMENTS OF RADIO COMMUNICATION, by John H. Morecroft, published by John Wiley & Sons, New York City, pages VI to 269.

It is impossible within the limits of our scope to review this book. The subject is so concisely treated in its 256 pages of text that the reader feels that in it is to be found the whole story of radio, simply, as well as accurately, treated. Professor Morecroft is the author of a truly monumental book entitled, "The Principles of Radio Communication," containing some thousand pages of text, and this book is considered as the final word in radio literature as far as the English language is concerned. The book we are reviewing, which is about one-quarter as long, seems to be constructed exactly on the right level. There is no attempt in it at simplification. It is not too much to say that it is all there—all radio. Formulas are used and numerous calculations by the formulas are given, but the derivation of the formulas is often passed over. For this part of the subject, as given by Professor Morecroft, all that is required is a knowledge of the simple operations of algebra. It is fair, to say that unless a radio student is willing to go through this altogether admirable book, word for word, applying the formulas and doing the problems which are given, he cannot consider himself as anything better than a service man. And the person who wishes to round out his knowledge of radio will find from this book that there is no excuse for the least difficulty in understanding the basic principles of radio. It supplies an admirable framework as well as details for giving him an excellent knowledge of this subject. We can compliment the book by saying that it deserves a better index than has been given it, and we think we have noticed one or two minor points which could be changed in a future edition, but they are slight. It is intended as an introduction to the standard work, "Principles of Radio Communication," and it is hard to believe that anyone will go through it with the diligence which it deserves without following it up by studying the above larger really monumental work by Professor Morecroft, assisted by A. Pinto and W. A. Curry.

RADIO LIBRARY, flexible fabrikoid, 7 1/2" x 5", five volumes, profusely illustrated. Published by International Textbook Company, Scranton, Pa.

In this edition of five volumes the aim has been to incorporate everything in radio, from the fundamental principles of this science to the practical problems of the service man. The editor seems to have achieved his end by securing authors, who not only know their radio, but also know how to write about it. This edition gives a lucid explanation of the fundamentals of radio receiving and transmitting circuits; besides a comprehensive discussion of tubes, antennas, and radio mathematics. It is really very difficult to do justice to this series of books in a short review, for there is no doubt that the matter covered is very comprehensive. Some of the chapters we liked best were those on receivers—the explanations of the underlying principles of the neutrodyne, heterodyne, and regenerative circuits. Another thing we liked was the glossary of radio terms. Outside of a radio dictionary we have never come across such lucid definitions. However, the library has its faults, one of them being that its chapters on servicing sets do not go into enough detail.

## Learn AVIATION WHERE LINDBERGH STARTED!



### Quick Success for Lincoln Graduates

Men, aviation offers you remarkable opportunities for a big future. Capable trained pilots and mechanics are in demand at good salaries. Our graduates take the better positions because of the superior training given them at this school. Read below what some of our graduates say.

#### Read These Letters!

**Demonstrates Planes** —"Thanks to your instruction, I have secured a position with an aircraft company in Lincoln, demonstrating planes. It pays me a good salary, and enables me to build up enough hours solo required for my transport pilot license at no expense to myself."—M. S. Smith.

**Substantial Salary** —"I traveled U. S. investigating aviation schools and airplane factories. I finally selected the Lincoln School, and am glad I picked it. After graduation, I had no difficulty in getting a good position in one of Lincoln's aircraft factories. I get a substantial salary and assurance of promotion."—W. Q. Mangold.

**Job in 4 Days** —"After completing my mechanic's and ground work June 20, I started to work at the Worcester Airport at East Douglas, Mass., June 24. I heartily recommend your school."—E. C. Thompson.

## LINCOLN Airplane & Flying School

Lindbergh learned at Lincoln! You, too, come to Lincoln! Get superior training at the Lincoln School. Complete, practical Pilot and Ground Courses. Plenty of new-production planes. Extensive ground training facilities. Expert instructors. Planes and transport pilot and mechanic instructors government-licensed. Mail Coupon for full information.

#### FREE Aviation Book!

Contains full information about Lincoln School. Tells story of "Lindy" at Lincoln. Check full of interesting aviation facts and photos. Tells about Big Money opportunities. Mail Coupon today!



#### MAIL COUPON NOW!

LINCOLN AIRPLANE SCHOOL  
220 Aircraft Bldg., Lincoln, Nebr.  
Dear Sirs: Please send me FREE Book, "Aviation Beckons You," including the story of Lindbergh at Lincoln, Low Tuition, etc.  
Name..... Age.....  
Address.....  
City..... State.....

# Name This House

## \$500.00 GIVEN!

**We Will Pay \$500.00 Cash For the Most Suitable Name For This Beautiful Six-Room House**



**ANY NAME may win. Offer open to everybody. Nothing to buy or sell. No Obligation. Rush your suggestion today—SURE!**

This is a new Colonial Bungalow---cozy, convenient---yet a roomy house. It is meeting with such popularity that we are desirous of obtaining a suitable name for it for use in connection with our building program, and will pay \$500.00 cash for the most suitable name suggested. There are no strings tied to this offer. Sending us a name for this house does not obligate you in any way. Nothing to buy or sell. We merely want a suitable name and are willing to pay \$500.00 in cash for the best one sent in. Surely you can think of an appropriate name for such a beautiful home. Do not use more than two words. Any word or words may be used or any combination of words, such as Ridgelawn, Shadynook, Hearthome or names like Sunshine Inn, Journey's End, etc. No matter how simple your suggestion is, you cannot afford to neglect sending it in at once. Any name may win. Possibly you may have the most suitable name right on the end of your tongue this minute. If you have, send it in at once, and \$500.00 in cash is yours, or \$600.00 if sent within 3 days.

### \$100 EXTRA FOR PROMPTNESS

We want the name for this house quickly, and will pay the winner an extra \$100.00 cash just for promptness—or a total of \$600.00 in all. Send your suggestion today! The very first name you think of may be worth \$600.00 cash to you.

**FOLLOW THESE RULES** This offer is open to everyone, excepting relatives. Each participant may send only one name. Sending two or more names will cause all names submitted by that person to be thrown out. Contest closes June 28th, 1930. Should two or more persons submit an equally suitable name for this house, the full amount of the prize offered will be paid to each one so tying. To win the \$100.00 CASH PROMPTNESS PRIZE, the winning name must be mailed within three (3) days after this announcement is read. This \$100.00 CASH PROMPTNESS PRIZE will be added to the \$500.00 prize and paid to each one submitting the winning name, provided suggestion is mailed within three (3) days after this announcement is read. Any easy, simple name may win.

**FREE!** In appreciation of your suggesting a name for this house real quickly, we will send you FREE and POSTPAID, the floor plans and blue print of this beautiful house. Understand, this does not obligate you in any way. Rush us a name for this house TODAY—QUICK. A postal card will do.

**HOME BUILDERS' SOCIETY, Box 3794, BATAVIA, ILLINOIS**

## Deafness Yields to Galvanic Current

By Emanuel M. Josephson, M. D.

THE human hearing mechanism is subdivided into four parts—the outer ear, or ear canal, which transmits sound from the ear into the head as far as the ear drum; the middle ear, which serves as a protective resonating and transmitting mechanism; the inner ear, which converts incoming sound waves into nerve impulses into the part called the cochlea; and the vestibular apparatus, the human spirit level, indicating change of position of the head; finally the nerve and brain mechanism, which makes the nerve impulses which have risen in the inner ear intelligible.

Malady of any part of this mechanism may cause impairment of hearing or deafness. Blocking of the outer ear canal will deafen a person temporarily. Chronic ear abscess and chronic mastoid, even though the discharge may be so slight in amount as not to run out of the ear, may cause impairment of hearing because of the underlying infection. It is surprising to find that though this is the most dangerous form of chronic infection in the body (the ear lies directly next to the brain and to the large blood vessels of the head), the chronic running ear is very frequently neglected by both physician and patient. The general method of procedure with the chronic running ear is to wait until the infection has spread and threatens life and health, and then to do a radical operation on the mastoid, which results in loss or impairment of hearing. Over 90% of these chronic ear cases if taken in hand and treated by the newer medical methods, can be caused to heal without operation. The modern medical treatment of chronic ear trouble results in a large majority in a restoration of hearing. Contrary to the impression widely held, the destruction of the drum and of the little bones in the middle ear does not seriously impair the hearing, for their primary function is to act as a shock absorber for the inner ear. On the other hand, disturbance of function of these bones, due to spasm of the tiny muscles attached to these bones, results in loss of hearing due to pressure disturbances in the inner ear affecting its blood circulation, which is rendered permanent in the course of time by bony changes in the window in the inner ear, into which the last of these bones fit, which bony changes are labelled otosclerosis.

Acute disease of the inner ear, or its injury, often results in a destruction of the nerve endings of hearing and in deafness. The inner ear lies in a bony capsule in the base of the skull and is a delicate structure. Though the inner ear be well protected, severe blows and falls on the head frequently injure its structure, though there may be no noticeable evidence of the damage at the time of injury. In some rare cases of deaf-mutism the patient may have been born without an inner ear. Chronic progressive deafness has been regarded, in the past, as a disease limited to the inner ear and to adjacent structure of the middle ear, but recent findings by the writer contradict this previously held idea.

Chronic progressive deafness, or otosclerosis as it is frequently misnamed, is an intensely disagreeable and pathetic malady which affects principally individuals in the prime of life, young mothers and young folks just about to make a place for themselves in the world. The disease has probably played an important part in world history. Martin Luther, according to his own accounts, was severely troubled by

(Continued on page 1154)



## FREE CATALOG

Ready March 1st Fully illustrated—showing footwear, clothing, tents, etc., for fishermen and motor campers.

**L. L. BEAN**  
30 Main St.  
Freeport, Maine

## WANTED MEN

To Manufacture Metal Toys and Novelties

Big demand for 7 and 10c store Novelties, Ashtrays, Toy Soldiers, Animals, Auto Radiator Ornaments, etc. We co-operate in selling goods you make; also buy these from you. Small investment needed to start and we help you build up. WE FURNISH COMPLETE OUTFITS and start you in well-paying business. Absolutely NO EXPERIENCE and no special place needed. A chance of a lifetime for man with small capital.

Write AT ONCE if you mean strictly business and want to handle wholesale orders now being placed.  
**METAL CAST PRODUCTS COMPANY**  
DEPT. E 1696 Boston Road New York City

## Inspiration

power of concentration controls your attitude.

Real progress is never made by forcing your mind. It is only made by feeding it food which enables it to grow naturally with ease, balance, poise and harmony. This brings out into use your soul and spiritual power; your inspiration and intuition.

“Concentration—Its Mentology and Psychology,” and “How to Conquer Fear,” are two wonderful books by F. W. Sears which brings such growth, giving you imagination, judgment, foresight, together with the courage, daring and ability to use them with increased strength, power and success. Over 100,000 copies sold to satisfied users, some of whom say they wouldn't take \$1,000 for the benefits received from their use. Both books mailed postpaid anywhere, \$1; or sent to any U. S. Post Office; you pay postman \$1.20 on delivery. **Money back if not satisfied.**

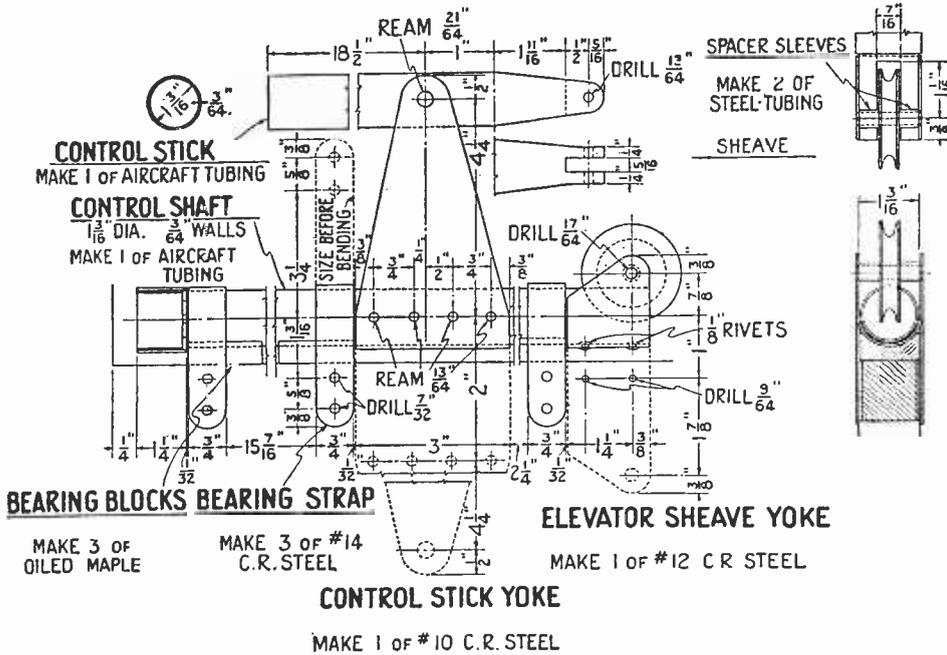
**CENTRE PUBLISHING CO., 1123 Broadway X-45 New York**

“It isn't the thing itself, but your attitude towards it, that determines its effect upon you.” (Sears.) Your

# One More Step to the Take-Off

By Lieutenant H. A. Reynolds

(Continued from page 1103)

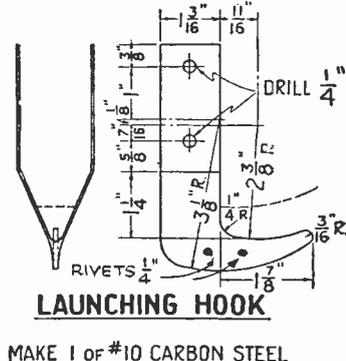
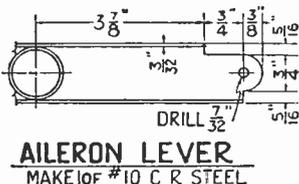
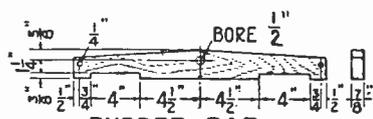


straight edge you can mark the course of the long holes through the wood work for the elevator cables. These holes should be carefully bored with a long  $\frac{1}{4}$ " bit. If the cables bear slightly against the sides of these holes later it should be no cause for concern, for the resultant friction will not cause noticeable drag. The control stick assembly can be bolted in place allowing about 1" clearance at its rear end. The top elevator control cable should just clear the top of the metal tube at its back end.

The rudder bar is made of ash to the dimensions shown in the drawing. It can be fastened in place on the bolt previously placed on the top of the runner and should have a bearing surface provided by wide, flat metal washers on its lower side and under the bolt nut on its top.

### Single Pulley Sets

THREE single pulley sets are made of carbon steel No. 14, with one aluminum pulley to each set. All the sets are



bolted to wooden members and, if the builder prefers, a metal wood screw can be screwed tightly into the member instead of the rivet bearing for the aluminum pulley.

One of these single pulley sets is bolted to the back of the butt end of each front main spar in the wing framework. If the aileron pulley sets have been previously shimmed away from the spars to allow the control cables clearance from rib uprights, the single pulley sets should be shimmed likewise. The purpose of the single pulley set in the wing is to allow the top aileron control cable to feed directly to the aileron lever arm on the back end of the control stick assembly. Therefore locate the single pulley set on each front main wing spar as nearly in line with the control stick aileron lever as possible. Make these positions the same in both wings.

The remaining single pulley set is bolted through the plywood top and longest streamlined strut of the main skid section just under the top F. 14 metal fitting. It is over the aluminum pulley of this fitting that the top elevator cable is to be led.

The two wings are next bolted to the main skid section with  $\frac{1}{2}$ " coupling bolts, through the F. 11 and F. 5 metal wing connection fittings. The wing tips are raised to their approximate flying position and blocked up by tall saw horses or wood strips which can be temporarily nailed to the front and back wing spars. It is best to measure the distance from the under surface of the

(Continued on page 1150)

## Are You Jealous of Your Physical Superiors?



Do you look with envy and hatred upon the man who stands out in a crowd the picture of health and vigor and strength—the real manly fellow? Do you sneer at the peppy pugilist, the powerful wrestler, the speedy runner, the graceful dancer—do you call them "big stuffs"?

Beware, man, if this is you feeling toward strong healthy men—you are filled with jealousy. You feel your own weakness. In your heart you wish you were like these fellows. You want to be strong and healthy. You want to command the attention of men and the admiration of women—you wouldn't be half a man if you didn't. You know your own weaknesses even if you are hiding them from others, and you envy those who are your superiors—those who seem to get the center of the stage wherever they are. They are the "life of the party" always, everywhere. They are the fellows who get all the promotions, all the good jobs.

### There's No Place For Weaklings

Builder of Men —and you needn't be a weakling—you needn't be jealous—you needn't have physical superiors—you can be strong and healthy yourself. You don't have to go on ailing and complaining. You don't have to be ashamed of your weakness—even though you know better than anyone else what brought you to your present condition. There's a way out of your dilemma. You are no different from thousands of others who have gone the pace, dissipated their strength, and are paying the penalty. You can be put back on your feet. You can be made a 100 per cent man—energetic, vigorous, alert, ambitious, happy—a respected husband—a proud father.

## STRONGFORTISM

Science of Health and Strength —Will Do Wonders for You

It was through the methods I used in developing my own body that I won the world's record as the finest specimen of muscular development, and championships in feats of great strength, in Europe and in the United States, that I constructed the science of STRONGFORTISM. It is through it that I reclaim wrecked and weak men, make them into new beings, and give them a body and arms of which they can boast. I require you to use no apparatus. No drugs or medicines are prescribed. No inconvenient hours are required. Only a little of your time in the privacy of your own room is necessary to follow my easily understood instructions—and, oh, man, how glad you'll be that you listened to me, once you start on my course. It means a new day for you, that's sure as you're alive.

### Send For My FREE BOOK

I've packed the experience and research of a lifetime of physical and health building into my startlingly interesting book, "Life's Energy Through Strongfortism."

In it are plain facts that will astonish you and help you out of your sorry plight. Just check the subjects on the free consultation coupon on which you want special confidential information.

### Send For Your Copy TODAY

**STRONGFORT INSTITUTE**  
LIONEL STRONGFORT, DIRECTOR,  
PHYSICAL AND HEALTH SPECIALIST

DEPT. 39 NEWARK, NEW JERSEY, U. S. A.

—CLIP and SEND THIS COUPON—

FREE Consultation—Absolutely Confidential

Mr. Lionel Strongfort, Strongfort Institute, Dept. 39, Newark, N. J.: Please send me absolutely free my copy of your book, "LIFE'S ENERGY THROUGH STRONGFORTISM." I have marked (x) before the subjects in which I am most interested.

- .. Colds
- .. Catarrh
- .. Asthma
- .. Headache
- .. Rupture
- .. Thinness
- .. Pimples
- .. Insomnia
- .. Overweight
- .. Weak Back
- .. Weak Eyes
- .. Increased Height
- .. Flat Chest
- .. Despondency
- .. Emaciation
- .. Rheumatism
- .. Nervousness
- .. Constipation
- .. Short Breath
- .. Weak Heart
- .. Great Strength
- .. Lung Troubles
- .. Poor Circulation
- .. Round Shoulders
- .. Skin Troubles
- .. Stomach Disorders
- .. Muscular Development

.. Private Ailments

Name .....

