

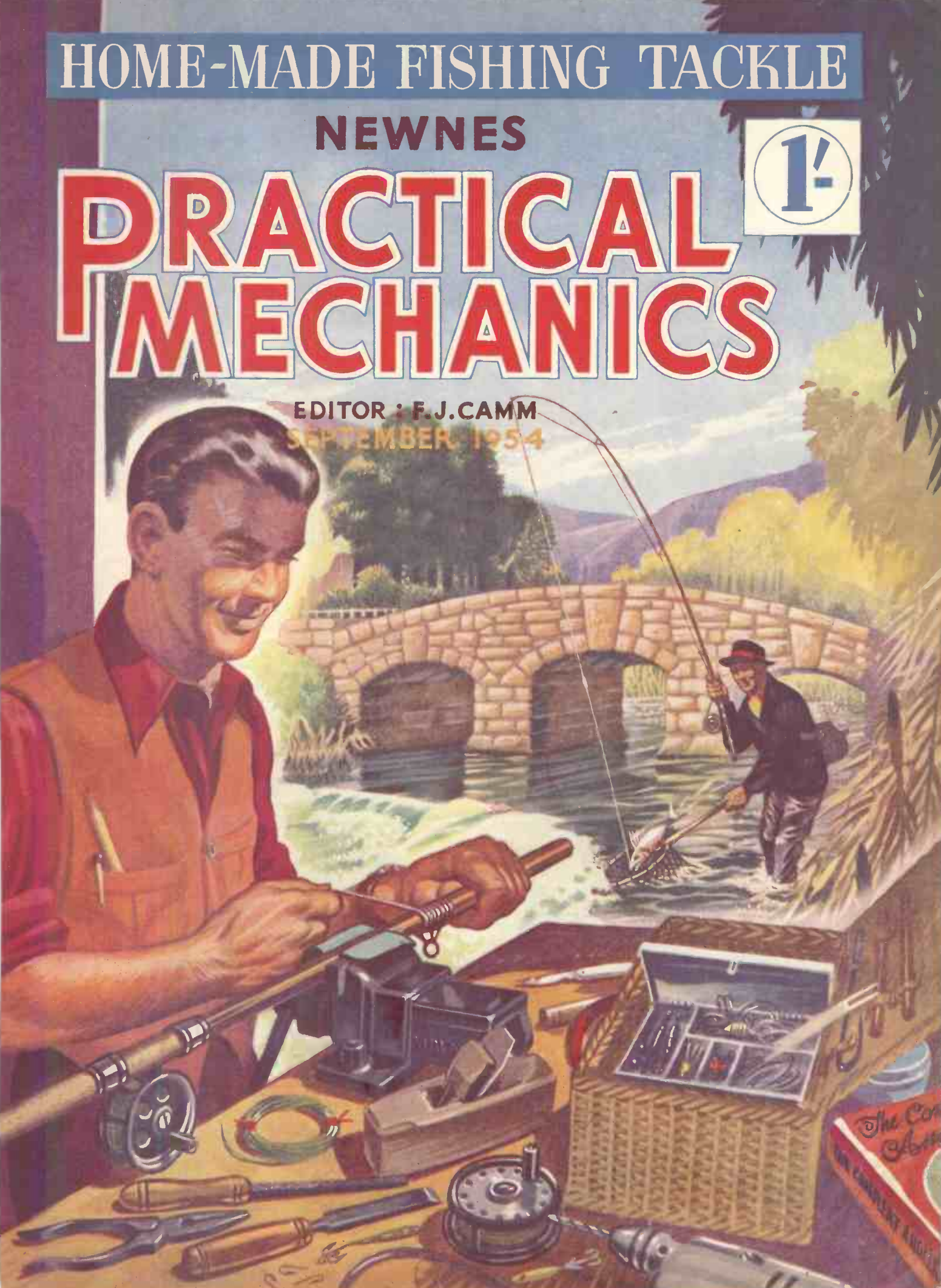
HOME-MADE FISHING TACKLE

NEWNES

1/-

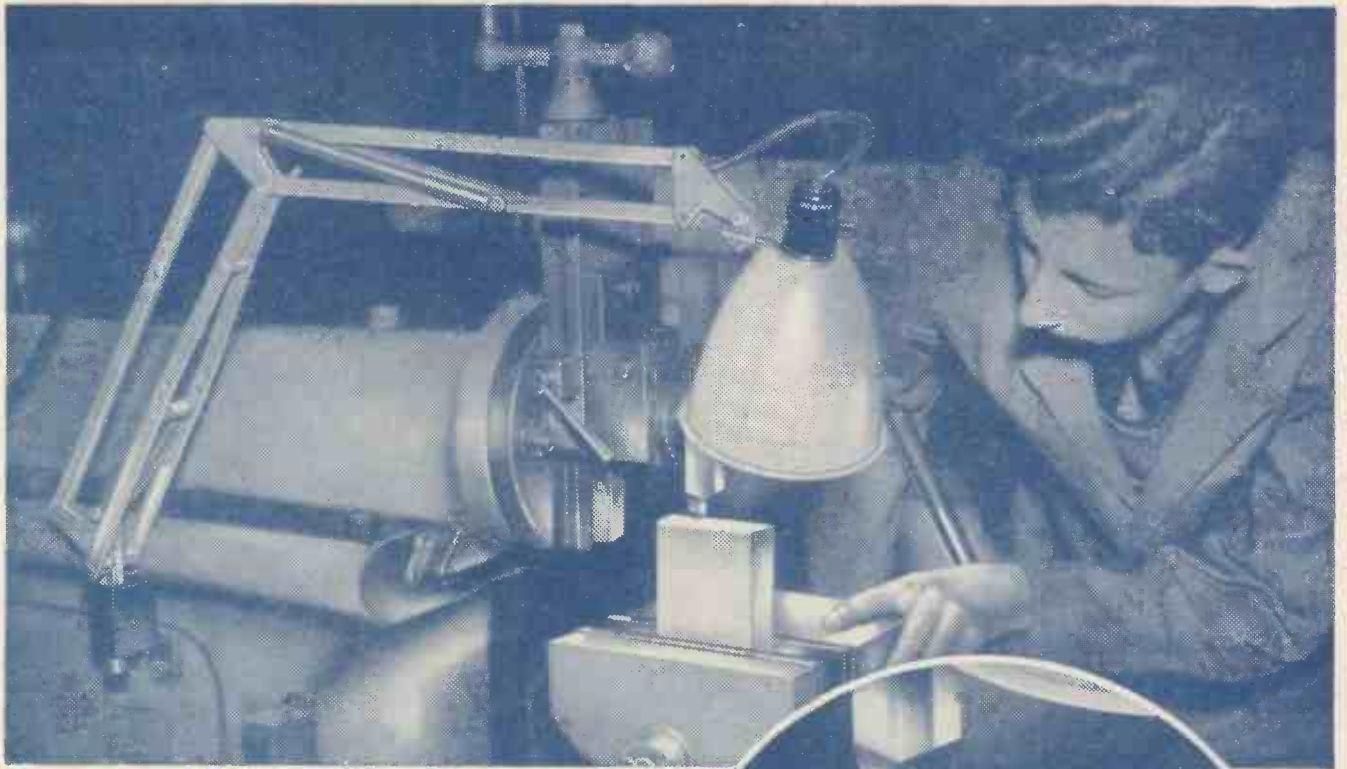
PRACTICAL MECHANICS

EDITOR : F.J.CAMM
SEPTEMBER 1954



The Complete
Angler's
Pocket Guide

How's this **FOR CONCENTRATED WORK LIGHT?**



Down a little! Still nearer! Right on the job!



AN OPERATOR working under the best working conditions does a better job. Give your operatives **ANGLEPOISE** Lamps on their machines, it will pay dividends in accuracy and output. This lamp has everything — instant adjustability, throws a clear concentrated beam right on the work, 'follows' the job at a touch, takes and holds any required angle, moves out of the way as required.

Every drawing office, workshop and machine room should have its battery of **ANGLEPOISE** Lamps—why not yours? Send today for our fully descriptive Booklet P.M.

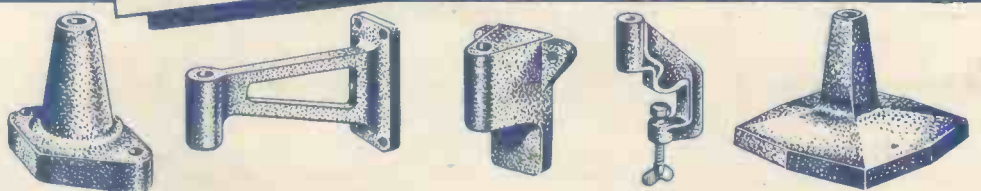
Sole Makers: **HERBERT TERRY & SONS LTD**
REDDITCH • WORCESTER • ENGLAND

THIS IS HOW ANGLEPOISE LIGHTS
UP THE JOB IN STRONG RELIEF—
SAVING EYESTRAIN AND FATIGUE

TERRY **ANGLEPOISE** LAMPS

Pat. all countries

**SOME
ALTERNATIVE
BASES FOR
ALL MODELS**



—And now still more uses
for these two versatile tools . . .



1/4" Drill
£5.19.6

5" Sander-Polisher
£8.7.6

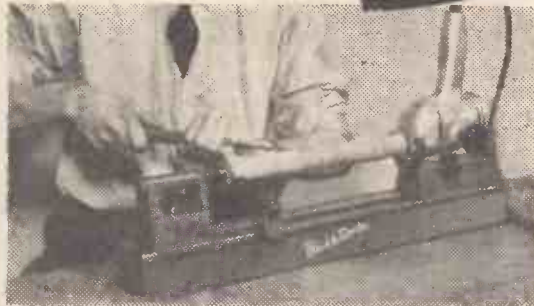
* Both tools are fully suppressed against T/V interference.

with the new

B & D LATHE
£5.5.0

THESE compact, easy-to-handle tools are already an essential part of workshop equipment. . . . Now you can broaden their scope still further with the new B & D Lathe, latest accessory in the unique B & D Utility range.

USE THEM for drilling wood, plastic, steel, cast-iron . . . for grinding, buffing, polishing, waxing, cleaning off old paint, sharpening tools and, with the lathe, to make a wealth of useful and decorative articles.



- ★ Rigid, vibrationless base
- ★ Reversible head stock
- ★ Rigid tool rest
- ★ Sliding head and tail stocks for adjustments for any size work up to 12"
- ★ Can turn 2 3/4" sq. wood between centres
- ★ Face plate turning up to 5" in diameter
- ★ Can be used as horizontal drill stand

Black & Decker



PORTABLE ELECTRIC TOOLS

BLACK & DECKER LTD · HARMONDSWORTH · MIDDLESEX

Smec's



OLYMPIA

see how to DO-IT-YOURSELF

MARQUETRY • WOODWORK • FRETWORK • NEEDLEWORK
BASKETRY • LEATHERWORK • RUGMAKING • WEAVING • LAMPSHADES
SOFT TOYS • POTTERY • MODELLING • HOUSE DECORATING, ETC.

The most fascinating of all Exhibitions. It is twice as big and far more comprehensive than the successful 1953 Exhibition. You will be delighted by its size and pleasure-ranging scope.

Daily demonstrations, by experts, of every type of handicraft and hobby. W. P. MATTHEW, B.B.C. Handyman, to deal with "Do-It-Yourself" queries. Examples of the finest craftsmanship from Britain and Overseas. Display of modern silver work. Competition Section. Latest tools, materials and equipment. Television's "Model Village," etc.

2nd International **HANDICRAFTS**
Homecrafts & Hobbies **EXHIBITION**

Sept. 9th
to the 23rd

Admission 2/- (children half-price). Empire Hall. Main entrance in Hammersmith Road. From 11 a.m. to 9 p.m. daily (except Sunday). Details concerning the Exhibition are published in POPULAR HANDICRAFTS, 1/- monthly from all newsagents.

The New 'GALA' METEOR WOOD TURNING LATHE



Two of the main attachments available



(Above) CIRCULAR SAW ATTACHMENT



(Below) SANDING ATTACHMENT

A precision lathe for quality work in wood and the lighter metals, made in 20in., 30in., 40in., and 50in. B.C. sizes. Rigidly built and beautifully finished. Additional equipment is available for :—

- SAWING METAL SPINNING
- POLISHING SANDING
- GRINDING

Full range of accessories available. Detailed specification list No. GMH on request.

SCOTTISH PRECISION ENGINEERING CO.
27, Cadogan Street, Glasgow, C.2.

Export enquiries to :
R. PROCTOR & CO. (LONDON) LTD., 220-226, BISHOPSGATE, E.C.2.



S. G. Brown AUDIO AIDS

Headphones with individual volume control. Ideal for use with church and cinema deaf aid installations or for individuals with impaired hearing. They provide the essential clarity of reception when listening to Radio and TV.

Send for Brochure "P" of all types available. If desired, advice is given on selection of type most suited to individual needs.

S. G. Brown provide Headphones and associated equipment for all known purposes.

S.G. Brown, Ltd.

SHAKESPEARE STREET, WATFORD, HERTS.

Telephone : Watford 7241

(4)

Train your mind to SUCCESS

FREE!

to YOU!
—if you seek SUCCESS!

If you lack the qualifications which would get you a better job ; more pay and quicker progress ; if you wish to know how The Bennett College can guarantee to teach you up to qualification stage by one of the easiest, quickest and soundest methods of mind training ; if you wish to learn how Personal Postal Tuition can prove that you are cleverer than perhaps you think you are— if you like the idea of studying in your own time, at your own pace, with your own tutor guiding you, helping you, teaching you by post—send at once for this recently published important book—' Train your mind to SUCCESS.' It is quite free. Just fill in the coupon below and name the subject you are interested in (some of the many Courses available are listed here). Send in coupon to us TODAY. You will never, never regret it. But do it today. Act NOW!

WHAT'S YOUR LINE ?

- Agriculture
- Architecture
- Aircraft Maintenance
- Building
- Carpentry
- Chemistry
- Commercial Art
- Diesel Engines
- Draughtsmanship
- Electrical Engineering
- Electric Wiring

- Engineering Drawings
- Fire Engineering
- Forestry
- Locomotive Engineering
- Machine Design
- Mechanical Engineering
- Motor Engineering
- Plumbing
- Power Station Eng.
- Quantity Surveying

- Accountancy Exams
- Auctioneer's Exams
- Auditing
- Book-keeping
- Civil Service
- Commercial Arith.
- Casting
- English
- General Education
- Geography
- Journalism

- Languages
- Mathematics
- Modern Business Methods
- Police Subjects
- Salesmanship
- Secretarial Exams
- Shorthand
- Short Story Writing
- and many others

GENERAL CERT. OF EDUCATION, R.S.A. EXAMS

- Radio Engineering
- Road Making
- Sanitary Science
- Steam Engineering
- Surveyor's Exams
- Surveying
- Telecommunications
- Textiles
- Wireless Telegraphy
- Workshop Practice

TO THE FAMOUS BENNETT COLLEGE

(DEPT. I.76.F), SHEFFIELD

Please send me, without obligation, a free copy of " Train your mind to SUCCESS " and the College Prospectus on :

SUBJECT.....
NAME.....
ADDRESS.....

Please write in Block Letters. AGE (if under 21).....

THIS DAY
COULD BE THE TURNING-POINT IN YOUR LIFE.

THIS COUPON
COULD BE YOUR PERSONAL PASSPORT TO SUCCESS.

Send it NOW!



**FOR EASY
HOME CONSTRUCTED
REFRIGERATION**

SILENT RUNNING
HERMETICALLY
SEALED UNITS

READY TO INSTALL
ONLY REQUIRE WIRING
UP TO PLUG POINT
200/250 VOLT A.C.

Covered by 5 years FREE
REPLACEMENT GUARANTEE
by G.E.C.

ILLUSTRATED. 3/4½ cu. ft. UNIT. PRICE £27/10/0.
STAINLESS STEEL EVAPORATOR

These units are Self-contained and are suitable for modernizing existing troublesome refrigerators—Home Constructed Cabinets —“Built In” or “Free Standing.”

9 MODELS AVAILABLE, RANGING IN SIZE FROM 3 cu. ft. to 9 cu. ft.

Prices from £27/10/0 to £34/10/0.
Free Delivery in British Isles.

Save 50% Outlay and have guaranteed efficiency with ice making and frozen food storage facilities.

Send stamped addressed envelope for
“SEALED SYSTEMS.” Free Reduced Price Leaflet.

Latest complete general catalogue with many ‘Hints & Tips,’ price 1/- post free (Refunded on first order.)

BRAID BROS.

For Home Refrigerator Construction.

50, Birchwood Ave., Hackbridge, Surrey Tel.: Wallington 9309.
We do not wish to be associated with Scrapped Second-hand Ice-cream Components.

YOURS FOR
28/2



MODEL
OSDT



**“TOOL POWER”
ORBITAL
SANDER**

Universal
A.C./D.C.
Motor.
Manu-
factured

in voltages 110,
200/220, 230/250V.
Sanding surface 8in. x
4in., and weighs only
5½ lbs. A really compact job.

CASH PRICE £11.10.0, or 28/2
deposit and 8 monthly payments
of 28/2.

**“TOOL POWER”
GP DRILL**

CASH PRICE
£7.10.0

YOURS FOR 18/4
DEPOSIT. And 8
Monthly Payments of
the same amount.
Accessories
will be available
Sept./Oct.
SEND S.A.E. FOR
LEAFLETS

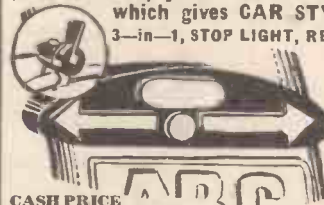


**THIS CAN
BEYOURS
FOR 7/4!**

And 8 Monthly
Payments of the same
amount. (CASH
PRICE £2.19.6)
OTHER TYPES
AVAILABLE RANG-
ING FROM 25/6 to 59/6.
All available on easy
terms.
Send for Leaflets and
full details.

Wolf

AND NOW! for the “PRACTICAL MECHANIC” who also possesses a m/cycle we can offer the well-known “SAFE-LITE” which gives CAR STYLE SAFETY for your machine. 3-in-1, STOP LIGHT, REAR LIGHT, and DIRECTION INDICATOR



For better control when signalling—new safety at night or on tricky surfaces—replace your old-fashioned tail light with the brilliant “SAFE-LITE”! Each arrow has 3 bulb illumination and all lights have a special lens system for long-range recognition. Flick-switch control head for indicators (with pilot light to warn of bulb failure); brake-operated stoplight. Smart rust-proof finish. Easy to fit; very economical. Weight only 23 ozs. (Featured in Editorial section of “Practical Motorist,” August issue.) Fully tested by the highest authorities and approved by experts.

CASH PRICE
49/6 or 6/1 Deposit and
8 Monthly Payments of 8/1.

All we need at this stage is your remittance for the deposit. (Send to Desk 42, LAFCO COMPOUNDS, LTD., 3, CORBETTS PASSAGE, ROTHERHITHE NEW ROAD, S.E.18. BERNARDSEY 4343)

RAWLPLUG

PLASTIC WOOD

Whether it's new woodwork or repairs, you'll find Rawlplug Plastic Wood of enormous help in getting perfect results. You apply it like putty—it fills cracks or joints and moulds to any shape, however intricate; when dry you can cut, sandpaper, paint or polish, just like wood. It is wood—hard, grainless wood that never cracks or comes away.

Rawlplug Plastic Wood is an essential part of your equipment for
MODEL-MAKING • WOODWORK • HOME REPAIRS
Look for the name Rawlplug — your guarantee of finest quality. Rawlplug Plastic Wood does not blister, crack or decay.
In tubes 1/- Tins 2/3, 3/9 & 5/9

**TRADE ENQUIRIES
INVITED**

8475



THE RAWLPLUG COMPANY LTD • CROMWELL ROAD • LONDON • SW1

HANDYMEN—HERE'S THE SOLDER

professionals prefer

For reliable, economical home repairs, Ersin Multicore is the solder to use. It cuts costs by avoiding wastage—the 3 cores of exclusive Ersin Flux ensure that there are no solder lengths without flux. It saves time because the 3-core construction means thinner solder walls, quicker melting and speedier soldering. It can be used for every soldering job, replacing stick solder, fluid and paste fluxes.



SIZE 1 CARTON
PRICE 5/- EACH



THIS SIZE 2 (HANDYMAN'S)
CARTON COSTS *only 6d.*

Contains approximately 3 ft. of
18 S.W.G. Ersin Multicore Solder,
sufficient for 200 average joints.

MULTICORE SOLDERS LTD.

MULTICORE WORKS, MAYLANDS AVENUE, HEMEL HEMPSTEAD, HERTS.
BOXMOOR 3636 (3 lines)

Lay Your Own Floors

Oak Flooring Blocks Free of Licence

PRICE
19/6

PER
SQ. YD.

Plus 4/8d.
per sq. yd.
Purchase
tax.



FULL
DETAILS,
SAMPLE
AND
LAYING
INSTRUC-
TIONS
ON
APPLICA-
TION

Hardwood floors are not difficult to lay on concrete or wooden sub-floors. We supply kiln dried flooring blocks accurately manufactured from Prime quality Scandinavian Oak ready for laying with full instructions. At a modest cost you can transform concrete or wooden surfaces into a beautiful polished Oak Parquet floor that will last a lifetime, and add to the value of your property.

THE SURREYBOARD CO. LTD.

(DEPT. P.M.),
72, HIGH STREET, CROYDON, SURREY

TAKE UP PELMANISM

For All Times and Circumstances



PELMANISM has stood the test of time. During the last half century, in peace and war, in times of prosperity and of

depression, it has helped and encouraged men and women in all the affairs of life. Now in these times of strenuous endeavour two facts stand out against a background of evidence—the increasing number of men and women, who want to make a success of life, enrolling for the Pelman Course; the continued support of serving and ex-Service members of H.M. Forces.

This increasing demand proves the creative and re-creative value of Pelmanism. Minds under stress and strain are sorely in need of restful recreation and soothing stimulus. Pelmanism gives all this and more. It is the way to clear thinking and calm but determined action under all circumstances. You cannot be harassed by anxieties, fears and worries, or feel helpless, mute and fearful in times of sudden emergency when imbued and buoyed up by the friendly personal guidance of Pelmanism. Take the Course to-day and possess those self-reliant attributes permanently enjoyed by over 750,000 grateful Pelmanists.

A True Philosophy

Pelmanism is a true philosophy of living for ordinary sensible people who wish to make the best of themselves at all times and under all circumstances.

The general effect of the training is to induce an attitude of mind and a personal efficiency favourable to the happy management of life.

Reduced fees for members of
Her Majesty's Forces.
(Apply for Services Enrolment Form)

The Pelman Course is simple and interesting, and takes up very little time; you can enrol on the most convenient terms. The Course is fully described in a book entitled "The Science of Success," which will be sent you, gratis and post free, on application to:—

PELMAN INSTITUTE,
130, Norfolk Mansions,
Wigmore Street, London, W.1.
POST THIS FREE COUPON TO-DAY
To the Pelman Institute,
130, Norfolk Mansions,
Wigmore Street, London, W.1.

"The Science of Success," please.

Name

Address

(Established over 50 years)

JOHN M. PERKINS & SMITH, LTD., BRAUNSTON, Nr. RUGBY
Telephone: Braunston 238. Telegrams: Drills, Braunston Rugby.

MAKE MONEY — making casts

with **VINAMOLD**

A grand spare-time occupation

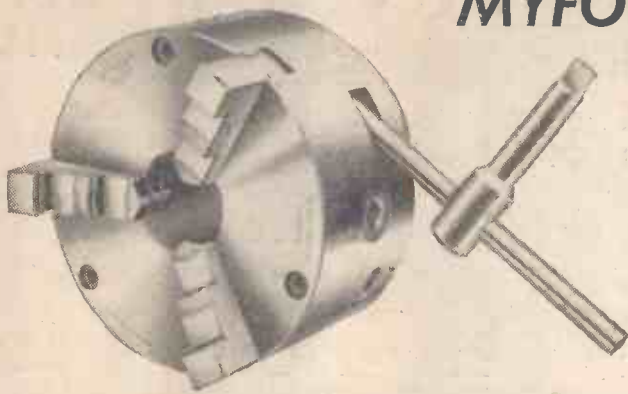
WITHOUT any previous experience you can mass-produce any object, from a chessman to a candlestick, statuette or model ship, in plaster, resin, concrete, etc. . . . with "VINAMOLD" the flexible mould that gives the BEST results. Easy to work, can be used over and over again. Needs NO special equipment, provides a profitable and enjoyable spare-time occupation with minimum outlay.

Write for full details and instructions. Also available: Illustrated booklet describing "VINAMOLD," methods of heating and melting, preparation of models and moulds, etc. Price 1/6 post free, from:—

VINATEX LTD. (Dept. P.M.3), CARSHALTON, SURREY



MYFORD LATHE OWNERS!



This new GRIPTRU Chuck with micro-concentricity adjustment will positively grip your components within Two Ten Thousandths total indicator reading with instantaneous repetition.

The Myford-Burnerd Self-Centring 3-jaw Geared Scroll GRIPTRU Chuck (4in. size only, Model 130M) has individual and independent adjustment to each jaw in addition to the orthodox self-centring movement. The average operator can adjust the GRIPTRU to 0.0002in. within two minutes. The chuck body is specially threaded to screw direct on to Super-7 and ML7 Lathe spindles—NO BACKPLATE IS REQUIRED.

Obtain maximum accuracy from your Myford Lathe. Order the GRIPTRU now through your Tool Merchant.

PRICE £9.2.6

MYFORD

BEESTON · NOTTINGHAM · ENGLAND

Plastics LTD

(MANCHESTER)

BRITAIN'S LEADING STOCKISTS OF

"PERSPEX"

SHEET - ROD - TUBE

11 WHITWORTH STREET MANCHESTER, 1

Telephones: CENTral 7081-2 and 1000

THE ULTRA LENS AIDS PRODUCTION

This unequalled electric magnifier is of the most modern design and has proved its extreme and sustained usefulness to countless industrial firms engaged on minute examination of surfaces of every conceivable object.

The ULTRA LENS has won the enthusiasm of technical experts especially in the field of engineering, and is used extensively in collieries, foundries, electricity works, tool shops, forges, motor works, and practically every branch of the engineering trade

Whether you are manufacturing, buying or selling, there are occasions when you have to submit some objects to a very close scrutiny. At these times the ULTRA LENS becomes indispensable.

Triple lenses ensure distortion-free magnification and eliminate the necessity for adjustment of focus. The focus is always perfect.

The ULTRA LENS achieves a six-fold magnification in a brilliantly lit field which is shadowless.

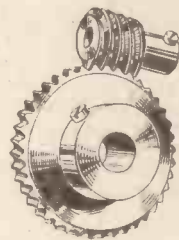


Write today for full particulars and price list to

THE ULTRA LENS COMPANY

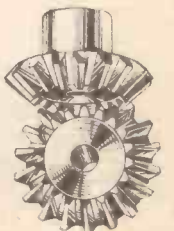
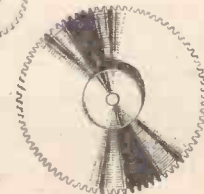
Tel.: TRAFalgar 2055
17c, Oxendon Street,
London, S.W.1.

Accurately cut GEARS ensure accurate MODELS



The Bassett-Lowke series of machine-cut gears enables the final convincing touch of realism to be given to every scale model or experimental unit.

Flat cut, worm, bevel and mitre bevel types are available from stock in a wide range of sizes and ratios.



Write for your copy of "Model Shipping and Engineering Catalogue," a manual of great help to every model engineer. Price 2/-. Quote Reference MS/12.

BASSETT-LOWKE LTD.

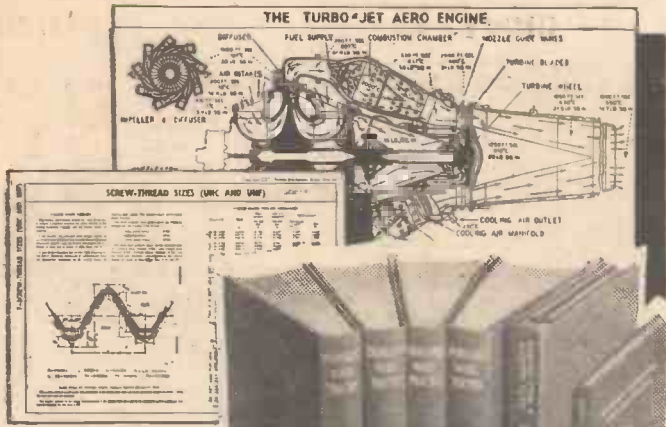
Head Office & Works:

London:
112, High Holborn, W.C.1.

NORTHAMPTON

Manchester:
28, Corporation Street.





Add to your Knowledge THE LIFETIME'S EXPERIENCE OF SUCCESSFUL ENGINEERS



NEWNES ENGINEERING WORKS PRACTICE

The Key to YOUR Success

This latest Newnes technical work is planned to aid you, the ambitious engineer. Written by more than 50 of the foremost specialist engineers in the light of post-war development and experience, it sets out to equip you with knowledge vitally necessary if you wish to earn more. ENGINEERING WORKS PRACTICE is an all-embracing guide to modern engineering, and thousands of discerning engineers are benefiting from it. Start on the road to higher pay by sending for **FREE BROCHURE**.

Deals comprehensively with:

BASIC PROCESSES AND MACHINES

MODERN METHODS AND MATERIALS

PRODUCTION ENGINEERING

INSTALLATION, OPERATION AND MAINTENANCE

YOU WILL RECEIVE

4 Volumes strongly bound in Rich Maroon Cloth. 9½ in. X 6½ in.

2,022 pages written by 50 successful engineers.

2,000 instructive "action" photographs, diagrams and drawings, etc.

24 Unique Data Sheets, 11½ in. X 8½ in., containing facts, figures, drawings, etc.

12 Instructive Wall Charts, 16½ in. X 11½ in., giving technical detail in convenient form.

1 Strong Chart Case 9½ in. X 6½ in., for Data Sheets and Wall Charts. In Binding to match the volumes.

FREE! Workshop Calculations, Tables and Formulae. 192 pages. 124 illustrations. Value 7s. 6d. it is presented to every purchaser of ENGINEERING WORKS PRACTICE.

2 Years' Technical Advisory Service on all subjects in Newnes ENGINEERING WORKS PRACTICE is included without cost.

Engineers are enthusiastic . . .
"Since I have had ENGINEERING WORKS PRACTICE I have shown a marked improvement in my work. The books are so easy to understand."—R. L. B. (London, N).

SEND NOW FOR FREE ILLUSTRATED BROCHURE

To George Newnes, Ltd., 66-69, Great Queen St., London, W.C.2.

Please send me, without cost or obligation, your illustrated brochure of Newnes ENGINEERING WORKS PRACTICE and details of the easy monthly subscription payments.

Name

Address

Occupation..... **EWP46**

Prices slashed at Clydesdale

DISTRIBUTION BOARDS

250 VOLTS
15 amp. 3 way.



ALL UNUSED BUT SLIGHTLY MARKED EXTERNALLY DUE TO BEING STACKED.

a "Simplex" iron clad 15 amp. Distribution Board with 6 rewirable fuses, highly efficient fuse unit, mounted on hinged battens and fireproof fillet between poles. Size: 8in. L x 6½in. B x 3½in. D. Weight 8 lbs. Ask for H949.