Age ..... Occupation .....

Street .....

City ..... State .....

# WARNING

## Science & Invention

### Subscription

### Price

# GOING UP!

# LAST CHANCE

To subscribe -- or have your present subscription continued from expiration -- at these Special "LAST CHANCE" low rates!

**One Full Year - Only \$2.00 - You Save \$1.00**  
**Two Full Years - Only \$3.00 - You Save \$3.00**  
**Three Full Years - Only \$4.00 - You Save \$5.00**

**Offer Open Only Until April 10th**

Savings figured on newsstand prices

THE subscription price of SCIENCE & INVENTION will be increased to \$3.00 a year, effective with the next (the May) issue.

It would be decidedly unfair to put this increase in effect without giving all our old friends an opportunity to protect themselves for 1, 2, or 3 years ahead at the old low rate!

We are doing even more! For just one month (until April 10th only) we are allowing all present subscribers and newsstand readers to order subscriptions to SCIENCE & INVENTION at extraordinary "LAST CHANCE" rates which have been reduced even lower than the old low rates!

Here's your "LAST CHANCE" to save from \$1.00 to as high as \$5.00 on SCIENCE & INVENTION just when it is launching an editorial program that will bring its readers greater value than ever before.

### Entertainment that Brings Fatter Pay Envelopes!

Radio, Electricity, Aviation, Carpentry, Auto Mechanics, Designing, Engineering, Television, Projection and

To Save \$1.00 to \$5.00 on

# Science and Invention

Clip and Mail TODAY 

Filming of Talkies, Magic, Still Photography, New Patents, Chemistry . . . the bigger and better SCIENCE & INVENTION will record the miraculous achievements and gives you a liberal education in all fields!

Each issue will be chock full of the practical "miracles" that are revolutionizing life in every part of the globe. Each issue will contain more than 200 highly instructive, entertaining pictures. Each issue will bring you the latest inventions of science, industry, building and all fields—great educational features—hundreds of new ideas for doing and making things—plans, designs, building directions, etc.

One man hit the nail on the head when he said, "I'd rather read SCIENCE & INVENTION than the best fiction ever written. From almost every issue I get ideas that more than pay for my whole subscription." . . . That is why hundreds of thousands of shrewd people read SCIENCE & INVENTION from cover to cover every month.

. . . That is why YOU need SCIENCE & INVENTION and will want to take advantage of these tremendous "LAST CHANCE" savings immediately!

**"LAST CHANCE" Ends April 10th**

**Mail Coupon NOW!**

SCIENCE & INVENTION, Dept. 2504,  
MACKINNON-FLY PUBLICATIONS,  
381 Fourth Avenue, New York, N. Y.

Gentlemen: YES, please enter my subscription to SCIENCE & INVENTION at the extraordinary reduced "LAST CHANCE" prices for the number of years checked below. Remittance is enclosed.

One Year at \$2     Two Years at \$3     Three Years at \$4

Name .....

Address .....

City and State .....

Present subscriptions will be continued from date of expiration.

# List of Manufacturers' Literature for Home Improvement Series and Basement Plan Contest

Order by Number  
Coupon at End of List

## LUMBER

- 21. YOU CAN MAKE IT. Pamphlet illustrating uses of odd pieces of lumber. Ten cents.
- 22. TRANSFORMATION FROM AN OLD HOUSE TO A NEW HOME. Illustrated pamphlet.
- 24. MODERN HOME INTERIORS. Plans for building breakfast alcoves, kitchen cabinets, bookcases, etc.
- 34. MANUAL OF SUPERCEDAR PRODUCTS. Suggestions for installation of cedar closets and vaults.
- 44. DUBOIS WOVEN WOOD FENCE. Showing adaptation of this type of fence to interior uses.
- 45. SOUTHERN PINE — THE SUPREME STRUCTURAL WOOD OF THE WORLD. Booklet of information on using Southern pine in the home.
- 46. WESTERN RED CEDAR, THE ENDURING WOOD OF THE AGES. Interior and exterior uses of red cedar.
- 47. WEST COAST HEMLOCK, ITS QUALITIES AND USES. Title self-explanatory.
- 48. SITKA SPRUCE, A QUALITY WOOD OF HIGH SERVICE. Uses of wood named in home building.

## HEATING EQUIPMENT

- 1. IDEAL HEATING. Heaters for homes and water.
- 5. OIL HEAT KILLS FURNACE SLAVERY. Automatic oil burners for domestic heating.
- 6. COLD CORNERS ARE COZY CORNERS NOW. Portable electric radiators and humidifiers for the home.
- 7. IDEAL GAS BOILERS, A.I.A. File No. 29f4. Data on domestic gas boilers.
- 3. THE MODERN HOME DEMANDS HOT WATER SERVICE. Automatic hot water heaters.

## WINDOWS, SCREENS, DOORS

- 26. CRITTALL METAL WINDOWS. Installations and description of windows of this type.
- 33. SOUND-PROOF DOOR, A.I.A. File 17a5. Doors that are sound-proof, odor-proof, weather-proof, air-tight.
- 11. WHAT GOOD IS A SCREEN THAT RUSTS? Bronze or copper screens.

## HOME BUILDING MATERIALS

- 9. DONLEY BOOK OF SUCCESSFUL FIREPLACES. Illustrated from constructive angle.
- 35. THE WOOD-FRAMED FIREPLACE. Period mantels in wood.
- 29. BEAUTY IN BRICK. Adaptability of brick to home beauty. Fifty cents.
- 10. THE DONLEY CATALOG. Coal chutes, package receivers, laundry chutes, etc.
- 18. A REAL HOME. Brass and copper for domestic building.

## SURFACE MATERIALS AND FINISHES

- 54. ZENITHERM DEFINED. Exterior and interior uses of this product.
- 23. WOOD FLOORS. Floors of beauty and use.
- 30. MONEY SAVED FOR BUILDERS. Red cypress wood for home building.
- 31. SPECIFICATION DATA FOR STRUCTURAL USES OF TIDEWATER CYPRESS. Self-explanatory.
- 40. OIL CLOTH, THE MODERN CINDERELLA. Varied uses in the modern home.
- 41. WALL DECORATIONS IN THE MODERN MANNER. Sanitas—a modern wall covering.
- 42. SANITAS, MODERN WALL COVERING. How to use this product.
- 32. BEAUTIFUL FLOORS. Rubber flooring.
- 36. ENDURING BEAUTY IN YOUR HOME THROUGH KERAMIC TILES. Self-explanatory.
- 62. A NEW KIND OF HARDWOOD FLOOR. Information about a new and unusual flooring.

## INSULATION

- 2. ALL WINDOWS AND DOORS LEAK LIKE SIEVES. Advantages of weather strips.
- 25. THE COST OF COMFORT. Handbook on economics of dwelling insulation, with full data.
- 61. THERMAL INSULATION OF BUILDINGS. Non-technical treatment of principles of insulation for homes. Five cents.
- 55. JUST BETWEEN YOU AND THE WEATHER. Insulation for the home.
- 56. INSULATION SPRAYED ON PROCESS. Application of insulation by gun.
- 49. CELOTEX CANE FIBRE INSULATION. Uses of this type of insulation.
- 50. YEAR 'ROUND COMFORT AND FUEL SAVING FOR EVERY HOME. Advisability of complete insulation.
- 51. FLINTKOTE ASPHALT EMULSION AND PLASTICS. Particularly with reference to refrigeration.
- 52. FLINTNOTE ASPHALT EMULSION FLOORING MASTIC. For flooring, floor patching, and resurfacing.
- 53. FLINTKOTE ASPHALT EMULSIONS FOR WATER PROOFING AND DAMP ROOFING. Specifications for use of this product.

## WIRING AND LIGHTING

- 14. WIRING AND RE-WIRING TO MODERNIZE THE HOME. Practicability of correct wiring.
- 15. HOME FIXTURES. The beauty of modern fixtures in brass.

(Continued on page 1148)

Know  
**ELECTRICITY**  
as Experts Know It  
—and Get an  
**Expert's Pay!**



## The New Croft Library of PRACTICAL ELECTRICITY

2785 pages, 2045 illustrations  
Semi-Flexible Keratol Binding

Thousands of men have used the Croft books to step up into better positions. The sound, usable material they contain will give you full mastery of your present job and fit you for the many opportunities that are constantly opening up in the electrical field everywhere.

### A combined home-study course and reference library

Not in a lifetime could you gain by experience alone the knowledge that has been brought together by Terrell Croft in these seven books. Yet by spending a short time daily on them you can gain a practical understanding of electrical work that is based upon a long experience and an actual contact with design, construction and maintenance work.

Electricity is covered from the most simple circuits and elementary theory of power and electro-magnetic energy to intricate switchboard wiring, and operation of central stations.

Wiring for light and power is explained. Special emphasis is placed on a modern interpretation of the National Electrical Code.

### No Money Down— Small Monthly Payments

Even though the new edition of this famous Library has been enlarged and contains more material, the terms and the price remain the same. The books are yours for 10 days' free examination. After that period—after you have seen for yourself just what these books are—you are privileged to return it at no expense. If you decide to keep this Library and use it to fit yourself for a commanding electrical position, send a first payment of only \$1.50 and then \$2.00 a month until \$19.50 has been paid.

**McGraw-Hill  
FREE EXAMINATION COUPON**

McGraw-Hill Book Co., Inc.,  
370 Seventh Ave., New York

Send me the seven volumes of the New Croft Library of Practical Electricity on approval for 10 days' free examination. At the end of this time I will either return the books, or remit a first payment of \$1.50 and \$2.00 a month for 9 months.

Name.....

Home Address.....

City and State.....

Position.....

Name of Company..... S & I 4-30

# NOW-You Can Go to High School at Home

Make up NOW for that education you missed and get your High School Certificate. These 15 amazing "Question and Answer" books will prepare you for bigger pay, business and social success. This new method teaches every High School subject you ought to know: Correct English, American Government, Geography, Ancient and Modern History, Literature, Spelling, Grammar, Plant and Animal Life, Science, Latin, Physics, Physiography, Civics, Economics.



### It's Fun to Learn

this easy inexpensive way—now used in 12,000 High Schools. All you do is read the fascinating questions and answers in your spare time at home. A few minutes and a few cents a day will bring you rich rewards. Increase your earning power; improve your social standing; qualify for your High School Certificate.

### FREE Examination

Put this million dollar high school in your home on FREE trial. Send no money—pay nothing on delivery. Just examine the books 5 days absolutely without cost. Mail them back at our expense if you aren't delighted. Otherwise, send \$3.85 first payment and then only \$4 a month until the amazingly low price of \$19.85 has been paid. Is this offer too good to be true? Send your name and address NOW for FREE examination. No obligation.

**High School Home-Study Bureau, Inc.**  
Dpt. 3794, 31 Union Square, New York, N. Y.

### 34 LESSON

## DRAWING COURSE \$2.98

The biggest value you ever saw advertised anywhere.

Haven't you often wished that you could draw cartoons, illustrate some idea, sketch some pretty face, etc.? You can do all of these things. One of America's most famous Cartoonists and illustrators has developed a great, simple system for success in all branches of Commercial Art. This system has revolutionized the entire theory of drawing. It means that drawing can be as easy for you as writing—much simpler than learning shorthand, bookkeeping or typewriting. We are now placing this original system for Learning Drawing, Art and Cartooning, consisting of 34 lessons with over 500 illustrations, within reach of every one. If you will devote a few hours each week to the Course WE ABSOLUTELY GUARANTEE that you will learn to draw and draw well before you have half finished the Course. If we fail to make this claim good we will refund every cent paid us. By eliminating a large office force for answering correspondence, expensive catalogs, etc., we are enabled to make a price of \$2.98 the cheapest price ever known for a high-grade home study course. Learn to draw. It is a big asset, no matter what field you are in.



### Send No Money

Just order the Course, and on arrival pay postman \$2.98 plus a few cents postage payment in full for the entire Course and Drawing Outfit. If not entirely satisfied, return within five days and we will REFUND MONEY. Address: Lederer School of Drawing, Dept. 474-L, Chattanooga, Tenn.

If you order the Course at once we will include a drawing outfit, consisting of artist's pencils, pens, paper, erasers, thumb tacks, etc., enabling you to go to work without any additional cost.

Orders outside the U. S. A. payable \$3.28 cash with order

## SONG WRITERS!



Substantial Advance Royalties are paid on work found acceptable for publication. Anyone wishing to write either the words or music for songs may submit work for free examination and advice. Past experience unnecessary. New demand created by "Talking Pictures", fully described in our free book. Write for it today—Newcomer Associates, 764 Earle Building, New York, N. Y.

## Be a Traffic Manager

Big Pay—Big Opportunity

Big business needs trained traffic men. At least three Detroit manufacturers pay their traffic managers better than \$20,000 a year. Train in your spare time for this highly profitable profession. Low cost; easy terms. Write now for valuable 64-page book—FREE. La Salle Extension University, Dept. 4384-T, Chicago

## Manufacturer's Literature

(Continued from page 1147)

### PLUMBING

- 12. THE END OF RUST TROUBLES. Advantages of brass pipe.
- 13. BRASS PIPE AND HEALTH. Hygienic aspects of this product.
- 19. WATER SERVICES THAT SERVE. Copper and brass pipes for water service.

### BATH ROOMS AND BATHROOM ACCESSORIES

- 57. SPARTAN CERAMICS PORTFOLIO. This illustrated portfolio demonstrates the beauty and practicability of tiles.
- 58. ARCHITECTURAL HANDBOOK OF ROMANY TILES. Illustrated booklet demonstrating uses, plans, and designs of tiles.
- 59. PLUMBING FIXTURES FOR THE HOME. Illustrated pamphlet giving plans for bathrooms and necessary fixtures.
- 60. HOMES OF COMFORT. Illustrated booklet showing plans and illustrations of bathrooms with complete material concerning fixtures for the modern bathroom.
- 39. BATHROOM INDIVIDUALITY AND CHARM. Illustrated folder showing bathroom accessories in modern color.

38. CHURCH IMPROVED SANI-BLACK SEATS. Illustrated booklet demonstrating an important accessory for the bathroom.

37. BATHROOM ACCESSORIES. MEDICINE CABINETS, MIRRORS, ETC. Complete catalogue of these articles.

### INCINERATORS

4. THE DECENT WAY. This booklet discusses the advantages of disposing of garbage with a gas-burning incinerator.

### ROOFING AND SHINGLES

16. REAL ROOFING. Booklet showing the advantages of a copper roof from an economical standpoint as well as that of beauty.

17. RUST-PROOFED. Booklet setting forth the economical reasons for using brass and copper for such as roofs, gutters, rain pipes, plumbing fixtures, etc.

27. WHAT CONSTITUTES ROOFING QUALITY? The facts about asphalt shingle and roofing products.

28. COLOR. Colored photographic samples of asbestos shingles.

### FURNITURE

43. THE HOME MAGNET. Billiard tables in the home.

### SCIENCE AND INVENTION,

381 Fourth Avenue, New York, N. Y.

Gentlemen:

Please send me booklets

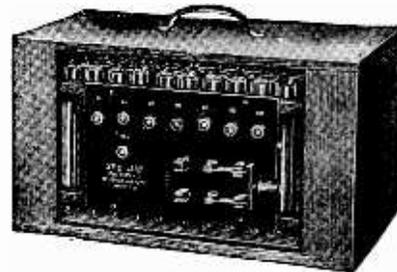
No. ....

Name .....

Address .....

## "Dependable 'B' Battery Power"

Non-Destructive, Re-chargeable, Edison Element Batteries for Long and Short Wave Receivers. 100 volt, \$12.00; 140, \$17.00; 180, \$24.00. Prices include dry TRICKLE CHARGER. All batteries shipped dry with solution. Send no money, pay expressman. Also "B" and "A" Battery Outfits operating from 32-volt systems.



Write for our interesting booklet. See Jay Battery Co., 911 Brook Ave., N. Y. C.

## CORRECT Your NOSE



Improve your appearance with the ANITA Nose Adjuster. Shapes flesh and cartilage—quickly, safely and painlessly, while you sleep. Results are lasting. Doctors praise it. 68,000 users. Write for 30-Day Trial Offer and FREE BOOKLET.

ANITA INSTITUTE, 473 Anita Bldg., Newark, N. J.

## QUIT TOBACCO

Don't try to banish unaided the hold tobacco has upon you. Thousands of inveterate tobacco users have, with the aid of the Keeley Treatment, found it easy to quit.

**KEELEY TREATMENT FOR TOBACCO HABIT** Quickly banishes craving for tobacco. Successful for over 60 years. Write today for FREE BOOK and particulars of our MONEY-BACK GUARANTEE.

THE KEELEY INSTITUTE, Dept. L-602, Dwight, Ill. Home of the famous Keeley Treatment for Liquor and Drugs. Booklet Sent on Request. Correspondence Strictly Confidential.



## I CHALLENGE

you that I will teach you, by mail, in one lesson, the simplest, shortest method. All for \$1.00. Not telepathy. You can read one's mind to a dot, by only looking in the eyes of partner, chum, sweetheart, etc. Praised by New York, Boston, Montreal, Ithaca, etc. Colliers; Thurston; Blackstone, etc. If fake, let them arrest me.

A. HONIGMAN, Dept. Inv-X  
Sta. E. P. O. B. 85 Montreal, Can.

## DASHFUL?



"Shame on you!" Are you nervous, embarrassed in company of the other sex? Stop being shy of strangers. Conquer the terrible fear of your superiors. Be cheerful and confident of your future! Your faults easily overcome so you can enjoy life to the fullest. Send 25c. for this amazing book. RICHARD BLACKSTONE, B-454 Flatiron Bldg., New York



## This BOOK 10¢

Amaze and Mystify Your Friends! Earn money at Clubs and Parties. No skill required. It's easy. "The Book of 1000 Wonders" tells how and teaches you many startling tricks of Magic. Also contains a complete catalog. SEND 10c. today. LYLE DOUGLAS, Station A-3 Dallas, Texas

## RAISE CHINCHILLA AND NEW ZEALAND WHITE FUR RABBITS In Your Back Yard

We supply stock and a market for all you raise. 36-page illustrated book and catalog, also copy of FUR FARMING magazine tells how to raise rabbits successfully, all for 10 cents. STAHL'S OUTDOOR ENTERPRISE CO., Inc. 1086 Outdoor Bldg., Holmes Park, Mo.

# A Great Lake City

(Continued from page 1092)

machinery, and other heavy metal products. . . It has the only plant where power generating equipment and prime movers of all types are designed and built in the same shop under one management. It has produced the largest ore crusher and the largest locomotive lifting crane. It constructed the largest gas engine installation in the world twenty years ago, and still holds the record.

Small boat motors, airplane propellers, electric controls, motorcycles, herringbone gears, gasoline locomotives for mining use, malt products, dyes, candy, silk hosiery, leather gloves and mittens, work shoes, toilet soap, bird houses, silk hats, motor car frames, sausages, dyes, temperature regulation devices. . . All these are in Milwaukee's industrial alley—an alley claimed to hold the most diversified concentration of manufacturing projects in the United States.

Most of the dredging machinery used in building the Panama Canal came from a Milwaukee plant—that of the Bucyrus Company. The fame gained by this company's products in Panama brought orders for its machinery from throughout the world. Its most recent major triumph took place in far-off India where, after testing the Milwaukee excavators against those manufactured by its own nationals, the imperial British government awarded the American company contracts for ninety per cent. of the machines needed to carry out the great Indus irrigating enterprise. Powered with internal combustion engines, and manned by sixty-men crews, some of the Bucyrus units in the Indus area are performing the equivalent of the excavating work that could be done by 1,500 men.

The outstanding aeronautic enterprises of Milwaukee are the Hamilton Aero Manufacturing Company, makers of propellers, and the Hamilton Metalplane Company, producers of all-metal monoplanes. Other aero products include pontoons, fliers' clothing, paints, motor oil, hangars, wind indicators, landing lights, tires and miscellaneous accessories and supplies.

Giant concrete mixers of Milwaukee make are serving on a large proportion of the greatest construction projects of our time. Within the past three years one Milwaukee firm has become the greatest producer of pipe line in America. In all, Milwaukee's metal trades industry employs 60,000 workers and embraces more than four hundred firms.

## Solution to Puzzle on Page 1128

S	O	O	T	A	B		M	A	P		I	N	D		
P		B	U	R	M	A		A	R	E	A	S	R		
R	E		P	I	E	R		N	I	O	S		M	Y	
I	V	E		M	E	R	I	D	E	N		V	I	N	
N	E	M	A		R	E	V	A	L		V	I	L	E	
G	R	I	L		S	E	N		P	I	M	A	S		
S	T	R	A	I	T		S		A	L	L	Y	N	S	
							B	E	A	R		V	A	A	L
S	E	B	A	G	O		F		S	T	A	T	E	N	
A	G	A	M	E		B	E	T		A	G	I	R	A	
L	Y	D	A		B	R	A	I	N		E	L	I	S	
A	P	E		G	E	O	R	G	I	A		L	E	H	
M	T		L	E	R	O		R	E	N	O		S	U	
I		H	A	R	E	M		I	C	O	N	S		A	
S	E	A		M	A	E		S	E	N		E	O	S	

# FREE!

If You Copy This sketch

**AIRPLANE BLUE PRINT**

Top View  
Upper Aileron  
Lower Aileron  
Inspection Window  
Wing Spar  
Engine

If you are ambitious — want to earn big money as a draftsman — copy this sketch and mail to me. If I think you show talent I will send you, direct from my drafting room, a handsome Airplane blue print in three views with all main parts named and explained. Also FREE my two books, "My Pay Raising Plan," and "Successful Draftsmanship." Learn about my working method by which I train you right in your own home. Clip the coupon and learn what I can do for you.

## These Money Making Tools

**AVIATION**  
Drafting and Designing COURSE Included—No Extra Charge!  
To meet the demand for designers, I have prepared a complete course on airplane drafting which I will include free of any extra charge.

**IF You Earn Less than \$70 a Week—Write Me!**  
Mail coupon with copy of Airplane sketch. Get "My Pay-Raising-Plan" and "Successful Draftsmanship". Both of them sent Free. You owe it to yourself to find out what big opportunities there are in practically all industries for Draftsmen. They come to you postpaid. Mail the coupon TODAY!

**I Train You At Home for a Big-Pay Drafting Job!**  
No need to leave home or quit your job. Not only do I give you complete practical drafting room training at home—but I show you how to earn while you are learning—in a few short weeks after you start. I have trained men who are making \$3,500 to \$9,000 a year. Get started today. Copy sketch and mail with coupon.

**Employment Service Age or Lack of Education No Drawback**  
After training you I help you to get a job without charging you a cent for this service. Employers know that Dobe Trained Men make good. They know they are not taking chances with men trained by me.

Previous experience is not necessary for success. You do not need to be a college man or even high school graduate. If you have gone to grade school and can read and understand plain, every day English—that's all you need.

**My "Pay-Raising Plan" Sent Free**  
Write today for this book which has started hundreds of men—many with but little education and no experience. Learn about the other features of my training. Write today.

**Draftsmen Needed In:**  
**Auto Work**  
The automobile industry is one of the greatest in America. Thousands of draftsmen needed. I'll train you.  
**Electricity**  
Electricity is the coming motive force of the world. Draftsmen are needed in every department of this fascinating work. I'll train you at home.  
**Aviation**  
It is bound to expand to enormous proportions. Draftsmen are essential to it. I'll train you quick at home for drafting position.  
**Motor Bus Work**  
Motor bus building and transportation have become leading world industries. Hundreds of draftsmen engaged in this work. I'll show you the way.  
**Building Work**  
There will always be building. No structure can be erected without plans. I'll make you an architectural draftsman.

**FREE Blue Print Coupon**  
Engineer Dobe, Div. 14-24  
1951 Lawrence Ave., Chicago

I am attaching sketch of Airplane and am interested in getting a Big-Pay Draftsman's job. Send me the three-view blue print, as offered. Also your two books—all free to me.

Name \_\_\_\_\_ Age \_\_\_\_\_  
Address \_\_\_\_\_  
Town \_\_\_\_\_ State \_\_\_\_\_

**Mail Coupon for Free Blue Print Now!**  
**ENGINEER DOBE** 1951 LAWRENCE AVE. Div. 14-24 CHICAGO

## What's Wrong in this Picture?

### HOW MANY MISTAKES CAN YOU FIND?

The artist was evidently in a hurry drawing this picture and made several mistakes. Can you see what's wrong? How many of the errors can you find? Study the picture line by line and mark each mistake you find with a cross like this: X. Find at least five of the errors, tell me where they are and I will show you how easily you can

## Win \$2000

Someone who has sharp eyes and uses them promptly can win a fine new automobile and a lot of money besides! More than \$15,000.00 in prizes given already to advertise and make new friends for our old established firm. Now comes our big new offer of seven fine new cars and other costly prizes amounting to more than \$7,000.00—all to be given free. This is a real opportunity for you to

**WIN STUDEBAKER — NASH — BUICK — OLDS — PONTIAC — CHEVROLET — FORD — DIAMONDS — CASH — BIG AWARDS**

**ANSWER TODAY** Send no money. Find 5 mistakes, mark them on the picture or write them on a paper and rush your answer with name and address at once—right off. **\$650.00 CASH PAID EXTRA FOR PROMPTNESS!** Costs nothing to win. Nothing to buy. No puzzles. No fine writing. No words to make up. No risk. No obligation. All win offer. A reward for everybody! Someone wins \$2000.00! Why not you? Answer at once. Everything free.

**GEO. WILSON, DEPT. 141 AUGUSTA, MAINE.**

# Start with WIRING



... the first step toward a good job in ELECTRICITY

The sensible way to "break into" Electricity is to learn how to wire bells, annunciators, alarms—how to wire houses, stores and factories for light and power—how to estimate the cost—



—then cash in on this training before tackling the next branch. You'll be surprised how quickly you can learn WIRING, at home in your spare time, by our JOB TICKET method of practical experience—takes only a few months—costs only a few dollars a month.

"I surely have received quick results, for I am starting in a new job today as engineers' assistant in the Syracuse Lighting Company in the subway department. I was assured there was an excellent chance for advancement. Thanking you for your great help, I remain

**START with Wiring, but don't stop when you're an Electrician. From time to time you can learn MOTORS, GENERATORS, Electrical DRAFTING, Power Station Equipment, radio and other subjects.**

And when you're only half way through the course we'll help you get a good Electrical job without extra charge! During the past few months we have placed hundreds of former clerks, mechanics and even beginners in good Electrical positions. Mail the Coupon, and we'll be glad to do the same for you.

T. D. DeVore, Baldwinsville, New York

## American School

Dept. E-453, Drexel Ave. at 58th St., Chicago  
 American School, Dept. E-453, Drexel Ave. at 58th St., Chicago  
 Please send free Electrical Book, and tell me all about your plan to get me a good Electrical Job when only half way through the course.

Name .....

Address .....

## Bankrupt Radio Stocks Fully Guaranteed

- ABC Power Packs, 250 V. of B. Also has A. C. filament for up to 9 tube sets. Can be used as B. eliminator. Make your battery set all electric or build your new A. C. set around this pack. Completely assembled ..... \$ 8.75
  - 7 Tube A. C. Sets ..... 24.50
  - Short Wave Sets, one tube, complete with 5 coils, 30 to 550 meters ..... 6.45
  - 12 Mfd. Condenser Blocks, 1000 volts ..... 4.75
  - A. C. 600 V. Power, Filament & Double Choke Pack ..... 5.00
- For one 281, one 250, one 227 and four 226 tubes  
 Tubes 1" X type Guaranteed No. 210, \$2.25; No. 250, \$2.35; No. 281, \$1.85; No. 280, 95c; No. 245, \$1.25; No. 224, \$1.65; No. 227, 75c; No. 226, 65c; No. 171, 75c; No. 199, 95c.

### CHAS. HOODWIN CO.

4240 Lincoln Ave., Dept. D-3, Chicago, Ill.  
 Dealers in  
**BANKRUPT RADIO STOCKS**

## BURN YOUR NAME ON TOOLS WITH THE ARKOGRAF

Protect Your Tools From Theft. Write with electricity any name or design on the hardest and finest tools, or any metal, like writing with a pen. **OUTFIT \$3.50 Prepaid Anywhere.** Illustrated circular free. Write today. Agents wanted. ARKOGRAF PEN CO. 1171 1/2 E. Stark St., Portland, Ore.

## LEARN CARTOONING

At Home—In Your Spare Time  
 The famous Picture Chart Method of teaching original drawing has opened the door of success for hundreds of beginners. Whether you think you have talent or not, send for sample chart to test your ability, and examples of the work of students earning from \$50 to \$300 per week. Please state your age.  
**THE LANDON SCHOOL**  
 1469 National Bldg., Cleveland, O.



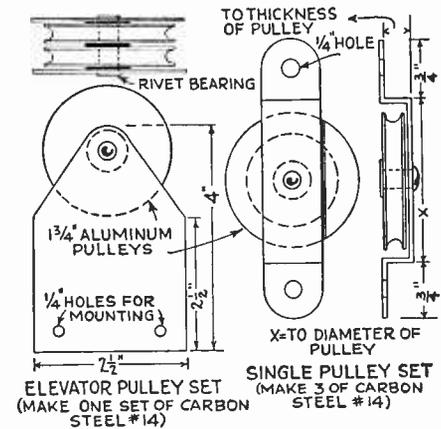
## One More Step to the Take-Off

(Continued from page 1145)

wings to the floor under the front and back spars, at the rib section nearest the wing connections. The distance between the under surface of the wing and floor should be the same at the last rib found at the wing tips.

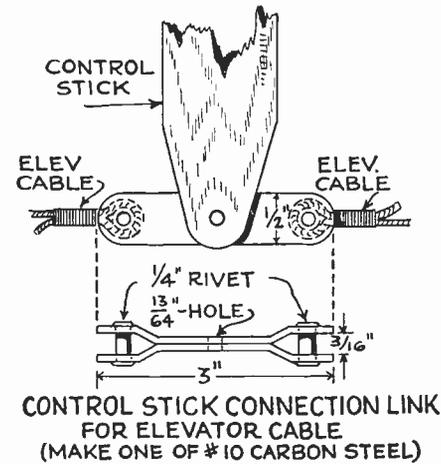
### Wiring

YOU will need 23 good standard airplane turnbuckles to complete the wiring of your glider. The Heath Airplane Co., 1721 Sedgwick St., Chicago, Ill. sells a No. 326-S.F. or S.M. turnbuckle, with a minimum strength rating of 2,150 pounds, for 35 cents each. These turnbuckles are very satisfactory for this use. Do not use weak turnbuckles found in hardware stores and



sold for general use. The hard wire ferrules shown in the drawing for bending the hard wire end loops can also be purchased from the Heath Co. at 2 cents each.

Rivet or bolt a turnbuckle between the long metal straps in each top and bottom F. 22 wing brace clamp. Using No. 34 hard steel piano wire or No. 12 plated aviator wire, which can be secured from the Heath Co. for 60 cents a pound, cut the four lengths necessary for the top flying wires. Leave enough extra wire at each end beyond your measuring mark to form the five bend system shown for making your hard wire end loops. The hard wire ferrules should be slipped over the wire before bending the loops and the wire should be examined after bending to see that



# How Would You Like a \$15<sup>00</sup> Check?

... and Cash Commissions of Four Times that Amount?

From boys and girls in their teens to grandmas and granddads, hundreds of folks are turning their leisure moments into good hard cash—without experience and without interfering with their regular duties.

You, too, can have an extra independent income in addition to your regular source of funds. We supply everything you need free. Just as hundreds of others are doing—you can make extra cash roll into your pockets by simply taking care of new and renewal orders for the 12 famous MACKINNON-FLY PUBLICATIONS—the magazines that sell themselves!

Your spare time is worth money—don't waste it. Mail coupon TODAY!

\$

MACKINNON-FLY PUBLICATIONS, INC.  
 Dept. 2504-W, 381 Fourth Ave.  
 New York, N. Y.

Without obligation to me, please tell me how I can easily earn BIG MONEY in my spare time.

Name .....

Street .....

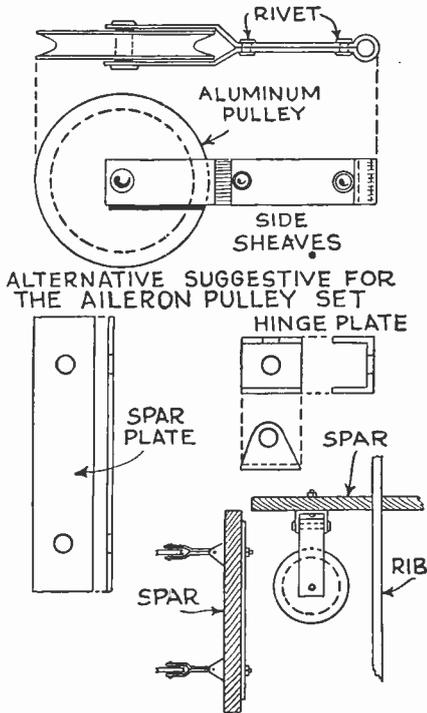
City..... State.....

\$

no scratches, splits, or crystallized spots have developed.

After securing the top flying wires proceed in the same manner with the four bottom flying wires. The positions of all these rigging wires are shown in the top view of the glider.

The two wires running from the F. 11 fittings at the rear of the main skid section to the F. 4 fittings on the back surface of the back main spars are next



installed. It is best to have the turnbuckles in the wire just below the wing surface to eliminate wires dragging from the wings later when taking the assembly apart. The tail section can be bolted into place and the wires leading to it installed with their turnbuckles also near the surface of the wings. The two stabilizer support wires can next be installed. After attaching the elevators and rudder you are ready to install the control system.

The control wires are flexible cable to facilitate their easy movement over the aluminum pulleys necessary in the control system. The Heath Co. sells 3/32" flexible aircraft cord at \$4.50 per 100 feet which is very satisfactory. The writer has successfully used a good grade of flexible metal strand sash cord 1/8" in size and purchased at a local hardware store for 3 cents a foot. This cord should be strongly twisted and have a cotton core. It should hold at least 700 pounds strain.

**Cables**

**T**HE aileron cables are first installed. The top aileron cable is brought from the top of the aileron horn over the top double pulley and along the inside of the wing to the single pulley set where it turns down and out of the bottom of the wing to its connection on the aileron lever of the control stick assembly. The turnbuckle for tightening this cable is best placed at the aileron lever of the control stick assembly. The bottom aileron cable is brought from the bottom of the aileron horn over the bottom double pulley and along through the wing to a turnbuckle which passes through a 1 1/2" hole in the top of the main skid section. The bottom aileron cable next passes from this con-

*(Continued on page 1152)*

**\$80 to \$150 A WEEK MOTION PICTURE OPERATORS EARN THIS - and MORE**

**B**E the man in the projection booth—it is one of the big, important jobs in the great billion-dollar movie industry. The hours are short, the work is light, fascinating—and most important of all—you can earn from \$4,160 a year and more—easily, quickly!

**Picture Operating Easily Learned!**

With our simplified system of home study your training is practical and complete—it includes all types of projecting machines and their operation, Electricity, Stage and Theatre Lighting, Color Films, and the new *Talking and Sound Movies!* Earn two to three times your present salary—have a glorious future before you! Thousands of others have found this work interesting—fascinating—one of the best paid professions open today! And right at home, in your spare time, you can learn all there is to know about moving picture projection—can start on the road to high pay and an unlimited future.

Send today for **FREE** descriptive book Our new **FREE** book tells you about this wonderfully attractive profession. Shows how you can quickly qualify for a well-paid position as **Motion Picture Cameraman or Projectionist, Commercial Photographer or Photo-Finisher.** Send for it **TODAY**—NOW! It may be the turning point of your career!



New York Institute of Photography  
Dept. K-1813, 8 West 33rd St., New York, N.Y.  
Without cost or obligation send me a copy of your **FREE** book and details about how I can qualify as:  
Motion Picture Cameraman  
Motion Picture Projectionist  
Commercial Photographer  
Photo-Finisher  
Name.....  
Address.....  
City..... State.....

**SUCCESS COUPON**

**Now! Do Your Own Electric Nickel Plating** Introductory Offer ONLY \$6.50 Plus Postage

**A REAL MONEY-MAKING OPPORTUNITY**

Nickel, Brass, Copper, Silver, Gold, etc.

No experience required. Do YOUR OWN Electro-Plating in Your Home Garage, Office, or Place of Business. Electrically Deposit Metal—Nickel, Brass, Copper, Silver or Gold. You can Successfully do all the plating on your Automobile, Electric Fixtures, Faucets, Spoons, Forks, Chandeliers, Tools, Coffee Urns, Surgical and Dental Instruments, Utensils large or small, Iron Stoves, Music Instruments; recondition worn plating or plate New Work; do it Instantly without interrupting the Service or without removing the parts to be plated with the

**ALADDIN PORTABLE ELECTRO-PLATER**

Simple and Economical to operate. Not a toy, but a practical Plating Outfit with which Perfect and Durable Work can be done. Positively Guaranteed to do as we claim. **BE YOUR OWN BOSS!** Build up a Profitable Aladdin Electro-Plating Business of your Own. This offers wonderful **ECONOMY** to users and **BIG MONEY-MAKING** possibilities to **AGENTS.** Thousands in Service. Write for **FREE** Booklet and Testimonials and 30-Day Trial Offer Today. **AGENTS and DEALERS WANTED EVERYWHERE.**

Thousands in Service since 1924 P. J. F. BATENBURG CO., Dept. 162, RACINE, WISC.



**LIKE A CHIP— ON YOUR SHOULDER**

"Old Towns" are modeled after Indian birch-barks. That's why they're so fine for the paddle or portage. They quickly answer every dip of the blade . . . they're easily swung to the shoulder for carrying—and you can keep them there indefinitely.