"SANDALITE DUPLEX," similar, but with no fillet. Overall size: 8in. L, 8½in. B, 4in. D. Weight 13 lbs. Ask for H950.

"M.E.M. KANTARK," similar, but with no fillet. Overall size: 8in. L, 7in. B, 3½in. D. Weight 8 lbs. Ask for H95.

6/6 each. SPECIAL QUOTATION FOR QUANTITIES. Post Paid.

BRASS GLANDS. ½in. diam.

In three lengths, 1-3/16th; ½in. 1½in. Bore ½in.

Price 1/3 each. Post Paid.



SUITABLE AS UNIVERSAL ELECTRIC MOTORS

For 200-250 v. A.C. or D.C. mains. By simple external wiring, full data supplied. New method gives better than 1/6th h.p. with M.G.29, or approx. 1 h.p. with M.G.30.

MOTOR GENERATOR TYPE 29
As generator. Input 24 v. 16 a. Output 1,200 v. 200 mA. Dim.: 11in. x 5½in. x 5½in. Ask for E880 **17/6** each Carriage Paid

MOTOR GENERATOR TYPE 30
Ref. 10K/21. Input 9.3 v. 23 a. Output 7.2 v. 13 a. 255 v. 110 mA. Size: 12in. x 5½in. x 5in. Ask for H488 **15/-** each Carriage Paid

RECORDER MK. 11. 24 Volt.

This unit is an auto Camera for 16mm. film. The shutter can be operated at single shot or one frame per half-second continuously. The Recorder requires a cassette, or Magazine (not supplied) to hold 25ft. of 16mm. film. The optical unit has an F/4.5 lens and prism Reflector system, for right angle operation through the side of the case. Dim.: 4½in. x 4in. x 1½in. Contained in Transit Case.

USED, GOOD CONDITION. Ask for H883. **27/-** each. Post Paid.

AIR POSITION INDICATOR MK. 1.

Ref. 6B/248. Ask for H913. **22/6** each. Carriage Paid.

Order direct from:—

CLYDESDALE

SUPPLY CO. LTD.

2, BRIDGE STREET GLASGOW C.5

Phone: South 2706/9

CASTING SECRETS REVEALED

Make your spare time profitable pouring beautiful castings at home. We supply everything and show you how. Amazingly simple. Rapid production. Immediate results. Also other Novel Plastics. Good proposition for both women and men and younger generation. Send 2½d. stamp for exciting book and Market details. No obligation.



QUALITY PLASTICS LTD. (Dept. P.M.6)
BRENTWOOD, ESSEX.

RESPRAY YOUR CAR

For as little as **£5!** with the

SPRAYT SPRAY GUN

WORKS OFF TYRE PUMP

Gives a smooth, even spray. Tackles small jobs as efficiently as large. Cheapest, most efficient Spray Gun made.

Kits including Gun and all materials 20/-. Double size 30/-.



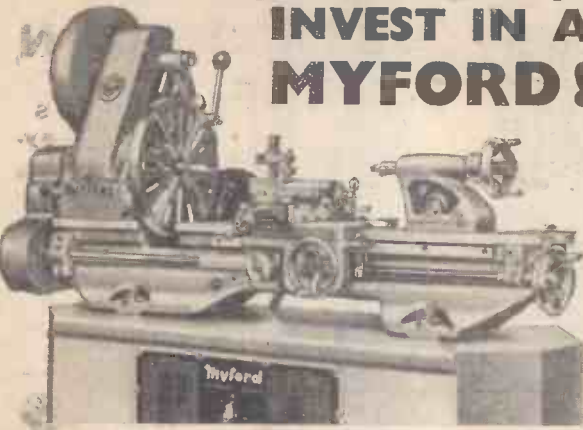
ONLY 7/6
Plus 1/- Postage.



SPRAYT 2 YEARS' GUARANTEE

Send P.O. to SPRAYT (Dept. P.M. 2)
226 MUNSTER ROAD, LONDON, S.W.6

For Greater Workshop Efficiency . . . INVEST IN A MYFORD!



MYFORD M.L.7. 3½ in. lathe—the ideal machine where high spindle speed range is not required, Bench model with standard equipment, £48.5.0. Deposit £12.1.6 and 18 monthly payments of 45/9. WE PAY CARRIAGE OUT (Mainland only.)

MYFORD Super 7. 3½ in. high speed lathe. 2,000 r.p.m. plus. Fourteen spindle speeds from 25—2,150 r.p.m. Clutch control to drive, Bench model with standard equipment, £73.5.0. This fine machine can be yours for as little as £18.7.4 deposit and 18 monthly payments of 68/11. Cabinet stand, motor, chucks and accessories may be added to the account, and we shall be pleased to submit a detailed quotation for your individual requirements.

ILLUSTRATED MYFORD LITERATURE GLADLY SENT—quite free of obligation.

“THE CHOICE OF EXPERIENCE”

A. J. REEVES & CO.

416, MOSELEY ROAD, BIRMINGHAM, 12
Grams: "Reevesco, Birmingham." Phone: CALthorpe 2554

The Ideal Machine for the PRACTICAL WOODWORKER
SYLVAN SAW BENCHES

- Petrol - Diesel - or Electric Drive
- From 10" to 16" ● Sile it v. belt drive

IMMEDIATE DELIVERY

Full details from the manufacturer:—

F. W. KUBACH (Dept. A) 12 SYLVAN ROAD
LONDON, S.E.19 TEL. LIVINGstone 3311

EX-ADMIRALTY TELESCOPES. Highest quality single-draw Telescopes by Ross of London and Otway of Ealing. 16 x 42mm. Length 16in. Weight 2½lbs. Optically good—externally fair. Originally cost about £12.

Post free 65/-

3in. ADMIRALTY COAST GUARD TELESCOPES. Suitable for Astronomical and Terrestrial use. Magnification 40X. Length 37in. Optically good. Complete with rigid garden tripod. Estimated original cost about £50. Price £10.15.0 to £14.10.0 according to external condition. Part carriage 5/- extra.

EX-AIR MINISTRY PRISM BINOCULARS. 6 x 30. Good used condition. Eyepiece focusing, with leather case. Post free £8.5.0

NEW 8 x 30 CENTRE FOCUSING PRISM BINOCULARS. Coated. With leather case. Post free £12.10.0

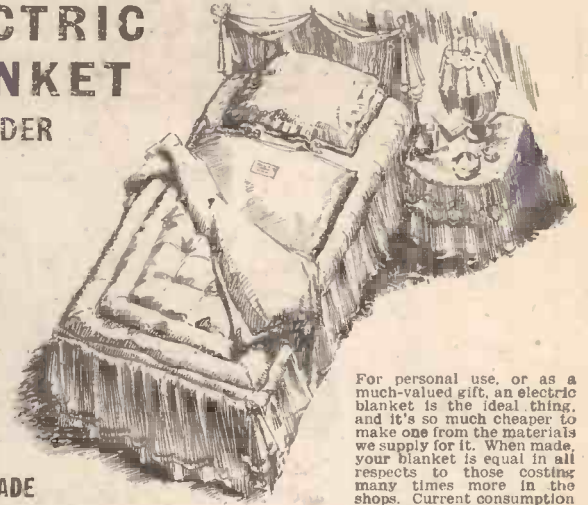
NEW 12 x 40 CENTRE FOCUSING PRISM BINOCULARS. Coated. With leather case. Post free £15.10.0

We guarantee satisfaction or full refund.

Illustrated Brochure on request.

CHARLES FRANK
67-73, SALTMARKET, GLASGOW. C.I.
Phone: Bell 2106-7.

IT IS SIMPLE TO MAKE THIS LUXURIOUS
ELECTRIC BLANKET
FOR COLDER NIGHTS



COUNTLESS THOUSANDS ALREADY MADE AND IN REGULAR USE

With all necessary heater cable and easy-to-follow blueprint. For 200-250 volts A.C. or D.C.
60in. x 30in. (Single bed) 20/- post free.
60in. x 50in. (Double bed) 30/- post free.
Blueprint only (either size). 1/8 post free.

For personal use, or as a much-valued gift, an electric blanket is the ideal thing, and it's so much cheaper to make one from the materials we supply for it. When made, your blanket is equal in all respects to those costing many times more in the shops. Current consumption is negligible and the benefits it gives are beyond measure. Absolutely safe. Easy to make. This blanket is a boon to health and comfort.

CAR HEATER ELEMENT
No. 87. 6in. x 1¼in. 6/3 ea.
100 w.

WE HAVE A REPUTATION FOR HIGH QUALITY THERMOSTATS AND LIST SOME OF OUR STOCK ITEMS HERE :

THERMOSTAT. CS. Convactor Thermostat for Space Heaters and Low temperature Ovens. 15 amps. 250 volts A.C. 40/80 deg. F. 25/-, post 5d.

THERMOSTAT. MB. for control of Electric Immersion Heaters up to 3 KW. 90/190 deg. F. 15 amps. 250 volts A.C. £2/0/0, post 9d.

THERMOSTAT. PF. Room Thermostat. 15 amps. 250 volts A.C. 5in. x 11in. x 2in. A beautiful instrument. Temp. ranges 30/90, 40/100, 40/80, 60/100 deg. F. as required. £2/0/0, post 6d.

THERMOSTAT. BW/1. 3 amps. 250 volts A.C. For control of hot-plates, vulcanisers, etc. 50-550 deg. F. 15/8, post 4d. We are only too glad to send illustrated leaflets on any of these Thermostats if you will send a S.A.E. stating which model interests you.

AMMETERS
Moving Iron. A.C./D.C. 0/5 amps., 1¼in. dial. Projection mounting. Price 18/-, Post 1/-. As above but 0/10 amps. Price 18/-, Post 1/-.

GREENHOUSE THERMOSTAT

Type ML. Constructed especially for the amateur gardener. The scale plate is calibrated "High-Medium-Low," and has a temperature range of 40-90 deg. F. Current-carrying capacity is 10 amps. 250 v. A.C. Differential, 4 to 6 deg. F. Dimensions: 4½in. x 2in. x 1½in. Price 35/-, Post 6d.

Model PJ. Miniature Thermostat for control of domestic Electric Irons and special purpose machines where space is limited. Capacity: 5 amps. 250 v. A.C. ½in. x ½in. x 11/16in. Single screw fixing. Price 9/3. Post 3d.

Model SN/40. 1 amp 240 v. A.C., 50-250 deg. F., 5/6. Post 3d.

FIRE BARS

- No. 41. Bowed. 3in. x 9½in. 7/6 ea.
- No. 42. Bowed. 3in. x 7½in. 7/4 ea.
- No. 43. Bowed. 3½in. x 8½in. 7/6 ea.
- No. 44. Bowed. 3½in. x 8½in. 7/6 ea.
- No. 45. Flat. 3in. x 9½in. 7/6 ea.
- No. 46. Flat. 2½in. x 7in. 7/4 ea.
- No. 47. Bowed. 3in. x 9½in. 9/- ea.
- No. 41. Suitable for Sunbeam, Revo, Belling, Dudley, Swan.
- No. 42. Suitable for Small Revo and various types.
- No. 46. Suits Belling, Brightglow.
- No. 47. Suitable for Creda.

SPIRALS

- No. 70. Spiral, 1,500 w. 2/9 ea.
- No. 70a. Spiral, 1,000 w. 2/2 ea.
- No. 70b. Spiral, 750 w. 1/10 ea.
- No. 70c. Spiral, 600 w. 1/5 ea.
- No. 70d. Spiral, 500 w. 1/4 ea.
- No. 70e. Spiral, 200 w. 1/2 ea.
- No. 70f. Spiral, 100 w. 1/1 ea.

★
Send
3d.
in
Stamps
for our
Interesting
Electrical
Catalogue
★

FINE SILVER CONTACT RIVETS for light and medium duty.

Ref.	Head Diam. (in.)	Head thickness (in.)	Shank Diam. (in.)	Shank length (in.)	Type of head	Price per doz.
110	.062	.020	.032	.025	Radiused	1/-
111	.062	.020	.032	.040	"	1/-
113	.093	.030	.050	.035	"	1/9
119	.075	.031	.048	.120	Flat	2/9
124	.093	.030	.050	.065	"	2/9
199	.125	.062	.082	.082	Radiused	6/-
205	.156	.065	.078	.100	"	8/-
211	.18	.062	.094	.215	"	12/-
321	.235	.080	.185	.165	"	15/-
837A	.230	.047	.094	.050	Flat	12/-
837B	.250	.047	.094	.050	Radiused	12/-

All post free : For Gross Price multiply doz. price by six.

FINE SILVER TIPPED CONTACT SCREWS.

- 7 B.A. x 1½in. 4/- doz.
- 4 B.A. x 1½in. 6/- doz.
- 6 B.A. x 1½in. 4/6 doz.
- 6 B.A. x 1½in. 5/6 doz.

SPECIAL QUOTATIONS FOR LARGE QUANTITIES.

THE TECHNICAL SERVICES CO.
SHRUBLAND WORKS . BANSTEAD . SURREY.

VALUABLE NEW HANDBOOK FREE TO AMBITIOUS ENGINEERS

Have you had your copy of "Engineering Opportunities"?

The new edition of "ENGINEERING OPPORTUNITIES" is now available—without charge—to all who are anxious for a worthwhile post in Engineering. Frank, informative and completely up to date, the new "ENGINEERING OPPORTUNITIES" should be in the hands of every person engaged in any branch of the Engineering industry, irrespective of age, experience or training.

**We definitely Guarantee
"NO PASS—NO FEE"**

This remarkable book gives details of examinations and courses in every branch of Engineering, Building, etc., outlines the openings available and the essential requirements to quick promotion and describes the advantages of our Special Appointments Department.

WHICH OF THESE IS YOUR PET SUBJECT?

MECHANICAL ENGINEERING

Gen. Mech. Eng.—Maintenance — Draughtsmanship—Heavy Diesel—Die & Press Tool Work—Welding—Production Eng.—Jig & Tool Design—Sheet Metal Work—Works Management — Mining — Refrigeration—Metallurgy.

ELECTRICAL ENGINEERING

Gen. Elec. Eng.—Elementary & Advanced Elec. Technology—Installations Draughtsmanship—Supply —Maintenance — Design —Electrical Traction —Mining Electrical Eng.—Power Station Equipment, etc.

RADIO ENGINEERING

Gen. Radio Eng.—Radio Servicing, Maintenance & Repairs—Sound Film Projection — Telegraphy — Telephony — Television — C. & G. Telecommunications.

BUILDING

Gen. Building—Heating & Ventilation—Architectural Draughtsmanship — Surveying — Clerk of Works — Carpentry and Joinery —Quantities — Valuations

CIVIL ENGINEERING

Gen. Civil Eng.—Sanitary Eng.—Structural Eng.—Road Eng.—Reinforced Concrete—Geology.

AUTOMOBILE ENGINEERING

Gen. Automobile Eng.—Motor Maintenance & Repairs — High Speed Diesel—Garage Mngment.

WE HAVE A WIDE RANGE OF AERONAUTICAL COURSES AND COURSES IN FORESTRY, TIMBER TECHNOLOGY, PLASTICS, G.P.O. ENG., TEXTILE TECHNOLOGY, ETC., ETC.

One of these qualifications would increase your earning power WHICH ONE?

A.M.I.Mech.E., A.M.I.C.E., A.M.I.P.E., B.Sc., A.M.Brit.I.R.E., A.F.R.Ae.S., A.M.I.M.I., L.I.O.B., A.R.I.B.A., A.M.I.H. & V.E., M.R.San.I., F.R.I.C.S., A.M.I.E.D., CITY & GUILDS, COMMON PRELIM., GEN. CERT. OF EDUCATION, ETC.

THE BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY



410A, COLLEGE HOUSE,
29-31, WRIGHT'S LANE,
KENSINGTON, W.8.

Phone: WESTern 9861

WHAT THIS BOOK TELLS YOU

- ★ HOW to get a better paid, more interesting job.
- ★ HOW to qualify for rapid promotion.
- ★ HOW to put some valuable letters after your name and become a "key-man" . . . quickly and easily.
- ★ HOW to benefit from our free Advisory and Appointments Depts.
- ★ WHERE today's real opportunities are . . . and HOW you can take advantage of the chances you are now missing.
- ★ HOW, irrespective of your age, education or experience, YOU can succeed in any branch of Engineering that appeals to you.

144 PAGES OF EXPERT CAREER-GUIDANCE

You are bound to benefit from reading "ENGINEERING OPPORTUNITIES," and if you are earning less than £15 a week you should send for your copy of this enlightening book now—FREE and without obligation.

POST NOW!

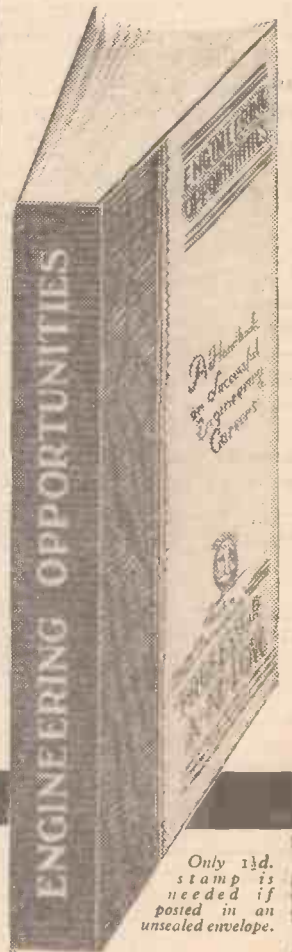
TO: B.I.E.T. 410A, COLLEGE HOUSE, 29-31, WRIGHT'S LANE, KENSINGTON, W.8.

Please send me FREE and without obligation, a copy of "ENGINEERING OPPORTUNITIES." I am interested in (state subject, exam., or career).....

NAME

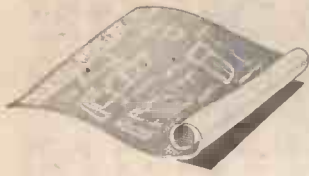
ADDRESS

WRITE IF YOU PREFER NOT TO CUT THIS PAGE



Only 13d. stamp is needed if posted in an unsealed envelope.

THE B.I.E.T. IS THE LEADING INSTITUTE OF ITS KIND IN THE WORLD



PRACTICAL MECHANICS



The "Cyclist," and "Home Movies" are temporarily incorporated.

VOL. XXI. No. 249

Editor: F. J. CAMM

SEPTEMBER, 1954

Next Month—21st Birthday!

THIS issue completes Volume XXI, and so with our next issue we shall celebrate 21 years of continuous publication with one minor gap due to the printing strike. It is, I hope my readers will agree, with justifiable pride that I can look back on 21 years of editorship of this journal. Last year saw the celebration of the 21st birthday of our companion journal, *Practical Wireless*. In next month's issue I shall review the events of the past 21 years, but it is appropriate in the closing issue of the 21st volume that I should express my pleasure at the continued growth year by year of our readership, and my thanks to that large and loyal band of regular readers who have taken the journal from its first issue; for it is fair to say that this journal is unique amongst British technical journals. It has not a competitor which deals with such a very wide range of subjects from model making to science, from astronomy to flying saucers, from mechanics to chemistry, and with all those subjects dear to the heart of the amateur craftsman and the practical householder.

The service which we give to our readers through our Advice Bureau ranges over a sphere of subjects vaster even than the subject matter in the paper. Technical schools and colleges are regular subscribers, and our readership extends to almost every country in the world.

In this 21 years we have described how to make a very vast range of models, domestic appliances, and articles of utility. We pioneered the construction of the Flying Flea, my little runabout car which could be built for £21 before the war, motor boats, canoes, electrically-operated bicycles, the Luton Minor Light Aeroplane, motorised lawn mowers, washing machines, radio-controlled models, unique models such as the Burrell Road Tractor, the Lethal Bed at the Ostrich Inn, Harmonographs, Macmillan's First Bicycle, Model Aircraft powered by elastic, steam, compressed air, petrol, and diesel fuel, weaving machines, wind power generators, to mention but a few of the subjects. I do not wish here to anticipate what I shall have to say next month in a special article, but will content myself with

FAIR COMMENT

By

The Editor

assuring my readers that the journal enters its 22nd year in a far stronger position than it has ever been before, that its readership continues to grow, and that we dedicate ourselves afresh to the service of our great band of readers.

Craftsmanship and Draughtsmanship

AS a member of the panel of judges of the annual Craftsmanship and Draughtsmanship Competition, organised by the Gauge and Tool Makers' Association, which this year showed an even greater increase in skill than last year's contest, I reflected during the judging on the very great advances in skill and technical education which had taken place during the past 21 years. Some of the tools made by apprentices under 19 years of age were superior in finish and accuracy to even high grade commercial products. In the drawing section of the contest some of the competitors under 19 years of age showed designing ability of quite outstanding merit. We are beginning to see the results of the facilities for technical education which were instituted in the early 'thirties, and as those facilities have improved during the past 21 years, so has skill advanced amongst youths to the point where, at the age of 19, they are producing work almost equal in accuracy and skill to the work of an experienced man of 21 years ago. The number of youths leaving school applying

for apprenticeship courses steadily increases each year, and youth is relying less and less upon the guidance of parents in the selection of a career.

The "P.M. How-to-Make-It-Book"

BACK issues of this journal are in constant demand, but it is seldom that we are able to supply the particular copy a reader requires. It was for this reason that we reprinted in our "How-to-Make-It-Book" some of the articles which are in continuous demand. In order to avoid queries on the subject I here repeat its contents: A Tape Recorder; A Master Battery Clock; An Electronic Organ; An Electric Washing Machine; A Hand Vacuum Cleaner; Electrically-operated Garage Doors; A Bagatelle Table; A Reflecting Telescope; A Harmonograph; A Designograph; A 15 in. Four-heddle Hand-loom; A Potter's Wheel; A Pottery Kiln; An Electric Oven; Westminster Tubular Door Chimes; A Cycle Trailer; A Pedal-cycle Sidecar; A Portable Air Compressor; A Water Softener; A Spanish Hawaiian Guitar; A Steel-stringed Ukelele; A Double-seater Canoe; A Radio Deaf-aid Unit; A Garden Pool; A Vertical Enlarger; A Photo-electric Exposure Meter; A Synchronised Flash-gun; A Combined Printing Box and Safelight; Diascopes and Episcopes; Steam-driven Motor Boat; An Electric Wall Bracket; Inexpensive House Telephones; An Electric Gas-lighter; An Adjustable Drawing-table; and A Toboggan.

Another Winner!

OUR companion journal, the *Practical Motorist and Motor Cyclist*, the sixth issue of which is now on sale, has steadily advanced in circulation since it was launched in April of this year. It is the only journal entirely devoted to the upkeep, overhaul and repair of all makes of motor-cars, motor cycles, and motorised cycles, irrespective of the year of manufacture. It does not deal with touring or racing. Its Advice Bureau advises readers on the remedies for all of the defects which may occur in running, and articles help the reader not only to save money, but also to keep their vehicles in first-class and economical running condition. It costs 1/- every month.—F. J. C.

SUBSCRIPTION RATES

including postage for one year

Inland - - - - 14s. per annum.

Abroad - - - - 14s. per annum.

Editorial and Advertisement Office: "Practical Mechanics," George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2
Phone: Temple Bar 4363

Telegrams: Newnes, Rand, London.

Copyright in all drawings, photographs and articles published in "Practical Mechanics" is specially reserved throughout the countries signatory to the Berne Convention and the U.S.A. Reproductions or imitations of any of these are therefore expressly forbidden.



Home-made Fishing Tackle

A Series of Articles Dealing With the Construction of a General Purpose Fresh Water Rod : a Sea Rod and Reels in Wood and Light Alloy

1.—The Making of Built (Split) Cane By C. W. TAYLOR, M.I.E.T.

THE present article is devoted to the making of built cane—very often called split cane—which is the timber used for both rods. For those who do not wish to try making this material, ready made tapered lengths can be bought at tackle stockists.

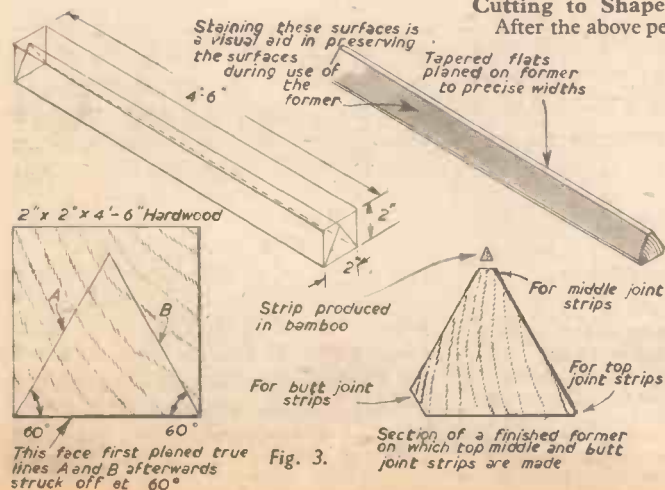
Hexagonal built cane consists of six strips of bamboo cemented together. Each strip is an equilateral triangle in section, and making such strips to precise dimensions is not a formidable, but an interesting job for the mechanic.

The Former

A simple wooden jig or former is first made from a piece of knot-free hardwood, about 2in. square and 4ft. 6in. long. This former must be made accurately to produce strips of bamboo to precise dimensions.

One edge of the hardwood is planed true and the ends are squared off. On each end of the timber two lines are struck off at 60 deg. to the planed face, to form an equilateral triangle. (See Fig. 3.) Once the former has been completed, the surfaces should be preserved by staining them as shown in Fig. 3. The illustration also shows a section of a completed former on which top, middle and butt joint strips are made. The wood is then sawn and planed accurately to these two lines throughout its length. A bevel set at 60 deg. is used to check the angles of the planed faces. An accurate former is essential, so care must be taken with this work. The former can be temporarily screwed to a board in the vice to facilitate planing. (See Fig. 4.)

With this work completed, flats are next carefully planed on the corners of the former. The flats are of the precise width and taper as the strips of bamboo which are to be produced. The sizes and details of the bamboo strips will be specified in following articles.



Working on the Bamboo

Having completed the former, work commences on the raw material, which consists of stout Tonkin bamboo poles, about 1in. to 1½in. diameter. It is important to obtain thick-walled bamboo; old tent poles or heavy curtain poles will often suit, but material can easily be obtained from certain tackle stockists.

The poles are split down into strips (see Fig. 5), about ½in. wider than the flats on the former, on which they are later temporarily mounted.

Six strips about 6in. longer than the required rod joint are laid side by side. Each strip is moved a little to stagger the knots,



The hexagonal section of a built cane rod consisting of six triangular pieces of bamboo

Fig. 1.



Faults which result from an inaccurate former, or from feebly finished strips

Fig. 2.

and all six strips are then cut to the correct joint length. The knots are filed flat, and each strip is straightened by warming it. This makes the bamboo pliable and it can then be pulled straight. Further heating, but not scorching, toughens the bamboo.

The outside, skin side, of each strip is next slightly roughened with a file, and each strip in turn is glued by the skin side to the appropriate flat on the former (see Fig. 6). The glue used for this is "Casco" powder, cold water glue. Having applied "Casco" to the skin side of the strip, string is used to bind the strip tightly to the former along its full length (see Fig. 6).

The former (and strip) is next warmed over a gas ring, or in front of a fire for a few minutes until the wood is warm. The former is then allowed to cool and the glue hardened for 40 minutes. This period must be observed. Meanwhile, other work can be undertaken.

Cutting to Shape

After the above period has elapsed, the glue

should be tested with the finger-nail and should be found quite hard. This being so, the string binding is removed and the waste bamboo of the glued strip is cut away by planing, or by careful paring with a knife. Both of these tools must be extremely sharp and the plane set very fine.

Finishing

The bamboo strip is finished flush with the faces of the former; a file can be used for this, but the 60 deg. angles must be maintained. After very little practice the job becomes easy.

The finished strip is immediately prised away from the former by carefully inserting the blade of a penknife between the two. It will be found that the strip comes away quite easily and without damage to the former if the time which has elapsed, after glueing the strip, is not excessive. This part of the job should, therefore, be carried out

according to the clock and to the stated routine.

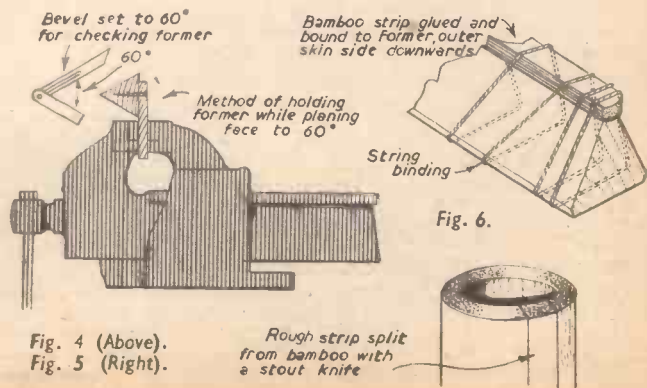
Glueing and Straightening

All six strips for each joint are finished in the same manner, and after applying "Casco" to each the six are glued together to form the hexagonal joint. The six strips are bound together with string in an open spiral along the full length. The skin side of each strip must be on the outside, and the joint is pressed and rolled on a board to straighten. Any twisting of the strips must be corrected while the glue is wet by sighting along the joint and correcting where necessary. The rough finished joint is then stood up to dry for a few days.

Built cane is expensive material and the mechanic will get considerable satisfaction from producing his own tough rod timber at low cost.

Next month's article will describe rod fittings and general construction.

(To be continued.)



AN ELECTRIC BOMBER

A Novel and Entertaining Game for the Handyman to Construct

By F. G. RAYER

The plane, made from thin aluminium.

THIS model is of a somewhat novel and entertaining type and has proved to be very interesting in operation. It consists of a small aircraft which circles upon the end of a boom, and carries a dart or "bomb" which can be released electrically from a control panel. The aim of the operator or competitor is to release the dart at such a time as will gain the highest score on a marked-out board on the floor, the scores being added together over a series of runs. The same dart may be used each time, or a number may be used so that each competitor may complete his series of attempts before the darts are removed from the scoreboard.

means of support out of doors. In most cases it should be feasible to arrange a hook or other means of suspension. If this is quite impossible, the model could be modified so that a mast or pole could be used, mounted vertically from the floor or ground, and supported by stays or wires. For such an arrange-

as a reduction drive for tuning condensers. (The $2\frac{1}{2}$ in. wheel, with set-screws, would then be mounted on the condenser spindle, but is here screwed to the shaft—which would normally bear the control knob—instead.)

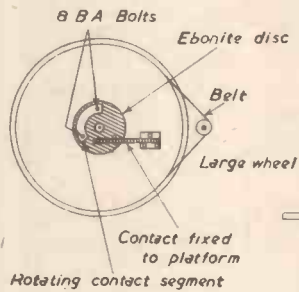


Fig. 2.—Contact and wheel.

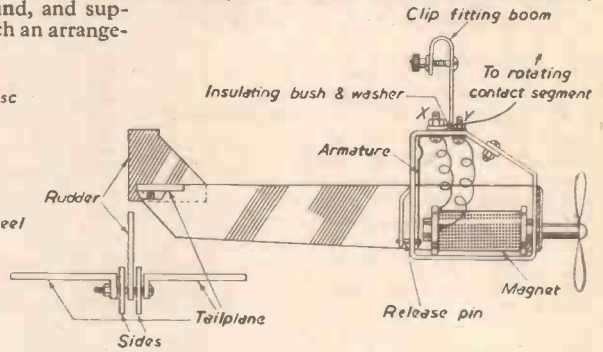


Fig. 3.—Bomb release and plane.

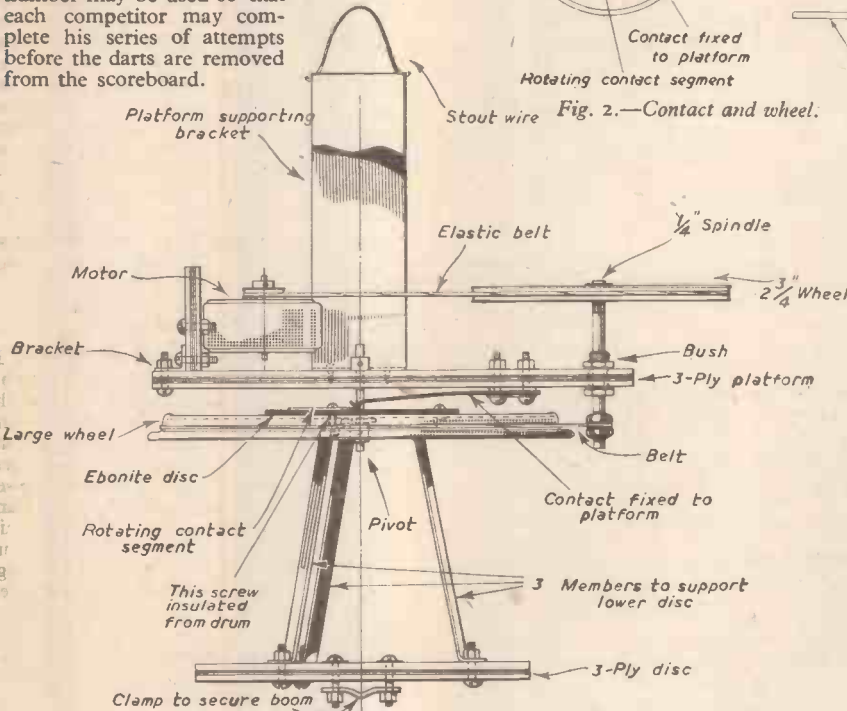


Fig. 1.—Side view of the driving mechanism.

So that dry-battery operation is feasible, consumption was kept as low as possible, and is about .4 amp., rising momentarily to about 1 amp. when the "bomb release" control is operated. This proved satisfactory for long operation from flashlamp type 4.5 volt or 6-volt dry batteries. As the model is suitable for use indoors, and the circle covered by the plane is large, an automatic arrangement is provided so that the dart cannot be released over articles of furniture or the operator. To achieve this the circuit to the magnetic bomb release is only completed for a part of the revolution of the boom (about 90 deg. of the total rotation) and the target is arranged within this sector. To add interest, a speed control is fitted, and a bulb which lights only when the plane is within the sector of rotation during which the bomb may be released.

The model is made for suspension from the ceiling, or from a strained wire or any suitable

ment the motor platform would be underneath and the large wheel carrying the boom would be on top. The three long brackets used in the hanging model would be omitted.

Construction of Driving Mechanism

Fig. 1 illustrates this, two belt drives being used. The bush, axle and wheel for the intermediate spindle may readily be obtained, being sold by many advertisers of radio components

Elastic bands were found best for driving purposes, and each should be sufficiently long so that it is not under excessive tension. Such tension in the first belt, in particular, might prevent the motor running properly. The latter is of the small permanent-magnet "electrotor" type and only consumes about .3 amp. Other motors could be used and the motive power required is very small.

The three-ply platform is 5 in. by 2 1/2 in. and hangs by means of the large bracket. This can be bent up from aluminium or other metal, a strip 1 in. wide and 8 in. long being suitable, giving a final bracket with sides about 3 in. long and 1 in. feet, suitably drilled, to bolt to the platform. A small bracket holds the motor in position, the height of the 2 1/2 in. wheel being adjusted so that the belt does not come off during running. With the type of motor mentioned, the bearing surfaces are small, and the motor was found to run best with the small driving pulley as near as possible to the motor casing. The belt passes inside the supporting bracket, the nearest side of this bracket being cut away in Fig. 1 to show the pivot.

The contact strip is cut from brass and fixed



A view of the complete device.

to the platform with small bolts; it is quite near the pivot, as shown in Fig. 2. Its purpose is to convey current to the magnetic release, the circuit being completed by the pivot itself.

The rotating part of the mechanism is shown in Figs. 1 and 2, and the large wheel is 4½ in. in diameter. A sound, clean lid of the push-on type with a flange about ¼ in. wide is satisfactory, and no upper rim is required to hold the belt on during running if the intermediate spindle is correctly positioned.

An ebonite disc 2 in. in diameter is fitted to the top of the large wheel, the rotating contact segment, cut from thin brass, being bolted to this. Paxolin or thin plywood could be used. The bolts holding the contact segment pass down through the large wheel, insulating bushes being provided underneath so that no

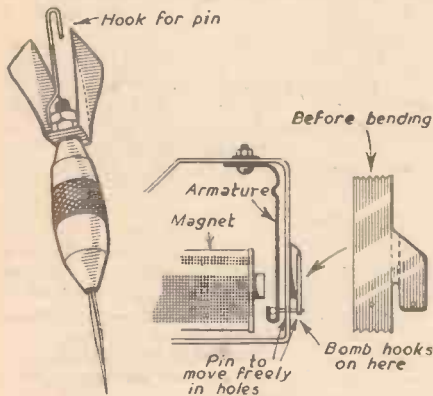


Fig. 4.—Parts for release.

electrical contact can arise. Three supporting members, bent up from aluminium strips 3 in. long and ¼ in. wide, descend to the lower three-ply disc, which is 3½ in. in diameter. Two of these members are secured by the bolts which hold the rotating contact segment; the remaining member is held by the bolt which passes through the ebonite and is in contact with the large wheel. (This is shown in Fig. 5.)

A clamp, cut from aluminium, enables the boom to be fitted in a few moments. The boom itself was made up from ¼ in. diameter plated steel tubing of the type sold for use as vertical rod aerials, as sections may be plugged together immediately to build up a rod of suitable length. These rods are offered by



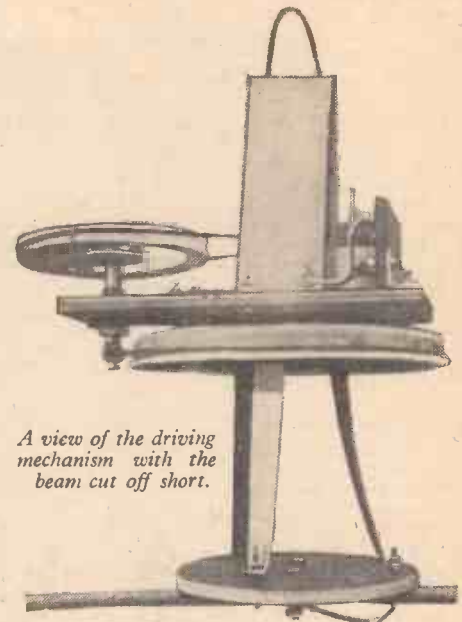
A view from above of the driving mechanism.

many advertisers. A wooden boom would be suitable, either round or of square section. Its length is a matter of personal taste and the space available and 5 ft. was used in the model made, giving a 3½ ft. projection to carry the plane and 1½ ft. for the lead balance-weight. It would be feasible to obtain balance by using two planes.

Plane and Release

The plane is shown in Fig. 3, the nearest side member having been removed. Thin aluminium is suitable, each wing being about 1½ in. by 2½ in. For the sides of the body pieces 5½ in. long are suitable, 1 in. wide at the front and ¼ in. wide at the tail end of the plane. The tailplanes are ½ in. by 1 in. However, the dimensions and method of building the plane are not important. A model of light wood could be used or a plane already to hand might in some cases be adapted.

The release fits inside the plane as shown in Fig. 3, connections to the magnet being completed by the metal boom and clip and by an insulated lead passing inside the tubular



A view of the driving mechanism with the beam cut off short.

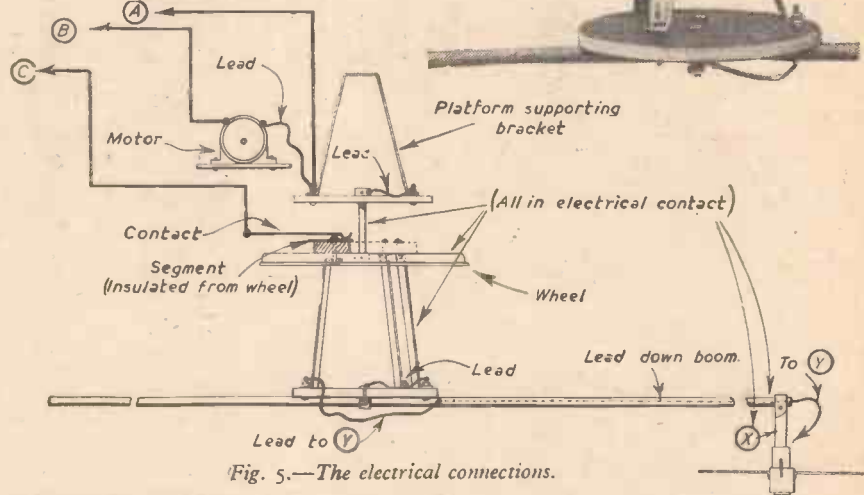


Fig. 5.—The electrical connections.

boom and emerging near the 3-ply disc. With a wooden boom two wires would, of course, be required.

The magnet employs an iron core ¼ in. in diameter and 1½ in. long, wound to capacity with 26 s.w.g. insulated wire. When it is energised the armature is drawn towards the core and the release pin thereby allows the dart to fall. Details of the magnet are not very critical, and one to hand could be used if it operates satisfactorily. The magnet circuit is completed only momentarily, so that a magnet with stouter wire (thus consuming an increased current) would be suitable.

The release is shown in greater detail in Fig. 4, its frame consisting of a strip of aluminium ¼ in. wide and 6 in. long, bent as seen in Fig. 3. A projection is left on this strip, and bent round as shown in Fig. 4. A 1/16 in. drill is then taken through strip and projection, forming holes in which the pin can move. All roughness should be filed away. The pin itself has its point cut off and passes through a small hole in the end of the armature, the lower end of which is turned up so that when the armature is released the pin is pushed back into position.

The armature is cut from tinplate such as obtained from domestic canisters, and is about ¼ in. wide and 2 in. long. Its upper

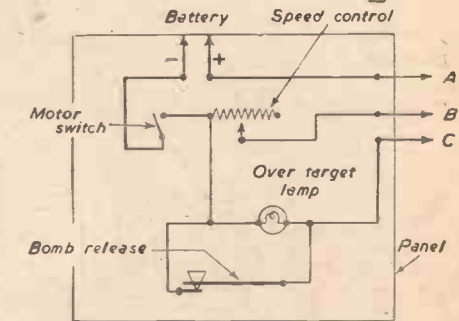


Fig. 6.—The control circuit.

end is bolted to the aluminium frame, and its tension adjusted so that when the magnet is energised the pin is withdrawn sharply from the outer hole and allows the hook on the dart to escape. The pin should not be withdrawn completely out of the hole in the inner strip or it will not return properly when the circuit is broken. The full movement of the pin need only be about ¼ in. and the pole of the magnet should be as near the armature as possible. Such a release was found satisfactory with much larger weights than would normally be used in the present model.

The completed craft is easily removable, one 6B.A. bolt clamping it to the end of the boom. For the dart a ready-made one with thin wire hook bound to the tail would be satisfactory. That actually used was made up with a brass body, steel point and thin aluminium fins.

Electrical Connections

The circuit is shown in Fig. 5, and is very

straightforward. Lead "A" acts as a common connection for both motor and magnet, the circuit to the latter being made through pivot, wheel, bracket, boom clamp, boom and the clip supporting the plane. Lead "B" is to complete the motor circuit. Lead "C" is for the bomb release control, the circuit being via platform contact, rotating segment, bracket, and the lead passing along the boom to point "Y" in Fig. 3.

Three leads pass from the platform across the ceiling to the control panel. Thin 2-amp. or 5-amp. flex is suitable for these, or thin, single strand "bell" wire. (With the latter, a slight increase in battery voltage may be required to compensate for the voltage drop in the connections.) Separate wires, twisted together, can be used, or a three-core cord.

Control Panel

In its simplest form this may consist of a single switch for starting and stopping the motor and a push-switch or key for releasing the bomb. However, the arrangement shown in Fig. 6 was found better in several respects, and gives added interest.

As the type of motor mentioned (and all permanent magnet motors) reverses the direction of rotation when polarity is reversed, the battery must always be connected correctly. When the "motor switch" is closed the circuit is completed, and the motor commences to run, its speed being controlled by the variable resistance. At the same time, the indicator bulb will light each time the contact circuit to the release is made by the rotating contact segment. This bulb circuit is via the

magnet windings, but the current passing is insufficient to release the dart. When the "bomb release" key is depressed, the bulb is shorted and the dart immediately drops, unless the craft is over a part of the circuit where release is not possible, as already explained.

For the speed control, a 5-ohm resistor was found suitable. It can be omitted, of course. Or a form of speed controller may readily be made up for battery operation from iron or resistance wire of about 30 to 32 s.w.g. 1ft. or 2ft. of such wire would be sufficient.

The "over target" bulb must be of low-consumption type, or the release may operate. A .06-amp. bulb, such as intended for use with cycle-dynamo rear lamps, is ideal. However, some torch bulbs are satisfactory. The bulb will light at fair brilliance, the magnet coil being of quite low resistance.

For the "bomb release" switch any push-type switch is satisfactory. This item can also be made up with ease. All the items of the control circuit may be mounted on a panel or fitted to a box housing the battery. Connections should be correctly marked so that proper operation is possible.

For Two Planes

With a single plane correct balance is achieved by adding a lead weight to the free end of the boom, sliding this along to a suitable place. A second plane, duplicating that described, would be satisfactory. To enable it to be controlled a lead should pass from it to a second contact segment bolted opposite that already shown.

Each "bomb" could then be released in turn by operating the release switch of the control unit. Whether this arrangement is adopted or not would depend upon personal preference. The second plane could be added in this way at any time without difficulty.

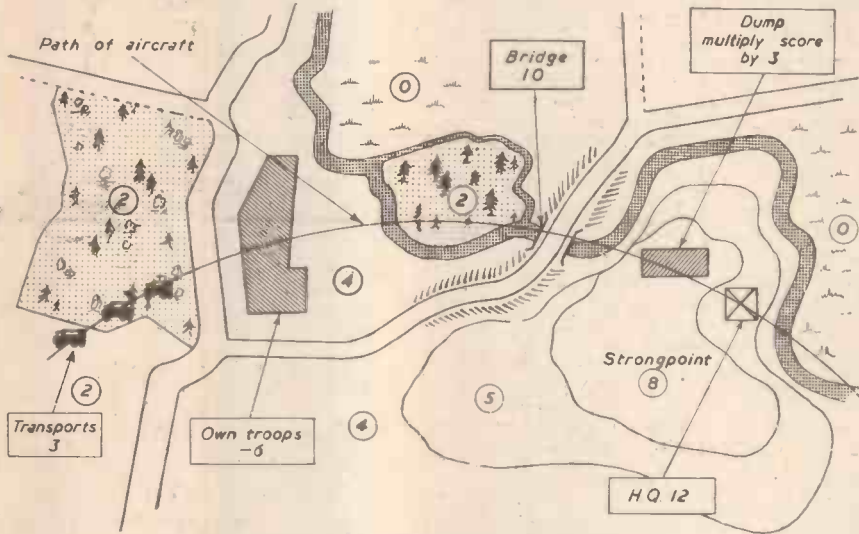


Fig. 7.—A suggested target design.

Making Blueprint Paper

How to Prepare Your Own Sensitive Material

The method used for swabbing large areas of blueprint paper.



more or less completely before the ferric salt is added. The ferric ammonium citrate is obtainable in the form of green or brown "scales." Either of these varieties will suit, but the green form is preferable.

All these solutions are poisonous, and where there are children in the house, it is advisable not to store them unless a safe place is available. Never store any of these solutions without labelling the bottle clearly and indicating that the contents are poisonous. If, however, the solutions are stored, they should be kept away from the light.

Coating the Paper

Choose a good quality paper, rough or smooth, lay this material down on a level surface and in a small vessel mix equal parts of solutions A and B. By means of a fragment of sponge, a flat camel's hair brush or a piece of cotton wool, charged with the mixed solutions, wipe the latter evenly over the surface of the paper. When large areas have to be dealt with, a piece of absorbent cloth, folded into two or more thicknesses, doubled over the edge of a piece of glass and

held in place with a rubber band, is used; and old plate negative will do for the glass (see illustration). This operation should be carried out under a weak light only and when it is completed the paper should be hung up to dry in a dust-free place.

The best way to apply the solution is in long parallel bands each slightly over-lapping its predecessor until the surface is covered and then while still wet apply another coat in the same way, but at right angles to the first. It does not matter if the result looks a bit streaky, as long as the surface is covered completely.

The time required for printing cannot be given, as it depends upon the density of the negative, but it should be continued until the deepest shadows assume a bronzed appearance. Then immerse the print in cold water and allow it to soak (changing the water if necessary) until the water runs off clear and free from yellow tinge. The colour becomes darker as the print dries and will be slightly improved if the wet print is subjected to a bath of extremely weak acid—say a teaspoonful of vinegar in a pint of water—before the final rinse in clean water.

THE "blueprint" process is extensively used for making copies of engineers' tracings, but it can be used successfully for prints from photographic negatives if the negatives are strong and contrasty, having dense highlights and clear shadows.

Blueprint paper is exceptionally easy to prepare and the following solutions should be made up and stored in amber-coloured bottles until wanted:—

Solution A:

- Ferric ammonium citrate ... 1/2 oz.
- Gum arabic ... 50 grains.
- Water ... 2 oz.

Solution B:

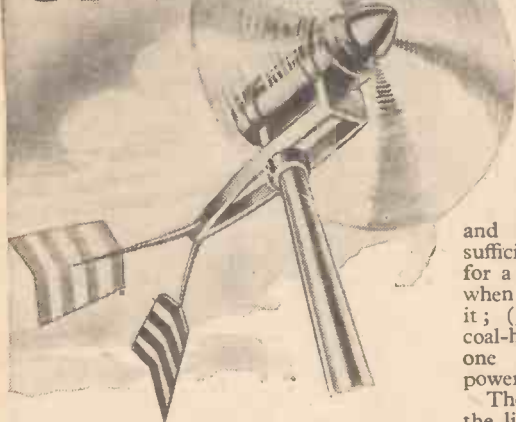
- Potassium ferricyanide ... 90 grains.
- Water ... 4 oz.

In making up solution A it is best to soak the gum arabic in the water for a few hours in order that it may swell up and dissolve

INDEXES FOR VOLUME 20—

1/1 by post from The Publishing Dept.,
Geo. Newnes Ltd., Tower House, Strand, W.C.2

Small Wind Power Plants



5.—Lighting Problems : Wiring Details : Converting Old Lamps

(Concluded from the August issue.)

This series of articles was first published in "Practical Mechanics" in 1944 and is now being reprinted in response to readers' requests.

RECENT years have seen a marked increase in the number of amateur lighting installations in use throughout the country. In particular, the influx of American-built "Windchargers" has aroused widespread interest in this source of free power, and many technical magazines have published designs of home-made wind-generating plants. Little attention has been given, however, to the layout of the lights and fittings, on which the ultimate success of the plant depends. A short account is given here of some dodges and devices found effective when used in conjunction with the wind-charger previously described in this series.

Lighting Problems

In windcharger lighting two main problems emerge: (a) the minimum working intensity of illumination necessary to supply each part of the house; (b) to do this with the utmost economy of current consumption. For distri-

and other rooms where a small light is sufficient for normal purposes, with provision for a more powerful light at strategic points when occasion demands it; (3) halls, stairways, coal-house, etc., where one or two candle-power is quite enough.

The requirements of the living-room are best satisfied by two separately switched bulbs, arranged (Fig. 1) to throw light on the two positions usually occupied on each side of the fire. When only one person is reading, the second bulb is idle. With both bulbs in use, good illumination is provided over the whole area in front of the fire, since the cones of light will overlap. In normal practice, 25-watt bulbs would be considered the minimum for such a job, but 12-watt lamps are sufficient if particular attention is given to the mounting. These

Lamp Holders

Whatever the type of bulb used, a holder is necessary, and this is usually difficult to



Fig. 1.—Arrangement of lights in living-room. Separately switched 12- or 18-watt bulbs, suspended by flex from bare 7/22 aerial wire stretched from walls at a height of about 9ft.

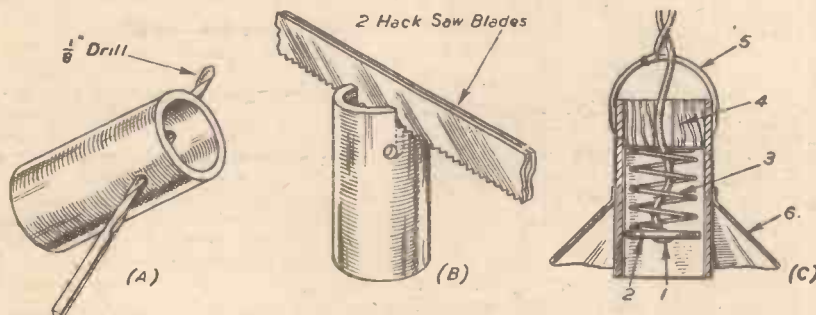


Fig. 2 (Left).—Two operations necessary to make a bayonet socket for car bulbs. (A) Drill $\frac{1}{8}$ in. hole, (B) make two cuts, using two hacksaw blades.

Fig. 3 (Right).—Section through finished bayonet socket for motor-car bulbs.

bution purposes, the house is divided into three sections: (1) Two main rooms—living-room and kitchen—where comfortable reading and working light is necessary; (2) bedrooms

lamps are made to fit standard 9-10-in. bayonet sockets, in any voltage from six to 100. Failing this, 12-watt clear-glass car bulbs are just as good.

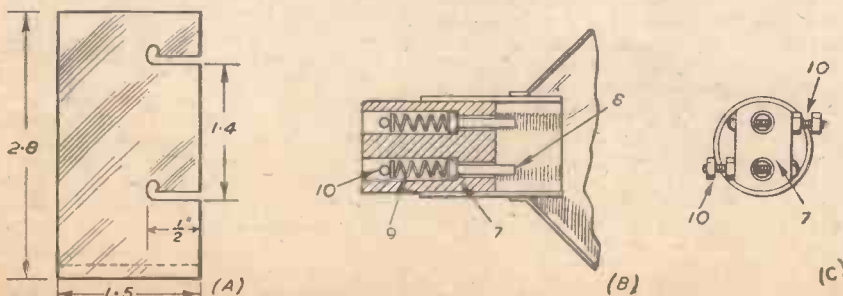


Fig. 4 (Left).—Bayonet grips cut in strip of tin.

Fig. 5 (Right).—Section and end view of bayonet socket for bulbs with standard size bases.



A converted candle lamp.

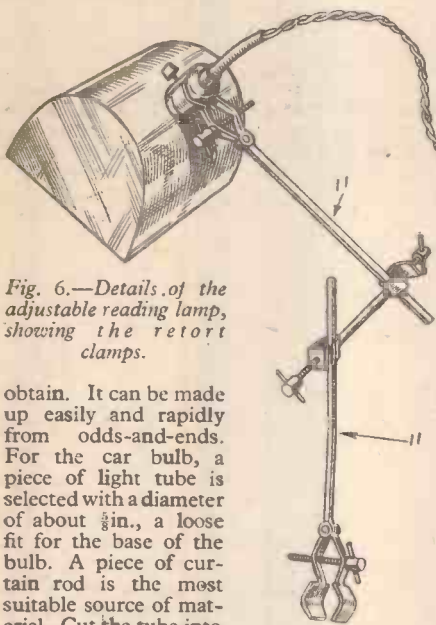


Fig. 6.—Details of the adjustable reading lamp, showing the retort clamps.

obtain. It can be made up easily and rapidly from odds-and-ends. For the car bulb, a piece of light tube is selected with a diameter of about $\frac{3}{8}$ in., a loose fit for the base of the bulb. A piece of curtain rod is the most suitable source of material. Cut the tube into $1\frac{1}{2}$ in. lengths. The bayonet grip is made in two operations. First, drill a $\frac{1}{8}$ in. hole right through the tube, accurately along a diameter, about $\frac{1}{2}$ in. from one end (Figs. 2 and 3). Then, using two blades in a hacksaw frame to give the necessary width, make a cut down each hole, slightly to one side, so that the typical bayonet socket is produced (Figs. 4 and 5). It is best to make these cuts separately by tilting the saw, so that each may be guided accurately to the correct position. The single contact stud consists of a brass paper-fastener (1) in the centre of a disc of fibre-insulating material (2). The legs of the fastener are passed through a slit made with a small, sharp screwdriver; cut off the legs about $1/16$ in. below the disc, open them out to secure the fastener, and solder on a length of heavy flex. Pressure between fastener and bulb contact is maintained by a spring (3), which is a close fit in the tube. A wooden plug (4), with a hole for the flex, keeps the spring in position. A "stirrup" of bare wire (5) is soldered to the end of the holder to support the weight of the lamp and shade evenly over the centre. The tin shade (6) is soldered directly to the holder at any suitable point.

It is advisable to make holders for standard-sized bulbs on the following system. A strip of tinfoil (Fig. 4) is cut to the size shown and bent into a cylinder around the base of a bulb, a strip of thick paper between bulb and tin giving the necessary clearance. The cylinder is held temporarily with a loop of wire and soldered lightly along the joint. A piece of wooden rod (7, Fig. 5) about $9/10$ in. diameter has two $\frac{1}{8}$ in. holes, separated by $\frac{1}{2}$ in. drilled along its length. These holes are then widened to within $\frac{1}{8}$ in. of one end by a $\frac{1}{8}$ in. twist drill. Two wire nails (8, Fig. 5) are cut down to about $7/10$ in. length and inserted to act as contact studs. The heads may need to be

filed to pass freely into the $\frac{1}{8}$ in. holes. Two small springs (9, Fig. 5), preferably of brass or copper, press on the heads of the nails. The springs are best held in place by two 6 B.A. bolts (10, Fig. 5). The bolts act as terminals for the flex and are arranged "back-to-front" as shown, to support the weight of the lamp evenly. Flat surfaces are obtained for the bolts by four hacksaw cuts. The tin is held in position on the timber by small screws or tacks, and the shade is soldered to the holder, as before.

Shade Construction

The shades for the lamps are made from tinfoil, polished well with metal polish. A 12 in. gramophone record is suitable for marking out the circle, but if a big enough sheet of clean tinfoil is not to hand, open out two canisters, at least 6 in. long and $\frac{1}{2}$ in. diameter, and mark two semicircles. Solder these together along one half of the common diameter, leaving the other half free for bending purposes. Shape the tinfoil into whatever size cone is required, and, after cutting away the extra tinfoil, solder lightly along the joint. Cut a hole at the apex to fit the holder



A useful reading lamp which can be tilted at any angle.

in use, and enamel the back of the shade to suit the colour-scheme of the room. The angle of the cone may lie anywhere between 90 deg. and 135 deg. The shades are soldered directly to the home-made holders described.

Wiring Details

On low voltage system it is essential to use the largest possible diameter of wire, so that the voltage drop along it may remain small compared with the voltage of the battery. Heavy rubber-covered cable is expensive and scarce, and the best substitute is bare 7/22 aerial wire, which can be bought quite cheaply in rolls of 50 ft. or 100 ft. It should be nailed or stapled along walls so that opposite polarity wires are separated by at least 2 in. or 3 in. To save material and power, the wires should be stretched directly from one point to another on their journey from battery to lights, rather than follow neatly the contours of the building. Fig. 1 shows this plan adopted in the wiring of the living-room. Three lengths of 7/22 wire are stretched tightly from hooks across the room, and the bulbs are suspended by heavy flex soldered

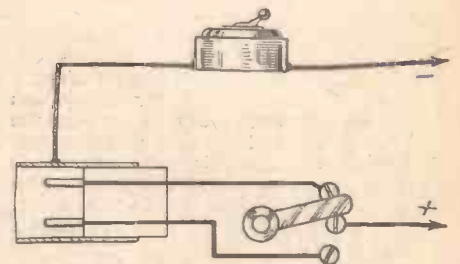


Fig. 8.—Connections for double-filament 18/3 bulb, using the switch shown in Fig. 7.

to the bare cross-wires. The two outside wires are positive, coming from the two switches inside the door, and the inside wire is a common negative for both bulbs. Any one 7/22 wire may feed bulbs totalling 24 watts on 6-volt circuits, where the drop in voltage will be 0.045 volts per yard. Small 6-watt bulbs can be supplied through 18 s.w.g. wire taken from an old dynamo field coil or ignition coil, provided the distance from battery to bulb is not too great.

In the bedroom, a 6-watt car-bulb, with a small tin shade about 6 in. diameter, gives a satisfactory light, but a socket should be provided for a bedside reading-lamp containing a 12- or 18-watt bulb. The bases of old plug-in coils form very useful sockets, which can be placed at suitable points throughout the house where a good intensity of illumination is needed occasionally. Fig. 6 and the photograph on the left explain the construction of a very useful lamp, which can be arranged, by readjustment of the clamps, to throw intense light on the most awkward positions. The shade is semi-cylindrical, and is easily made from tin canisters, soldered at the joints. It should be large enough to surround the bulb completely. A bulb-holder with a built-in switch is used. Retort clamps (11, Fig. 6), of the type used to hold school laboratory apparatus, make an ideal stand, which can be attached to any support. When used as a bedside reading-lamp, it clamps neatly to the top rail of the bed, throwing the light just where it is needed.

Converting Old Lamps

Old candle or oil lamps, with good silvered reflectors, can often be converted into ideal reading-lamps. The photograph on page 520 shows a typical conversion, using an old parabolic reflector candle-lamp. A small toggle panel-mounting switch is fitted into the base. The best type of bulb for these lamps is a double filament double contact car-bulb, rated usually at 6-8 volts, 18 and 3 watts. The appropriate filament is selected by a small changeover switch, made from the wiper of an old wire-wound rheostat or volume control, moving over small round-headed brass 6 B.A. bolts arranged on a piece of fibre or paxolin (12, Fig. 7). The wiper (13) moves in its original bush (14), and just

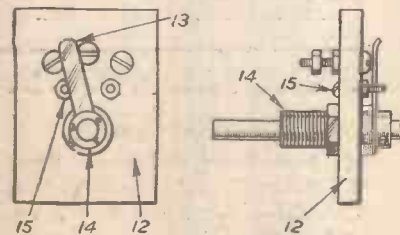


Fig. 7.—Back and side view of "snap action" changeover switch for use with double filament 6-8 volt, 18/3 watt bulbs for use in reading lamps.