Not only are "Old Towns" amazingly light, but they're sturdy, strong, well-built—perfectly balanced canoes. An "Old Town" goes for years without repairs because it's made *right*, in the beginning.

Send for free catalog. It shows many models—paddling, sailing, and square-stern canoes; rowboats; dinghies; outboard motor-boats, including big, fast, seaworthy, all-wood models for family use; and speedy step-planes. Write today. Old Town Canoe Co., 1144 Main St., Old Town, Maine.

**"Old Town Canoes"**

**SOUSA**

The World's Greatest Band Master Says:

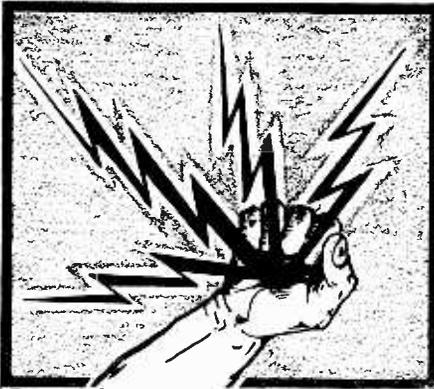
"COMPLETE equipment with Conn instruments enhances the musical value of any band at least 50%."

Conns are the choice of the world's greatest artists. Especially recommended to beginners for quicker progress and greater musical success. Easiest to play. Many exclusive features. Yet they cost no more.

**FREE TRIAL, Easy Payments** on any Conn. Write for interesting book. Tells everything you want to know about your favorite instrument. Full color illustrations of most popular models. Write today. C. G. Conn, Ltd. 456 Conn Bldg. Elkhart, Ind.

**CONN**  
World's Largest Manufacturers of BAND INSTRUMENTS

SEND FOR THIS FREE BOOK ON YOUR FAVORITE INSTRUMENT



## GIVE YOURSELF A SQUARE DEAL!

**G**ET OUT OF THE RUT! Join the higher income class!

REALIZE your life's ambitions!!! Volumes could be written concerning the manner in which thousands have forged ahead to happiness and prosperity!

You, too, can do it if you will! You must help yourself of course—BUT—if you will sit right down—NOW—and write us—we will gladly tell you of an amazing new invention that has shown many people a new world! An invention that has realized ambitions, developed personality and that has overcome many of the physical and mental obstacles that stand between mediocrity and success!

Psycho-Phone works while you sleep. No study, no memorizing, no tiresome word drills—just a little determination on your part is all that is needed.

\*Hundreds of sworn letters on file, copies on request

## SUCCESS

Lies Within You!

We Believe That Our Method Will Help You, Because It Has Helped Others!

Don't Delay—Write Today!



Send For Your Free Copy Now!

The whole amazing story of this revolutionary development that is changing people's lives, remodeling their characters, is told in "The Secret of the Superman," a remarkable FREE book. Get it. Read it. Judge for yourself what this new discovery would mean in your life.

No obligation. No cost. Write for your copy at once, or mail the coupon NOW.

The Psycho-Phone Company (Dept. "S")

103 Lafayette St., New York, N. Y.

— Mail NOW for FREE Book —

Psycho-Phone Company, Dept. "S"  
103 Lafayette St., New York, N. Y.

Gentlemen: Please send me your FREE book, "The Secret of the Superman," which explains a new way of getting the things I want in life.

Name .....

Address .....

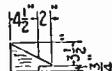
Town ..... State .....

## One Step More to the Take-Off

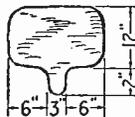
(Continued from page 1151)

necting turnbuckle along through the other wing to the bottom double pulley of the double pulley set in that wing and then to the bottom of the other ailerons easily. When the stick is moved free from any obstruction and move the ailerons easily. When the stick is moved to the left the left aileron should move up and when moved to the right the right aileron should move up. The elevator cables are next installed by connecting cables to the control stick connection link at the pointed end of the control stick. The rear cable from this link feeds back through the top hole in the woodwork, under the elevator pulley set, and up over the single pulley set from which it is led to the turnbuckle connection between it and the two elevator top horns. The front cable leading from the connection link runs forward over the aluminum pulley in the front of the stick system and back through the horizontal tube continuing through the bottom hole in the woodwork and under the elevator pulley set, from which it is led to the turnbuckle connection between it and the two bottom elevator horns. When the stick is pushed forward the elevators should flap down and when pulled back the elevators should flap up.

In wiring the rudder control run a No. 24 piano wire from each rudder



SEAT BRACKET  
MAKE 2 OF 3/8" SPRUCE



SEAT

MAKE 1 OF 3/8" 3 PLY BIRCH



SEAT BACK

MAKE 1 OF 3/8" 3 PLY BIRCH

horn side to the rudder bar end on the same side. Facing the front and pushing the rudder bar with the right foot should turn the rudder to the right.

It is well to oil all the aluminum pulley bearings and make certain that each control works smoothly and firmly. This is an excellent time to examine all the cable connections and check the amount of available take up in each turnbuckle.

Construction of the wing framework, elevator, stabilizer, and tail and main skid sections was described in the February and March numbers.

## Floors That Clean Themselves

By Mrs. Christine Frederick

(Continued from page 1108)

backnumber, however, as it is wrong in principle. The film of oil left on the floors is merely a trap for dust, and every footprint shows; to say nothing of the bad effects of getting oil upon rugs. Some of the electrical floor machines are equipped to scrape the floor—to make it over into a new floor entirely. To see one of these scraping machines in action, and then contrast it with the old hand

## Two Famous Books (Now Only) 50c Each



### 1001 RADIO QUESTIONS AND ANSWERS 1930 Edition

Everything you want to know about radio from "How to Kill Outside Radio Noises" to a clear description of the newest tubes. If you have a question on radio, here is your answer and a thousand more. 96 illustrated pages. Large 9 by 12 inch size. Beautiful colored cover. Price postpaid only **50c**



### HOW TO WIN AT BRIDGE

The world-famous Bridge authority's newest book. Tells how to play both Auction and Contract Bridge TO WIN! Complete rules of play and methods of scoring for both Auction and Contract Bridge. Contains 500 hands to bid and play, with complete solutions and analyses. The biggest 50c worth ever offered to Bridge fans. Price postpaid only **50c**

Experimenter Publications, Inc.  
Dept. 2504aa, 381 Fourth Avenue  
New York, N. Y.

Gentlemen: I enclose ....., for (amount here)

which please send me postpaid the following:  
 How To Win at Bridge  
 Popular Magic and Card Tricks

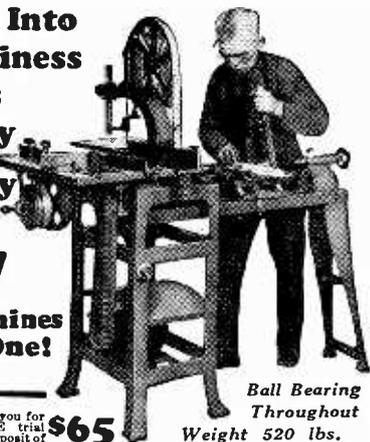
Name .....

Address .....

City ..... State .....

**Get Into Business this Easy Way**

**7 Machines in One!**



Sent you for FREE trial on deposit of **\$65**

*Ball Bearing Throughout*  
Weight 520 lbs.

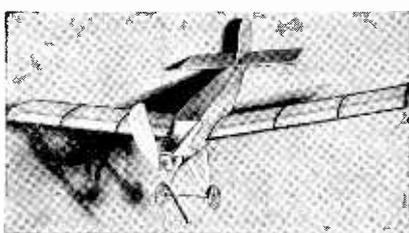
**The Electric Carpenter**

Make money on screens, trellises, furniture, toys, etc. 8" Circular Saw; 14" Band Saw; 30" Lathe; 10" swing; 6" Joiner; Reversible Shaper; 3/4" Hollow Chisel Mortiser; Sander. Does 35 wood-working operations. NOT a toy!

Write Today for Illustrated Folder

We also build a complete line of single-purpose machines.

The Woodworking Machinery Co., Inc.  
260 N. Eleventh St. Philadelphia, Pa.



**Build Model Airplanes the IDEAL Way!**

Plans for Model Airplanes 25c each  
FORD MONOPLANE  
Fokker Monoplane  
New York-Paris Plane  
Curtiss BiPlane  
De Havilland BiPlane  
NC-4 Naval Seaplane  
Bleriot, Niouport or Monoplanes  
Cecil Peoli Racer

Build the IDEAL "American Eagle", the new, low-wing Model. 20-in wing span, weight 3 1/2 oz. A marvelous flyer and easy to build. Construction Set, with Instructions, \$2.50. Also sold Assembled, \$5.00. Ask your dealer or order direct. 48-page Catalog Model Airplanes, Parts and Materials for Builders. IDEAL AEROPLANE AND SUPPLY COMPANY, Inc. 22-24 West 19th St., N.Y. City.

work of scraping is like seeing the *Bremen* alongside of a canal boat.

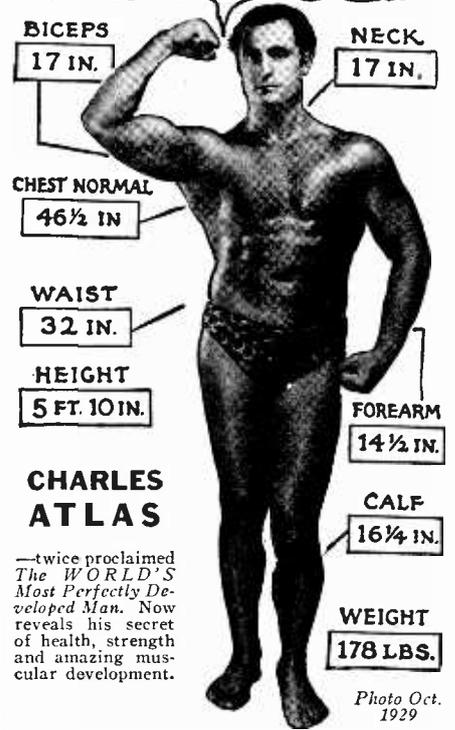
We are also becoming wiser in building floors. We are making more cement or composition floors in homes. It is a startling fact that 75% of home fire-losses start in the basement, so that by using steel beams and concrete for the first floor, we not only get far safer homes, but also floors more readily cleanable. There are various forms of composition flooring, and by carrying it up to baseboard height around the rooms, the sanitation and cleaning problem is brought up to the standard of hospitals or public buildings. The electric scrubbing machines are, of course, especially effective in washing down such concrete or composition floors. Tile is more and more becoming interesting, and the cleaning problem thus even more simplified.

In recent years vacuum cleaners have been made more powerful in their suction and adaptable to home uses; they present a great factor in cutting down the energy needed for keeping floors in condition. Many women have taken advantage of the use of modern equipment to greatly enhance their standards of cleanliness. Whereas, under the old back-breaking methods, they achieved a weekly clean-up, they now have a *daily* clean-up; and as any woman knows this is a far better system, preventing unhealthy accumulations and an over-laborious cleaning time.



*A combination brush that waxes, scrubs and polishes by merely changing the base attachment helps keep your floors spotless with minimum effort. (Lewis & Conger)*

**"Give me your measure and I'll PROVE that you can have a body like mine"**



**CHARLES ATLAS**

—twice proclaimed The *WORLD'S Most Perfectly Developed Man*. Now reveals his secret of health, strength and amazing muscular development.

Photo Oct. 1929

**I**T'S easy my DYNAMIC-TENSION way. And quick! Just tell me what you NOW measure—and what you want to be. I'll give you PROOF in just 10 DAYS that I can turn you, too, into a man of might and muscle. I'll put a solid inch of smooth, supple, powerful muscle all over your body. If you are under weight, I'll add the pounds where they are needed and, if you are fat in any spots, I'll show you how to pare down to the fighting trim that I am always in myself. And with big muscles and the powerful, evenly-developed body that my method so quickly gives you, I'll also give you through-and-through health—health that digs down into your system and banishes such things as constipation, pimples, skin blotches and the hundred-and-one other ailments that rob you of the good times and the good things of life.

**FREE! "Everlasting Health and Strength"**

First, do what my other prize-winning followers did. Send for a free copy of my 48-page book—"Everlasting Health and Strength," by Charles Atlas. Gamble a 2c stamp for the biggest prize that anyone can gain—a handsome, healthy, muscular body that commands the respect of anybody, any time, any place! With my book I'll send you a chart so you can give me all your measurements. Then compare your biceps with mine. Measure your chest and put the figures beside mine. Do the same with your legs, arms, neck, wrist and all other parts of your body. Then get the proof of what my secret of Dynamic-Tension will do for you—in your home—spending as little as 15 minutes a day doing what I tell you—without apparatus—without special foods, pills, or baths—without any kind of fussy contrivance whatsoever! Give me 10 days and I'll give you the proof! Remember, it's easy my way. No apparatus—Dynamic-Tension does the work. You owe it to yourself to find out what my secret will do for you. Make sure of your free copy of my book—mail the coupon NOW. Address me personally—CHARLES ATLAS (Dept. 174), 171 Madison Ave., New York City.

-----**MAIL THIS NOW!**-----  
**CHARLES ATLAS** (Dept. 174)  
 171 Madison Ave., New York City  
 Dear Mr. Atlas: I want the proof that your system of Dynamic-Tension will give me, too, a healthy, husky body and big muscle development. Send me your free book, "Everlasting Health and Strength" and the confidential chart for my measurements.  
 Name .....  
 Address .....  
 City ..... State .....



**High School Course in 2 Years**

This simplified, complete High School Course—specially prepared for home study by leading professors—meets all requirements for entrance to college, business, and leading professions.

**20 Other Courses**

- Over 200 noted Engineers, Business Men, and Educators helped prepare the special instruction which you need for success. No matter what your inclinations may be, you can't hope to succeed without specialized training. Let us give you the practical training you need.
- American School**  
 Dept. H-453, Chicago
- Money Back When You Finish If Not Satisfied**
- American School, Dept. H-453 Drexel Ave. and 58th St., Chicago  
 Send me full information on the subject checked and how you will help me win success in that line.
- |                           |                           |
|---------------------------|---------------------------|
| .....Architect            | .....Electrical Engineer  |
| .....Building Contractor  | .....General Education    |
| .....Automobile Engineer  | .....Lawyer               |
| .....Civil Engineer       | .....Mech. Shop Practice  |
| .....Structural Engineer  | .....Mechanical Engineer  |
| .....Business Manager     | .....Steam Engineer       |
| .....C. P. A. & Auditor   | .....Sanitary & Heating   |
| .....Bookkeeper           | .....Surveyor & Mapping   |
| .....Draftsman & Designer | .....High School Graduate |
- Name .....  
 Address .....

**\$5,000 FOR PERPETUAL MOTION**

The editors have received thousands of different designs of perpetual motion devices, and have received hundreds of circular letters soliciting finances for the building of perpetual motion machines.

The editors know that if they receive these letters, there are thousands of others in this country who get similar letters and who fall for the claims made in the numerous prospectuses giving the earning capacities of the various machines.

Most of the shares of stock for these perpetual motion machines are being sold at a rate of \$1.00 per share, although some inventors are trying to sell shares of stock at \$100.00 per share.

Therefore, the editors of this publication say, "Just come in and show us—merely SHOW us—a working model of a perpetual motion machine and we will give you \$5,000.00. But the machine must not be made to operate by tides, winds, waterpower, natural evaporation or humidity. It must be perpetual motion."

# I'll Give You BULLDOG COURAGE



**In 48 Hours —OR NO COST**

Are you timid? Bashful? Self-conscious? Are you afraid of people? Afraid of superiors? Give me 48 hours and I'll make you bristle with bulldog courage—or no cost!

Thousands of men and women are being held back—made miserable—made unhappy. Why? Simply because of bashfulness, of criticism, business worries, and dozens of other fears. Yet fear is ABSOLUTELY UNNECESSARY. I have discovered an amazing method which banishes fear forever! No trouble! No inconvenience. No long waiting for results. My method is perfectly simple—perfectly natural—perfectly logical. It works almost instantly. Try it. You will be astonished! In just a few hours you will find yourself brimming over with splendid new courage—new daring—new self-confidence.

Only 50 Cents

Dr. Bush gives you his secrets of real, he-man courage in his book called "Spunk." It is one of the most startling books ever written. You can't read it without a quickening of your pulse—without a surge of red-blooded courage.

This book is declared to be the masterpiece of Dr. Bush who has astounded throngs in America's greatest cities and shown thousands the one way to health, prosperity, and self-confidence. Write for this amazing book today. Send only 50 cents in full payment. If you are not delighted, return the book within 5 days and your money will be instantly refunded.

DAVID V. BUSH, Publisher  
Dept. K-1094, 225 N. Michigan Blvd., Chicago, Ill.

**NIGHTS OF JOY IN A STORE FOR YOU!**

**Free Lessons!**

**START TO PLAY VERY FIRST DAY**

Even if you can't read a note of music right now, you play a simple melody on the very day you get your Deagan Xylorimba. Free, easy lessons show you how. Soon you are amazing friends and relatives. Then a new life begins—long, happy evenings of joy, parties, popularity, radio engagements—and the same chance to make \$5 to \$25 a night as Ralph Smith, Chicago—"Played 20 minutes at wedding; received \$20." Or the Hallmann family, Reading, Pa.—"Made \$300 in 5 weeks, spare time."

**FIVE DAYS' FREE TRIAL**—Our big FREE book tells all about this fascinating instrument—the 5-day free trial offer—the free lessons—the easy payment plan. Send in the coupon today—the booklet will be mailed promptly without cost or obligation.

**MAIL COUPON TODAY!**

J. C. Deagan, Inc., Dept. 1564, 1770 Berteau Ave., Chicago  
Send me, without obligation, full details of Free Trial offer and easy-payment plan on the Deagan Xylorimba.

Name \_\_\_\_\_  
Address \_\_\_\_\_

## NO JOKE TO BE DEAF



—Every Deaf Person Knows That I make myself hear, after being deaf for 25 years, with these Artificial Ear Drums. I wear them day and night. They stop head noises and ringing ears. They are perfectly comfortable. No one sees them. Write me and I will tell you a true story, how I got deaf and how I make you hear. Address \_\_\_\_\_

Medicated Ear Drum  
**GEO. P. WAY, Artificial Ear Drum Co. (Inc.)**  
68 Hoffman Bldg., Detroit, Mich.

**AIRPLANE BLUEPRINTS**  
Lincoln Sport Plane \$6.75  
Gerber Monoplane \$1.00  
**SCIENCE & INVENTION**

381 Fourth Ave. New York City

# Deafness Yields to Galvanic Current

By Emanuel N. Josephson, M.D.

(Continued from page 1144)

the annoying head noises, which are symptom of the disease, and attributed them to the activities of demons who were besetting him in his work. He wrote: "When I work, my head becomes filled with all sorts of buzzing, whizzing and thundering noises, and if I do not leave off the instant I should faint away. For the last three days I have not been able to look at a letter. The day your letter came from Nurnberg, I had another visit from the devil. I was alone . . . and this time the devil got the better of me, drove me out of my bed and forced me to seek the face of man. Not seldom has it happened to me to awake at midnight and dispute with Satan concerning the Mass." One night he was awakened by the noises. "Is it thou, devil?" he shouted, but Satan did not answer. Then Luther concluded that the devil would not be drawn out and returned to sleep. These noises which accompany chronic progressive deafness are often the torments of Hell for the victims of the disease.