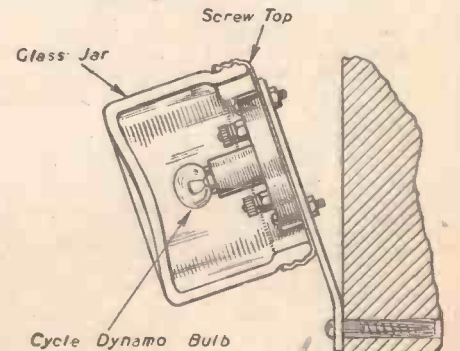


Fig. 9.—Partial section of a hall or stairway light, using a cycle dynamo bulb in a clear glass screw-top jar.

touches a pair of the bolt heads, giving a pleasant "snap-action" as it crosses the central bolt. Two small bolts (15) act as stops. Fig. 7 shows details of the construction of this switch, while it can clearly be seen on the base of the reading-lamp shown on page 520. Fig. 8 gives the connections necessary when using the switch to control a double filament bulb. From this it is obvious that the holder could be wired up with only one contact-stud in use, the second wire being attached to the metal of the holder. Changing from one filament to the other would then be effected merely by reversing the bulb in the holder, so that the "live" contact of the holder would touch the other contact of the bulb. This would eliminate the changeover switch, and is particularly useful for positions where a strong light is needed only now and again (e.g., a shaving light for the bathroom).

For passages, stairways, etc., screw-base 6-volt or 8-volt cycle dynamo bulbs are ideal.

These can be mounted very artistically under clear glass ointment or cosmetic jars with screw lids, attached either flat against the wall or roof, or by a small aluminium bracket. Fig. 9 gives an idea of the way in which it is made.

Total Load

With an installation consisting of twelve 6-volt lights arranged on the lines suggested, the total load will rarely exceed 6 amps., while the average nightly load over a period will be about 3 amps., provided reasonable care is exercised in switching off unnecessary lights. Allowing five hours for each night, the average consumption would therefore be about $\frac{1}{2}$ kilowatt hour per week. Allowing a battery efficiency of 80 per cent., and an average charging rate of 8 amps., this would need about 16 hours' charging in every week of 168 hours, or one hour in every 10. Wind surveys reveal that we get about 2,000 hours

of 10 m.p.h. winds over most of the country during the year, which works out at about one windy hour in every five, or more than sufficient to supply the load mentioned. The weak point in this reasoning depends on the fact that many of the 2,000 hours of wind will come in the form of sustained gales, lasting up to 24 or more hours, with hardly a break. To make good use of such windy periods, large storage capacity is necessary.

Accumulators

The single car accumulator, with a top capacity of 100 amp-hours, is obviously insufficient. Several accumulators in parallel go a long way to solve the problem, but large glass house-lighting 2-volt cells are the ideal solution. These cells have correct charging rate of about 20 amps., and can be fitted with visual charge indicators, taken from old Exide radio batteries.

Making a Film Rewinder

An Accessory for the Ciné Enthusiast

By S. A. MONEY

THOSE enthusiasts who take up home movies as a hobby soon discover that the film must inevitably be rewound at some time or other, and therefore that some form of re-winder is an invaluable piece of equipment to possess. Films can, of course, be rewound by hand, or on the projector, but, whilst these methods are satisfactory, it is far better to use a proper re-winder for the purpose. The apparatus required consists of two shafts, to carry the spools, mounted some 2ft. to 3ft. apart and fitted with some form of hand drive for winding. The drives are usually geared with a step-up of about 10-1 to reduce the time required if a long film has to be rewound. The construction of such a simple piece of equipment takes only an hour or two, and need not cost more than a few shillings.

The first requirement is a suitable pair of drives for the spools. A visit to the local multiple store brought to light some small, hand-driven grindstones which are ideal for the purpose. These grindstones have a step-up gear ratio of 12-1 and are of cast steel construction. A pair of these can be obtained for about twelve shillings. In addition to a pair of these grindstones, a piece of wood 6in. by $\frac{3}{4}$ in. and 2ft. to 3ft. long will be required for the baseboard. The exact length of this baseboard has not been specified, since it will depend on the personal preference of the constructor.

Dismantling

Since the grindstone is to be used for a purpose for which it was not designed, it is necessary to carry out a little dismantling before construction can be commenced. The toolrest at the side of the grindstone can be removed, since it is no longer required. The grinding stone itself can be taken from the shaft by unscrewing the 2 B.A. shake-proof nut which holds it there. The grinding wheel, being of little use on its own, may be disposed of, but the two washers which were used to hold it should be set aside for future use. Projecting from the front of the main casting are two lugs, which form part of the clamping arrangement used in fixing the grindstone to a bench or table. If the normal 400ft. spools are to be used, it will be necessary to cut these lugs down by at least $\frac{1}{2}$ in., so that they will clear the spools. The lugs are no longer required for clamping, since the bottom flange alone will be used for this purpose. The bolt

which screws through the bottom flange should be removed by sawing off the washer which is fixed to it and then unscrewing the bolt.

The upper shaft is removed next by undoing the 2 B.A. bolt at the top of the casting. This shaft has to be modified to take the spools, and the actual changes necessary will depend on the gauge of film being used.

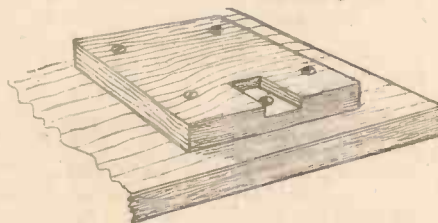
Construction

The modification to be described is for use with 9.5 mm. spools, but, no doubt, some



Fig. 1 (Left).—The shaft modifications.

Fig. 2 (Below).—The mounting block.



similar method can be devised if the re-winder is to be used with 8 mm. or 16 mm. spools. Take one of the washers that were used to clamp the grinding wheel and drill a $\frac{1}{4}$ in. hole in it at a point 0.4in. from the centre. A $\frac{1}{4}$ in. length of $\frac{1}{4}$ in. brass or steel rod should be soldered into this hole, as shown in Fig. 1. The washer may then be soldered to the shaft as shown. The bearings on the shaft will expand when heated for soldering and the shaft should be left for about a quarter of an

hour to allow the metal to contract to its original size. When the shaft is replaced in the main casting it should rotate freely. If this is not so, it may be necessary to rub the bearings down a little with fine emery cloth. When the shaft has been replaced the alterations are complete and it only remains to mount the two drives on a baseboard.

The Baseboard

The two drives are first mounted on pieces of wood $\frac{1}{4}$ in. by $\frac{1}{4}$ in. by $\frac{1}{4}$ in., the sole purpose of which is to raise the rather long handles to a convenient height above the table. A recess $\frac{1}{4}$ in. deep should be cut at one edge of these pieces to take the bottom flange of the drive, as shown in Fig. 2. This recess is necessary to prevent the drive rotating on it; fixing bolt. Since the flange is already tapped for a $\frac{1}{4}$ in. Whitworth thread, it is most convenient to use this size bolt for fixing the drive to the baseboard. A $\frac{1}{4}$ in. hole should be drilled through each of the mounting blocks to take the fixing bolts.

The two mounting blocks should be fixed, one at each end, to the baseboard proper, with their front edges about $\frac{1}{2}$ in. in from the front edge of the main board. Two holes, large enough to clear the heads of the fixing bolts, should be drilled through the baseboard in the appropriate positions. The upper edges of the baseboard should then be bevelled and the whole painted or stained to make a presentable piece of work. The two drives may then be bolted into position.

In commercial rewinders it is usual to have the end of the spool shaft pivoted so that after the spool has been pushed on, the end can be bent up to prevent the spool from slipping off as it is being rotated. In this case, it was decided that it would be much simpler to screw a 2 B.A. wingnut on to the shaft, since the latter is already tapped with a 2 B.A. thread. It is not necessary to screw these nuts up tight against the spool, since they only serve as stops. The original 2 B.A. nuts fitted to the grindstone could, of course, be used, but the wingnuts are to be preferred since, being larger, they are less likely to be mislaid when not screwed to the shaft.

THE PRACTICAL WIRELESS ENCYCLOPÆDIA

By F. J. CAMM

The Entirely New 12th Edition of the Famous Standard Work

Considerably enlarged, amplified and entirely re-written and re-illustrated. Complete Television Section, with theoretical and constructional data.

All the facts, figures, and constructional data of Radio and Television—Definitions, Terms, Units—Principles, Circuits, etc.

Over 300,000 copies sold!

Price 21/- or 21/11 by post from:

GEORGE NEWNES LTD., Tower House, Southampton Street, Strand, W.C.2

A working Model Rowing boat

A Novel Design for the Modelmaker

By D. WASSELL

WITH the object of attempting a new subject for modelmaking, I constructed the electrically operated row-boat seen in the accompanying photographs. The details which follow are intended to form a basis for the modelmaker to work from, and possibly the individual may incorporate ideas of his own. The hull was made of cardboard, stiffened and water-proofed by layers of 1in. wide adhesive material and coats of paint. Using cardboard

pieces of card were cut to the cross-section contours at the four positions shown in Fig. 1 and fixed temporarily to the keel and to each other.

A sheet of card was bent along its mid-length, gummed to the keel, folded and secured together at the forward end to form the bows and then fashioned round the formers. This process called for numerous scraps of gummed paper applied *ad lib.* wherever they would best



To deal with the severe curvature of the hull near its maximum beam two cuts, 1 1/2 in. apart, were made from the gunwales half-way to the keel. If wetted slightly the card can be moulded to some extent, and the overlapping edges can be faired off by increasing thicknesses of gummed paper scraps. At the stern, where the angle at the keel is 90 deg., a transom was fitted, cut from three-ply wood.

The next operation was to cover the outer surface with slightly overlapped paper strips, port and starboard strips laid on opposite diagonals and overlapping each other along the stem and keel. When dry and given a

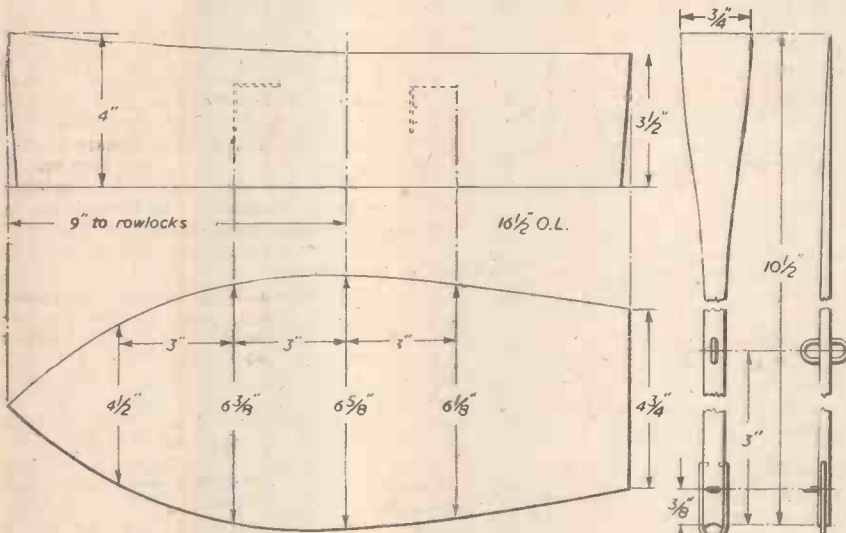


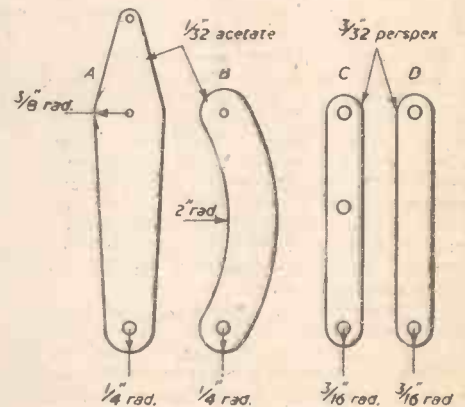
Fig. 1.—Plan and side elevations of the hull.

Fig. 2.—The oars.

of .04in. thickness throughout, the keel was a strip 16 1/2 in. x 4 in., strengthened by gumming a 2 in. strip centrally lengthwise. The keel-piece was then cut to a shape resembling that of the hull plan in Fig. 1, and bent to V-section.

Having determined the lines of the hull (which no doubt could be much improved),

serve to hold the card in position. As soon as the approximate lines of the gunwales could be drawn the card was cut, allowing a small margin for finishing off. Paper strips were crossed athwartships to hold the sides in position and prevent warping of the job as a whole.



A view of the completed model showing the linkwork.

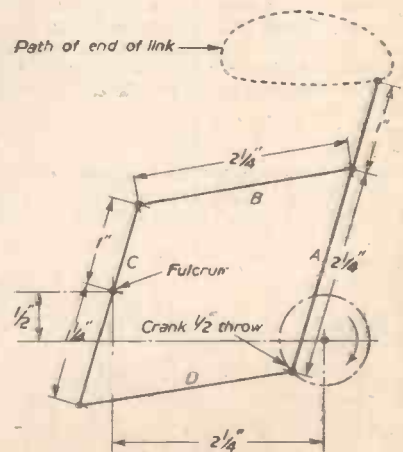


Fig. 4.—The linkage.

coat of cellulose paint, the job was firm enough to allow removal of the formers and other supports and to cover the inner surface in the same manner.

Over the first coat of paint I repeated the process, using strips of self-adhesive Sellotape applied oppositely to the layer of the paper strips. Then the gunwale edges were cut accurately and protected by lengthwise strips

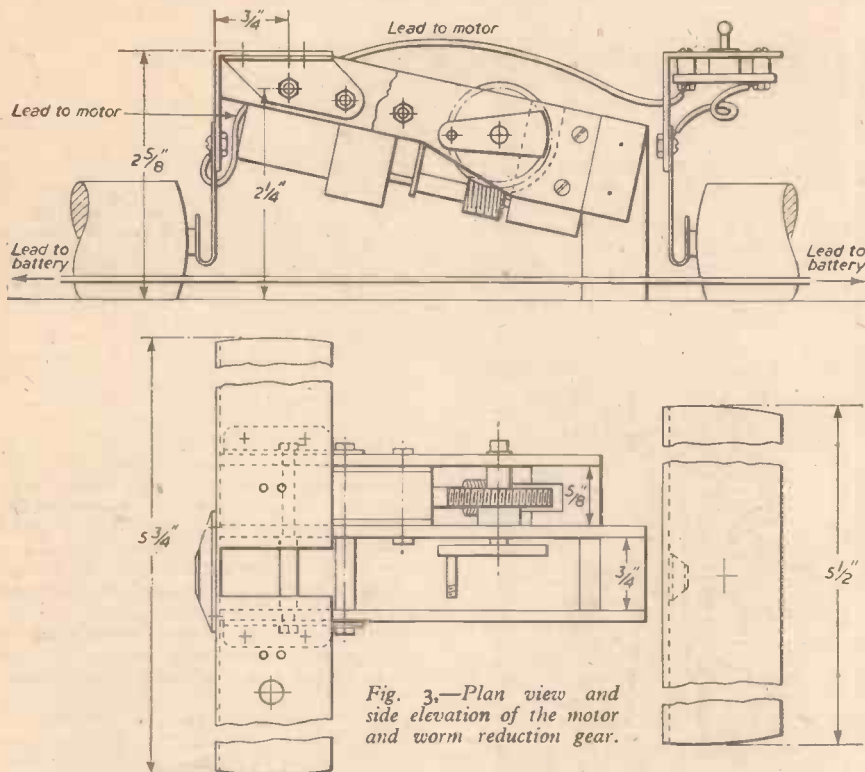


Fig. 3.—Plan view and side elevation of the motor and worm reduction gear.

of Sellotape, and the whole structure received two coats of cellulose paint.

I completed the hull itself by steaming two 1/2 in. strips of three-ply wood to shape and screwing them along the gunwales, with a small connecting V-piece at the bows.

The oars were carved from 12 in. office-type rulers, and the rowlocks made from 1/4 in. split pins, flattened at the eyes and opened out to shape (see Fig. 2).

The Drive

The mechanism for this model consists of a six-volt fractional horsepower motor, surplus war stock, obtained from Gamage's of Holborn, coupled direct to a 50 : 1 worm reduction gear, supplied by Bonds of Euston Road, London, N.W.1, driving a crank. They are positioned as shown in Fig. 3. The crank operates link-work connecting to the inboard ends of the oars, giving them their proper actions, i.e., horizontal motion forward and elliptical motion rearward.

The Linkage

The arrangement is shown in Fig. 4, links A and B being in duplicate pairs and of thin

material to allow them to flex in following the radial motion of the oars about the rowlocks. Links B may be straight, but they are less visible in motion if they are arcuate. Link C is double, separated by short-distance tubes for the assembly of links B and D. Two pairs of single-cell batteries, Ever-Ready U2, wired in series and connecting to the flat spring contacts attached to the boat seats, provide ballast fore and aft as well as motive power.

The Figure

It will be understood that the model as described will function without the figure of the oarsman whose movements are derived from those of the oars. He may, therefore,

be a ready-made puppet given an approximate movement by some simple connection with the oars. I have given him a more realistic action by building him up on a wire frame, Fig. 5, hinged at the elbows, shoulders and at the hips which are pivoted to the boat seat.

The leg frames are seen separately attached to the seat for easy access to the mechanism which they normally conceal. The wire eyes at the wrists are permanently coupled to staples in the oar handles where five turns of brown line simulate fingers. When the crank pin is in its lowest position the oars can be folded back with their blades over the transom for protection.

The body of the oarsman is lightly sprung forward by means of a projection of the framework below the level of the seat, so that tension keeps the arms outstretched until the backward motion of the body is limited by a stop, causing the arms to bend during the remainder of the stroke.

Loose floorboards in two sections were added, cut from cardboard and covered with brown paper strip in imitation of planking. A second seat farther aft serves to mount a switch with enough lead to allow the main seat with mechanism attached to be removed for inspection.

Provision should be made to prevent the oars being knocked out of the rowlocks by flotsam. Failing a better arrangement, tie a loose loop of thread round the rowlocks, and make fast inside the hull.

In practice this little craft rides well, and the

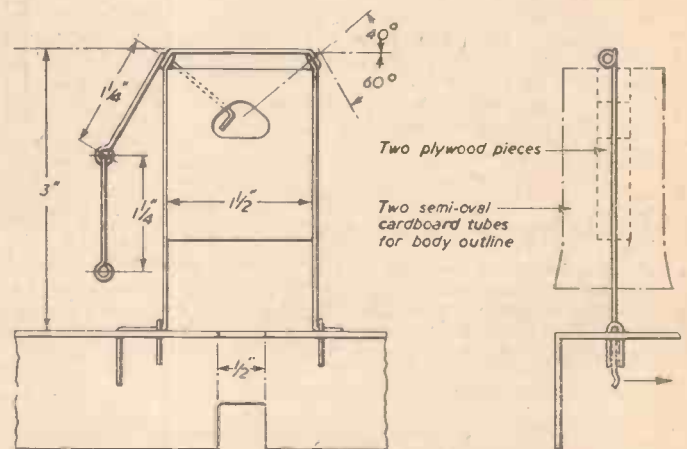


Fig. 5.—The wire frame of the figure.

general arrangement has proved quite satisfactory while the motions of the working parts closely resemble those of their life-size counterparts.

The Dunlop Diving Apparatus

A REVIEW of the breathing endurance secured with Dunlop's self-contained diving apparatus for shallow water was given in a paper read to the Institution of Mining Engineers by Professor R. McAdam of the Mining Department of Edinburgh University and Heriot-Watt College.

"If the apparatus is fitted with two cylinders," he says, "and the safety pressure is 30 atmospheres, then the apparatus endurance is 2 hours at depths of 0-30ft. when charged with pure oxygen at a pressure of 120 atmospheres. Using a 60 per cent. oxygen/40 per cent. nitrogen breathing mixture, the maximum period that the apparatus can be used for depths of 0-80ft. is 1 1/2 hours when charged to 120 atmospheres, or 2 hours when charged

to an initial cylinder pressure of 150 atmospheres."

For depths of 0-140ft., requiring the use of a 40 per cent. oxygen/60 per cent. nitrogen breathing supply, the endurance times are :

45 min.	when charged at 120 atmospheres,
60 "	" " " " 150 "
and 85 "	" " " " 200 "

"Considering," he adds, "the special problems involved in diving at depths of over 80ft. with the aid of self-contained breathing apparatus and bearing in mind the necessity for controlled decompression, it is recommended that the services of professional divers should be obtained for all work beyond a depth of 80ft."

Professor McAdam describes the apparatus as "one of the most compact of the self-contained types of diving apparatus suitable for underground use, and its general performance and reliability has been adequately proved by the diving units of the Royal Navy.

"No special dress is required," he explains. "For long dives, however, it is advisable to wear some type of diving dress in order to give protection from cold and abrasions. Bearing in mind that a rescue man will generally be on the move when under water in a mine and there is the possibility that he may have to walk along the roadway after negotiating the flooded part, it is advisable to choose a light-weight type of dress such as the Dunlop Mk.1 neck-entry underwater swim suit, or a frogman suit. Boots, if required, should also be comparatively light and 5lb. lead soles are quite sufficient."



A Surveyor's Level & Theodolite

By J. VOSE, A.M.S.E.

Made From an Astro Compass



AN accurate surveyor's level and theodolite can be easily made at small cost by adapting an ex-R.A.F. Astro compass (Mark 2), which can be purchased from advertisers in PRACTICAL MECHANICS. The one constructed by the writer, and described here, was tested against a standard dumpy level of a good make, with the result that no difference in accuracy could be detected over short distances up to 70ft. or 80ft. Above this distance the simple telescope was not sufficiently powerful to enable figures to be read on the staff, but by using a plain staff with a target, as described later, sufficient accuracy could be obtained for all normal building purposes, at distances up to 200ft. or more.

In addition to straightforward levelling, the instrument can be used as a simple theodolite, divided circles allowing horizontal bearings to be measured as well as gradients.

The Instrument Described

Fig. 1 shows the instrument as purchased. The base is a clamp, which can be fitted on to the tapered tip of a 1 1/4 in. diameter wood or

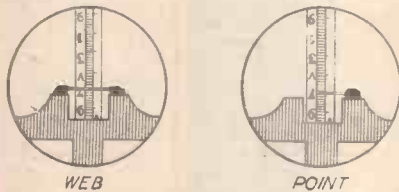


Fig. 2.—The two types of sighting line.

metal rod, and is secured by a clamping screw, with a tommy bar attached. Two levelling screws are attached to this base casting for the purpose of levelling the baseplate of the instrument. This baseplate is secured by a gimballed universal joint to the clamp casting and carries, on a fixed extension, two spirit-levels. By means of the milled wheels on the levelling screws, the baseplate is adjusted until each of the two level bubbles lies central. Carried on this baseplate is a 360 deg. divided circle, which can be revolved in a full circle. An arrow pointer marked "True Course" enables horizontal angles to be measured. Carried in a pair of bearings on this divided circle is a further circle also divided into 360 deg. This circle can be turned by means



Fig. 1.—The ex-R.A.F. Astro compass as purchased.

of a milled knob at the side, and can also be tilted to correspond with the polar axis. A divided arc shows the tilt, which is controlled by a small milled knob having a vernier adjustment divided into degrees. This is used in the modified instrument for measuring angles of gradient. A fixed vertical plate at the top of the compass carries an optical sighting bridge marked "Declination." This is pivoted on one screw, and carries a pointer to indicate the declination angle against an engraved arc. The optical sight has a small lens at one side, and some kind of sighting bars at the other end. In the writer's instrument these bars were missing.

It is obvious that the instrument can be used for measuring angles, and for rough levelling, without any modification, by sighting across the optical sights, but having regard to the precision workmanship in it, it was considered

worth while devising a simple telescope, using the existing lens as an eyepiece, to enable observations to be taken at greater distances, and with much greater accuracy.

Making the Telescope

The optical sights are first taken off by unscrewing the locknut and taking out the screw. This screw and nut, together with the washers, should be placed on one side for replacement later. Care must be taken that the small lens is not damaged or dislodged. A sighting line is necessary at the opposite end, and the writer at first used a web, in the following manner. The two horns on the sighting bar were rubbed with a spot of "Metalfix" clear adhesive, and allowed to dry. Then a spot of "Metalfix" was picked up with the point of a pin and touched on to one of the horns, and immediately drawn away, pulling off a filament which can be drawn out to almost any desired fineness. This web is drawn across the other horn, and secured by touching it on to the prepared surface. After a few tries a satisfactory web was obtained—fine, taut, and level. This was later modified by using a

point instead of a web. The end of a fine sewing needle was broken off and soldered to one of the horns, the point extending half-way

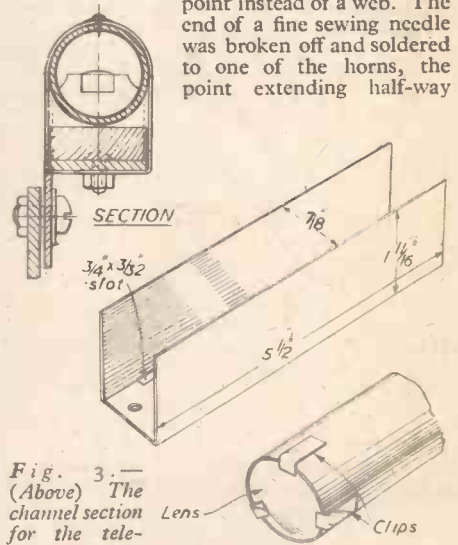


Fig. 3.—(Above) The channel section for the telescope body. Lens. Clips

Fig. 4.—(Right) Holding the lens in position.

across the gap. This was considered to be more robust than the web. Fig. 2 shows the two types as seen through the eyepiece when sighting on to a surveyor's Sopwith levelling staff.

The telescope body is bent up from a piece

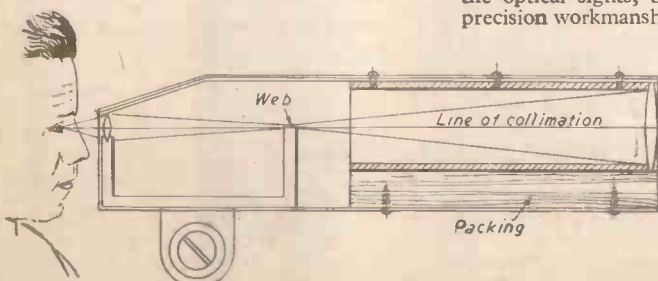


Fig. 5.—The completed telescope.

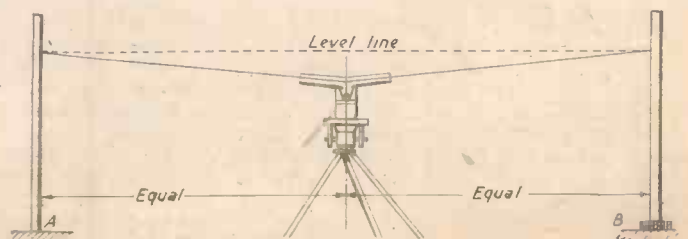


Fig. 6.—Adjusting the instrument.

of sheet aluminium $5\frac{1}{2}$ in. \times $4\frac{1}{2}$ in. to the channel section shown in Fig. 3. A slot is cut out of the bottom of this channel $\frac{3}{4}$ in. long \times $\frac{3}{32}$ in. wide. The slot is $\frac{1}{2}$ in. from the eyepiece end, and is on the left-hand side. The optical sight assembly is pressed down into this channel with the tongue projecting through the slot, a small hole drilled through each end of the base, and through the aluminium, and a small bolt passed through each hole and secured on the underside with a nut. It is essential that this fixing is perfectly rigid, as a slight movement of the objective end of the telescope relative to the eyepiece and sighting web, or point, would cause large errors in levelling.

Objective Lens and Mount

The objective lens was taken from a watch-maker's eyeglass. It is approximately $3\frac{1}{2}$ in. focus and $\frac{3}{4}$ in. diameter, was obtained from a well-known multiple store very cheaply and is eminently suitable for the purpose. The quality of the lens does not affect the accuracy of the instrument in any way, and a more powerful lens of longer focal length would only tend to make the level unbalanced and more liable to shake. The lens was mounted on the end of a $\frac{3}{4}$ in. length of $\frac{3}{4}$ in. internal diameter tubing. A piece of $\frac{3}{4}$ in. copper water pipe was used in the instrument described. Three short pieces of thin copper strip were soldered to the side of the tube at one end and equidistant from each other, the lens dropped in, and the strips bent over forming clips to hold the lens in position (see Fig. 4). A touch of Bostick adhesive prevents any slight movement, and the inside of the tube is painted dead-black to prevent annoying reflections.

A packing piece is required to bring the lens mounting tube up to the axis of the eyepiece lens. A $\frac{3}{4}$ in. length of $\frac{3}{4}$ in. \times $\frac{3}{4}$ in. hardwood is required for this, pressed down into the aluminium channel and secured by two small wood screws from underneath. The lens tube can now be dropped into the channel and on to the packing piece. It should be a fairly tight spring fit between the wings of the channel.

By sighting on to an object about 20 ft. away, the lens tube can be slid up or down, until the telescope is in focus. As the power of the telescope is quite low, it will be found that a fixed focus is quite good enough to enable readings to be taken from about 4 ft. to infinity. When a satisfactory mean focus has been found, the two aluminium wings are bent snugly around the lens tube, overlapping slightly, and temporarily bound with wire or strong string. Three or four small holes are drilled through the overlap, and into the lens tube, and self-tapping screws driven in to hold all secure. At the eyepiece end, the aluminium will need bending down to rest on the metal lens mounting, see Fig. 5. A couple of coats of black lacquer will finish the telescope, which can now be replaced in position on the Astro compass, and screwed up hand tight for the time being.

Adjusting the Instrument

Select a level piece of ground, or a footpath, and set up the level on a tripod, or clamp it on to a strong stake driven into the ground. Level it up by means of the milled screws until both spirit bubbles show level. See that the "LAT" adjustment is set to 9 and the vernier to 0. This means that the instrument is 90 degrees from vertical, which, of course, is horizontal. Adjust the telescope as near level as can be judged, and then set out a point A, 30 ft. in front of the level and another one B, 30 ft. behind it. Have an assistant hold a staff vertically on the first point A, and get him to mark a heavy pencil mark on the staff where you see the web or point in the telescope cut across the staff. You will have to guide the assistant's pencil by hand signals until it is at the right height.

Transfer the staff to the second position B and reverse the level by turning either of the horizontal circles, but without disturbing the tripod. Check the spirit levels again. If now the staff is packed up or lowered until the web again cuts the pencil line, the two points are level.