Like cancer, chronic progressive deafness has been regarded in the past as a mysterious disease, the origin of which was unknown. The doctor specializing in diseases of the ear has been able to diagnose chronic progressive deafness and to predict that the patient would eventually lose his hearing, but he has not been able to influence the symptoms or to relieve the deafness and other symptoms. To be sure, it has been realized that the symptoms vary in severity with changes in weather. The patients complain that their deafness and noises are often intensified in rainy weather. Careful study of these variations and associated weather changes has revealed that the factor which controls these variation in symptoms is changes in barometric pressure. Even slight changes of barometric pressure, one-half an inch of mercury, may cause marked changes in the symptoms of the disease; but the sum total of a change of a half inch of mercury pressure over several hundred square inches of body surface probably exert an appreciable effect on blood circulation. These variations in the symptoms of the disease have indicated that the theory previously held that bony changes in the inner ear capsule of the ear are responsible for the deafness are untenable. For it is known that such rapid changes in the structure of bone, as might account for the rapid variation in symptoms, are not possible. That the disease has baffled medical science is indicated by the formation of an international committee, under the auspices of the American Otologic Society, for the sole purpose of studying this disease.

The writer, working independently of any hospital or otologic society, has brought to light some interesting and important data regarding the disease, including a method of relieving the symptoms and treating chronic progressive deafness with a measure of success; as well as a theory as to the cause of the disease which is proven correct when put to test. Though many different causes have been ascribed as the cause of the disease by various investigators, among which are syphilis, disorders of body chemistry, disorders of glands of internal secretion, and others, it is becoming increasingly evident that any condition which results in impairment of the blood circulation in the inner ear will eventually cause the disease.

Direct proof of the part which the blood circulation plays in this disease has been offered by clinical observation

of the patients. The administration of drugs which are known to directly affect the blood circulation markedly influences the hearing. The administration of small doses of nitroglycerin to a patient suffering of a less advanced form of chronic progressive deafness results in a momentary improvement in hearing, and it is known that nitroglycerin dilates the blood vessels; whereas the administration of ephedrin or adrenalin, which is known to contract the blood vessels, generally results in a drop in hearing in these cases. The negative pole of the galvanic current applied to the ear has proven to give the same improvement in hearing as is given by the drugs which dilate the blood vessels without the unpleasant by-effects of the drug.

The improvement obtained in early cases of chronic progressive deafness by these means is frequently astonishing. The range of hearing improves, the noises are alleviated, and the disturbances in the muscles of the middle ear above mentioned, which cause the so-called retracted drums in many cases, are relieved. In the more advanced cases the results are slower, for another factor enters. The nerve endings which translate the incoming sound waves into nerve impulses of sound, and sometimes the nerve itself, have become wasted and incapable of functioning, due to cutting off of their nourishment brought to them by the blood vessels. The process of regeneration, or rather reactivation of the nerve ending, is increasingly prolonged and doubtful, in proportion to the length of time which they have not been nourished and functioning. Patience is a prime requisite in obtaining a result, as is also a thorough knowledge of medicine and a large measure of skill and experience. The treatment may extend over many months of slow and intermittent progress.

Results are not obtainable in all cases of deafness. Deafness of the chronic progressive type is a not infrequent symptom of tumors and other disease changes in the brain. In such cases the treatment of the deafness is of no avail.

**In May**  
**SCIENCE AND INVENTION**  
*will offer you—*

**Eyes Across the Sea**—A dramatic close-up, by William Watts Chaplin, of the scene when trans-oceanic television had its first instant of success.

**Riding the Thunderheads**—An exposition of glider soaring technique, by Martin H. Schempp, a seasoned German pilot.

**Does Your Food Like You?**—A wise and witty article on the reactions of individuals to eatables, by Dr. Walter Damrau.

**A Story of exploration** in equatorial Africa that upsets all the usual ideas of the region, by Carveth Wells.

**An interesting article on the home chemist** in the garden, with practical suggestions on chemical treatment of plant growth.

**And a number of other features**, including the third article in the S. Gordon Taylor series on home improvement, Sam Loyd's famous Brain Teasers, and the ever-popular Safety Valve.

# LUMINOUS PAINT

**Make Your Watches, Clocks, Etc., Visible by Night** The very latest discovery in the scientific world. Hitherto, practically unobtainable except at an exorbitant price, we have at last succeeded in producing this remarkable LUMINOUS PAINT, which, applied to the surface of any article, renders it perfectly visible in the dark. **THE DARKER THE NIGHT, THE MORE BRILLIANT IT SHINES.** Quite simple to use. Anywhere you see it, a little applied to the dial of your watch or to the face of your clock, and the push buttons or switch plates of your electric lights, match boxes, and innumerable other articles; make your own Luminous Cigarettes, Luminous Rosaries, etc. Small bottles, price 25c. Larger sizes, 50c and \$1 postpaid. **JOHNSON SMITH & CO., Dept. 955 RACINE, WIS.**



## CIGARETTE MAKER

Roll your own and save money. Better and quicker; saves more than half. Use your favorite brand of tobacco. Neat, useful, handy. Pocket size, weighs 75 cts. Made entirely of metal, nickel plated. 25c, 3 for 75c postpaid anywhere.



## GOOD LUCK RING

Very striking, quaint and uncommon. Silver finish; skull and crossbones design; it sparks out of the eyes. Said to bring good luck. Only 25c and.



## Exploding Cigarettes

Box contains ten genuine cigarettes of excellent quality. They appear so real, but each one is a time bomb. One-third smoked, the victim gets a very great surprise as a bright light and a loud BANG! A great mirth provoker yet entirely harmless. Price 25c box.

## NOVELTY BADGES



**Kissing Permit 10c** **Garier Inspector 10c**  
Two very novel metal badges, nickel plated that you can wear, giving you fun out of all proportion to their trifling cost. 10c, each badge, 3 for 25c, or 75c per doz. postpaid anywhere.

## MIDGET BIBLE

**GREAT COURTESY** Small Bible in the World. Size of a postage stamp. 200 Pages. Said to bring good luck to the owner. A genuine work of art. Must be seen to be appreciated. Make good money selling them to friends, acquaintances, etc. PRICE 15c each, 3 for 40c, 12 for \$1.35, 100 for \$7.50. Also obtainable in Leather Binding, with gold edges. Price 60c each, 3 for \$1.25, \$4.50 per doz. Magnifying Glass for use with Midget Bible, 15c.

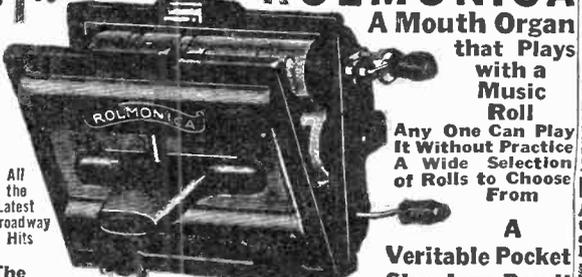
## STAGE MONEY

Without a bunch of these bills, it is easy for each person of limited means to appear prosperous by flashing a roll of these bills at the proper time and peeling off a genuine bill or two from the outside of the roll, the effect created will be found to be all that can be desired. Prices, postpaid: 40 Bills 20c, 120 for 50c, or \$3.50 thousand postpaid.

## BOOK ON ROPE SPLICING

Useful. Shows, step by step, each one made and what they are used for. Knots that are made with 100 illustrations. All about wire rope attachments, lashing blocks, tackle, etc. PRICE THREE COPIES FOR 50 CENTS POSTPAID.

# ROLMONICA



**A Mouth Organ that Plays with a Music Roll**  
**Any One Can Play It Without Practice**  
**A Wide Selection of Rolls to Choose From**  
**Veritable Pocket Size Jazz-Band!**  
**The Pocket Player Piano**  
Rolmonica is an automatic harmonica, that plays a music roll just like a player piano. It is a whole brass band all in one—the biggest sensation of the musical world in the last few years. Anyone can play it, for all you have to do is insert a roll, and turn the handle while you blow. That is all there is to it. Nothing could be simpler. Any child who can do these two simple things can play the Rolmonica. It is a veritable pocket size Jazz-band, combining the principles of the harmonica and the player piano. It is an instrument of a thousand melodies, it plays the popular airs of the latest Broadway hits. There are hundreds of rolls to select from, such as My Blue Heaven, Home Sweet Home, America, Old Black Joe, Among My Soubrettes, Love's Old Sweet Song, Dixie, Mighty Lak a Rose, Aloha Co, Ramona, Juanita, Rose Marie, Onward Christian Soldiers, Sally of My Dreams, Carolina Moon, I've Downed a Go Boon, Weary River, Over There, Ma Cherie, Long Way to Tipton, Make Believe, Desert Song, La Paloma, Sweet Adeline, I've Got a Feeling, Pagan Love Songs, When My Dreams Come True, Parade of Wooden Soldiers, Land of Sleepy Water, Turkey in Straw, Hail the Gang's All Here, and hundreds of others. An unfailing source of amusement. You can delight your friends for hours and play tune after tune simply by changing rolls. Small in size, fitting your pocket, yet mighty in its finger-tickling, toe-tlingling tune power. Not a toy, but a genuine musical instrument and the life of an evening. A roll free with each Rolmonica. Extra Rolls always obtainable; complete list with each instrument. New Rolls added each month. PRICE with 1 Roll \$1.50; Extra Rolls 50c each, all postpaid.

**LATEST CATALOG**  
A De Luxe Edition of our new CATALOG mailed on receipt of 25c. Handsome binding. Bigger and better than ever. Only book of its kind in existence. Nearly 650 pages of all the latest tricks in magic, the newest novelties, puzzles, the latest sporting goods, rubber stamps, unusual and interesting books, curiosities in seeds and plants, etc., unobtainable elsewhere. Remit by Stamps, Coin, Money Order, Check, etc. Canadian and Foreign Stamps also accepted.

# BLANK CARTRIDGE PISTOL

Protection against Burglars, Tramps, & Dogs. Special Offer. 1 Blank Cartridge Pistol. 100 Blank Cartridges. 100 Blank Cartridges. 100 Blank Cartridges. Catalog Only \$1.50



## Throw Your Voice

Into a trunk, under the bed or anywhere. Lots of fun fooling the teacher, policeman or friends. **THE VENTRILO** a little instrument, fits in the mouth out of sight, used with above for Bird Calls, etc. Anyone can use it. Never fails. A 16-Page Course on ALL FOR Ventriloquism and 10 Cents

## LOOK 35¢ LOOK Wonderful Instrument.

Everybody delighted with it. Odd, Curious and Interesting. Lots of pleasure as well as very useful. It is a double microscope for examining the wonders of nature. It is also an Opera Glass, a Stereoscope, a Burning Lens, a Reading Glass, a Telescope, a Compass, a pocket Mirror, and a Lavatory Glass. For looking eyes, ear, nose and throat. It is worth all the cost to locate even one painful cinder in the eye. Folds flat and fits the pocket. Something great—you need one. Don't miss it. Sent by mail. Only 35c or 3 for \$1.00

## PISTOL CIGARETTE CASE

It looks like a deadly weapon, but is merely a novel Cigarette Case. This clever contrivance has proved itself better than the real thing in many an awkward encounter. Great fun "sticking up" your friends. They squirm and protest it might be loaded. You aim at them and the slides open disclosing the cigarettes. Well made, light and compact. Weight only 2 ounces.

## MICROPHONE TRANSMITTER BUTTON

You can easily make a highly sensitive detector-phone by using this Transmitter Button to collect the sound waves. You can build your own outfit without buying expensive equipment. It is simple and inexpensive. You can install an outfit in your home and hear conversations being held all over the house. You can connect up different rooms of a hotel. This outfit was used by secret service operatives during the war. It is being used by the Government in its ultra-sensitive and is the greatest invention in microphones. You can mount the button almost anywhere—card board boxes, stove pipes, still chimneys, on the wall behind a picture frame, etc. Button is so light and small it cannot be detected. Persons can be overheard without suspecting it. You can listen in on conversations in another room. A deaf person in the audience can hear the speaker. Connected to phonograph, piano or other musical instrument, music can be heard hundreds of feet away. Button may be used to renew telephone transmitters; often makes an old line "talk up" when nothing else will. The ideal microphone for radio use; carries heavy current and is extremely sensitive. Amplifies radio signals. Countless other similar uses will suggest themselves. Experimenters find the button useful for hundreds of experiments along the lines of telephones, amplifiers, loud speakers, etc. Many fascinating stunts may be devised, such as holding the button against the throat of a client to reproduce speech without sound waves. PRICE \$1.00.

## MAGICIAN'S BOX OF TRICKS

Apparatus and Directions for a Number of Mysterious Tricks, Enough for Entertainment. \$1.00  
**Anyone Can Do Them**  
It is great fun mystifying your friends. Get this Conjuror's Cabinet, and you will be the cleverest fellow your dining room and is extremely popular. The apparatus for ten first-class tricks, including the MAGIC RIBBON AND YARE TRICK (a wooden ball placed inside and upon replacing the lid has disappeared and is found in someone else's pocket); THE HINDOO TRICK CARDS (can be made to change completely, no less than five times); DISAPPEARING COIN BOX (a coin placed in the wooden box, vanishes and is found in someone else's pocket); THE GLASS COBBLE TRICK (a coin is dropped into a glass of water and when the water is poured out the coin has vanished and is found somewhere else); THE RIBBON TRICK (a ribbon is placed in a glass of water and when the water is poured out the ribbon has vanished and is found somewhere else); THE DISAPPEARING COIN TRICK (a coin is placed in a glass of water and when the water is poured out the coin has vanished and is found somewhere else); THE ENCHANTED BOTTLE TRICK (a bottle is placed in a glass of water and when the water is poured out the bottle has vanished and is found somewhere else); THE GREAT HAT TRICK (a hat is placed on a table and when the table is lifted the hat has vanished and is found under the table); THE PHANTOM CARD TRICK (a card is placed in a deck and when the deck is shuffled the card has vanished and is found in the deck). Full instructions are sent for performing each trick. In addition to the above, a number of other tricks are fully explained for which you can easily make or procure the necessary apparatus. Price complete \$1.00 postpaid.

# DISSOLVING VIEWS

You may have a lot of fun with this little snap-away. A regular series of 10 views, made entirely of metal, having a microscopic lens fitted into one end. While the victim is absorbed in admiration of the pretty picture and turns the button on the confident expectation of seeing something interesting, a spring spring is brought into action, and the observer experiences a very great surprise. 50 cents each postpaid. **JOHNSON SMITH & CO.**

## Lover's Knot or Friendship Ring

Made of 4 strands of genuine 14K gold filled wire, woven into the True Lover's Knot, symbolic of love or friendship. Very pretty, yet not showy. Each ring is made by hand by gold wire expert. It looks good and it is good. Price 50c Postpaid **Johnson Smith & Co.**

## Rubber Chewing Gum

It is just like a regular package of chewing gum and looks so real that it fools everybody. Of course no one suspects it is not genuine until they start to chew it. There's a world of fun in this rubber chewing gum. Each pack is a package. Price, 10c Pkgs.; 3 for 25c; 12 for 75c postpaid.

## Rubber Cigarettes. Price per Box 20c

Rubber Matches. Price per Pkg. 10c

## 25 CENTS BABY TANK

Most remarkable toy ever invented. By drawing the tank backward, either with the hand or over the floor or table and then placing it down it will crawl along, overcoming all obstacles, in the same life-like manner as the larger tank that proved so deadly in the great war. What makes it so somewhat of a mystery, for there is no mechanism to wind up as is usually understood with mechanical toys, yet this tank will keep plodding along for longer than the ordinary run of toys. It will perform dozens of the most wonderful stunts. 25c prepaidd.

## ITCHING Powder

This is another good practical joke! The intense discomfort it causes to everyone, but themselves is thoroughly enjoyable. All this is necessary to start the ball rolling is to deposit a little of the powder on a person's hand and the powder can be relied upon to do the rest. The result is a vigorous scratch, then some more scratch, and still some more. 10c box, 3 boxes for 25c or 75c per dozen. Shipped by Express.

## ANARCHIST BOMBS

One of these glass vials dropped in a room full of people will cause more consternation than a limbberger cheese. The small entire package is in a short time 10c. per Box, 3 Boxes for 25c, 75c per doz. Boxes, or \$7.50 per gross Boxes. Shipped only by Express.

## SNEEZING POWDER

Place a very small amount of this powder on the back of your hand and blow it into the air, and everyone in the room or car will begin to sneeze without knowing the reason why. It is most amazing to hear their remarks, as they never suspect the real source, but think they have caught it one from another. Between the laughing and sneezing you yourself will be having the time of your life. For parties, political meetings, car rides, or any place at all where there is a gathering of people, it is the greatest joke out. Price 10c, 3 for 25c, 75c per dozen. Shipped by Express.

## COMICAL MOTTO RINGS

Lots of harmless fun and amusement wearing these rings. Made in platinum (to resemble platinum), with wording on enameloid, as illustrated. Price 25c ea. Postpaid.

## MAGIC MADE EASY 250 MAGIC TRICKS 10c

An excellent little book containing 250 Parlor Tricks, tricks with cards, coins, handkerchiefs, etc., rings, glasses, etc. So simple that a child can perform them. Profusely illustrated. Sent postpaid, to any address for only 10c, 3 copies for 25c.

**ADDRESS ORDERS FOR ALL GOODS ON THIS PAGE TO JOHNSON SMITH & CO. DEPT. 955 Racine, Wis.**

# Read Classified Advertising—It Pays!!!

Advertisements in this section fifteen cents a word for each insertion. Name and address must be included at this rate. Cash should accompany all advertisements unless placed by an accredited advertising agency. Not less than 10 words accepted. Objectionable or misleading advertisements not accepted. Advertisements for these columns should reach us not later than 1st of 2nd month preceding issue.

Classified Advertising Manager—Experimenter Publications, Inc., 381 Fourth Avenue, New York City

## Advertising

**Get into Advertising. Learn quickly at home.** Experience unnecessary. Now, easy plan. No text-books used. Practical work. Old established school. Send name and address for interesting free booklet. Page-Davis School of Advertising, Dept. 535-A, 3601 Michigan, Chicago.

## Agents Wanted

**Make your own products.** Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1332W Broad, Richmond, Va.

**AMAZING PROFITS SELLING NEW** Tablecloth. Looks like linen. Wash like Oilcloth. Samples free. Be-ster Co., 147, Irving Park Station, Chicago.

**MEN! WOMEN! Earn big money.** Establish permanent business as our exclusive representative your county. Get particulars quick. Indianapolis Soap Co., Dept. 101, Indianapolis, Indiana.

**Agents—Men, earn up to \$12 daily** wearing fine felt and selling friends. Smartest system. Latest shades, \$2 to \$5 saving on every hat. Samples FREE. Taylor Hat and Cap Mfrs., Dept DC-390, Cincinnati, Ohio.

**\$20 a day easy, all or part time selling** greatest line of shirts, underwear, hosiery, neckwear. Lowest prices. Big commissions. Write today for big free outfit. Carter Welch, Mgr., 227 W. Van Buren, Dept. 516, Chicago.

**Agents—IF YOU'RE LOOKING for a** real, honest-to-goodness money-making proposition, send me your name immediately. I have what you want. Albert Mills, 5220 Monmouth, Cincinnati, O.

**WANTED AT ONCE: More good men** to introduce and retail Rawleigh's Good Health Products. Town and Country. Wonderful opportunity. Get into business with backing of largest manufacturer in its kind. Capital over \$1 million. Write for quick freight, express, parcel post service from 10 great factories and branches—one near you. Nothing new—no experimenting. No experience required. You simply follow the same old time-tested Rawleigh Methods which secure the most business everywhere and have given our customers best values and satisfaction for 40 years. 170 necessities frequently needed every home. Enormous demand. Annual sales nearly 40 million products. Big free trial inducements. Quick easy sales. Repeat every 30-60 days. Enormous profits—\$100-\$400 more profit. Steady year-round, no lay-off. No boss—you become sole owner and manager. Practically no capital required. We supply everything—stocks, outfit, sales and service methods. Big pay every day. Profits increase every month. "First come first served." For full particulars write to: Rawleigh Co., Dept. 4-A Sci. Freeport, Ill.

**Big money and fast sales.** Every owner buys gold initials for his auto. You charge \$1.50; make \$1.35. Ten orders daily easy. Write for particulars and free samples. American Monogram Co., Dept. 71, East Orange, N. J.

**YOU ARE WANTED TO RESILVER** Mirrors at home. Profitable business plating auto parts, tableware, etc. Write Sprinkle, Plater, 935, Marion, Indiana.

**\$10 daily silversing mirrors, plating and** refinishing lamps, reflectors, autos, beds, chandeliers by new method. Outfit furnished. Write Gemmetal Co., Ave. D, Decatur, Ill.

**HARPER'S NEW "HOUSE CLEANER"** Does the most and costs the least of any invention for the home. Saves Labor, Money, Health, and Doctor Bills. Does more than vacuum cleaners. Costs little, uses no electricity. Price sells it. Good for home, garage, and public buildings. New plan sells where they haven't a cent. Profits large. Protected Territory. Loan you one to start with if well recommended. Harper Brush Wks., 2732 Main St., Fairfield, Ia.

**350% PROFIT. NEW MAGIC CAS-** Leters \$1.00 Dozen, \$8.00 Gross. Retail 25c. Zip-Hite's, Kossuth Avenue, New York.

**42 Miles on 1 Gallon of Gas—Wonderful** new Vapor Moisture Humidifier and Carbon Eliminator. All autos. 1 furnished to test. Critchlow, Inventor, 863, Wheaton, Ill.

**Just put our Chewing Gum outfit in your** pocket. Make daily expenses. Sell in stores. Popular Flavor Outfit furnished. Helmet Corp., Dept. 57, Cincinnati, O.

**\$60-\$200 a week. Genuine Gold Letters** for store windows. Easily applied. Free samples. Liberal offer to general agents. Metalfine Letter Co., 441 B, North Clark, Chicago.

**500 Formulas and Big Illustrated Catalog** 25c. Ideal Book Shop, Park Ridge, Ill.

**Gold Leaf Window Letters and Script** Signs; no experience; 500% profit; samples free. Consolidated, 69-B, West Van Buren, Chicago.

**Strange Battery Compound charges instantly.** Eliminates old method. Gives new life and pep. Big profits. Gallon free. Lightning Co., St. Paul, Minn.

**IMPORT Your own goods.** German export magazine published in English offers numerous bargains, latest novelties; opportunity for obtaining profitable agencies. Copy 60c. Square Deal Supply, 246-V Fifth Ave., New York.

**Color Craze Sweeping the Country—** Make big money taking orders for hand painted faceless tablecloths, bedspreads, etc. Castle-Ford Co., V230, S. Wells, Chicago.

**Don't sell for others—Employ agents** yourself. Make your own products. Toilet articles, household specialties, etc. 500% profit. Valuable book free. National Scientific Laboratories, 1332W Broad, Richmond, Virginia.

**Free Booklet describes 67 Plans for** making \$20-\$100 weekly in home, or office. Business of your own. Elite Co., 84-B, Elizabeth St., N. Y.

## Airplanes—Aviation

**Model Aeroplane supplies.** Write for free bundle of sample stock. Aero Shop, 3650 Hurbut Ave., Detroit, Mich.

**Biggest, Best Catalog Model Airplanes,** Paris, Supplies; 5c postpaid. Ideal Company, 23 West 18th Street, New York.

## Books

**HEALTH HINTS WITHOUT MEDICINE.** Priceless book 50 cts. Sent upon approval on receipt of name and address. Literature Free. H. E. Wildman, Graduate Specialist, 1723 Pine St., Los Angeles, Calif.

## Business Opportunities

**Sell By Mail!—Books, Novelties, Bargains!** Large Profits! Particulars Free! E-Elite, 525 South Dearborn, Chicago.

**Amateur Cartoonists: Sell Your Cartoons** New Plan. Smith's Service, Ex. 1194, Wenatchee, Wash.

**Free Book. Start little mail order** business. Hadwil, 5A-74 Cortlandt Street, New York.

**BIG MONEY AWAITS YOU HERE.** 250 Signs and pictures an hour without press, type or machinery. Samples and particulars 10c. Straco, 1015 Mulberry, Springfield, Ohio.

**Make \$20.00 a day cleaning wallpaper** with New Invention. Write Superior Specialties, Springfield, Ill.

**Screw-holding screw driver! Amazing** new invention. HOOPS removes, insects screws instantly inaccessible places. Factories, garages, electricians, radio owners buy on sight! Sells \$1.50. Exclusive territory. Free trial order. Jiffy, 1544 Winthrop Bldg., Boston.

## Chalk Talks

**Laugh-Producing Program. \$1.00 Catalog** 10c. Balda Art Service, Dept. 4, Oshkosh, Wis.

## Chemistry

**Your Chemical problems solved and working** process furnished for Five Dollars. Write me. W. Steadman Richards, Consulting Chemist, Box 2402, Boston, Mass.

## Chemicals

**"Handbook for Chemical Experimenters,"** Hundreds of experiments; illustrated 50c. Booklet of experiments, 15c. Chemical price list, 5c. General Chemical Company, Box 397, Reading, Penna.

## Coins

**BARGAINS, 10 Large Cents \$1.00; 10** 2c pieces \$1.00. Reaber, Westbrook, Conn.

## Correspondence Courses

**Used correspondence school courses sold** on repurchase basis. Also rented and exchanged. Money-back guarantee. Catalog free. (Courses bought). Lee Mountain, Pisgah, Alabama.

## Detectives

**Detectives work home or travel. Experience** unnecessary. Particulars free. Write George Wagner, 2190 Broadway, N. Y.

## Duplicators and Supplies

**"RAPIDOGRAPH" Rotary Stencil Dupli-** cator, Duplicates Typewriting, Handwriting, Drawings. Complete \$25.00. Samples Free. General Stamping Co., 238 E. 24 St., New York.

## Farm Lands

**Wanted to hear from owner having good** farm for sale. Cash Price, particulars. John Black, Chippewa Falls, Wis.

## For Inventors

**INVENTORS: Send for complete names** and addresses of over 800 manufacturers looking for new inventions, with suggestions from each on "What To Invent." Only \$2.00 prepaid. Inventor's Syndicate, 101 Palladium Bldg., St. Louis, Mo.

**FREE BOOKLET ON PATENTING New** inventions. Sterling Buck, S-629-F, Washington, D. C.

**Inventors, use our special service for** presenting your inventions or patent to manufacturers. Adam Fisher Mfg. Co., 205-A Enright, St. Louis, Mo.

**Unpatented Ideas Can Be Sold. I tell** you how and help you make the sale. Free particulars. (Copyrighted.) Write W. T. Greene, 908 Barrister Bldg., Washington, D. C.

**Inventions Commercialized. Patented or** unpatented. Write, Adam Fisher Mfg. Co., 205 Enright, St. Louis, Mo.

## Formulas

**Formulas—all kinds. Catalog free.** Clover Laboratories (T.), Park Ridge, Ill.

## For Sale

**Telephonograph for Radio receiving and** recording. Box 93, Creighton, Pa.

**New Standard G.E. 1/4 H.P. Washing** Machine Motors. While they last \$9 each. Check with order. Reid-Way Co., Cedar Rapids, Iowa.

## Help Wanted

**MAKE BIG PROFITS SILVERING** Mirrors. Easily learned patented process. Plans free. Wear Mirror Works, S.I.-3, Excelsior Springs, Mo.

## Help Wanted—Instruction

**\$1260 to \$3000 Year. Steady Work. U. S.** Government Life Positions. Men, women, 18 to 50. Short hours. Pleasant duties. Common education usually sufficient. Experience unnecessary. Sample coaching, list positions and full particulars—Free. Write immediately. Franklin Institute, Dept. H-4, Rochester, N. Y.

**WANTED IMMEDIATELY. Men-** Women 18-55, qualify for permanent Government Positions. \$105-\$250 month; experience not required; Vacations with pay; common education; many needed soon. Write, Instruction Bureau, 293, St. Louis, Mo. quickly.

**MEN 18-35. RAILWAY POSTAL** Clerks. \$158.00-\$225.00 month. Steady. Spring examinations likely. Common education sufficient. Particulars free. Write immediately. Franklin Institute, Dept. H-15, Rochester, N. Y.

## How to Entertain

**Plays, Musical comedies and revues,** minstrels, comedy and talking songs, black-face skits, vaudeville acts, monologs, dialogues, recitation, entertainments, juvenile plays and songs, musical readings, make-up goods. Catalog free. P. S. Denison & Co., 623 So. Wabash, Dept. 99, Chicago.

## Inventions Wanted

**BIG MONEY made with good inventions.** Get yours into action by sending full details to manufacturer with two large plants. G. W. MacDow, 200 Dartmouth St., Boston, Mass.

**Inventions Wanted—patented, unpatented.** If you have an idea for sale write, Hartley, Box 928, Bangor, Maine.

**Inventions Commercialized. Patented or** unpatented. Write, Adam Fisher Mfg. Co., 205 Enright, St. Louis, Mo.

## Machines

**CONCRETE Building Block Machines** and Molds. Catalog free. Concrete Manufacturing Co., 5 N. Main, St. Louis, Mo.

## Magic

**Magic tricks, cards, books, illusions, etc.** Catalog free. G. Fenner, 2401 Jefferson, Louisville, Ky.

**Magic Catalog 20c. Lynn, 105 Beach,** Dept. 6 Jersey City, N. J.

## Mail Order Business

**SELL MAGIC! We furnish Catalogs,** (Circulars, Everything! Samples, particulars, 10c. Housinger, 8236 Cornell, Chicago.

## Male Help Wanted

**Firemen, Brakemen, Baggage men (white** or colored), Sleeping Car, Train Porters (colored), \$150-\$250 monthly. Experience unnecessary. 887 Railway Bureau, East St. Louis, Ill.

**STEAMSHIP POSITIONS — Men-** Women—Good pay; experience unnecessary. List of positions free. W. E. Areculus, Mount Vernon, N. Y.

## Miscellaneous

**Agents, Canvassers, Salesmen, Merchants,** etc. who are seeking direct contact with manufacturers for live propositions; 100% satisfaction guaranteed; send me 25c (coin or stamps) for one pound of direct contact literature of over 200 unexcelled offers. Ted Armour, 136 East 28th Street, New York, N. Y.

**SELL BY MAIL. Wonderful opportunity.** Particulars FREE. Ford, 210 Chihuahua St., El Paso, Texas.

## Patents

**Inventions Commercialized. Patented or** unpatented. Write, Adam Fisher Mfg. Co., 305 Enright, St. Louis, Mo.

## Patent Attorneys

**Patents—Write for Free Instructions.** Send Drawing or Models for Examination. Carl Miller, Registered Patent Attorney (former Patent office examiner), 258 McGill Building, Washington, D. C.

**Inventions patented; confidential advice;** inventions developed—representative for Blair Tool and Machine Corp.; trade-marks registered. Edward Gottlieb, Patent Attorney, 5 Beekman Street, New York.

**Patents Procured; Trade-Marks Regis-** tered—Preliminary advice furnished without charge. Booklet and form for disclosing idea free. Irving L. McArthur, 703 International Building, Washington, D. C.

**Inventors who derive largest profits know** and heed certain simple but vital facts before applying for patents. Our book "Patent—Sense into these facts; free. Lacey & Lacey, 644 B St., Washington, D. C. Established 1869.

**Patents. Time counts in applying for** patents. Don't risk delay in protecting your ideas. Send sketch or model for instructions or write for Free book, "How to Obtain a Patent" and "Record of Invention" form. No charge for information on how to proceed. Communications strictly confidential. Prompt, careful, efficient service. Clarence A. O'Brien, Registered Patent Attorney, Security Bank Building (directly across street from patent office), Washington, D. C. See page 1123.

**"Inventor's Adviser." Valuable Patent-** book sent free. Labiner, 15 Park Row, New York.

**JAPAN; Yoshijiro Nakane. Registered** Patent Attorney. 24, Ishigatsujicho, Tempojuku, Osaka.

**Unpatented Ideas Can Be Sold. I tell** you how and help you make the sale. Free particulars. (Copyrighted.) Write W. T. Greene, 908 Barrister Bldg., Washington, D. C.

**"Inventors' Guide" free on request; gives** valuable information and advice for all who have original ideas or improvements. Frank Lederman, Registered Attorney and Engineer, 233 Broadway, New York City.

**PATENTS—Send for form "Evidence** of Conception" to be signed and witnessed. Form free. Schedule information free. Lancaster, Allwine & Kounkel Registered Patent Attorneys in the United States and Canada, 212 Ouray Building, Washington, D. C.

## Patents or Inventions

**Inventions Commercialized. Patented or** unpatented. Write, Adam Fisher Mfg. Co., 205 Enright, St. Louis, Mo.

## Personal

**TOBACCO HABIT OVERCOME OR NO** Pay. Over 500,000 used Superba Remedy to help stop Cigarettes, Cigars, Pipe, Chewing, Snuff. Write for full treatment on trial. Costs \$2.00. If successful, nothing if not Superba Co., L-82, Baltimore, Md.

## Photoplays Wanted

**\$\$\$ Photoplay Ideas For Both Silent and** Talking Pictures. Accepted any form for revision, criticism and submission to studios. Estab. 1917. Booklet free. Universal Scenario Co., 223 Western & Santa Monica Bldg., Hollywood, Calif.

## Printing Outfits and Supplies

**Print Your Own cards, stationery, circulars,** advertising, etc. Junior press, \$5.99; job presses, \$11; rotary, \$149. Print for others; big profit. Easy rules furnished. Write for catalog presses, type, paper, etc. Kelsey Company, Q-6, Meriden, Conn.

## Real Estate

**PECAN, Orange-Fig groves "On the** Gulf." Monthly payments. Guaranteed care. Big quick returns. Suburban Orchards, Dept. S, Biloxi, Miss.

## Salesmen Wanted

**PUNCHBOARD SALESMEN. Up to** \$10,000 Yearly. New Hire. All fast-sellers. Lowest prices. Full commission on repeat business. Catalog free. Puritan Novelty, 1409 Jackson, Chicago.

**42 Miles on 1 Gallon of Gas—Wonderful** new Vapor Moisture Humidifier and Carbon Eliminator. All autos. 1 furnished to test. Critchlow, Inventor, 863, Wheaton, Ill.

## Songwriters

**COMPOSERS—Verse or Music. Brill-** iant opportunity. Write Van Buren, 1992 McLaugh Bldg., Chicago.

**Songwriters—substantial advance roy-** alties are paid on publisher's acceptance. New Booklet, "Song Requirements of Talking Pictures" sent free. Newcomer Associates, 793 Earl Bldg., New York.

## Telegraphy

**Learn Morse and wireless telegraphy. Big** salaries. Tremendous demand. Expenses low, can earn part. Catalog free. Dodge's Institute, Stone Street, Valparaiso, Indiana.

## The Safety Valve

(Continued from page 1115)

guests of Sir Oliver Lodge, and of the British Society for Psychological Research, London, and read the true evidence adduced from the record as to how thoroughly Margery is constricted when scances occur. I also note that Arthur Ford of New York offers anyone \$10,000.00 to prove he got the wrong message for Mrs. Houdini, or that she did not pay him the \$10,000.00. Where is Dunninger? Put him on.

There are today thousands of mediums who are genuine, right in this country and more developing.

You who are way behind the times had better wake up—you would command the spirits—but no—they command you.

E. E. REED,  
Hudson, Michigan.

(Let us first say that Mr. Ford never received \$10,000.00 for giving the correct message to Mrs. Houdini. Mr. Ford admits so himself under his own signature, yet newspaper accounts state that he did receive the \$10,000.00. This, Mrs. Houdini denies.

There is no doubt but that this was the message. If you read the April 1929 issue of SCIENCE AND INVENTION Magazine you might see how this message was obtained.

Why not have any mediums that you consider genuine, call at the offices of SCIENCE AND INVENTION Magazine. Our offer of \$21,000.00 is absolutely bonafide. In view of the fact that it is published in a magazine that circulates through the United States mails, any refusal on our part to pay this offer would close the magazine to the mails, were the complaint lodged with the Postal Authorities. Such a condition would mean more to us than the \$21,000.00.

Should any question arise in your mind regarding the way in which mediums are handled, or regarding our honesty and integrity, I need only refer you to the last medium that we investigated, Mr. Decker.

Mr. Decker is well known in spiritualistic circles and a letter to him will undoubtedly set you right on this subject and will also convince you that mediums have nothing to lose by sitting before our investigating committee.—EDITOR.)

## In RADIO NEWS for April

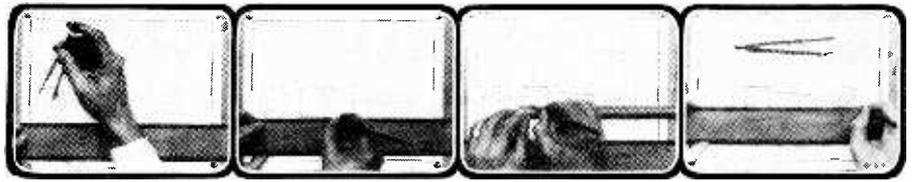
Sun Spots, Weather and Radio are all discussed in a most interesting manner by Lieut. William H. Wenstrom, whose original researches in this field qualify him to write with authority.

Austin C. Lescarbours, in answer to a storm of inquiries, tells why radio opportunities seem few, in spite of the great demand for trained men.

Commander Edward H. Loftin and S. Young White explain how to add a direct-coupled amplifier system to a standard radio frequency tuner.

A. Binneweg, Jr., discusses his experiments in the short wave field, developing transmitter equipment for 2.5 and 10-meter use.