Fig. 6 shows, exaggerated, how the two

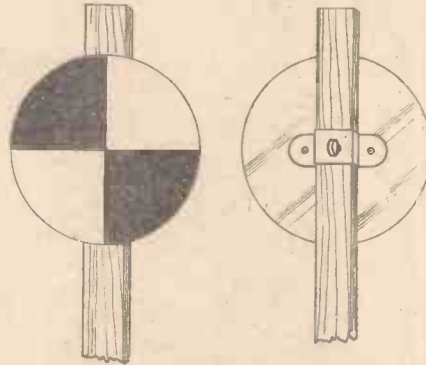


Fig. 7.—The circular metal target.

points are level, even though the telescope is pointing up, providing the two points are equidistant from the level. If now the instrument is set up a few feet behind one of the positions, and sights taken to the staff in both positions, the telescope can be adjusted until the same reading is obtained at both positions. This procedure should be repeated until it is certain that the line of sight, or line of collimation, as it is called, is dead level, when the screw can be tightened up and locked securely.

Using the Level

The easiest way of using the instrument, and one not liable to errors of reading figures, which is very easy, owing to the figures being viewed upside down in the telescope, is to use a staff, say $1\frac{1}{2}$ in. \times 1 in., and 5 ft. or 6 ft. long. A circular metal target 6 in. or 8 in.

diameter and painted in segments as shown in Fig. 7, has a bridge piece on the back to slide up and down the staff, being adjusted to position by an assistant, and fixed with a screw in the bridge which tightens on to the staff. A strip of metal under the point of the screw prevents digging into the staff. The staff is held on the given datum, and the target adjusted to the height as seen through the telescope, and fixed by the screw. It is then transferred to the second position and held against a peg driven into the ground. The staff is raised or lowered until the target is again in register, the foot of the staff marked on to the peg, and the peg sawn off to the mark. When as many pegs as required have been levelled, they must be checked again to ensure that no movement has taken place in the level or tripod.

Horizontal angles can be taken by either the larger lower divided circle, or by the upper one, whichever is preferred. The upper circle is controlled by the milled knob at the side. Slopes or gradients are measured by the "LAT" adjustment. Each division on the arc equals 10 degrees and each division on the vernier knob equals one degree. Before gradients are measured, the upper horizontal circle must be adjusted so that the "True Bearing" arrow points to either 0 or 180 degrees, otherwise errors will arise.

The few hours spent in adapting this beautiful little instrument, and a further few pleasant hours spent in mastering its use, will result in the possession of a most useful and valuable levelling instrument, costing less than one pound complete, and capable of doing similar work to that of an instrument costing forty or fifty pounds.

The transit case supplied with the compass will not take the level after conversion. This can be overcome by unscrewing the bottom of the case, glueing and screwing $1\frac{1}{2}$ in. deep battens all round, and screwing the bottom on again. This makes the case $1\frac{1}{2}$ in. deeper, and a piece of thick felt or rubber sponge can be stuck on to the bottom to support the end of the telescope.

A Mercury Switch Relay

THE "Tilray" relay has been designed to enable full advantage to be taken of the outstanding properties of the modern mercury switch, which include the ability to switch heavy and very inductive loads on both A.C. and D.C. and to perform millions of operations without the need for any maintenance.

Mercury switches will withstand inrush currents of many times their rating; will not ignite an explosive atmosphere and are unaffected by damp or corrosive conditions; require extremely little operating power and usually cost much less than an open switch to do the same job.

If the load is inductive, however, it is most essential that the switches are moved smoothly so that the mercury flows from one position to the other and is not splashed about so as to cause multiple make and break and, therefore, the production of unnecessary heat.

The usual design of a mercury switch relay in which the switch is directly connected to the armature will give sufficiently smooth action for the less inductive loads providing a weak coil is used, but this means that if the switches are at all heavy, the relay might not operate if the supply voltage drops significantly.

In the "Tilray" design, however, the movement is so smooth that almost indefinite life is assured and very heavy, very inductive loads can be switched in perfect safety, even though the supply voltage falls or rises by as much as 30 per cent. The method of

operation (provisional patents) can be seen from the sketch.

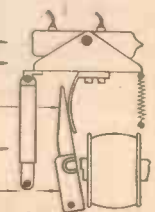
The switches are carried in a tilting tray pivoted at the optimum point for smooth mercury flow. The armature moves this tray by "variable ratio one-tooth gears" which drop the gear ratio as the armature accelerates towards the coil. The smoothing of the armature's acceleration curve thus produced is increased by the pneumatic damper, which also ensures that the tray is brought smoothly to rest.

The relay-chassis employed is the patent B. & R. type "C," which gives inherently silent operation on A.C. and a coil consumption of 5-15 vA. on A.C. and $\frac{1}{2}$ -2 watts on D.C.

Any further information may be obtained from Messrs. Besson and Robinson, Ltd., 6, Government Buildings, Kidbrooke Park Road, London, S.E.3.

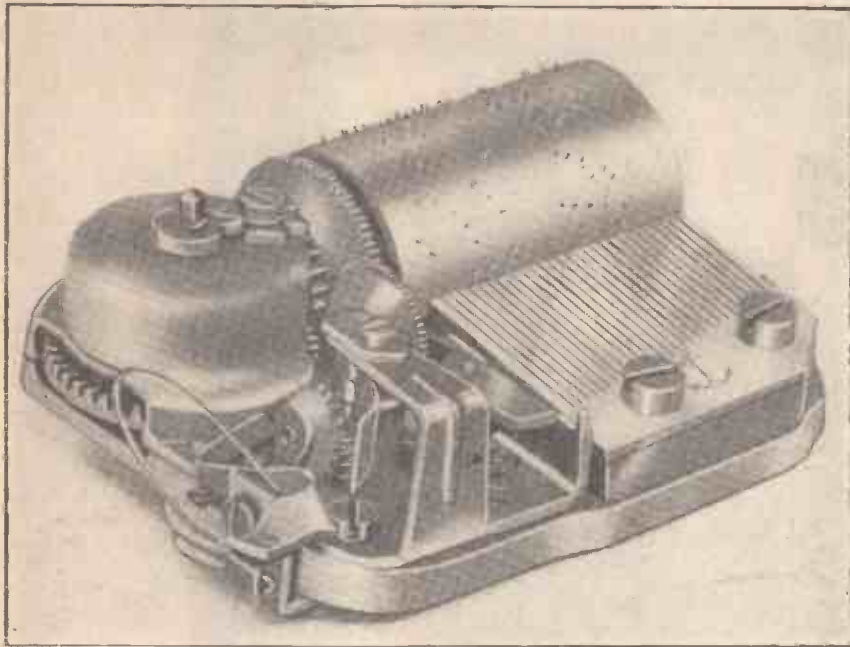
PIVOTS SHOWN THUS: •

MERCURY SWITCHES
TILTING TRAY
VARIABLE RATIO
ONE TOOTH GEARS
PNEUMATIC DAMPER
ARMATURE & COIL



SCHEMATIC DIAGRAM OF CO6

Musical Boxes: Overhaul and Repair



A typical mechanism.

THE Swiss and the Germans were responsible for developing musical boxes, of which many fine and ingenious examples are in existence. There are those which play only a set tune or two tunes, those with large steel discs which will play as many tunes as one has discs, others where figures perform as the music is played, including singing birds and acting characters. A musical box preceded the gramophone as a form of home entertainment. The gramophone and other forms of mechanical entertainment have killed the demand for these remarkable mechanical devices. Since the war, however, there has been a revival in musical boxes somewhat smaller in size and incorporated in such things as ladies' vanity cases, flapjacks, jugs and cigarette boxes. In years gone by, musical watches which played a tune automatically every hour, or whenever a stud was pressed in the side of the case, were on the market. It is difficult to-day to get such musical movements repaired. This is somewhat surprising since the mechanism is extremely simple. The illustration at the top of this page is typical of the majority imported from Switzerland to-day. It consists of a mainspring in a barrel, driving a cylinder through simple gearing. On this rotating cylinder a number of pins are inserted at irregular intervals, corresponding to the tune or tunes it is designed to play. These pins come into contact with a comb or key-plate, lifting or plucking them to give the note. Each reed is individually tuned. They play both the air and the base. The speed is governed by a fan brake as on chiming clocks, and the mechanism is set in motion when the lid of the box is opened, the lid pressing on a plunger which acts on the fan brake. When the lid is opened this plunger is released and the mechanism is set in motion. In the case of musical jugs the plunger is in the base of the jug and the weight of the latter keeps it in contact with the brake. It is released as soon as the jug is lifted.

It will thus be seen that there is very little to go wrong, and the main troubles encountered are: sluggish action due to congealed oil or broken mainspring; broken pins on the cylinder or broken comb, so that some notes are missed.

Curing Sluggish Action

As far as sluggish movement is concerned, this may be remedied by immersing the whole movement, without taking it to pieces, in benzine and cleaning it with a reasonably stiff brush to remove all traces of dust and congealed oil. The movement should then be left to dry, and all the pivots and rotating parts oiled, smearing a little on the comb to prevent rusting. If it is necessary to remove the comb it must be carefully reset for depth of engagement with the pins, as too much lift may cause breakage of either pin and/or note. Place vaseline on the worm which drives the

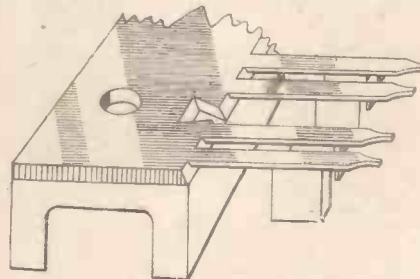


Fig. 1.—The dovetailed notch in the key-plate.

fan brake. A broken mainspring may, of course, be repaired in the ordinary way, but if the movement has stopped without the mainspring running down, do not forget to lift the pawl on the ratchet to let the spring down before dismantling the movement, otherwise pivots may become sheared and teeth distorted.

The following instructions relate to a complete overhaul, and are due to F. J. Britten.

First of all remove the comb or key-plate. Then let down the mainspring and see that the driving mechanism runs well, and that the cylinder, though free, has no end- or side-shake. The fly depth is important, for unless this runs smoothly and easily the movement will stop.

Replacing a Key

If there are one or more keys missing they may now be replaced in the following manner:

At the point where the new key is to be toothed in, file a dovetailed notch in the key-plate (see Fig. 1). Then file up a key similar to the adjacent one, but rather full at one end and with a heel to fit into the notch. Harden the key and temper it. Drive it tightly into position, and to make it secure slightly rivet it or run a little solder into the joint by heating the spot with a blow-pipe or heavy soldering bit. Heat the comb as little as possible, and confine the heat to the place under repair. Now the key may be tuned, leaving it half a tone too high; for it is easier to lower than raise, and the damping spring will bring it down the half-tone or nearly so. Keys are lowered in tone by weighting them with lead near the point, and raised by thinning a little on the underside behind the lead. To get at the underside to file it, have a rectangular brass stake as wide as the key, and with a little ledge, as shown, on one side, hardly as high as the key is thick. Rest the top of the key to be filed on the stake (Fig. 2), holding the comb in the hand, so that there is enough weight resting on the stake to elevate that key above the rest, and then it can be filed in comfort, the ledge offering the requisite resistance to the file. If the key is near the middle of the comb it may be necessary to use a file with an *over* handle to it. When getting the point of the tooth to length, continually apply a glass surface plate or straight-edge along the tips, for it is essential that all the tips should be exactly in line.

If only the tip of the key is missing, it will not be necessary to replace a whole key, but merely to file a slit in the stump and let in a new point which may be fixed by soldering. The tip may be let down a little, by means of a blow-pipe, to enable the file to cut, but care should be taken not to soften the bending part of the key.

It is sometimes necessary to elevate or depress a key, or to make it point a little to the right or the left. Place the top of the comb on a steel stake or anvil, face downwards, and, to elevate a key, tap the under-surface gently with the hardened pene of a hammer so as to stretch it. In the same way, if a key is to be turned to the right, stretch the left edge. If a key is to be depressed, an expert will bend it with a smart blow of the hammer on the middle of the underside while it rests on the anvil, but this is risky and will often result in a broken key. It is better to stretch the upper surface of the key with light taps even though the marks show.

Adjusting the Key-plate

Now put the key-plate in position and see that the points of the keys are exactly in a line with the pins in the barrel, and if not, the cylinder bearings must be bent till this is

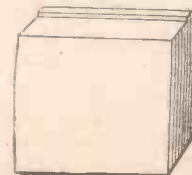


Fig. 2.—The Stake.



Fig. 3.—The free end of the damping spring should be as close as possible to the point of the key.

right. Then see to the damping springs and supply new ones where necessary, fixing them quite tight with the old pins. It will be observed that the thicker keys for the lower tones have heavier damping springs than the intermediate keys, while the highest notes are without dampers. Occasionally

some of the notes above the springs have dampers of quill. These are fixed with shellac dissolved in spirits of wine. The keyboard points not to the centre of the barrel, but above it, the proper elevation being about 15 deg. from the horizontal line. The free end of the damping spring should be as close as possible to the point of the key without touching it, shaped as shown in Fig. 3, so that the pin in the barrel touches the spring first at about the point indicated.

Adjusting the Springs

If the damping spring is too thin, it will fail to stop the vibrations of the key soon enough, and if too thick will create a buzzing noise just as the key leaves the pin. A spring may be thick enough and yet fail to stop the vibrations because it is not forward enough. The springs will be readily bent to position with a pair of tweezers.

To observe the action of the springs, place the key-plate in position and note first that it is the right height, as indicated by the dots on

the cylinder. The shortest key should be on a level with the dots, and the longest one, which has more movement, about half a dot below it. To alter the height, the bearings of the cylinder may be raised or lowered as required.

To see if the key-plate is at the right distance from the pins, let the cylinder rotate slowly, and if the keys are not drawn up enough there will be but little sound, and the comb must be set a little closer to the cylinder by bending the feet of the base. If the sound is harsh and the dampers fail to stop the vibrations, the key-plate is already too close. If, in playing a tune, the notes at one end are produced too late, it shows that end of the key-plate is too close to the cylinder.

Let the box run through all its tunes, and if at any tune the pins do not pass exactly in the centre of the keys, the star wheel for that tune must be corrected. The drop from the highest to the lowest step of the snail, in time, causes an indentation in the latter, which may be filled by screwing into the face of the snail a piece of tempered steel to

receive the blow of the pin. Any of the pins in the cylinder that are out of shape will be noted as the tunes run through, and carefully bent as required. New pins are formed with a pivot which fits tightly into the hole in the cylinder; the pin is driven in up to the shoulder, the part projecting being rather larger in diameter than the pivot.

Sometimes a buzzing noise is observed while the box is playing. This is generally caused by something loose. To discover it, sound each key by striking it with a suitable pointer till the buzzing is heard; then continue sounding that note while placing the hand on different likely parts of the box and mechanism till the buzzing is arrested, when an examination of the part will probably reveal a screw that requires tightening, or even the want of a drop of oil, which has been known to cause this disagreeable sound. In connection with these notes on musical boxes, I have to acknowledge the courtesy of Messrs. C. Paillard & Co., who have readily answered all my inquiries on the subject.

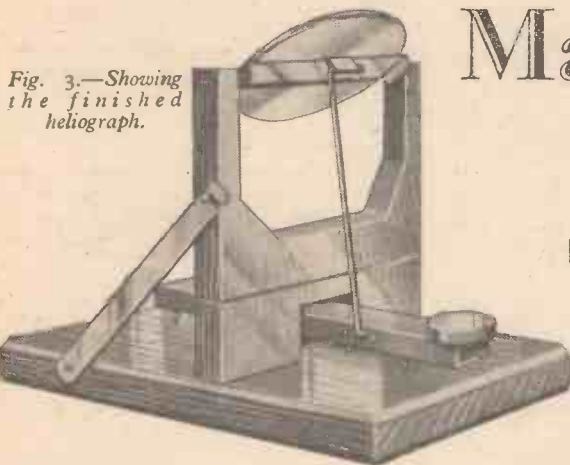


Fig. 3.—Showing the finished heliograph.

How it Works

READERS who are interested in signalling work, doubtless know that the heliograph is one of the instruments used in establishing communication between two parties at a distance from each other. The heliograph possesses several advantages, viz., portability, range, secrecy and rapidity. It is easily carried, being strapped round the waist or slung over the shoulder; with a 5in. diameter mirror it is possible to transmit a message seventy miles; the lateral range at six miles is only 50 yds. on either side, which equals about 8 yds. in a mile; it has great rapidity and it is possible for the signaller to keep up a high rate of speed; the bright flash of a heliograph can be readily picked up by any efficient reader of Morse, and it is easy with which to open up communication.

But for success in using the heliograph, sunshine is required, thus it is no good for a cloudy day; then it requires a fair amount of skill and continuous watchfulness to manipulate the mirror so that the "spot" is kept on. It is important to note in this respect that the beat must be kept regulated; you require a bigger beat for short distance, and a smaller beat for long distance.

The Theory of Heliography

The theory of the heliograph is simple enough to understand. It must be remembered that light travels in straight lines, called rays, and the first law is that the angle of incidence is equal to the angle of reflection; the second law is that the incident ray, the normal, and the reflected ray are always in the same plane. A ray from the sun striking the helio mirror will leave the mirror at the same

Making a Portable Heliograph

For Those Readers Interested in Signalling Work

angle. The incident ray is the line along which the light travels before striking the reflecting surface of the mirror and the reflected ray is the line along which the light travels after striking the reflecting surface; the normal is the line at right angles to the reflecting surface at the point where the ray strikes it. (See Fig. 1.)

The greater the angle of incidence and reflection, the less light you can get from your mirror. At early morning light travels through more atmosphere than at noon when

communicating. Place the sighting arm in line with the distant station and clamp up tightly. Now, keeping your head quite still, move the jointed rod until the centre of the unsilvered spot, bisection of cross wires of the sighting rod, and the reflection of the distant station are in one line. When the sun and the position of the distant station are at such an angle to each other that it is impossible to use a single mirror and the sighting rod, another mirror, called the duplex mirror, is used in place of the sighting rod. The reflected ray is carried from the signalling mirror on to the duplex mirror and again reflected from that on to the distant station. (See Fig. 2.)

The signalling mirror is worked by a key, under which is a spring which forces the key back after it has been pressed by the signaller. The adjustment of the "spot," necessary to keep correct alignment, is made

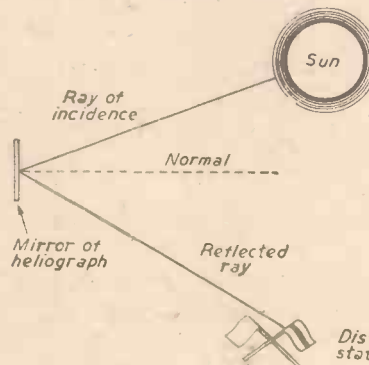


Fig. 1.—The principle of the heliograph shown diagrammatically.

the sun is directly overhead; thus you see that it is necessary to keep continually adjusting the mirror as the sunlight shifts onwards during the day. To keep this necessary adjustment, there is, in the centre of the reflecting mirror, an unsilvered spot, and the shadow of this spot must be kept aligned correctly.

Aligning

When using the jointed sighting rod, place the heliograph so that the signalling mirror is roughly half-way between the sun and the distant station with which you are com-

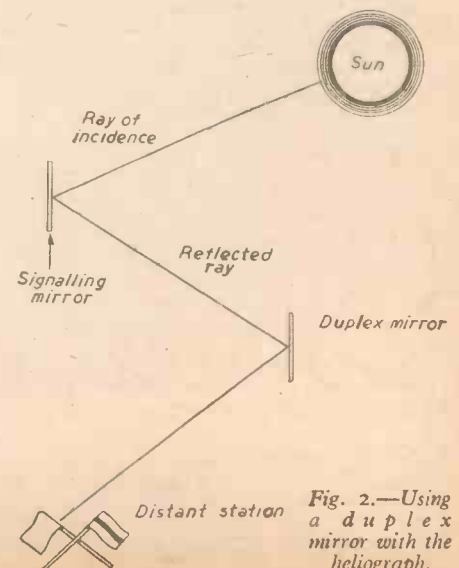
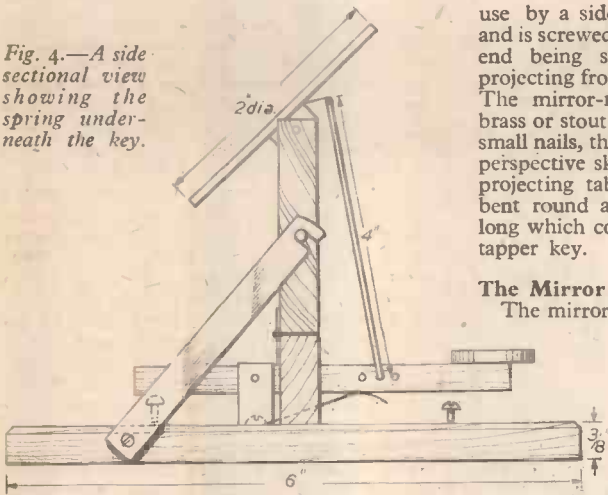


Fig. 2.—Using a duplex mirror with the heliograph.

Fig. 4.—A side sectional view showing the spring underneath the key.



by an adjusting screw; and there is a beat-regulating screw for adjusting the beat of the key.

Making a Portable Heliograph

By means of a heliograph, messages in morse may be sent, during sunshine, over distances of many miles. The instrument described here is simple to make, and when not in use, may be folded and carried in the ruck-sack, etc.

Begin by cutting the base from 3/4 in. wood to measure 6 in. x 3 1/4 in., as shown in Fig. 3, and the taper key to the measurements given in Fig. 5. Glue a rin. disc of wood at one end of the key, and at 1 in. from the other end insert the pivot. This is a piece of nail having the head and point cut off. It fits tightly in the key, and projects 1/2 in. at each side. To the right of the pivot will be noticed three small holes. These are 3/16 in. apart and should be drilled to admit a piece of stout wire easily but without shake. Fig. 5, also gives the measurements of the double bracket by which the key is fixed to the base. Cut it from stout brass, drill it and bend it at the dotted lines. The spring below the key (see Fig. 4) is a piece of clock spring. Soften one end by heating until red, then drill it to admit a round-headed screw which secures both the spring and the double bracket to the base. Two other screws project from the base, one below each end of the key. These regulate the movement of the key, the front screw being 3/16 in. lower than the back screw.

The Mirror Support

The mirror support (Fig. 6) is made from two pieces of 3/4 in. wood, hinged together. The lower piece, which is glued to the base, has a gap 1 in. by 1/4 in. cut out to allow it to bridge the key. The upper piece is held erect when in

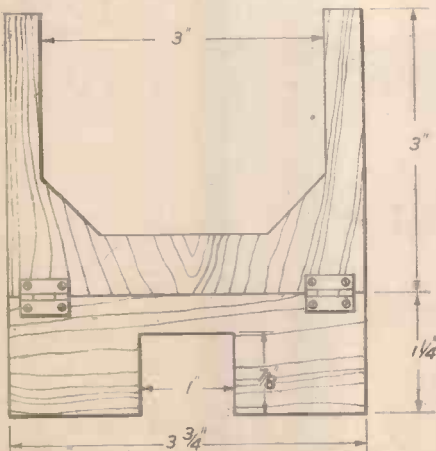


Fig. 6.—The mirror support.

use by a side strut. This is cut from brass and is screwed to the side of the base, the upper end being slotted to engage with a nail projecting from the side of the mirror support. The mirror-rocker (Fig. 7) is made from brass or stout tin. Drill the ends to admit two small nails, then bend the strip as shown in the perspective sketch in Fig. 7. The end of the projecting tab at the middle of the strip is bent round a piece of stout wire about 5 in. long which connects the mirror-rocker to the taper key.

The Mirror

The mirror is one of the tin-backed variety measuring about 2 in. in diameter which may easily be obtained. Solder it to the rocker strip, but be careful not to use too much heat or you will crack the glass. Drill the ends of the uprights of the mirror support and insert two thin nails which form the pivots of the mirror. Hold the mirror at an angle of 45 degrees and bend the end of the connecting wire so that it will enter the middle hole of the three. Upon operating the key, the mirror will be "flicked" and in sunshine a

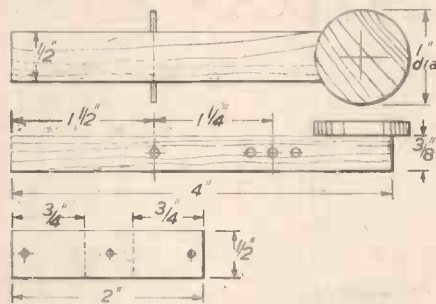


Fig. 5.—Details of the taper key.

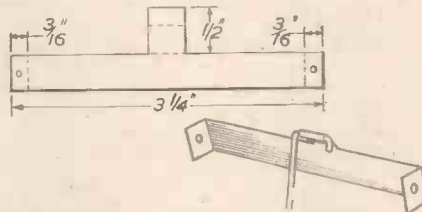


Fig. 7.—The mirror rocker.

distant observer will see a flash the duration of which denotes dash or dot. If the end of the wire is removed to either of the holes in the key the angle of the mirror is altered.



New Printing Method

THE Standard Register Co., Dayton, Ohio, have recently announced a "revolutionary new method of printing, expected to have far-reaching effects both in reproduction of office records and in the graphic arts field."

A "Photronic Reproducer" has been developed, combining the principle of photography and electronics, to print instantaneously without physical contact with the paper. The paper used by the machine requires no special coating or treatment before or after reproduction.

Basically, the process consists of the use of a dye in the form of a mist which is propelled by electrostatic force on to the surface of the paper in the form of the image which is projected on to the paper by the apparatus.

Briefly, the light energy is converted into electrical energy which causes the dye to be deposited on the paper in relation to the amount of light which is projected on to it.

The Newton

THE International Electrical Technical Commission adopted in 1950 a new unit of force—the Newton. It has been recommended by the Institution of Electrical Engineers for use in universities and technical colleges. It is defined as a unit of force in the M.K.S. system (metre-kilogram-second) and is the force which causes 1 kilogramme to accelerate at 1 metre per second per second.

Iron That Bounces

ALTHOUGH it may sound incredible, iron that can twist, bend and bounce is now being produced in Britain.

It is made by adding small amounts of magnesium and nickel to ordinary iron. The iron is wear and heat resistant, and it bridges the gap between cast iron and steel.

New Insulating Material

A NEW insulating material that is inexpensive and provides excellent insulation against heat, cold and sound is now being manufactured in Scotland.

It is silky in appearance, and is made from a rock known as dolomite and a type of clay.

Petrol-saving Device

AN ingenious petrol-saving device is being experimented with by Polish motor-car engineers. The device, called the "Ozonisator," sends out ultra-violet rays, which convert part of the air taken in by the engine to ozone. Ozone causes complete combustion of the petrol and air mixture.

The "Ozonisator" is stated to save about 10 per cent. in petrol, which otherwise is not completely burnt in the engine.

The Profiloscope

A NEW profiloscope for measuring and inspecting the bores of dies down to 1-500 in. in diameter has been developed by the Longworth Scientific Instrument Co., Ltd., Abingdon, Berkshire, in collaboration with the British Iron and Steel Research Association.

New Photographic Process

EASTMAN KODAK (U.S.A.) announce that they have recently developed a new technique by which sharply detailed negatives can be converted into effects like pen-and-ink drawings without extra art work,

— FOR THE MODEL MAKER —

THE MODEL AEROPLANE HANDBOOK
Construction and Principles of all Types
12/6 (13/- by post)

MODEL BOAT BUILDING
Constructional details of Model Sailing and Power Boats.
5/- (5/6 by post)

THE HOW-TO-MAKE-IT BOOK
13/- (13/6 by post)

From George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

Electric Buzzers, Bells and Chimes

Details of Some Simple Warning Devices

By "HOME ELECTRICIAN"

THE construction of buzzers, bells and chimes, such as those of two- or more note type, is interesting and does not present undue difficulty. Buzzers and bells have many applications, both in models and as signal or warning devices. They can also be used for code practice and similar purposes, and various methods of employing them will come to mind. Chimes of the simpler type are

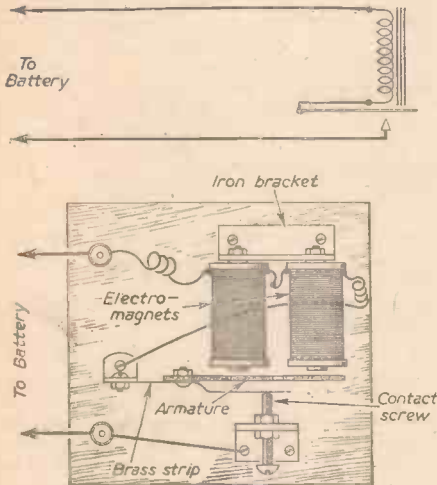


Fig. 1.—Circuit and plan of buzzer.

also well known, and often found instead of the buzzer type of doorbell because of their less strident characteristics. It is also comparatively easy to make up units which will ring a series of chimes, either for this purpose or for addition to clock circuits.

The circuit and layout of the usual type of bell and buzzer are shown in Fig. 1, and this type lends itself very readily to home construction. The circuit to the magnet windings is completed by the contact screw and strip to which the armature is secured, and is therefore broken when the armature is attracted towards the magnets. This sets up a very rapid vibration of the armature, the degree of movement being adjustable by altering the position of the contact screw and armature. With an electric bell a further flat spring strip projects from the free end of the armature, terminating in a small hammer which strikes a fixed gong or bell each time the armature vibrates.

Such a unit, either as buzzer or bell, can readily be made from odd parts. A single magnet may be used, but two are preferable. The cores may be made from iron bolts fitted with cheeks of any insulating material. For 3 volt to 6 volt operation 24 s.w.g. wire is suitable for the windings, each bobbin being wound to capacity. The ends of the windings must be so connected that the free ends of the cores have opposite magnetic polarity, and this will be so when the turns are wound on in opposite directions, the end of the first magnet winding being connected to the beginning of the second winding. A layer of insulation is required over the cores, to prevent possible shorting, if enamelled wire is used. For higher voltages or economical operation, 28 to 30 s.w.g. wire is satisfactory.

The armature must be of iron or other ferrous metal, and a suitable size is about 1½ in. to 2 in. long, ¼ in. to ½ in. wide and 1/16 in. to ¼ in. thick. All other details of construction are apparent from the diagram.

Mains Operation

When a bell or buzzer is fitted up for regular use, mains operation is an added convenience, as battery replacements are avoided. The correct connections for such a circuit are shown in Fig. 2, and a few points require note if maximum safety and reliability are to be achieved.

The transformer should be of the proper "bell" type, or one equivalent to it. Wiring to the primary will be at mains voltage and should be installed accordingly, insulated cable of suitable type being used. The transformer may frequently be adjacent to the main distribution board and primary wiring is then very short. No means for interrupting the primary circuit is provided, since a correctly designed mains transformer consumes virtually no current when no load is applied to the secondary.

Wiring to secondary, bell and bell-push is of low-voltage type, and thin "bell wire" can be used: As with all such low-voltage circuits,

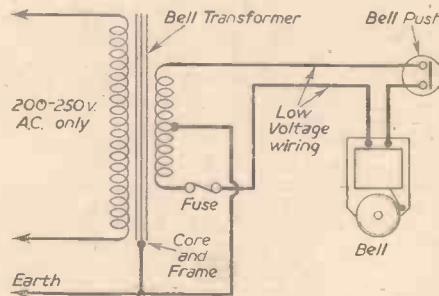


Fig. 2.—A.C. mains operation of bell or buzzer.

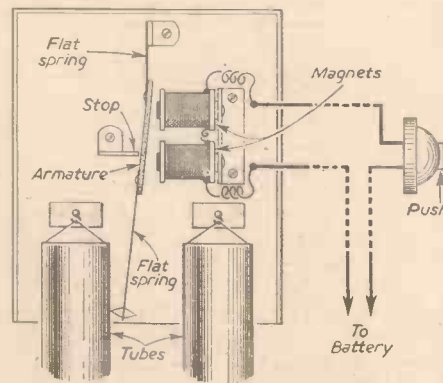


Fig. 3.—2-note door chime.

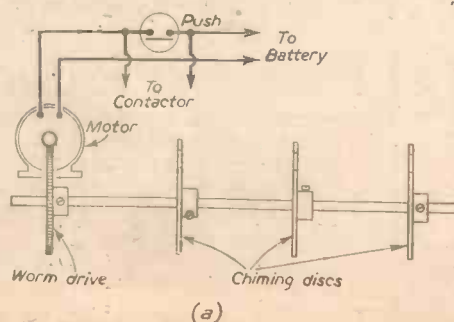


Fig. 4.—"Westminster Chime" type of mechanism.

the wiring should not be adjacent to mains voltage wiring, or run in the same conduit or channels as the latter. In order that the secondary circuit cannot become alive at mains voltage under conditions of fault, the core, frame and secondary of the transformer are wired to the mains earth point. If the secondary is not centre-tapped, one end is thus connected instead. The fuse in the secondary circuit can normally be of 2 to 5 amp. rating. If fuses are added in the primary circuit, they should be of low rating—½ amp. to 2 amps.

The usual output of such transformers is about 3, 5 and 8 volts. The higher voltage tappings are used to compensate for the voltage drop arising when leads to the bell or push are long. Transformers cannot be operated from D.C. mains.

Simple Door-chimes

The construction and operation of the simplest form of chime will become apparent from Fig. 3. The hammer is attached to a thin flat spring and is not normally in contact with the left-hand gong tube, the stop preventing further movement of the armature in this direction. When the push is depressed, the armature is drawn smartly to the right, so that the hammer strikes the right-hand gong tube. When the push is released, the armature springs to the left and the second tube is struck. As such pushes are usually depressed briefly this gives a two-note chime with the advantage of no electrical contactor or similar moving parts.

For a brisk movement, a strong magnet is necessary, and 18 or 20 s.w.g. wire can be used. Overheating of windings or transformer is unlikely because the circuit is completed very briefly. With a little adjustment, a strong action may readily be achieved.

The tubes should be of suitably resonant type, and these are usually best when freely suspended from one end. For a small chime, substitutes such as two cycle-bell tops of dissimilar note are quite satisfactory. This form of movement is also suitable for a "single note" bell, the bell being fitted in place of the right-hand gong tube. Such a bell strikes once only when the push is depressed and is preferable in some cases to the buzzer (continuous ringing) type.

Sequence Chimes

These are most easily constructed by employing a small electric motor as illustrated in Fig. 4. Such chimes may use four, five, or more tubes of different note, and are set in operation by a momentary contact in the control circuit—which may be that to a door bell-push. The sequence arranged is then rung through to its end, even if the push is released.

The motor drives a long axle through worm

or other gearing, as shown at A in Fig. 4. The number of chiming discs will depend upon the number of gong tubes, and each disc will usually have a different shape so that the tube is struck the desired number of times when the disc revolves.

The contactor, shown at B, is wired in parallel with the bell-push, the contacts normally being open because the notch in that near the disc shown fits in a similar notch in the disc. Immediately the push is operated, the contactor disc turns, thus bringing the contacts together. The motor, therefore, continues to run until the disc has rotated the full 360 degrees and has reached its original position, when the circuit is interrupted.

A suitable arrangement for the chiming

discs, hammers and gong tubes is shown at C, two projections for two strokes of the hammer being shown. The other discs require to be made according to the timing and number of strokes for the sequence to be played. The correct position for all the projections may easily be found by drawing a large circle and dividing it into slightly more segments than the sequence of notes to be played. The notes may then be marked round to agree with the direction of rotation; e.g., C, C, E, E, A, C, B, and the position for the projections on each disc marked off. (Some free space is left for the zero or stopping position of contactor disc and chiming discs.)

The power required to turn such a chimer is not great and the motor may be battery or

mains operated. In the latter case it should be of the type with a wound field and armature, drawing current from a suitable transformer. Permanent magnet motors may, however, be used with batteries, or from A.C. mains transformer with rectifier.

If two or more dissimilar sequences of chimes are wanted, the contactor disc should be notched accordingly and extra projections provided on the chiming discs. For example, with four notches in the contactor disc and suitably shaped chiming discs, four sequences may be played, separately, for each revolution of the shaft. This is suitable for 1/4 hour, 1/2 hour, 3/4 hour and hour positions with a clock. But for a door chime the arrangement adopted can be that in Fig. 4.



An ex-Government altimeter with millibar scale visible through window in dial.

An Altimeter/Barometer Conversion

Converting an ex-Government Altimeter to Give Barometer Readings

By C. W. TINSON

register zero. It follows, therefore, that if the millibar scale is set to register the pressure obtaining at a given place (the pilot radios onwards to ask control to ascertain what the millibar reading is at that aerodrome) the pointers will then show the height of the aircraft in relation to that particular place. The long pointer makes one revolution for every 1,000ft. of altitude, about 1in. of mercury.

For a barometer application it is usually required to register changes of pressure with reference to a standard pressure of

It is desirable to make a new dial face to show inches of mercury instead of altitude in feet, otherwise a conversion table must be used to give barometer readings. The accompanying table, taken from N.A.C.A. Report No. 218 on the International Standard Atmosphere, will enable you to calibrate a new dial, make a paper face to stick on the existing dial, or to prepare a conversion table.

The bezel is secured to the instrument case by eight countersunk-head screws and nut plates and the adjusting knob to its square-ended arbor by a screw.

To keep dust out of the instrument it is as well to plug the static connection with a plug having a tiny leak-hole in it, so that the instrument is able to breathe, for if the static

INSTRUMENTS of the "sensitive" type are quite suitable for conversion to barometers, but the ordinary altimeter is not so good, as will be appreciated from what follows.

Altimeters of the sensitive type are:

- Mark 19A ... —1,000ft. to 60,000ft.
- Mark 20A ... —1,000ft. to 35,000ft.
- Mark 20C ... —1,000ft. to 50,000ft.

and the dial calibrations are sufficiently open to permit reading an altitude difference of 25ft.—a difference of about .03in. of mercury.

Zero Adjustment

Zero adjustment can be obtained through a knob which is geared also to a rotating scale of millibars seen through a window in the dial, so as to permit altering the indication of pressure in millibars at which the pointers

Mb.	ins.	Mb.	ins.	Mb.	ins.	Mb.	ins.	Mb.	ins.
984	29.06	998	29.47	1,012	29.88	1,026	30.30	1,040	30.71
985	29.09	999	29.50	1,013	29.91	1,027	30.33	1,041	30.74
986	29.12	1,000	29.53	1,014	29.94	1,028	30.36	1,042	30.77
987	29.15	1,001	29.56	1,015	29.97	1,029	30.39	1,043	30.80
988	29.18	1,002	29.59	1,016	30.00	1,030	30.42	1,044	30.83
989	29.21	1,003	29.62	1,017	30.03	1,031	30.45	1,045	30.86
990	29.23	1,004	29.65	1,018	30.06	1,032	30.47	1,046	30.89
991	29.26	1,005	29.68	1,019	30.09	1,033	30.50	1,047	30.92
992	29.29	1,006	29.71	1,020	30.12	1,034	30.53	1,048	30.95
993	29.32	1,007	29.74	1,021	30.15	1,035	30.56	1,049	30.98
994	29.35	1,008	29.77	1,022	30.18	1,036	30.59	1,050	31.01
995	29.38	1,009	29.80	1,023	30.21	1,037	30.62	1,051	31.04
996	29.41	1,010	29.83	1,024	30.24	1,038	30.65	1,052	31.07
997	29.44	1,011	29.85	1,025	30.27	1,039	30.68	1,053	31.10

29.92in. (760 mm.) of mercury at a standard air temperature of +15 deg. C. (59 deg. F.), these conditions corresponding to "standard sea level." The millibar equivalent of this pressure is 1,013.3.

connection were completely blocked, false readings would result.

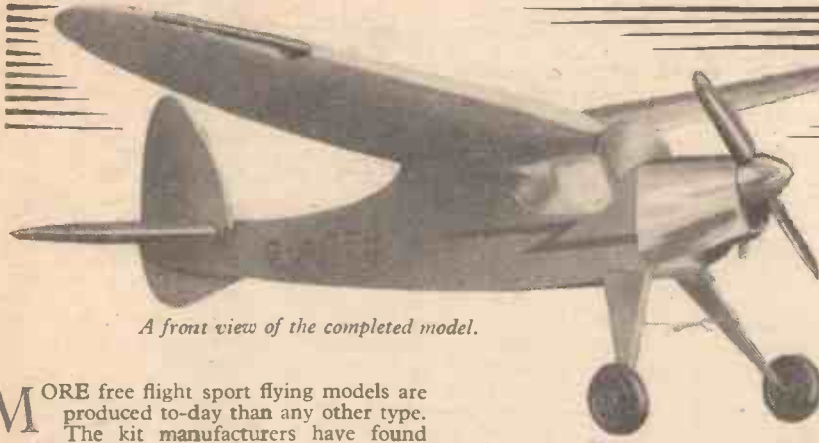
Height ft.	Pressure ins. Mercury	Height ft.	Pressure ins. Mercury	Height ft.	Pressure ins. Mercury
-3,000	33.31	200	29.71	3,400	26.42
-2,800	33.08	400	29.49	3,600	26.23
-2,600	32.84	600	29.28	3,800	26.03
-2,400	32.61	800	29.07	4,000	25.84
-2,200	32.38	1,000	28.86	4,200	25.65
-2,000	32.15	1,200	28.65	4,400	25.46
-1,800	31.92	1,400	28.44	4,600	25.27
-1,600	31.69	1,600	28.23	4,800	25.08
-1,400	31.47	1,800	28.02	5,000	24.89
-1,200	31.24	2,000	27.82		
-1,000	31.02	2,200	27.62		
-800	30.80	2,400	27.41		
-600	30.58	2,600	27.21		
-400	30.36	2,800	27.01		
-200	30.14	3,000	26.81		
S.L.=0	29.921	3,200	26.62		

The usual inscription on a barometer is given here.

BRITISH STANDARD

THE British Standards Institution has just issued a revision of B.S. 771 "Synthetic resin (phenolic) moulding materials," which was originally published in 1938 and the first revision of which was published in 1948. The present revision involves only small changes in levels of quality, generally towards high quality. It also prescribes for the following properties of eight types of phenolic moulding materials:—Impact strength, surface resistivity after immersion in water, volume resistivity, heat resistance, power factor, permittivity, tensile strength, water absorption.

Copies may be obtained from the British Standards Institution, British Standards House 2, Park Street, London, W.1, price 6s.



A front view of the completed model.



A Power-driven Model Aeroplane for

MORE free flight sport flying models are produced to-day than any other type. The kit manufacturers have found this to be true.

Sport flying, or flying for fun, requires a model that should possess three main factors, which are, realistic appearance on the ground and in the air consistent with good and realistic performance, great stability and robustness for a long life.

The little "Meteorite" was designed around these considerations to suit the highly popular class of 1½ c.c. to 1 c.c. diesel engines available on the market to-day. This size of engine is cheap to buy, well developed, and provides a model of small proportions that is simple to transport.

The discerning modeller will note that although the wingspan is only 45 in., the elliptical wing has a large centre-section chord, and gives a large area, that, in turn, provides reasonably slow speed flight. This low wing loading makes a low-powered engine's task easy, rather than the powered glider principle. It also makes it possible to employ more robust construction than is normally used. The "Meteorite" has proved itself by many hours flying in all sorts of weather. It is exceedingly stable if built and rigged correctly. Last year I fitted a very light E.D. "soft" valve Mark III radio receiver into the model, which performed well, powered by a Mills 1-3 c.c. diesel motor and a low pitched propeller.

In order to provide a long life, the fuselage is covered with sheet balsa and finally with silk or nylon. It is possible to cover the balsa with paper, but it is not so robust. The system of building is exceedingly simple, making up the fuselage sides on balsa sheet. The "Bowden type" wing tip slots, introduced a number of years ago in the model field, make for exceptionally stable flight in windy weather. They permit slight over-elevation of the model, which can then glide down and land nose well up very lightly. The engine mount is detachable and can be altered for length if necessary to cope with varying engine weights. I have found that the model flies very nicely powered by a Mills 1-3 c.c. diesel, or an E.D. 1½ c.c. diesel. It has also flown a lot on the old Frog 1 c.c. diesel, and a 1 c.c. E.D. Bee. Naturally, the 1 c.c. motors have a lower rate of climb and the propeller must be a good one with thin blades, approximate diameter of 8 in. to 9 in., and a 4 in. or 5 in. pitch. Strangely enough, one of the best performing motors on this model, that has reached some tremendous altitudes has been the old 1 c.c. Frog.

The Bowden "Meteorite," diesel powered, sport flyer of 45 in. span is a robust, very stable, all-weather aeroplane that can be

powered by any of the good 1½ - 1 c.c. motors, and is shown in the left hand heading photograph. On the right is a rear view of the little "Meteorite," showing the simple but practical realistic lines of the model. Should the reader later wish to fit this machine with radio of the light-weight type, the receiver and batteries can be arranged on sponge rubber over the centre of gravity position, so that the model balances, as shown on the general arrangement drawing Fig. 1.

Building the Fuselage

If the fuselage is built with the exact side elevation lines, shown on the general plan, Fig. 1, the correct angles of mainplane and tail will automatically be built in, thus providing good longitudinal stability. Only very slight adjustments will then be required to cope with slight differences in building weights produced by different people and grades of balsa wood. No two model aircraft ever seem to come out exactly the same, built on

a kitchen table. For one thing, balsa wood of certain specified dimensions that is purchased has slightly different weights. Furthermore people use different amounts of cement, plastic wood, engines, and so on. However, as long as the side elevation of the model is faithfully copied, and all wings, tail surfaces and fin are not twisted or warped, and are set up in alignment, there should be no difficulty in flight. Let us study the outline drawing, Fig. 1, and the sketches and photographs showing fuselage construction stage by stage.

First, place the three-times enlarged drawing on a table or building board, then below the fuselage drawing, place 1/8 in. thick sheet balsa, carefully butted up at the edges of each plank. Generally, it is possible to purchase planks 3ft. long by 3in. wide. Now insert sheets of carbon copying paper between the balsa sheet and the plan and carefully trace the outline of the fuselage on to the balsa sheet. If this outline is correct according to plan, the angles of attack of wing and tail will be built into the machine. Should any difficulty be experienced in enlarging the plan, this and a kit can now be obtained from



The E. D. Mark III Diesel Engine

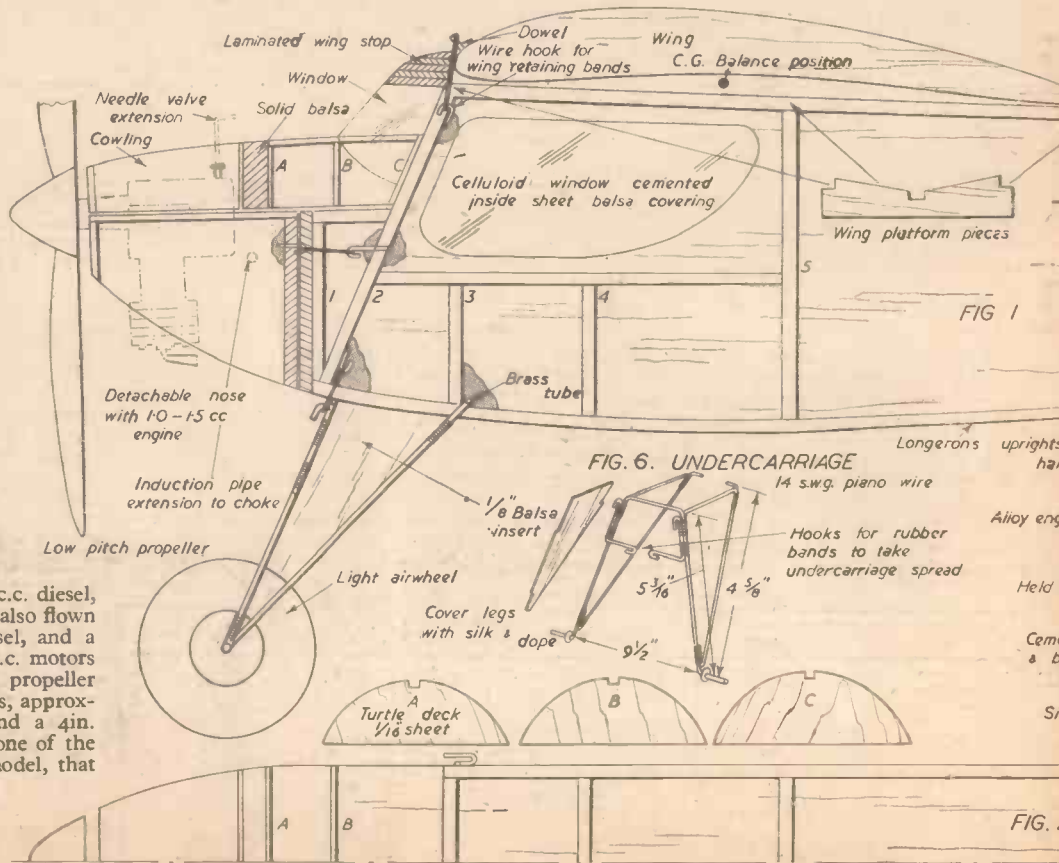


Fig. 1.—The general arrangement drawing. Fig. 2.—Plan view of the top and bottom of fuselage. Fig. 8.—The engine mount.

Meteorite

the Popular Small Diesel Engines

By C. E. BOWDEN



A rear view of the "Meteorite."

Messrs. B. M. Models, 43, Westover Road, Bournemouth.

Now cement the edges of the butt-jointed planks and let the cement dry, after which cut around the drawn-out side of the fuselage with a safety razor blade of the type that has one edge protected, such as the "Valet." You then have a fuselage side with window made in thin 1/8 in. sheet balsa. Make a second side. Lay these on to the building board, as shown in Fig. 7 and Fig. 7A, being careful to place the two sides looking inwards at each other.

Now cement longerons of 3/8 in. by 1/8 in. balsa (and uprights where shown) around the edges on to the balsa sheet sides. Fig. 7A shows one side completed in this manner, and the other side waiting for attention, with its belly facing the first side's belly, so that when completed it will have its longerons facing "inside" the fuselage. Whilst the cement is drying use women's household pins to keep the balsa sticks in position. These pins are removed when the cement is set. Crack the balsa sticks where they curve sharply. The cement and balsa sheet backing strengthen up the cracks. In this photograph do not get confused by the greater number of uprights visible than on the plan. The photograph was taken of a slightly longer

model made on the same lines, although the principle is the same.

The next action is to place the two sides upright side by side, after having cemented in celluloid windows (temporarily retaining the celluloid with pins on a flat table until dry). If you have no eye for squaring things up, a rectangular template can be made of cardboard. Cement in the top and bottom fuselage crosspieces of the same section balsa as the longerons, see Fig. 2, fully driving home the pins through the longerons into the crosspiece ends to keep the two sides firmly joined together. I always leave these pins in, but withdraw all other pins during construction. Pins form a wonderful way of holding balsa structures in position until the cement has set. (See sketch Fig. 7 and photograph Fig. 7B.)

Now cover the top and bottom of the fuselage with 1/8 in. lightweight balsa sheet, temporarily pinned, as seen in Fig. 7C. Then cement in all wire hooks, as shown in the main drawing, Fig. 1. These hooks must have plenty of plastic wood smeared around their intersection points with the fuselage sides.

The greater the spread of plastic

wood, the better the local load is spread on to the fuselage sides. Wire hooks take stresses and blows as they hold on wing, tail and engine nose, etc., by rubber bands. Do not spare the plastic wood at these highly-stressed points if you want a long-life model. My particular "Meteorite" has flown for several years now without any trouble, having landed in some queer places, and I know of a local club member who has won several competitions with a replica that has flown for four years without any repairs worth mentioning. The model can be almost indestructible when flown if reasonable care is given to the trim before flight, and if built properly, which is more than can be claimed for any of the normal type of models with open work paper-covered fuselages!

Now withdraw all pins and sand down smooth, as seen in Fig. 7D. Then build on the turtle deck and "ledge," as seen in Fig. 7 (stage 3), and also in Fig. 7E. One point I should have stressed is the importance of giving a very adequate amount of plastic wood reinforcement to the rear undercarriage brass tube, and the hooks of 14 s.w.g. wire, because this is an obviously highly stressed fitting. I find that it is always best to make each pair of wire hooks from one piece of wire that carries across the fuselage to the other side, and not in two separate hooks. This system stiffens the fuselage because the plastic wood reinforcement creates a rigid structure.

The fuselage can now be covered with thin silk, thin nylon, or even thin butter muslin, using photopaste as an adhesive smeared lightly on to the balsa sheet covering. Then dope with one thick coat of clear full-strength Cellon tautening dope, well flowed on.

I never use any "model dope" on any of my power or radio models. It does not provide sufficient rigidity, or weather-proofness for my purposes. Some model firms sell what they term full-strength dope, which is, in reality, a thicker model dope. It is not in my experience suitable for power models of

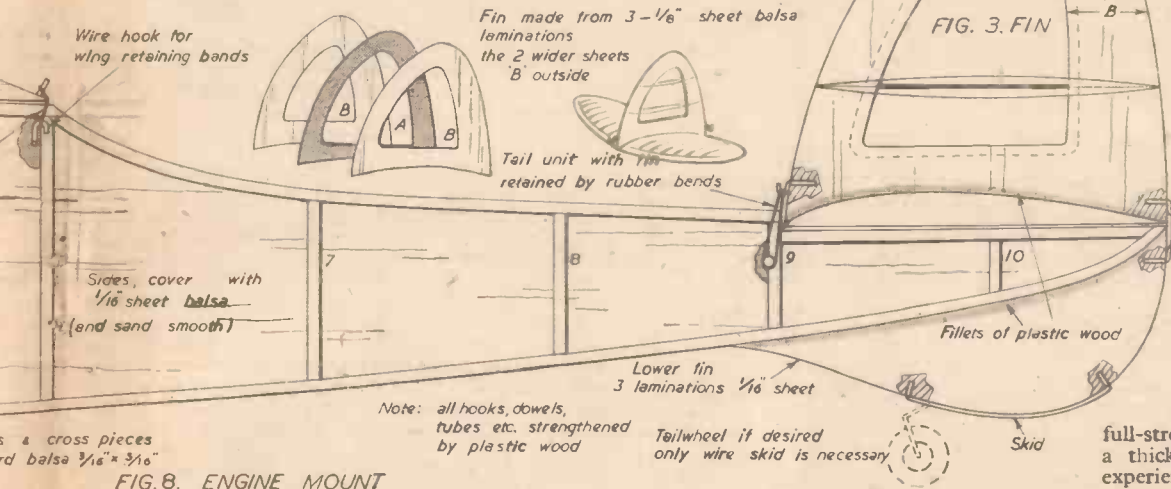


Fig. 7B (Below).—The pinned fuselage structure.

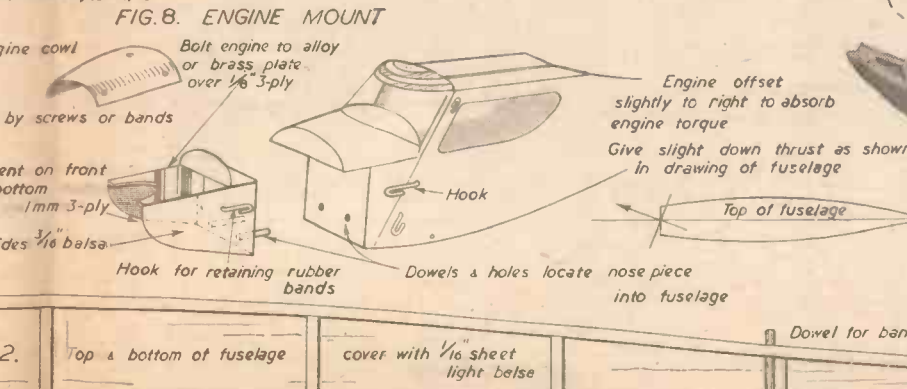
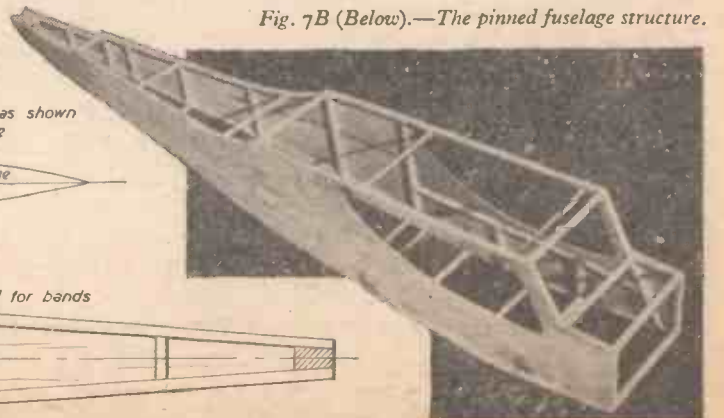


Fig. 3.—The tail fin. Fig. 6.—Details of the undercarriage.



the more robust fabric covered type that I design. The correct dope is Cellon tautening dope, No. D.L.5141. This is also magnificent stuff for weatherproofing powered seaplanes. Large radio models are as weatherproof as full-size machines, although considerably less dope is used. You can then use one or two coats of Cellon coloured dope to suit your tastes. I use white colour, for it is distinctive and shows up well in the air.

Make the undercarriage of 14 s.w.g. piano wire as shown in Fig. 6 and Fig. 7E. It will be observed that the undercarriage rear leg prongs slide into a brass tube located in the fuselage, whilst the front of the undercarriage rests up against the bottom of the fuselage, being held in position by rubber bands to wire hooks. It can therefore spring backwards against the rubber tension on landing, and the central rubber bands across the tie bar between the two front legs allow for controlled lateral spread. If the rubber tensioning is correct, this undercarriage can absorb a lot of punishment should hard landings occur through poor glide trim by a learner owner. Fill in the wire legs with balsa sheet, sand smooth, cover with silk and dope well. Use light M.S. or Caton airwheels.

I usually add a small piece of 1 mm. three-ply to the bottom of the fuselage just where the wire crossbar bears against the bottom planking. On large models I have recently covered the forward bottom of the fuselages with fibre-glass which provides a light but terrifically strong armoured bottom to the fuselage.

Covering Material

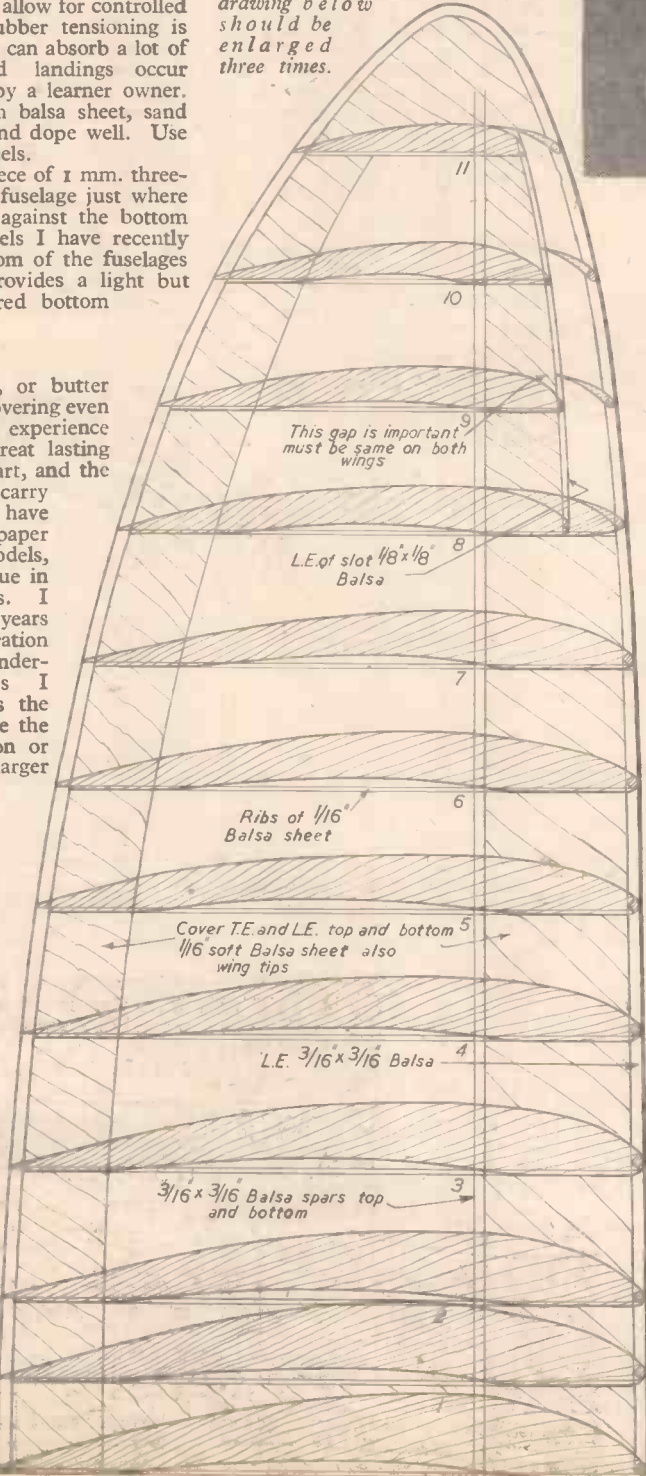
I stipulate silk, nylon, or butter muslin (light weight) for covering even this small model, because experience has shown me what a great lasting value such coverings impart, and the model was designed to carry the slight extra load. I have no use whatsoever for paper covering for powered models, and particularly is this true in the case of radio models. I always build to last for years instead of risking disintegration by overpowering and under-covering the models I designed. Light silk is the best for little models like the "Meteorite," whilst nylon or butter muslin is best for larger models. Photopaste is used for an adhesive for all coverings of fabric.

Silk is covered damp, and so is nylon, whilst butter muslin is put on dry. Nylon has the disadvantage of slacking off slightly in damp weather and rain even when well doped.

Building and Covering the Wings and Tail Unit

The wings and tail are made up on similar lines and are both elliptical in shape, thus providing a large area for a short span. Let us look at the tail unit first, for its construction forms a lesson to the beginner before launching into construction of the larger wing. Refer to the detailed drawing, Fig. 5, for rib shape and tail dimensions.

First, cut out all ribs, numbering them in pairs, by tracing their shape



Note - The wing drawing below should be enlarged three times.