# NOW-take this new quick way to



## Get a Fine BIG PAY JOB in DRAFTING

Come on you fellows who are sick and tired of lay-offs, job hunting and poor pay. Say goodbye forever to hard times and starvation wages. Become an Engineering Draftsman and land a fine-paying, year 'round job thru the now famous L. L. COOKE "picture method" of learning Drafting. This is the amazingly simple, quick-action training that is getting sensational results for men like you everywhere. Mail coupon for details today.

### Only Spare Time At Home Needed

Just give a little of your spare time at home to this wonderful training and you'll be surprised how rapidly you make progress. Complete Drawing Outfit Furnished starts you out doing Drafting just as it's done in great Drafting Rooms everywhere. You learn

right—you get practical training—and you learn fast.

It's just as easy as it looks in the pictures above. You learn by doing. Actual pictures of your instructor's hands guide you. You SEE IT DONE and you DO IT YOURSELF. The pictures show you HOW and the text tells you WHY. And

you learn all about mechanics, shop practice and everything a Draftsman must know. In other words, you learn Drafting from A to Z so you can sit in with the best of them on the jobs that pay Big Money.

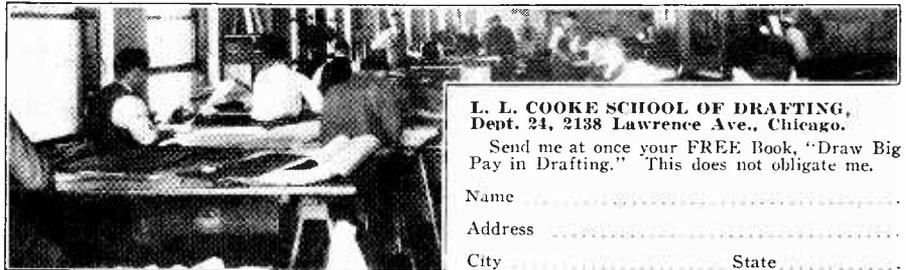
### Decide To Get Big Pay

Mail coupon today and make up your mind to get out of the rut and jump into steady, Big Pay work. Drafting is your great Opportunity. Good Draftsmen always in demand—many earn up to \$100 a week. That's the kind of work for you. Decide to get it. Send for Big FREE Book that shows how easy it is to learn Drafting this new quick way. Mail coupon now.

### Professional Instruments and Full Outfit Included—Nothing Else To Buy

Everything you need to learn Drafting and learn it right is sent you as part of this Course. There is no extra charge of any kind—nothing else to buy. You get a real professional outfit of Instruments and Drawing Materials without a penny of extra expense. Mail the coupon for details today.

Jobs like these are clean and steady and the Pay is BIG

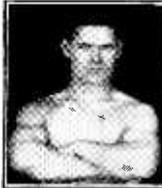


L. L. COOKE SCHOOL OF DRAFTING,  
Dept. 24, 2138 Lawrence Ave., Chicago.

Send me at once your FREE Book, "Draw Big Pay in Drafting." This does not obligate me.

Name .....  
Address .....  
City ..... State .....

## Complete Muscle Building Course, Including Exercisers, \$1.00



I positively guarantee to increase your arms one-half inch in size, chest one full inch, strength 25%, health 100% in one week's time, by following my instructions and using my exerciser 10 minutes mornings and at night. Send \$1 for complete course and exercisers. Satisfaction guaranteed or \$1 refunded.

Prof. J. A. DRYER  
Box 1850-L Chicago, Ill.

### Anyone CAN LEARN!

No talent or experience necessary. Fascinating work. Pays big money. Complete instruction book TELLS ABOUT: Alphabets, Colors, HOW TO MIX PAINTS, Show Cards, Window Board and Wall Signs, Ready made letters, Gliding TRICKS OF THE TRADE, also gives 100 Alphabets and Designs. Book bound in flexible imt. leather, gold edges, and four ball bearing Show Card Pens. Book and Pens sent postpaid for \$3.00. (C. O. D. 10c extra.) OgilviePub.Co., 57 Rose St., Dept. 109 New York

**EARN MONEY IMMEDIATELY— WE FURNISH EQUIPMENT TO START**

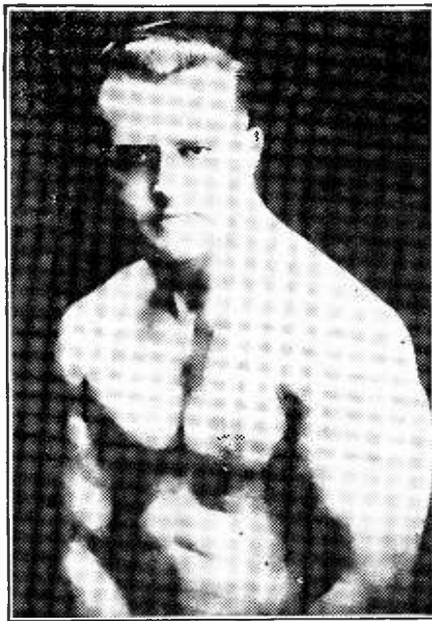
# WIN \$2000.00! NAME THE DOGS

Big friendship offer. \$3000 in prizes. Someone will win \$1000 cash and Nash sedan, or \$2000 cash! Why not you? Over \$15,000 already given. Mrs. Harrell won \$500; N. LaValle won \$700; R. A. Dobbins won \$2500; many others. Nothing to buy. Only 3 things to do—name the dogs, advertise for us around home, then play a jolly fun game. 50 fine prizes.

**Name the Dogs** Six dogs are pictured here. 1. Collie, 2. Police dog, 3. Airedale, 4. Bull, 5. Setter, 6. Bloodhound. Can you name them? Mark the Collie as No. 1, Police dog No. 2, etc. Number all 6 dogs. Send answer at once. A close observer who names the dogs correctly is going to win. First prize \$1000, and Nash extra for being on time, or \$2000 all cash.

**Send Answer Today** Name the dogs and you can start to win. \$3000 in prizes. Cash allowance guaranteed to every one who takes active part. No risk. No obligation. Costs 2c to mail answer. Costs nothing to win. Everything free and postpaid. If you want to win send answer today for complete particulars. Name the dogs! Send no money. Hurry!  
W. M. GOOD, Mgr. Dept. 55 AUGUSTA, MAINE.





EARLE LIEDERMAN—"The Muscle Builder"  
Author of "Muscle Building," "Science of Wres-  
tling," "Secrets of Strength," "Here's Health,"  
"Endurance," etc.

## A New Body Awaits You

Have you ever watched a magician pull wriggling rabbits out of a high hat? A wonderful trick, you say. Well, Earle Liederman is a magician, but of a different sort. He builds health and strength into your body in a miraculously short time—and it's no trick. It took him over 20 years of planning and experimenting to do it—not with hit-or-miss method—for Earle Liederman is a college trained man who works with a deliberate, analytical mind. People call him the Muscle Builder because he takes weak, run down bodies and transforms them into strong, virile, handsome bodies in double-quick time—GUARANTEES to do it and actually DOES do it.

### In The Privacy of Your Own Room

To obtain the new body awaiting you, does not mean that you must exercise 24 hours continuously. Earle Liederman's short-cut to healthy, handsome, broad-shouldered bodies must be taken in 15 minute doses. If you exercised more than this in his high-pressure, quick-development way, you would tear down more than he could build up. You can do his easy scientific exercises in the privacy of your own room.

### And What Results

What a thrilling satisfaction you will get out of watching your shoulders broaden and your arms thicken and strengthen. How glorious it will be to feel your vest becoming tighter around your chest and to watch your legs become muscular. There'll be no more leg fatigue when you climb stairs and you'll be the one who sets the pace when walking.

### A New Body—Inside As Well As Out

Your heart, your liver, your kidneys, your lungs—all your internal organs get the jolt of their young lives when this Sculptor of Human Bodies starts to work on them. Almost immediately they settle down to an orderly, well-mannered functioning that means a new kind of happiness for you—a new body—the joy of living that only a healthy, virile body can give you. And the headaches, constipation troubles, aches and pains that are caused by a weakened, flabby body somehow miraculously disappear.

### You'll See It In Her Eyes

And will your friends notice the difference! Just watch that girl you love so dearly open her eyes and fight to hold your attention! And the men bow and crowd—they'll look up to you as a real leader. Instinctively they worship strength and leadership that must go with these things. But let Earle Liederman tell you all about it. All you have to do is

Send for His New Book

*"Muscular Development"*

64 pages and—IT'S FREE

It contains forty-eight full-page photographs of himself and some of the many prize winning pupils he has trained. Some of these came to him as pitiful weaklings, imploring him to help them. This book will prove an impetus and a real inspiration to you. This will not obligate you at all, but for the sake of your future health and happiness do not put it off. Send today—right now before you turn this page. Mail the coupon to

**EARLE LIEDERMAN**

Dept. 2704 305 Broadway New York City

EARLE LIEDERMAN  
Dept. 2704, 305 Broadway, New York City  
Dear Sir—Please send me absolutely FREE, and without any obligation on my part whatever, a copy of your latest book, "Muscular Development." (Please write or print plainly.)  
Name..... Age.....  
Street.....  
City..... State.....

# INDEX TO ADVERTISERS

	PAGE		PAGE
<b>A</b>			
Advance Electric Co. ....	1126	Leonard, A. O. ....	1138
Alton Art Studios ....	1143	Lewis Hotel Training Schools .....	1133
American College ....	1142	Liederman, Earle .....	1158
American School .....	1132-1150-1153	Lincoln Airplane & Flying School .....	1143
American School of Aviation .....	1140	<b>M</b>	
American School of Photography .....	1143	McGraw-Hill Book Co., Inc. ....	1147
American Technical Society .....	1130-1138	Marvel Mfg. Co. ....	1132
Anita Institute .....	1148	Mead Cycle Co. ....	1138
Arkograph Pen Co. ....	1150	Metal Cast Products .....	1144
Artificial Ear Drum Co., Inc. ....	1154	Midland Appliance Corp. ....	1137
Atlas, Charles .....	1153	Miller, Carl .....	1122
Audel, Theo, & Co. ....	Inside Back Cover	<b>N</b>	
<b>B</b>			
Bartlett Mfg. Co. ....	1140	National Aircraft Welding School.....	1135
Bastian Bros. Co. ....	1130	National Co. ....	1133
Batenburg, P. J. F., Co. ....	1151	National Electrical School .....	1135
Bcan, L. L. ....	1144	National Model Aircraft .....	1130
Bernard & Heller .....	1124	National Poultry Institute .....	1159
Black, B. A. ....	1136	National Radio Institute .....	1065
Blackstone, Richard .....	1148	Newcomer Associates .....	1148
Bliss Electrical School .....	1142	Newell Pharmaceutical Co. ....	1138
Rogue, Benjamin N. ....	1130	New Method Mfg. Co., Inc. ....	1130-1137
Bureau of Inventive Science .....	1122	New York Electrical School .....	1137
Bush, David V. ....	1154	New York Institute of Photography .....	1151
<b>C</b>			
Centre Publishing Co. ....	1144	North American Institute .....	1130
Chicago Gear Works .....	1130	<b>O</b>	
Classified Advertising .....	1156	O'Brien, Clarence A. ....	1123
Coleman, Watson E. ....	1122	Ogilvie Publishing Co. ....	1140-1157
Collins Plow Co. ....	1138	Old Town Canoe .....	1151
Colonial Fireplace Co. ....	1140	<b>P</b>	
Columbia University .....	1127	Page-Davis School of Advertising, The....	1138
Conn, C. G., Ltd. ....	1151	Pan-American Band Instr. & Case Co....	1137
Cooke, L. L., School of Drafting .....	1157	Piccadilly Hotel .....	1141
Cooke, L. L., School of Electricity .....	1139	Plapao Co. ....	1141
Coyne Electrical School .....	1069	Polachek, Z. H. ....	1124
Critchlow, Walter .....	Second Cover	Postal Life Insurance Co. ....	1129
Crusader Apparatus Co. ....	1142	Psycho-Phone Co. ....	1152
<b>D</b>			
Deagan, J. C., Inc. ....	1154	<b>R</b>	
Delta Specialty Company .....	1131	R. C. A. Institutes, Inc. ....	1121
Detroit School of Lettering .....	1142	Radio & Television Institute .....	1067
Dobe, Engineer .....	1149	Radio Training Association of America....	1073
Douglas, Lyle .....	1148	Randolph & Co. ....	1122
Drake, Frederick J., & Co. ....	1138	Roat & Lohman .....	1130
Drake Hotel, The .....	1132	Rosecliff Shirt Corp. ....	1130
Dryer, Prof. J. A. ....	1157	R. B. Specialty Co. ....	1130
<b>E</b>			
Encyclopaedia Britannica .....	1057	<b>S</b>	
Ethyl Gasoline .....	1076	Sasnett, Edward C. ....	1124
Evans, Victor J., & Co. ....	1125	Schiereke, H. C. ....	1143
Excello Products Corp. ....	1134	School of Engineering of Milwaukee .....	1126
<b>F</b>			
First Hawaiian Cons. of Music .....	1132	See-Jay Battery Co. ....	1148
Fisher, Adam, Mfg. Co. ....	1124	Selmar, H. & A., Inc. ....	1140
Foley Mfg. Co. ....	1140	Smith & Smith Publishing Co. ....	1134
Franklin Institute .....	1137	Smith Typewriter Sales Corp. ....	Back Cover
<b>G</b>			
Gerstner, H. & Sons .....	1134	Snyder, J. D. ....	1141
Goon Slide Rule Co. ....	1132	Stahl's Outdoor Enterprises .....	1148
Good, W. M. ....	1157	Standard Business Training Inst. ....	1142
Gottlieb, Edward .....	1124	Stay Prest Co. ....	1143
<b>H</b>			
High Frequency Laboratories .....	1138	Stone, L. M. ....	1142
High School-Home Study Bureau, Inc. ....	1148	Strongfort Institute .....	1145
Hobart Bros. ....	1131	Studebaker Corporation of America, The....	1075
Home Builders' Society .....	1144	Superior Match Pants Co. ....	1130
Honigman, A. ....	1148	<b>T</b>	
Hoodwin, Chas. ....	1150	Tamblin, F. W. ....	1140
<b>I</b>			
Ideal Aeroplane & Supply Co. ....	1153	Teleplex Co. ....	1132
International Correspondence Schools. ....	1128-1159	Thaxly, D., Co. ....	1135
International Typewriter Exchange .....	1142	Thomas, C. M. ....	1141
Inventors Finance Corp. ....	1124	Townsend Labs. ....	1141
<b>J</b>			
Johnson-Smith Co. ....	1155	Trilety, M. ....	1138
Jowett Inst. of Physical Culture .....	1135	<b>U</b>	
<b>K</b>			
Keeley Institute .....	1148	Ultra Mfg. Co. ....	1128
Kelsey Co. ....	1130	U. S. School of Music .....	1141
<b>L</b>			
Laboratory Materials Co. ....	1140	Utilities Engineering Co. ....	1143
Lacey & Lacey .....	1124	<b>W</b>	
Lancaster, Allwine & Rommel .....	1122	Wagner, George Steve .....	1140
Landon School, The .....	1150	Walker-Turner Co. ....	1139
I. a. Salle Extension University. ....	1134-1138-1148	Wallace, J. D., Co. ....	1126
Lederer School of Drawing .....	1148	Whirlwind Mfg. Co. ....	1160
<b>M</b>			
<b>N</b>			
<b>O</b>			
<b>P</b>			
<b>R</b>			
<b>S</b>			
<b>T</b>			
<b>U</b>			
<b>W</b>			

(While every precaution is taken to insure accuracy, we cannot guarantee against the possibility of an occasional change or omission in the preparation of this index.)

# When the Fates Fooled Dunninger

By Dunninger

(Continued from page 1105)

catch in a week or two! Imagine that!

While doing handcuff escapes on the stage, I once issued my customary challenge to police officers to bring their own cuffs, from which I would release myself upon the stage. As I spoke I noticed a man seated in the front row dropping buckshot into the locks of his pair of handcuffs. It is impossible for anyone to free himself from handcuffs that have been doctored with buckshot. Saying nothing, I invited a committee upon the stage to examine the cuffs and assist in manacling me. Up stepped the wise guy carrying his handcuffs. Watching my chance, I took the handcuffs from him and grasping his wrist, snapped a cuff onto his wrist, pressing the side catch. Then I said, "I want to have the ladies and gentlemen out there see how easy it is for you to open those cuffs of yours with the key!"

Picture my predicament if I hadn't by sheer luck glanced in his direction when I first made my entrance on the stage!

I could unfold a thousand and one tales of the mishaps, the laughs and the comical situations that have arisen during my various entertainments before celebrities and in the homes of the élite. After showing a few magical tricks to the Prince of Wales he said to me, "Say, Dunninger, when you come over to England I want you to meet the folks and show them a few of those tricks, will you?"

When the entertainer least expects it, drama creeps into his work. I will never forget the thrill and fright I received one night that the people out front never suspected. Even my own assistants didn't know at the time what a narrow escape I had from being suffocated to death.

It came about in this manner. . . . I used to feature a thrilling strait-jacket release and the escape from a large safe, borrowed from the leading safe dealer in whatever town I was playing. One night I would do the safe trick, the next the strait-jacket release.

This night I stepped out on the stage and announced I would endeavor to make my escape from the safe. In this trick I used a searchlight so as to see the darkness of the safe in order to operate the tumblers from within. It perhaps isn't generally known, but tumblers in a safe can be operated from the inside by anyone understanding their workings by removing the plates after taking out the screws which hold them in place.

On the heels of the announcement a voice in the audience rang out: "I demand that you, Dunninger, escape or make an attempt to escape from this strait-jacket which I brought from the Such-and-Such asylum!"

"But, my dear sir, tonight I have scheduled my escape from this safe," I announced to the challenger as I pointed to the large safe which stood on the stage.

"Makes no difference. I insist on the strait-jacket!" called the man in the audience.

"If you insist, sir, I shall leave it to the audience, whom I am here to please." I expected the audience to pass his challenge up—but they yelled that I should do both the strait-jacket escape and the safe release! So I had to do them.

I requested the challenger to step upon the stage with his restraint jacket—one used only on the most violently insane unfortunate.

Stripping off my coat, in the pockets of

which were my small trusty screw-driver and searchlight, I tossed the coat over a chair. During the process of being man-handled and buckled into the restraint apparatus, I forgot all about it.

Officers recruited from the audience who assisted in the operations were experts in their line. I was handled none too gently, and the spectators out front seemed to sense this, for hisses greeted the efforts of the strong-arms.

When I was bound in approved asylum style I requested the committeemen to stand to one side. In full view I managed to make my escape from that murderous restraint jacket.

A thunderous volume of applause greeted my release and for a few moments I stood, nearly exhausted, bowing my thanks to the audience for their generous applause.

When I had regained my breath, I was ready to try the safe trick. The safe was opened, I stepped into it, and it was quickly locked. I knew my assistants were wheeling my cabinet around the safe to cover my escape methods from prying eyes. I was ready to work. I placed my hands in my pockets . . . pockets that were not there! Then I remembered.