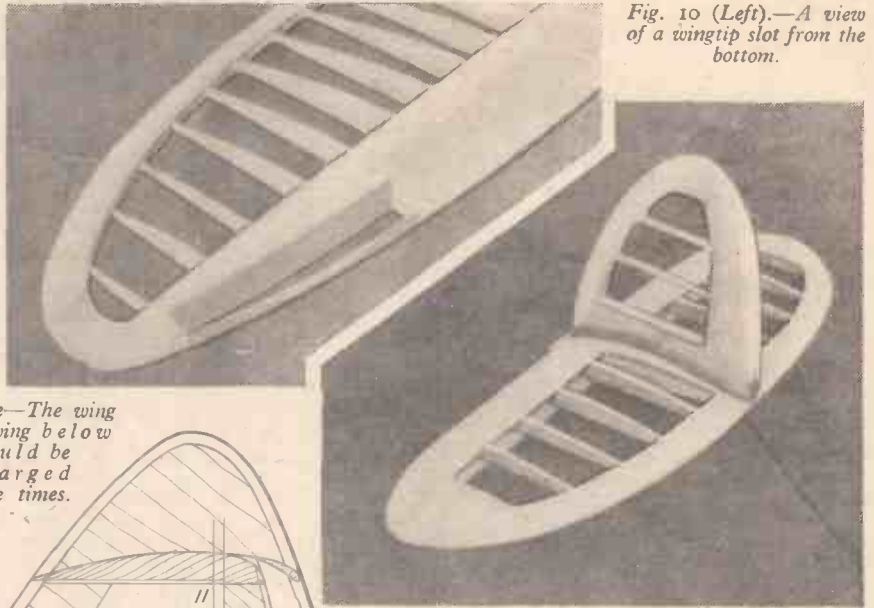


Fig. 10 (Left).—A view of a wingtip slot from the bottom.

Fig. 9. (Above).—The completed tailplane.
Fig. 4 (Left).—Constructional details of the wing.

on to 1/16 in. sheet balsa. Then trace the trailing edge sheet covering and cut out. Now cement the ribs on to this outline over the plan, with a piece of greaseproof transparent paper interposed between plan and work. Then cement around the edge of the elliptical shape, the leading edge spar and trailing edge spar, using the usual temporary pin retention.

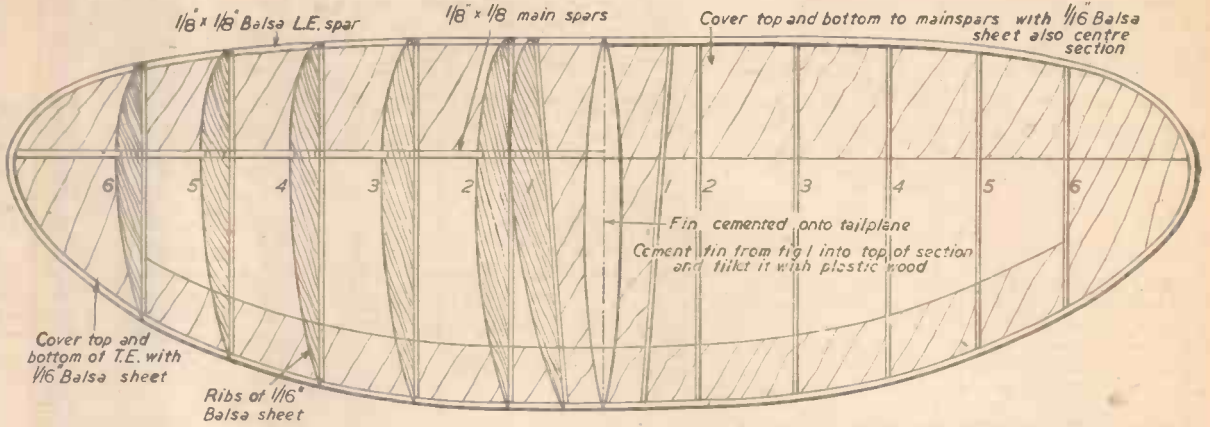
When the cement is dry, shape the leading edge and trailing edge by razor blade, and sandpaper smooth. Then cement on the top covering of sheet balsa that can be seen in the photograph, again using pins to keep the sheet in position until the cement sets, then withdraw. You now have a tailplane as seen in Fig. 9, after sanding smooth all over.

The fin is laminated as described in the insert sketch on the main drawing Fig. 1. It is cemented on dead fore and aft, and vertically upright, to the top of the tailplane as seen in Fig. 9, with a little filletting of plastic wood along the bottom of the fin. We now have a complete detachable tail unit which, after covering with silk, can be held to the fuselage tail platform by rubber bands. Cover with damp silk, water sprayed, allow to dry and tauten up, and then apply one thick flowing coat of glider full-strength dope. Do not work the dope heavily, flow it on and leave. If the silk is gently pulled tight, but not taut, the water spraying will take up any little wrinkles as it dries. If over-stretched, as some people try to do, distortion and folds occur. Covering is a very simple art, but one many people fall down on because they set about it the wrong way. First, smear the outline structure with photopaste. Lay on the silk dry, and gently pull up quite evenly, lightly sticking down to the framework. Now snip a small edge all



Fig. 8A.—The completed engine housing.

Fig. 5.—General drawing giving rib shape and dimensions. This drawing is one-third full size and must be enlarged three times.



round for overlapping. Then spray water on to the silk evenly from a scent spray. Then gently repull up the silk quite evenly all round and, with adequate photopaste, stick over the edges around the tail unit. Leave the tail to dry out, and the water will rectify any little mistakes you have made as it tautens the silk up, as it dries off.

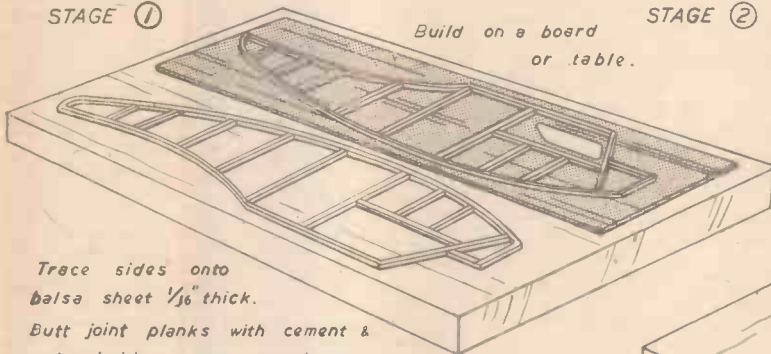
Whilst this is going on, watch that no twist-

ing takes place, and weight down to a flat board if necessary just before the final dry off. Now dope as already described when absolutely dry. It is the smooth flowing on of the dope without working in unduly that gives the final finish. Light hands are required here and a softish brush of wide shape. Put weights on and leave overnight as the final setting of the dope takes place. Leave for about

24 hours and you have a real long life surface. The full-strength dope will give you a surface that is durable, as on a real aeroplane.

The wings are built in the same general manner as the tailplane, after cutting out the ribs as shown in Fig. 4, the detailed-drawing. Build over the drawing in two halves, with greaseproof paper interposed between work and drawing. I cement the trailing edge

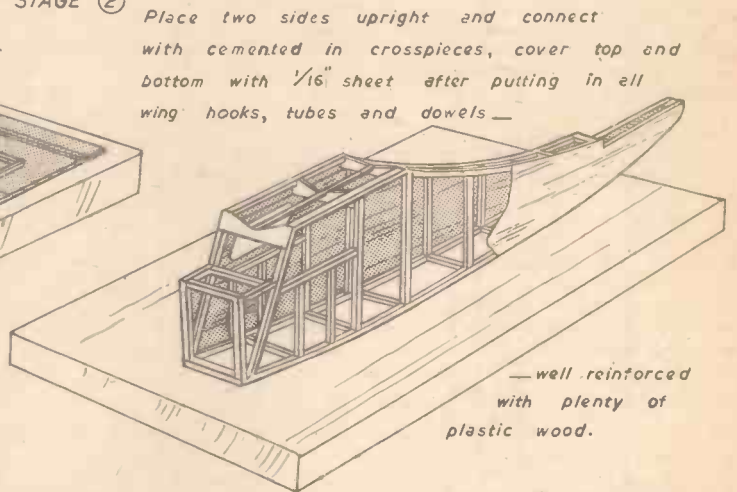
STAGE ①



Trace sides onto balsa sheet 1/16" thick.

Butt joint planks with cement & cut out sides, now cement on longerons uprights and windows, be sure to build insides as shown.

STAGE ②

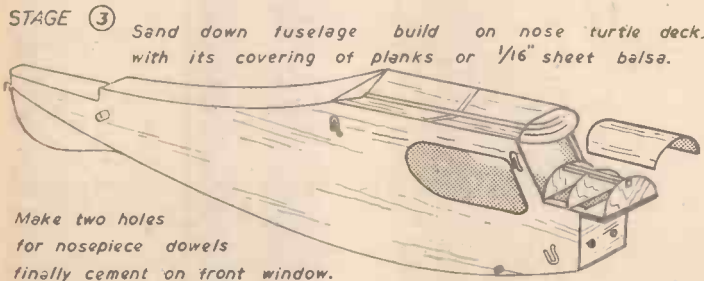


Place two sides upright and connect with cemented in crosspieces, cover top and bottom with 1/16" sheet after putting in all wing hooks, tubes and dowels—

—well reinforced with plenty of plastic wood.

NOTE: All wire hooks 12 swg piano wire.

STAGE ③



Sand down fuselage build on nose turtle deck, with its covering of planks or 1/16" sheet balsa.

Make two holes for nosepiece dowels finally cement on front window.

Cover whole fuselage with silk or nylon (lightweight) Dope with full strength Cellon clear dope.



Fig. 7E (Left).—The turtle deck and ledge.

Fig. 7D (Below).—The fuselage sanded down smooth.

Fig. 7. (Above and left).—Three stages in assembling the fuselage.

Fig. 7A (Below).—Constructing the sides of the fuselage.

spar of 1/4 in. by 1/4 in. balsa to the rear of the balsa sheet bottom trailing edge covering, and then cement the ribs into position over the plan on to the lower main spar and this trailing edge covering, butting up to the T.E. spar. I then cement in the leading edge balsa spar and the top main spar. The fore balsa 1/16 in. sheet covering top and bottom is cemented on last from L.E. to main spars.

(To be continued)

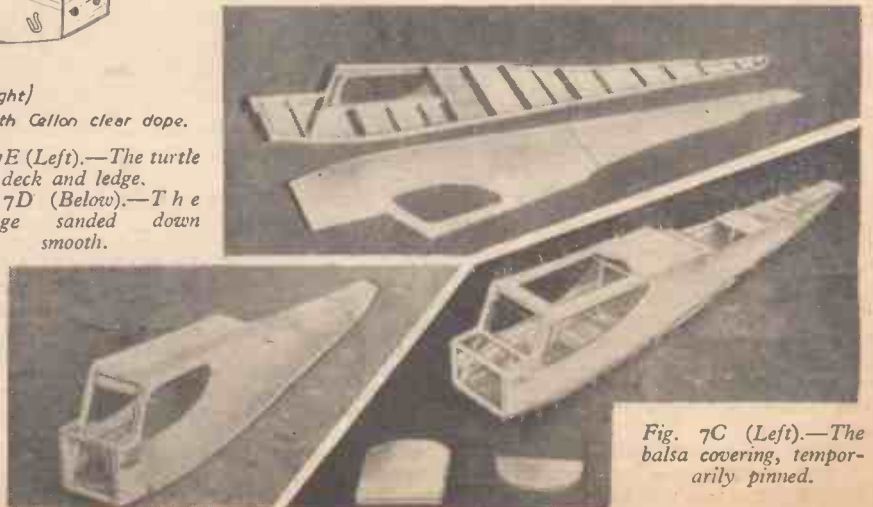


Fig. 7C (Left).—The balsa covering, temporarily pinned.

ASTRONOMY



1.—The Origin and Evolution of the Solar System

FROM the time that the French astronomer Laplace propounded his theory of the birth of our Solar system, that theory has been accepted and believed in, until comparatively recent times. It was certainly accepted until twenty or thirty years

By E. W. TWINING

(Illustrated with Drawings by the Author)

helium, carbon and the hydrogen, of which they are composed and on which they continue to exist. Stellar evolution is also outside the scope of this article, except in so far as our sun and similar suns with planetary systems are affected.

Whether there are other galaxies besides our own I do not know, but if there are any, I do not think they can be seen, nor yet photographed. I can see no reason to suppose that there are any others. I believe there is only one galaxy, and that it lies in a flat plane, extending out to the Milky Way and to the remote confines of the universe, which means that all spirals and star clusters are in our own galaxy.

The present-day astronomers tell us that all the spiral formations, which were once known as spiral nebulae, are galaxies, although each one has a large and brilliant nucleus

ing motion. If we look in either direction at right angles to the flat plane of the Milky Way, we see only a comparatively few stars; they are more numerous in the line of the plane, but nowhere is there seen a nucleus such as we see in the great spiral in Andromeda. It has been said that the nucleus of our galaxy is hidden by clouds of dust, haze and interstellar smoke, which lies thick in or near the centre, but I cannot accept this, neither do I believe that our sun is moving in a main "traffic-way" which is forming a part of a circular path, as we see is happening with the outer components in the Andromeda spiral. If we had such a nucleus to our galaxy, as the Andromeda spiral has, there would be some visible evidence of it, and no such evidence exists. If a nucleus existed, it would be so vast that no accumulation of dust could completely hide the whole of it. As regards the belief in a curved traffic-way, astronomers only fancy that they find evidence of spiral arms in the lay-out of the stars; they have, up to the present time, no reliable evidence.

The foregoing are my arguments for returning to, or not departing from, the theory that the spirals are the origin of planetary systems and that they are not nearly so remote as regards distance as the modern astronomer thinks they are.

By such a process do I believe that our sun, and the planets revolving around him, became evolved. In only one respect do I think that the old spiral theory for accounting for the evolution of planetary systems was in error, and to that I will refer presently.

The Formation of our Solar System

Going back to the commencement of the process, we have a vast expanse of gas, in parts only, glowing with an intense heat; not the whole of it, as was once thought. In other

(Continued on page 539).



Fig. 1.—The great nebula in Orion.

ago. The theory is that a vast mist or gas extended for millions of miles into the limitless space of the heavens and glowed with incandescent heat; that this mist, due to shrinkage, began to revolve, cooling as it spun and still shrinking towards its centre as it cooled. This continued shrinking caused a still more rapid spinning, and then the enormous centrifugal force generated overcame the shrinking action, and a ring, or sometimes a portion of a ring, was flung off from the mass. Continued shrinkage, coupled with accelerated velocity, caused still other rings and masses to be thrown off. Each of these rings contracted and, in time, formed globes about the densest parts. These globes have spectroscopically all the characteristics, as they would naturally have, of stars, since they are formed from the same material as the central nucleus. The globes were surrounded by stray, cooling and spinning, masses and these masses revolved around their parent globes and, in short, became satellites to the globes which with continued shrinkage and cooling became planets. On a scale far more vast than our own, other solar systems are being formed in regions of the heavens millions on millions of miles away.

Modern Ideas

Such was the theory that was once held and, up to a point, is held by modern astronomers today. But the point at which modern thought breaks away from the old theory is that many scientists no longer believe that the spirals are members of our own galaxy of stars. They believe that far beyond the stars which we normally see on a clear frosty night, and which we refer to as the star galaxy, there are other galaxies, hundreds of them, and that all the objects which we used to call "spiral nebulae" are these other star galaxies. They rather naively, as I think, admit that our own galaxy is one of the largest, if not the largest.

This article is not concerned with stars in general, either single or binarics, nor with their structure. I shall ignore the atoms, the



Fig. 2.—The great spiral in Andromeda.

which must be one star or a mass of stars. If these are galaxies, where is the nucleus of our own galaxy? We do not appear to have one. And what of the Milky Way? All the spirals seem to be very much nearer to us than the myriads of stars composing it. Can anyone looking at the great spiral in Andromeda, Fig. 2, or an accurate drawing or photograph of it, see any similarity between it and our own galaxy of stars? There is in its centre a great glowing star or cluster of stars the like of which is, apparently, entirely absent from our galaxy. Then beside this there is the obvious fact that the whole disc in Andromeda (it is a disc seen obliquely) is in violent whirl-



Fig. 3.—The spiral in Canes Venatici.



**“Finger-tip
flame control”**

said a silversmith, “Pleasant to handle,
very sensitive controls.”

He was one of the many users of our
Flamemaster Mark II and the three comments
he made probably sum up the main reasons
for the Flamemaster’s immense popularity.

- Also :
- It burns coal-gas or bottled-gases of the butane type
with equal efficiency . . .
 - The air or oxygen pressure needed is comparatively low . . .
 - All the different flame-units are easily interchangeable . . .
 - It won’t splutter or give you an unstable flame . . .
 - It won’t leak, even on high pressures . . .
 - It won’t raise your running-costs (our economiser-trigger
sees to that) . . .
 - But it *will* bring speedy and reliably controlled heating right
to the spot where you need it . . .

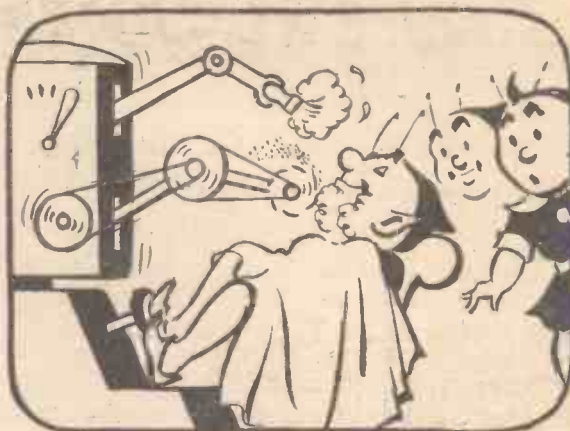
remember the name

FLAMEMASTER MARK II

Write for full details to :—

STONE-CHANCE LIMITED, DEPT. F27, LIGHTHOUSE WORKS,
SMETHWICK 40, BIRMINGHAM. TELEPHONE : BROADWELL 2651.
LONDON OFFICE : 28, ST. JAMES’S SQUARE, S.W.1. TEL. : WHITEHALL 6002.

THE “FLUXITE QUINS” AT WORK



“ Now, lads, you see what I mean,
Here’s an end to the old dull routine.
With brains and resource
And with FLUXITE of course,
We now have the shaving machine ! ”

FLUXITE
SOLDERING
FLUID



and its famous equal
THE
SOLDERING PASTE

*Simplify all
Soldering!*

The standard sizes of FLUXITE FLUID are :—

- 4 fluid ozs. 8 fluid ozs.
- 20 fluid ozs. 1 gallon cans.

FLUXITE LTD BERMONDSEY ST · LONDON S · E · 1

TELEPHONE : HOP 2632

EXPORT ENQUIRIES INVITED

I.C.S TRAINED MEN are in Greater Demand than ever—Maximum production depends on high technical skill, such as that acquired by I.C.S. Students

TENS OF THOUSANDS MORE TRAINED
MEN ARE URGENTLY NEEDED NOW
—BUT THERE IS NO WORTH-WHILE
PLACE FOR THE UNTRAINED

Ambitious men everywhere have succeeded through I.C.S. Home-Study Courses. So also can you.

The man with an I.C.S. Training in any one of the subjects listed below knows it thoroughly, completely, practically. And he knows how to apply it in his everyday work.

- | | | |
|-------------------------|--|--------------------------------------|
| Accountancy | Electric Power, Light-
ing, Transmission,
Traction | Motor Vehicle Elec. |
| Air Conditioning | Eng. Shop Practice | Municipal Engineering |
| Architecture | Fire Engineering | Plumbing |
| Architectural Drawing | Foremanship | Production Engineering |
| Boiler Engineering | Fuel Technology | Quantity Surveying |
| Book-keeping | Heating and Ventilation | Radio Engineering |
| Building Construction | Hydraulic Engineering | Radio Service Eng. |
| Building Specifications | Illumination Eng. | Refrigeration |
| Business Training | Industrial Management | Salesmanship |
| Business Management | Machine Designing | Sanitary and Domestic
Engineering |
| Carpentry and Joinery | Machine-Tool Work | Sheet-Metal Work |
| Chemistry, I. & O. | Maintenance Eng. | Short-Story Writing |
| Civil Engineering | Marine Engineering | Steam Engineering |
| Clerk of Works | Mechanical Drawing | Structural Steelwork |
| Coal Mining | Mechanical Engineering | Surveying |
| Concrete Engineering | Mining Engineering | Television Technology |
| Diesel Engines | Motor Engineering | Welding, Gas and Elec. |
| Draughtsmanship | Motor Mechanics | Woodwork Drawing |
| Drawing Office Practice | | Works Engineering |
| Electrical Engineering | | |

Students intending to sit for examinations in Architecture, Quantities, Civil Eng., Mech. Eng., and others, should enrol NOW for preparatory Courses. Using a specially prepared Study Programme, the student studies in his spare time, at his own pace and, with time for revision, sits with full confidence of success.

Courses are also available for General Certif. of Education and most other Techni- cal, Professional, Commercial, Civil Service Exams.

(I.C.S. Examination Students are coached until successful.)

Moderate fees include ALL books required.
REDUCED TERMS TO H.M. FORCES.

If you need technical training, our advice concerning your work and your career is yours for the asking—without obligation. Let us send our special free booklet on the subject in which you are specially interested.

The successful man DOES to-day what the failure INTENDS doing to-morrow. Write to us TO-DAY
Dept. 169A, I.C.S., 71, KINGSWAY, W.C.2.

CUT HERE

INTERNATIONAL CORRESPONDENCE SCHOOLS

Dept. 169A, International Buildings, Kingsway, London, W.C.2.

Please send me the free booklet on.....

Name..... Age.....
(USE BLOCK LETTERS)

Address.....

Addresses for Overseas Readers

Australia: 140, Elizabeth Street, Sydney. Egypt: 40, Sharia Abdel Khalek Sarwat Pasha, Cairo. Eire: 3, North Earl Street, Dublin. India: Lakshmi Bldg., Sir Pherozshah Mehta Rd., Fort, Bombay. New Zealand: 182, Wakefield Street, Wellington. N. Ireland: 26, Howard Street, Belfast. South Africa: Dept. L., 45, Shortmarket Street, Cape Town.

MODERN MACHINES FOR THE PRACTICAL MECHANIC



**THE NEW "Zyto" 10"
PRECISION SAW BENCH,**
18" x 12" table with canting and rise and fall motion. Ball bearing spindle rip fence, mitre slide, and £20/12/0 guards included. PRICE £20/12/0
Or supplied first payment of £5.12.0. Balance over 12 or 18 months. Illustrated list post free.



**Wolf DRILL
AND CHISEL
MORTISER**
Drills in steel up to 3". Mortises in wood up to 1". A really good general purpose machine. PRICE £33/0/0 including one hollow chisel and bit.
Or supplied on first payment of £8.5.0. Balance over 12 or 18 months.



**6" LECTRO BLACK AND
DECKER PORTABLE SAW**
A powerful electric hand saw with many uses. Supplied on first payment of £4.10.0 Balance over 12 months. PRICE £17/5/0
CASH PRICE



**THE GENUINE "ULMIA"
MITRESAW**
Will cut with precision mitres, half mitres, quarter mitres and squares. Depth of cut, 2". width of cut, 2". PRICE £5/5/0 Foreign
Illustrated leaflet of other sizes sent post free.

We have the finest display and stock of tools and machinery in London. If you are requiring a machine or tool, please let us quote you.

S. TYZACK & SON, LTD.
341-345 OLD ST., LONDON, E.C.1 Tel. Shoreditch 8301 (Ten Lines)

RADIO SUPPLY CO. (Leeds) Ltd. 32, The Calls, Leeds, 2

Terms: C.V.O. or C.O.D. over £1. Postage 1/1 extra under £1; 2/- extra under £3.

All Goods guaranteed. Catalogue 6d. S.A.E. enquiries.

CONVERT YOUR BATTERY RECEIVER TO A.C. MAINS.

R.S.C. BATTERY CONVERTER KIT.—A complete kit of parts for the construction of a unit which will replace both H.T. Battery and L.T. Accumulator where 200-250 v. A.C. Mains supply is available. Outputs fully smoothed are 120 v., 90 v., 60 v., 40 mA, and 2 v. at 0.4 a. to 1 amp. for all normal Battery Receivers. Only 48/9. Or assembled ready for use 8/9 extra.

R.S.C. BATTERY SUPERSEDER KIT.—All parts to assemble a unit (housed in metal case approx. 5 1/2 x 4 x 1 1/2 in.) to replace H.T. and L.T. Batteries in ALL DRY RECEIVERS when mains supply of 200-250 v. A.C. is available. Outputs fully smoothed 90 v. 10 mA., 1.4 v. 250 mA. For 4 valve sets only 35/9, or ready for use 42/6.

COLLARO 3-SPEED AUTOMATIC RECORD CHANGERS.—Type RC/3/521, with crystal pick-up (2 plug-in heads) for long playing or standard records. Plays ten 7, 10, or 12in. records, not intermixed. For A.C. Mains 200-250 v. input. Limited number at approx. half list price. Brand New, cartoned, £9/19/6, carr. 5/-.
PLESSEY 3-SPEED AUTOMATIC RECORD CHANGER.—Plays 8 records, 10in. and 12in. Intermixed at 78 r.p.m. or 10 records 10in. and 12in. Int. at 33 1/2 r.p.m. or 10 records 7in. at 33 1/2 r.p.m. or 8 records 7in. at 45 r.p.m. Complete with Crystal Pick-up with duo-point alloy stylus. Plays approx. 2,000 records on each stylus. 2 years' average use. For mains 200-250 v. supply. Brand New, cartoned. Limited supply at well under half list price. Buy now at £10/19/6, plus 5/- carr. **CONNOISSEUR HIGH FIDELITY MAGNETIC PICK-UPS COMPLETE WITH MATCHING TRANSFORMER.**—Brand New, Boxed, and Perfect. Limited number at fraction of maker's list price. Only 26/6.

R.S.C. BATTERY CHARGER KITS.

—For A.C. mains 200-250 v. operation. Kit comprises Mains Transformer, F.W. Selenium Rectifier, Fuses, Fuseholders, etc., and Loured Black Crackle Case.
6 v. 2 a. 26/9
6 v. or 12 v. 2 a. 31/9
6 v. or 12 v. 4 a. 49/9
Supplied assembled and tested, 6/9 ex.

SELENIUM RECTIFIERS
2/6 v. 1 a. H.W. 1/9
6/12 v. 1 a. H.W. 2/9
6/12 v. 1 a. F.W. (Bridge) 5/9
6/12 v. 2 a. F.W. (Bridge) 9/9
6/12 v. 4 a. F.W. (Bridge) 14/9
6/12 v. 6 a. F.W. (Bridge) 19/9
150 v. 40 mA. H.W. 3/9
250 v. 50 mA. H.W. 5/9
250 v. 100 mA. H.W. 8/9

VARIABLE RESISTORS.—2 ohms 5 amps, 7/9; 10 ohms 3 amps, 8/9; 7.5 ohms 5 amps, 8/9; 0.4 ohm 25 amps, 8/9; 60 ohms 1.5 amps, 11/9; suitable for speed control, battery chargers, etc. All complete with Knob.

R.S.C. FILAMENT TRANSFORMERS.—Primaries 200-250 v. A.C. 50 c/s 6.3 v. 1/5 a., 5/9; 12 v. 1 a., 7/11; 6.3 v. 2 a., 7/6; 12 v. 3 a., 17/6; 6.3 v. 3 a., 9/9; 24 v. 1.5 a., 17/6; 0-4-6.3 v. 2 a., 7/9; 6.3 v. 6 a., 17/6.

R.S.C. CHARGER TRANSFORMERS. Primaries 200-230-250 v. A.C. 50 c/s 0-9-15 v. 1.5 a., 12/9; 0-9-15 v. 6 a., 22/9; 0-9-15 v. 3 a., 16/9; 0-4-9-15-24 v. 3 a., 22/9; 0-11-22 v. 1.5 a., 45/-.

EX. GOV. ACCUMULATORS (NEW).—2 v. 16 A.H. with Non-spill Vents, 5/9.

EX. GOV. AUTO-TRANSFORMERS.—50 c/s. 15-10-5-0-215-235 v. 200 watts, 25/9. Double wound 10-0-200-220-240 v. to 10-0-270-290-310 v. or reverse 200 watts, 27/9. Many Auto Trans. in stock (up to 5 kVA) at very low prices.

parts it is without very much heat, but the whole is without definite form, so that it would, or might, resemble the great nebula in Orion, which is illustrated in Fig. 1. I theorise that this gas had its origin in a collision between two stars. Such a collision, even if it were between two dead stars, would generate such heat that the debris would form a mass glowing near the centre and extending to a tremendous distance into space. The combined original stars, or what remained of them near the centre, would form the nucleus of the new system or, it may be, form several nuclei, for there are masses of gas with more than one nucleus. Indeed the Orion nebula may have several. Much, in the form of the resulting system, depends upon the angle of impact of the colliding bodies. There is the dumb-bell nebula in Vulpecula which evidently owes its form to a glancing blow being struck in the collision, so that two glowing masses were formed, joined together by an attenuated piece between the main portions.

The nebula from which our sun and his planets was formed was not nearly so great as that of Orion nor, as it shrunk and set up rotation, was it so large as the Andromeda spiral; I merely give illustrations of these in order to show the stages through which our system must have passed.

Fig. 3 shows the spiral in Canes Venatici which was one of the earliest discovered and was for a long time looked upon as an astronomical anomaly. Here we have a spiral much further advanced than that shown in Fig. 2.

Here I want to say a few words in criticism of the old theory, where it states that continued shrinkage coupled with accelerated velocity caused rings to be thrown off by centrifugal action. Although the spiral shown in Fig. 3 certainly looks as though it is throwing off one big mass I do not think it is being thrown. The spiral appears to be winding itself up, leaving the big mass at the bottom where it always was and where centrifugal force will always keep it in balance with gravity and remain as a very big planet, probably with satellites. No, nothing is thrown off; at all periods and at all stages in the contraction of the masses and rings, the radius of gyration automatically adjusts itself to the forward velocity so that the centrifugal forces and speed balance the pull of the central body.

The beautiful object shown in Fig. 4 is a splendid example of a typical planetary spiral in a fairly advanced state. It is beautifully situated for photographing, for it lies in a plane normal to the line of vision, which is to say: we are able to view it in plan and not

at an angle as we do the Andromeda and Canes Venatici spirals. I think that most of the bright points in this Great Bear spiral would give a continuous, or bright, spectrum as do the stars, but they are all cooling and the nucleus which will be a sun (star) like ours will have a very large number of planets revolving around it, though only one will be a great one, like our own Jupiter.

The centre illustration, Fig. 5, shows our own planetary system when it was in a more advanced state than the spiral, Fig. 4, say about ten thousand million years ago (the age of the crust of the earth has been placed at 3,000,000,000 years). I have shown the orbit of Neptune as the outermost, although there is at least one planet, Pluto, beyond this, but it is so distant that little is known about it and it is probably small and insignificant. Inward from Neptune we have Uranus, then Saturn, then Jupiter, next come the Asteroids, many very small bodies, then comes Mars, next the Earth, with the Moon just indicated, then Venus and, lastly, Mercury and so we have the solar system. The Asteroids are shown as a mere mist in Fig. 5.