My coat was outside on a chair—and I had neither screw-driver nor search-lamp!

Here I was in total darkness, with barely enough room to move, and without the necessary means of making my escape!

And they say the work of an escape artist is a sinecure!

Fumbling as best I could with the plates over the tumblers . . . with the oxygen rapidly being used up . . . with no means of attracting or signaling my assistants . . . I was gradually enveloped in a panic! Beads of perspiration dripped from my forehead striking my cold, nervous hands like drops of melted lead. . . . I fought the panic and fear that were slowly getting the best of me.

Searching in the back pocket of my trousers I got out my key-ring. The gods were with me! I had a sort of screw-driver fashioned some time before with a file, at the end of a long skeleton key . . . in my panic I had entirely forgotten it.

Now I set to work again on the plate covering the tumblers of the safe. My head seemed ready to burst . . . my tongue was parched . . . my head splitting . . . I tore the collar from my dress shirt . . . then the neck . . . I must continue to breathe . . . finally the tumblers clicked into place. . . . I was free . . . free!

I had just enough strength left to push open that door . . . the sounds of the orchestra sounded faintly in my ears . . . I staggered forward . . . fell . . . then darkness!

When I came to, I was seated in a chair back stage. A doctor was holding a bottle of smelling salts to my nostrils. My assistants and the stage crew were standing about, with faces as white as sheets.

"Narrow escape that!" volunteered the physician.

"Dunninger, we were afraid you were gone!" my first assistant told me.

"The lamp and the screw-driver were in my coat—" I was too weak to talk.

"Yes, I found that out after they had locked you in," replied my assistant.

"That safe stuff is out from now on!" I managed to say.

Fervently I heard my man, who had been with me for several years, reply, "Amen!"

And never again, in the several years I continued to do escape stunts, did I include the escape from a borrowed safe!



## Only 28 years old and earning \$15,000 a year

W. T. CARSON left school at an early age to take a "job" in a shoe factory in Huntington, W. Va., at \$12 a week. He worked hard and long and under great handicaps, but he refused to quit. He made up his mind that he would get ahead.

Today W. T. Carson is owner and manager of one of the largest battery service stations in West Virginia, with an income of \$15,000 a year.

He gives full credit for his success to the International Correspondence Schools.

If the I. C. S. can smooth the way to success for men like W. T. Carson, and help other men to win promotion and larger salaries, it can help you.

At least find out by marking and mailing the coupon printed below. It won't cost you a penny or obligate you in any way, but that one simple little act may be the means of changing your entire life.

### Mail the Coupon for Free Booklet

**INTERNATIONAL CORRESPONDENCE SCHOOLS**  
"The Universal University"  
Box 6214-F, Scranton, Penna.

Without cost or obligation on my part, please send me a copy of your 48-page booklet, "Who Wins and Why," and tell me how I can qualify for the position, or in the subject, before which I have marked an X:

- | TECHNICAL AND INDUSTRIAL COURSES                                 |   |
|--|---|
| <input type="checkbox"/> Architect                               | <input type="checkbox"/> Automobile Work                                    |
| <input type="checkbox"/> Architectural Draftsman                 | <input type="checkbox"/> Aviation Engines                                   |
| <input type="checkbox"/> Building Foreman                        | <input type="checkbox"/> Plumber and Steam Fitter                           |
| <input type="checkbox"/> Concrete Builder                        | <input type="checkbox"/> Plumbing Inspector                                 |
| <input type="checkbox"/> Contractor and Builder                  | <input type="checkbox"/> Foreman Plumber                                    |
| <input type="checkbox"/> Structural Draftsman                    | <input type="checkbox"/> Heating and Ventilation                            |
| <input type="checkbox"/> Structural Engineer                     | <input type="checkbox"/> Sheet-Metal Worker                                 |
| <input type="checkbox"/> Electrical Engineer                     | <input type="checkbox"/> Steam Engineer                                     |
| <input type="checkbox"/> Electrical Contractor                   | <input type="checkbox"/> Marine Engineer                                    |
| <input type="checkbox"/> Electric Wiring                         | <input type="checkbox"/> Refrigeration Engineer                             |
| <input type="checkbox"/> Electric Lighting                       | <input type="checkbox"/> R. R. Positions                                    |
| <input type="checkbox"/> Electric Car Running                    | <input type="checkbox"/> Highway Engineer                                   |
| <input type="checkbox"/> Telegraph Engineer                      | <input type="checkbox"/> Chemistry  |
| <input type="checkbox"/> Telephone Work                          | <input type="checkbox"/> Pharmacy   |
| <input type="checkbox"/> Mechanical Engineer                     | <input type="checkbox"/> Coal Mining Engineer                               |
| <input type="checkbox"/> Mechanical Draftsman                    | <input type="checkbox"/> Assayer  |
| <input type="checkbox"/> Machine Shop Practice                   | <input type="checkbox"/> Iron and Steel Worker                              |
| <input type="checkbox"/> Toolmaker                               | <input type="checkbox"/> Textile Overseer or Supt.                          |
| <input type="checkbox"/> Patternmaker                            | <input type="checkbox"/> Cotton Manufacturing                               |
| <input type="checkbox"/> Civil Engineer                          | <input type="checkbox"/> Woolen Manufacturing                               |
| <input type="checkbox"/> Surveying and Mapping                   | <input type="checkbox"/> Agriculture <input type="checkbox"/> Fruit Growing |
| <input type="checkbox"/> Bridge Engineering                      | <input type="checkbox"/> Poultry Farming                                    |
| <input type="checkbox"/> Gas Engine Operating                    | <input type="checkbox"/> Mathematics <input type="checkbox"/> Radio         |
| BUSINESS TRAINING COURSES  |   |
| <input type="checkbox"/> Business Management                     | <input type="checkbox"/> Business Correspondence                            |
| <input type="checkbox"/> Industrial Management                   | <input type="checkbox"/> Show Card and Sign                                 |
| <input type="checkbox"/> Personnel Management                    | <input type="checkbox"/> Lettering  |
| <input type="checkbox"/> Traffic Management                      | <input type="checkbox"/> Stenography and Typing                             |
| <input type="checkbox"/> Accounting and C. P. A.                 | <input type="checkbox"/> English  |
| <input type="checkbox"/> Coaching                                | <input type="checkbox"/> Civil Service                                      |
| <input type="checkbox"/> Cost Accounting                         | <input type="checkbox"/> Railway Mail Clerk                                 |
| <input type="checkbox"/> Bookkeeping                             | <input type="checkbox"/> Mail Carrier                                       |
| <input type="checkbox"/> Secretarial Work                        | <input type="checkbox"/> Grade School Subjects                              |
| <input type="checkbox"/> Spanish <input type="checkbox"/> French | <input type="checkbox"/> High School Subjects                               |
| <input type="checkbox"/> Salesmanship                            | <input type="checkbox"/> Illustrating <input type="checkbox"/> Cartooning   |
| <input type="checkbox"/> Advertising                             | <input type="checkbox"/> Lumber Dealer                                      |

Name.....  
Street.....  
Address.....  
City..... State.....

Occupation.....  
*If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada*

## 1000 POULTRY SECRETS

Our famous home-study Course teaches how to get bigger hatches, cut feed bills, cull-out non-layers, avoid losses and 1000 other money-making secrets. Methods used by successful poultry raisers all over the world.

Trained Poultrymen are needed to fill thousands of good, healthful outdoor jobs at from \$35 to \$100 a week. But whether you want to work for someone else on a real salary—or go into a highly profitable spare-time or full-time business for yourself, the Poultry Industry offers you the most. Write for your copy of our new FREE Book today and learn why thousands are succeeding quickly with our methods. Address:

**National Poultry Institute**  
Dept. 417-H Washington, D. C.



Get this FREE BOOK

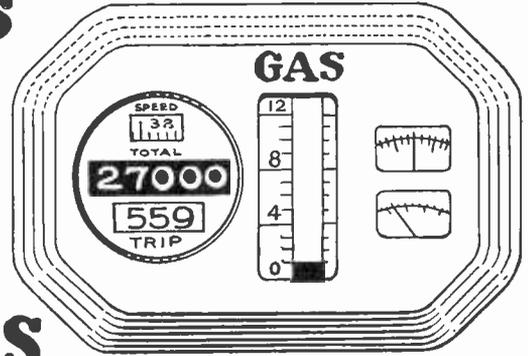
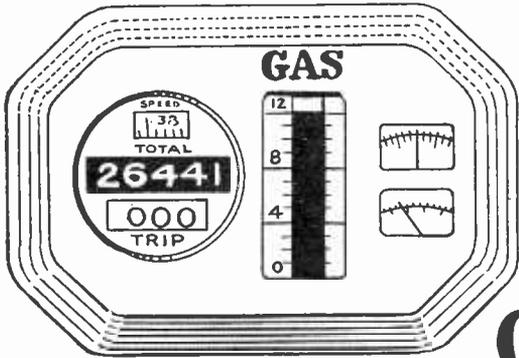
It tells of the International Poultry work done by Harry M. Lamon, Pres., Nat'l Poultry Institute, and how he can train you at home to make big money in Poultry; write Now!

# Over the Mountains from Los Angeles

## 559 Miles on

# 11

## Gallons of GAS



Think of it! FIVE HUNDRED FIFTY-NINE MILES over rough mountainous country burning only ELEVEN GALLONS OF GASOLINE. Imagine more than FIFTY MILES to the GALLON. This is what the WHIRLWIND CARBURETING DEVICE does for D. R. Gilbert, enough of a saving on just one trip to more than pay the cost of the Whirlwind.

# THE WHIRLWIND SAVES MOTORISTS MILLIONS OF DOLLARS YEARLY

Whirlwind users, reporting the results of their tests, are amazed at the results they are getting. Letters keep streaming into the office telling of mileages all the way from 22 to 59 miles on a gallon, resulting in a saving of from 25 to 50% in gas bills alone.

Mark H. Estes writes: "I was making 17 miles to the gallon on my Pontiac Coupe. Today, with the Whirlwind, I am making 35 5/10 miles to the gallon. Am I glad I put it on? I'll say so!"

P. P. Goerzen writes: "I made an actual test both with and without a Whirlwind, getting 13 1/2 miles without and 34 6/10 miles with the Whirlwind, or a gain of 21 miles to the gallon. The longer the Whirlwind is in use on the machine, the better the engine runs, has more pep and quicker starting. It makes a new engine out of an old one, and starts at the touch of the starter button."

R. J. Tulp: "The Whirlwind increased the mileage on our Ford truck from 12 to 28 miles to gallon and 25% in speed. We placed another on a Willy's Knight, and increased from 12 to 17 miles per gallon.

Arthur Grant: "I have an Oakland touring car that has been giving me 15 miles to the gallon average, but I can see a great difference with the Whirlwind, as it climbs the big hills on high and gives me better than 23 miles to the gallon of gas, which is better than 50% saving in gas."

W. A. Scott: "I had my Whirlwind for three years. Winter and summer it gives the same perfect service, instant starting, smoother running, and what I saved in gasoline these last few years has brought other luxuries which I could not have afforded previously."

Car owners all over the world are saving money every day with the Whirlwind, besides having better operating motors. Think what this means on your own car. Figure up your savings—enough for a radio—a bank account—added pleasures. Why let the Oil Companies profit by your waste. Find out about this amazing little device that will pay for itself every few weeks in gas saving alone.

### FITS ALL CARS

In just a few minutes the Whirlwind can be installed on any make of car, truck, or tractor. It's actually less work than changing your oil, or putting water in the battery. No drilling, tapping or changes of any kind necessary. It is guaranteed to work perfectly on any make of car, truck or tractor, large or small, new model or old model. The more you drive the more you will save.

### GUARANTEE

No matter what kind of a car you have—no matter how big a gas eater it is—the Whirlwind will save you money. We absolutely guarantee that the Whirlwind will more than save its cost in gasoline alone within thirty days, or the trial will cost you nothing. We invite you to test it at our risk and expense. You are to be the sole judge.

### SALESMEN AND DISTRIBUTORS WANTED

Free Sample and \$100.00 a Week Offer

Whirlwind men are making big profits supplying this fast-selling device that car owners cannot afford to be without. Good territory is still open. Free sample offer and full particulars sent on request. Just check the coupon.

### FREE TRIAL COUPON

WHIRLWIND MANUFACTURING CO.  
999-209-A Third Street, Milwaukee, Wis.

Gentlemen: You may send me full particulars of your Whirlwind Carbureting device and free trial offer. This does not obligate me in any way whatever.

Name .....

Address .....

City .....

County ..... State .....

Check here if you are interested in full or part time salesmen position.

WHIRLWIND MANUFACTURING CO.  
999-209-A Third Street Milwaukee, Wisc.

# WHAT EVERY ELECTRICIAN WANTS TO KNOW!

**JUST OUT!**—Latest Exact Information from A to Z!

We take pleasure in announcing: "AUDELS NEW ELECTRIC LIBRARY"

New and More Uses for Electricity offer great opportunities to men who can handle this power correctly. Modern electrification of industry calls for trained men who know how to handle electricity accurately.

Simple as A. B. C.—"Audels New Electric Library" gives latest, exact information from foundations of electrical practice to latest modern applications. This is a NEW practical and theoretical course in electricity for home study and ready reference.

Here are the answers to your questions, giving you the real dope that every electrician must know. They chart your knowledge, taking away the uncertainty of guess work.

**NEW!**

As Easy As ABC



Latest information, fully illustrated, covering:—

Fundamental Principles and Rules of Electricity, Magnetism, Armature Winding, Repairs, Dynamos, D.C. Motors, Construction, Installation, Maintenance and Trouble Shooting, Tests and Testing Instruments, Storage Battery, Construction and Repairs, Alternating Current Principles and Diagrams, Power Factor, Alternators, Transformers, A.C. Motors, Windings, Reconnecting, Converters, Switches & Fuses, Circuit Breakers, Relays, Condensers, Regulators, Rectifiers, Meters, Switchboards, Power Station Practice, House Light & Power Wiring, Circuits, High Tension, Transmission, Plans, Calculations, Code, Electric Railways, Signals, Elevators, Hoists & Gas Engines, Auto & Aero Ignition, Starters, Radio, Telephone, Telegraph, Bells & Signals, Motion Pictures, Talkies, Lighting, Illumination, Electric Refrigeration, Heating, X-Ray, Plating, Welding, Pumps, Compressors, Domestic & Farm Appliances, An Electric Calculator for Engineers and Mechanics, Practical Mathematics for Ready Reference, A New Electric Dictionary & Encyclopedia of Words.

**7 Books Now on Sale 5 in Preparation**

The Library contains 12 books—the first 7 books containing 3600 pages with thousands of diagrams and illustrations are now ready; the remaining 5 books are in preparation. A pocket-size, flexibly bound series that is valuable wherever electricity is used.

Beautiful, timely books for service—pocket size; completely illustrated with diagrams and charts; simplified, easy to read and understand. No electrical man can afford to pass up this opportunity. Extremely low price; buy on your own terms.

QUESTIONS AND ANSWERS  
**AUDELS NEW ELECTRIC LIBRARY ILLUSTRATED**

**NEW!**

**SATISFACTION GUARANTEED!** "Audels New Electric Library" is backed by our 50-year record as helping hand publishers. Satisfaction always guaranteed.

**Beautiful, Timely Books**

**POCKET SIZE**

**Read for Profit**

**BUY ON YOUR OWN TERMS**

**PLAN 1—ONE BOOK A MONTH**  
Please enter my subscription to "Audels New Electric Library" to consist of twelve volumes, price \$1.50 a volume (\$10.50 for the seven volumes now ready). Mail one volume each month and as they are received, I will mail you \$1.50 promptly.

**PLAN 2—PAY 50c OR MORE A WEEK**  
Please ship me for one week's free trial the first seven volumes of "Audels New Electric Library," \$1.50 each (\$10.50 for the seven volumes now ready). The remaining five volumes to be mailed as issued at \$1.50 a volume. If satisfied, I will mail you 50c or more each week as payment for the first seven books and I will pay for the last five numbers as I receive them at \$1.50 each.

**PLAN 3—CASH PRICE \$9.98**  
Please ship me postpaid "Audels New Electric Library" for which I enclose remittance \$9.98 in full payment for the seven volumes now ready. You are to ship me on one week's trial the remaining five volumes as they are issued for which I will either pay \$1.50 each as received or return to you. This price is based on 5% cash discount.

**THEO. AUDEL & CO.,**  
65 West 23rd St., New York, N. Y.

Please ship me the NEW "Audels Electric Library" on the plan marked (X).

NAME .....

ADDRESS .....

OCCUPATION .....

EMPLOYED BY ..... S. I. April



Only  
**\$ 2<sup>00</sup>**  
 down

**BRAND NEW**

**CORONA** GENUINE  
*Model #3*

**Lowest Price — Easiest Terms  
 Ever Offered**

HERE'S your chance to own that *brand new* Genuine Model 3 Corona you've wanted—on the easiest terms ever offered—at the **LOWEST PRICE** ever offered. Complete in every detail; back spacer, etc. *Manufacturer's Guarantee.* Recognized the world over as the finest, strongest, sturdiest portable built.



S. Joveton writes: "It truly is a wonderful machine. I am very pleased with it and find it very simple to work although it is the first typewriter I have ever used."

Don P. Fina, composer and pianist says: "Corona has helped me put my songs over and is still doing it. I find it just the thing for writing words, to songs and for all correspondence to the profession."

F. J. Barsuglia, Jr., writes: "I am very well pleased with your little Corona and I must say I do not know what I would really do without it. It works like a charm and has every convenience of a larger machine."

Mrs. G. Bernstein says: "Allow me to thank you for prompt delivery of the Corona. I am delighted with it and know I shall derive great pleasure from its possession."

***Yours for 10 DAYS FREE***

Only a limited number of these splendid machines available. To get one, you must act now! Experience the joy this personal writing portable typewriter can give you! Use it ten days free! See how easy it is to run and the splendidly typed letters it turns out. Ideal for the office, desk, home, traveling. Small, compact, light, convenient. Don't send out letters, manuscripts, reports, bills, in poor handwriting when you can have this Corona at such a low price on such easy terms. Remember, these are *brand new* machines right out of the Corona factory.

**Carrying Case  
 FREE**

*If you act Now!*



Leatheroid carrying case, oiler, instructions free on this offer. Send no money—just the coupon. Without delay or red tape we will send you the Corona. Try it 10 days. If you decide to keep it, send us only \$2—then \$3 a month until our special price of \$39.90 is paid. Now is the time to buy. This offer may never be repeated.

**Save Money—Use This Coupon**

**Smith Typewriter Sales Corp.  
 (Corona Division)  
 469 E. Ohio St., Chicago, Dept. 1204**

Ship me the Corona, F. O. B. Chicago. On arrival I'll deposit \$2 with express agent. If I keep machine I'll send you \$3 a month until the \$37.90 balance of \$39.90 price is paid, the title to remain with you until then. I am to have 10 days to try the typewriter. If I decide not to keep it, I will repack and return to express agent who will return my \$2. You are to give your standard guarantee.

Name \_\_\_\_\_  
 Address \_\_\_\_\_  
 Employed by \_\_\_\_\_