The immensity of the abyss that separates us from the stars, about which planets might revolve, prevents us from gathering evidence of the existence of other solar systems; some

stars are so large and so brilliant that, compared with them, our sun, if moved to the same distance from the earth, would probably appear as a star of the eighth or tenth magnitude. Even telescopes more powerful than the famous 200in. reflector in America would not enable astronomers to see such possible planets, when the distance between him and the hypothetical centre of a remote system is such that the light of that centre, travelling at



Fig. 4.—The spiral in the Great Bear.

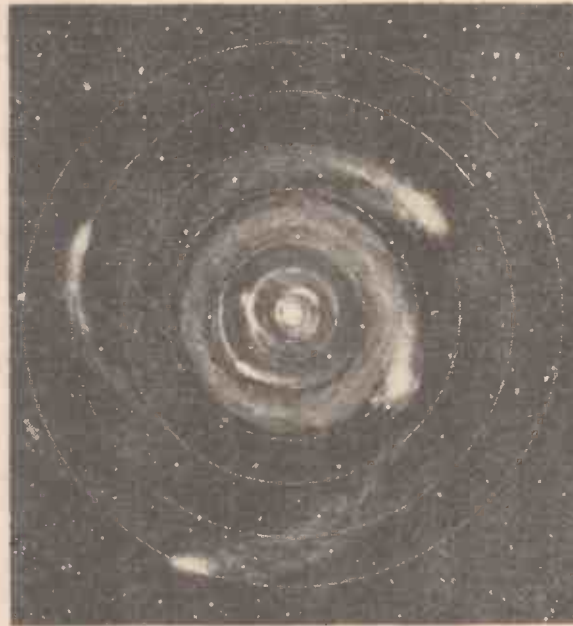


Fig. 5.—Our Solar System in formation.

186,000 miles per second, reaches us only after a lapse of centuries. We can see the star but we shall probably never see the planets because they, after they pass the spiral stage, have expended all their hydrogen atoms and are no longer self luminous and only shine by reflected light of the central star.

The Size of the Planets

For the interest of the reader, I have prepared a drawing, Fig. 6, showing the comparative sizes of our solar system. This has largely been copied from the diagram contained in Sir Robert Ball's "Atlas of Astronomy," published many years ago by George Philip and Son. This diagram brings home to us very vividly the tremendous sizes of both Saturn and Jupiter, as compared with the Earth on which we live. Jupiter has an equatorial diameter a little more than eleven times as great as that of the Earth.

It is rather interesting to note that Jupiter must have a circumference of no less than 274,890 miles and, as he makes a complete revolution in practically ten hours, a point on his equator travels at the rate of 27,490 miles an hour. The mass of Jupiter is greater than that of all the other planets combined.

The drawing shows two views of Saturn: one a view in plan, looking down on one of his poles and showing the three rings: the outer Bright Ring, the inner Bright Ring and the Dusky or Grape Ring. The other view is an elevation in line with the equator and viewing the rings edgewise. From this, it will be seen that the rings have no great thickness. In spite of the fact that the extreme outside diameter of the outer ring is 170,000 miles the thickness of them cannot be more than a hundred miles, possibly much less. They are wholly composed of myriads of small bodies, each so tiny that no telescope that we can turn on them will resolve their particles. They must be in the nature of little moons all swinging along in their orbits at tremendous velocity; but so densely packed are they that when the planet assumes certain positions they cast a dense black shadow on the body of the planet.

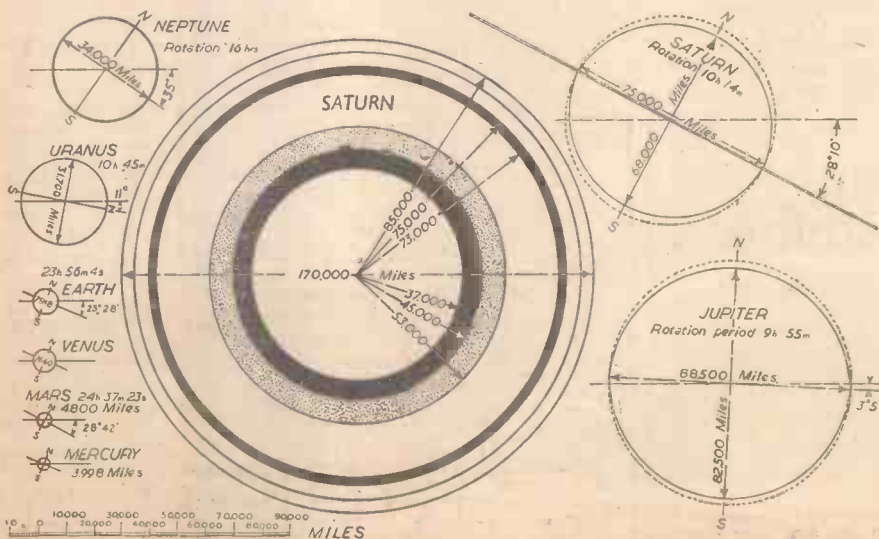


Fig. 6.—The comparative sizes of the planets.

The table on the right gives some interesting data. One fact which is particularly noteworthy is the inconceivable size of the solar system as a whole, for the orbit of Pluto has a mean diameter of seven thousand two hundred millions of miles, so that light rays travelling at 186,000 miles per second, would take 10½ hours to cross the diameter of the system and it takes 5 hours and 20 minutes for the light of Pluto to reach the Earth.

Name	Diameter in miles	Rotation around Sun	Mean Distance from Sun, miles	Satellites	Mass and Revolution of Sun.
Sun	864,000	—	—	—	about 700 times united mass of all the planets.
Mercury	3,900	88 days	36,000,000	—	Revolution, mean, 27 days.
Venus	7,600	225 days	67,000,000	—	
Earth	7,927	365½ days	92,900,000	1	
Moon	2,160	—	—	—	
Mars	4,800	687 days	141,500,000	2	
Asteroids	—	—	—	—	
Jupiter	88,500	12 years	483,000,000	9	
Saturn	75,100	30 years	883,000,000	9	
Uranus	31,700	84 years	1,782,800,000	4	
Neptune	34,000	165 years	2,793,500,000	1	
Pluto	?	249 years	3,600,000,000	—	

Recent Advances in Science

Ergonomics : A New Metal : Termite Research

By Prof. A. M. LOW

THE most far-reaching research in science is still that dealing with atomic power. The "breeding" of fissile material, advanced in America and more recently developed in Britain, marks a forward step of considerable importance.

Striking though such an achievement is, there are few details that can be revealed and little that is immediately serviceable to ordinary people. What advances are there that help us personally? One of them, also atomic, is the increased development of radio-active isotopes at Harwell.

These twin-brothers of ordinary chemicals, activated with radio-activity, are used in checking illness, combating disease, testing manufactured products, monitoring machines, and many other applications. The latest figures show that we now export 9,000 shipments a year to 37 foreign countries—a great increase in range and production over last year.

Ergonomics

Another branch of science making great

strides is the newly-named Ergonomics—the science that measures the limitations of human performance.

This is more than Time and Motion study, for it takes into account the comfort of the worker and the suitability of the atmosphere in which he or she works. At Oxford this year the third symposium of reports by Ergonomic scientists from several parts of the world was heard. They varied from the "Physiological measurements of work load and work conditions in a steel factory" (from a Swedish investigator) to "The measurement of energy expenditure of military cadets" (a series of tests by a London scientist).

Not the least important new developments arising from Ergonomic research are the specially delicate instruments designed to measure energy expenditure. Notably, these are the Kofranyl-Michaelis respirometer and the Muller photo-electric pulsometer. The former was used in difficult surroundings underground to assess the energy rates of miners. How much sweat and toil per ton of coal? Is it necessary? The progress of

true science is rarely spectacular but the Ergonomic approach is making life and work easier by the elimination of extra stresses imposed by unsuitable postures or the adverse environment of temperature. Rest periods at scientifically arranged intervals will enable a worker to do his best with the minimum fatigue. A very different solution from the usual "let us see how much production we can obtain, without regard to the human element," attitude.

A New Metal

Yet, to deal with the advance of science is not easy. The news of to-day may well have been ten years in the making—and the modest monograph hardly noticed in a scientific journal this month could be an astonishing revelation to our children's way of life. The former case is well exemplified by Terylene, the artificially created fabric recently released for public use; and a second example might well be the modest achievements to date with the use of titanium.

The ore of this metal was first found in 1791, in Cornwall, by one of those enquiringly scientific clergymen with which this land was once so rich. Since that time titanium compounds have been widely applied, but the pure metal has been a somewhat elusive substance. The major problem was that, when liquid and at high temperatures, the molten metal "sucked up" oxygen and became brittle when solidified. When molten, it dissolves almost every substance with which it comes into contact.

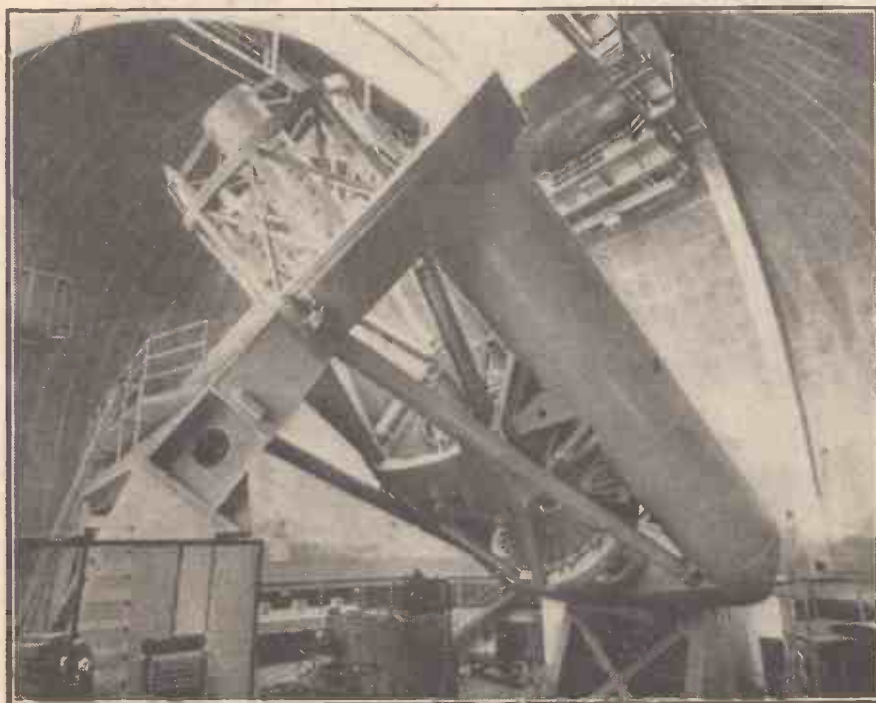
Can Stand Great Heat

Both these riddles were solved and 99 per cent. pure titanium metal was made in ingots by Imperial Chemical Industries! Here is a metal of the future, which may prove rustless, stainless, less than twice the weight of aluminium and twice as strong as steel. It can stand great heat and its first practical use will be in jet engines—later, who knows, space ships!

How did the chemists keep it molten while preventing it from "eating" its container? The answer is one of those simple but ingenious devices of physical chemists. They processed molten titanium at 1,700 degrees in a copper crucible that melts at 1,100 degrees—by using an electric arc inside the molten mass and constantly running cold water round the outer jacket.

News has just arrived that the Australian Scientific and Industrial Research Organization is forecasting an immense titanium industry for Queensland. The rutile sands lying along the Queensland coast contain a wealth of the metallic ore. This organisation

(Continued on page 543)



The 200in. Hale Telescope, built since the war, the lens for which took eleven years to grind, is now in regular use by the astronomers working for the Carnegie Institute and the California Institute of Technology.

MONEY BACK GUARANTEE
DUKE & CO *Tele: GRA 6677*
 621 ROMFORD RD. LONDON, E.12.
 CWO OR COD

12" T.V. TUBES £5

T.V. TUBES. 3 MONTHS' GUARANTEE

Mazda CRM121-A-B, and a few other types and makes. Picture shown to callers. Not Ex.-W.D. Carriage and Insurance 15/6 extra. No catch. SPECIAL OFFER of tubes with burns for testing and spares at 30/- each.

SPECIAL ISOLATING TRANSFORMERS FOR T.V. TUBES. To cure Cathode to Heater Shorts, including boost. 1-1 for Mazda 16/8, Mains Pri. 230 v. 21/6. Post 2/-.

RADIOGRAM CHASSIS. End-drive. £7.17.6. A.C. or A.C./D.C. Salvage, reconditioned 3-wave band, 5 valve superhet (latest midgets), ext. speaker and pick-up sockets. Post 3/6.

SUPERHET V.H.F. RECEIVER. Ex.-W.D. R1124D. 6 channel switching, tuning 30.5 to 40 mc/s. Less valves. Last few. 7/6. Carriage 2/6. FREE drawings for suggested conversion to A.C. or A.C./D.C. or with valves, 17/6, plus 2/6.

H.T. BATTERIES. 3/9. 60 v. 90 v. Portable, 7/9. 90 v. x 1 1/2 v. 6/9. Post 1/9. New 4 1/2 v. 1/6. Post 9d.

ACCUMULATORS. 7/9. New 2 v. 45 amperes. Post 2/3.

MOTORS. 12-24 volt, with flexible shaft. 1B ctt gold brushes. 17/6. Post 2/6.

RECTIFIERS. 8/9. T.V. type. Salvage, guaranteed. 250 volt at 200 m/A. 180 volt at 40 m/A. 3/9. Post 1/-.

BURGLAR ALARMS. To clear. 3/9. Brand new, self-contained unit. Made by Truvox. Consist of bell and trip device mounted in metal cover. Works off 4 1/2 volt battery. Post 1/3.

CLOCKWORK MECHANISM. 3/9. Can be modified for use as dark-room timer. Drawings free. Post 9d.

DUNLOPILLO EX-COACH SEATS. 34in. x 16in. x 4in. Back 28in. high. 37/6. Ideal for cars, caravans and utilities. Carriage 4/6.

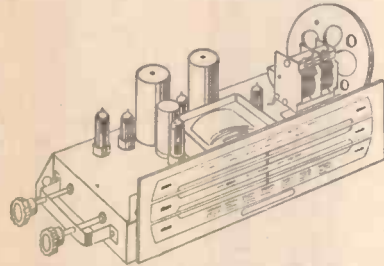
SPOTLIGHTS. 8/9. Butlers, new but ex-W.D. 7 1/2in. dia., 6 1/2in. deep. Pre-focus fitting. Post 1/3. Easily adapted.

BULBS for above, 4/6. 6 v. 36 watt., 12 v. 48 watt.

SIDELIGHTS. Infra-red glass. Ideal tail lamps. New ex.-W.D. 1/9. Post 9d.

REAR OR PARKING LIGHT. 1/9, on lead with battery case and clips. Post 6d. 1.4 v. bulbs 4d. each.

SEND STAMP ONLY FOR 1954 CATALOGUE.



"Baker's"
 Regd



QUICK · CLEAN · CERTAIN · ECONOMICAL

PRODUCT OF SIR Wm. BURNETT & CO. (Chemicals) LTD.
 GREAT WEST ROAD · ISLEWORTH · MIDDLESEX · ENGLAND



POST THE COUPON TODAY FOR OUR BROCHURE ON THE LATEST METHODS OF HOME TRAINING FOR OVER 150 CAREERS & HOBBIES

PRIVATE AND INDIVIDUAL TUITION IN YOUR OWN HOME

- | | | | |
|--------------------------|----------------------------|------------------------------|------------------------------------|
| Accountancy | Commercial Art & Drawing | M.C.A. Licences | Sanitation |
| Advertising | Customs & Excise Officer | Mechanical Engineering | Secretaryship |
| Aeronautical Engineering | Draughtsmanship | Motor Engineering | Sheet Metal Work |
| Automobile Engineering | Economics | Photography | Shorthand & Typing |
| Banking | Electrical Engineering | P.M.G. Licences | Sound Recording |
| Book-keeping | Electronics | Police | Structural Eng. |
| Building | Fashion Drawing | Production Engineering | Telecommunications |
| Business Management | Heating & Ventilating Eng. | Public Speaking | Television |
| Carpentry | Industrial Administration | Rc3ar | Time & Motion Study |
| Chemistry | Journalism | Radio & Television Servicing | Tracing |
| Civil Service | Languages | Radio Engineering | Welding |
| Civil Engineering | Marine Engineering | Refrigeration | Works Management |
| Commercial Subjects | Mathematics | Retail Shop Management | Workshop Practice and many others. |

Also courses for University Degrees, General Certificate of Education, B.Sc.Eng., A.M.I.Mech.E., L.I.O.B., A.C.C.A., A.C.I.S., A.M.Brit.I.R.E., A.M.I.I.A., City & Guilds Examinations, R.S.A. Certificates, etc.

THE ADVANTAGES OF E.M.I. TRAINING

★ The teaching methods are planned to meet modern industrial requirements. ★ We offer training in all subjects which provide lucrative jobs or interesting hobbies. ★ A tutor is personally allotted by name to ensure private and individual tuition. ★ Free advice

covering all aspects of training is given to students before and after enrolment with us.

COURSES FROM £1 PER MONTH

POST THIS COUPON TODAY

Please send without obligation your FREE book.
E. M. I. INSTITUTES (Dept. 144k)
 43 Grove Park Road, London, W.4

NAME _____
 ADDRESS _____

SUBJECT(S) OF INTEREST _____
 September, 1954.

EMI INSTITUTES
 The only Postal College which is part of a world-wide Industrial Organisation

GALPIN'S

ELECTRICAL STORES

408, HIGH STREET, LEWISHAM, S.E.13

Tel.: Lee Green 0309. Nr. Lewisham Hospital.

TERMS: CASH WITH ORDER. NO C.O.D.

All goods sent on 7 days' approval against cash.

EARLY CLOSING DAY THURSDAY

HEAVY DUTY SPOT WELDER TRANSFORMERS, input 200/250 volts. OUTPUT a combination of 2, 4, 6, 8, 10, 12 volts at 120/150 Amps. New £6/15/- each, carriage 6/-.

LIGHT ARC WELDING TRANSFORMERS, 200/250 volts Input, Output 40/60 volts, 30/40 Amps. £7/5/- each.

MEDIUM SPOT WELDING TRANSFORMERS, input 200/250 volts, OUTPUT a combination of 2, 4, 6, 8, 10, 12 volts at 50/70 amps., new £5/2/6, C/paid.

HEAVY DUTY L.T. OUTPUT TRANSFORMERS, 200/250 volts Input. Output a combination of 6, 12, 18 and 24 volts at 30 amps. £4/2/6 each. C/paid.

Another Input as above, Output 0, 6, 12, 18, 24 volts at 12 amps., 55/- each, post 2/-.

Another Input as above, Output 0, 6, 12, 18, 24 volts, 6/8 amps., 46/6 each, post 2/6.

HEAVY DUTY L.T. TRANSFORMERS suitable for rectifiers, soil heating, etc. Input 200/250 volts, Output a combination of 6, 12, 18, 24, 30, 36 volts at 15 amps, 67/6 each, post 2/6.

Another Input and Output as above but at 6 amps., 47/6, post 2/-. Another input and output as above but at 4 amps., 36/6 each.

CONVERTORS, 400 watts output, 24 volts D.C. input, 50 volts 50 cycles 1 phase output. Complete with step-up transformer from 50 volts to 230 volts at 400 watts. £12/10/- each C/F.

Ditto 200 watts. £9/10/- each C/F, fully guaranteed.

ROTARY CONVERTORS. 230 volts D.C. input, 230 volts A.C. output, 50 cycles 1 phase at 250 watts. £15 each C/F.

EX-RADAR MAINS TRANSFORMERS. Input 230 volts. Output 4 or 5 Kilo-volts at 30 M/A., also 3 L.T. windings 4 v. 2 a., 6.3 v. 2 a., 2 v. 2 a., these transformers are capable of a larger output than stated and are immersed in oil. £3/15/- each, carriage 5/-.

DIMMER RESISTANCES. Large type 2,000 watts rating, 45/- each, carriage 5/-.

MAINS TRANSFORMERS (NEW), input 200/250 volts in steps of 10 volts, output 350/0/350 volts, 180 m/amps, 4 volts 4 amps., 5 volts 3 amps., 6.3 volts 4 amps., 45/- each, post 1/6; another 350/0/350 volts 180 m/amps., 6.3 volts 8 amps., 0/4/5 volts 4 amps., 45/- each, post 1/6; another 500/0/500 volts 150 amps., 4 volts 4 amps. C.T., 6.3 volts 4 amps., C.T., 5 volts 3 amps., 47/6 each, post 1/6; another 425/0/425 volts 160 m/amps., 6.3 volts 4 amps., C.T., twice 5 volts 3 amps., 47/6 each, post 1/6.

MAINS TRANSFORMERS, 200-250 volts input, output 400/0/400 volts, 280 m/amps., 6.3 v. 8 a., 2 v. 3 a., 5 v. 3 a., 4 v. 2 a., 4 v. 2 a., the last two heaters insulated at 8,000 volts, 85/- each; another 200/230 volts input, output tapped 0, 9, 18 volts at 4 amps., 25/- each, post 1/-.

EX-U.S.A. ROTARY CONVERTORS, 12 volts D.C. input, outputs 500 volts 50 mA. 275 v. 100 mA. Complete with smoothing, 22/6 each, carriage 2/6. As new.

EX-NAVAL ROTARY CONVERTORS, 110 v. D.C. input 230 volts A.C. 50 cy., 1 ph. 250 watts, output. Weight approx. 100 lbs. £12/10/-, c/forward.

EX-W.D. U.S.A. HAND GENERATORS, less winding handle, output 425 volts at 110 mA., at 6.3 v., 2 1/2 amps., complete with smoothing, 30/- each, carriage 2/6.

ELECTRIC LIGHT CHECK METERS, useful for sub-letting, garages, etc., all for 200/250 volts A.C. mains, 5 amp. load, 19/- each, 10 amps., 22/6; 20 amps., 27/-; 25 amps., 32/6.

METERS. Moving coil, 0 to 14 amps., 18/6 each. Ditto, Moving Iron, suitable for A.C. 0 to 30 amps., 25/- each. Another moving coil, 100 to 250 amps., D.C. 35/- each, all 4 in. scale.

1,000 WATT AUTO WOUND VOLTAGE CHANGER TRANSFORMER tapped 0/110/200/230/250 volts. £5/15/- each, carriage 4/6.

1,500 watt ditto, £7/15/-, carriage 7/6.

350 watt 55/-, 500 watt 75/-, 200 watt 45/-.

PRE-PAYMENT I/- ELECTRIC LIGHT SLOT METERS, 5/H reconditioned, variable tariff, 10 amp. load, 200/250 volts A.C. 55/- each.

1,500 watt ditto, £7/15/-, carriage 7/6.

350 watt 55/-, 500 watt 75/-, 200 watt 45/-.

PRE-PAYMENT I/- ELECTRIC LIGHT SLOT METERS, 5/H reconditioned, variable tariff, 10 amp. load, 200/250 volts A.C. 55/- each.

1,500 watt ditto, £7/15/-, carriage 7/6.

350 watt 55/-, 500 watt 75/-, 200 watt 45/-.

PRE-PAYMENT I/- ELECTRIC LIGHT SLOT METERS, 5/H reconditioned, variable tariff, 10 amp. load, 200/250 volts A.C. 55/- each.

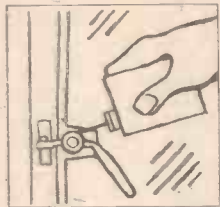
1,500 watt ditto, £7/15/-, carriage 7/6.

350 watt 55/-, 500 watt 75/-, 200 watt 45/-.

RUSTED FITTINGS?

Free them quickly with

Shell Easing Oil



Shell Easing Oil comes in a handy 8 oz. tin with special pourer spout—very good value at 2/6.

SHELL EASING OIL is very handy in the house—and very good value at 2/6! Buy some to-day—good ironmongers stock Shell Easing Oil.



Here's the way to free those rusted fittings! Free them quickly, too. Shell Easing Oil is sure and swift, penetrates deeply to loosen and free.

From nuts and bolts to taps and pipe joints, from bicycle frames to window catches, Shell Easing Oil is the answer to your rusted parts problem.

MIDLAND INSTRUMENT CO. OFFER:—

SELSYN TRANSMITTERS (Magslips), 3in. type, pure synchro x-y-1-2-3, suitable as master or slave, 50 v. 50-cycle single phase A.C. operated. When two or more of these are wired up, the rotation by hand (or other means) of one, will result in a 100 per cent. follow in the others), both clockwise or anti-clockwise, supplied brand new with test report, in tropicalised sealed cartons, value £8 each, our price 25/-, post 2/-; 2 for 50/-, post paid with wiring diagram. **SIEMENS HIGH SPEED RELAYS**, coil res. 145 ohms, single-pole changeover platinum contacts, adjustable armature tension and contact gap, well worth 35/-, our price, new, unused, 5/-, post 6d., 50/- doz., post 2/-.

INFRA-RED IMAGE RECEIVERS, size 6in. long (6in. with shade extension), 2 1/2 in. dia., consists of front magnifying lens, image converter cell, duo-Achromatic lens system, infra-red filter glass, with attached H.T. lead, requires 3,000 v. at infinitesimal current to operate, definition up to 350-lines per inch, fraction of original cost, new, unused, 35/-, post 1/6.

ELECTRO-MAGNETIC COUNTERS, 0-9999 repeating, 3-ohm coil, operates down to 1 1/2 v., size 1 1/2 in. x 1 1/2 in. x 4 1/2 in. long, perfect order, 5/-, post 1/-; 48/- doz., post 2/4.

DEWAR FLASKS (vacuum flasks), 10-litre capacity, internal dia. 6in., depth 2 1/2 in., fitted metal base, German manufacture, for storing liquid oxygen, etc., 50/- each, callers only, we cannot dispatch. **BECK PRISMATIC PERISCOPIES**, 6x magnification, adjustable eyepiece at right-angles, length 17in. extends to 23in., removable handrip, in leather carrying case, perfect condition, a real bargain, 25/-, post 1/6.

PROJECTION UNITS, consists of an optical mount fitted with a bloomed F.2.2 Achromatic lens, 3 1/2 in. focal length at one end, and a concave/convex ground glass at the other, attached to an enclosed lamp-house fitted with a 24 v. 15-watt lamp, with polished reflector, fraction of original cost, 10/-, post 1/-.

VENNER AUTO TIME DELAY SWITCHES, 12/24 v. operation, consists of a high-grade clockwork mechanism, with external wind, 2 electro-magnets with cam-operated contacts, in smart metal cases fitted 4-way terminal block, size 3 1/2 in. x 2 1/2 in. x 2 1/2 in., new boxed, cost £8, our price 7/6, post 1/6.

HOOPER BLOWER MOTORS, dual voltage, with terminations for 12 or 24 v. D.C., alternately 20 or 40 v. A.C., length 5 1/2 in., blower casing 4 1/2 in. dia., 1 1/2 in. dia. inlet and outlet ports, thousands of these have been fitted for car heaters, new, unused, complete with 2 hose connectors, 25/-, post 1/6.

TELEPHONE SETS, consists of 2 combined receivers and microphones, connected by 20ft. twin flexible, provides perfect 2-way communication (up to 1 mile with extra flex), self-energised, no battery required, complete ready for use, new boxed, 12/6, post 1/-.

K TYPE CYLINDER LOCKS, deadlocking and thiefproof, has 7 concentric tumblers instead of the usual 5 in line, interchangeable with ordinary cylinder locks, or right-or-left-hand doors, complete with 2 keys and all fittings, instruction booklet, list price 18/9, our price new boxed, 5/-, post 1/1; 2 for 10/-, post paid.

P.M. SPEAKERS, all brand new, less transformer, Elac 6 1/2 in. dia., 12/6, post 1/6; Goodmans 6 1/2 in. wafer type, 10/-, post 1/3; Elac 3 1/2 in. square front, 10/-, post 1/3; Plessey 3 1/2 in. dia., personal portable, 8/6, post 1/4.

CHARGING KITS, consists of a G.2.C. 12 v. 1 1/2 amp. selenium full-wave rectifier, and a Douglas 200/250 v. transformer specially wound for this rectifier, with requisite voltages to charge a 2, 6 or 12 v. battery at 1 1/2 amps., also makes a perfect model railway unit, complete with circuit diagrams and instructions, 2 brand new components, 25/-, post 1/8.

VARIABLE RESISTANTS, wire-wound on ceramic, 50 ohms at 1 amp., laminated wiper, bakelite control knob, in metal cases size 5 1/2 in. x 4 1/2 in. x 2 1/2 in., fitted on/off toggle switch and 2 cannon plugs, new boxed, 7/6, post 1/6.

LIGHTER PARTS, cartons of 60 brand new parts, includes fine cut wheels, springs, stems, frames, bearings, etc., enough parts to nearly complete 2 high-grade lighters, easily worth 15/-, our price, 2/6, post 4d.

CRYSTAL SET COILS, high-gain dual range med. and l.w., complete with crystal set circuit, 2/6, post 4d.; Variable cond., .0005 mid., bakelite dielectric, complete with pointer knob, 2/6, post 4d.; Germanium detector, latest wire-ended type, 2/-, post 3d.; Wave-changer switches, 6d., post 3d.; Click plugs with sockets, 4 sets 2/-, post 4d.

All items to construct a crystal set, 10/-, post paid.

D.C. SERIES MOTORS, 12-24 v. 15/20 amps., size 6 1/2 in. long 3 1/2 in. dia., fitted 1/2 in. dia. shaft, weight 9 lbs., a very superior motor, originally cost £10, our price, new unused, 7/6, post and packing 2/6.

SPIRIT DUPLICATING CARBONS, size 16in. x 13in., cartons of 100 sheets, tissue interleaved, worth 15/-, our price, brand new, 2/6, post 1/8. Also hundreds of other interesting items. Send 3d. with s.a.e. for current lists.

MIDLAND INSTRUMENT CO.,

Moorpool Circle, Birmingham, 17.

Tel. HAR 1308.

TELEPHONE SETS

FOR PERFECT COMMUNICATION BETWEEN 2 OR MORE POSITIONS.

EASY TO INSTALL.

1 Pair of Units £5 Post 2/6

Illustrated leaflet and wiring diagram available on request.

EXPOSURE METERS.—Metrovick photo-electric in leather case. Cine Model. 24.17.6.

ENLARGER TIMER.—A mechanically operated unit giving from 1 to 15 seconds exposure at each winding, dial calibrated in 1/2 seconds. Will work on any voltage from 6 to 250. A.C./D.C. Lamp automatically cuts out at end of each exposure. Separate switch fitted for focusing. Simple to use, will save its cost in Bromide paper in a few weeks. Improved model, still same price, 50/-, Post 2/6.

FIREMAN'S AXE.—One piece blade of finest drop forged steel. Insulated handle tested to 20,000 volts. Special curved blade for breaking through flat surfaces, with spike attachment. Brand new 17/6. P. & P. 2/6.

ALKALUM LONG LIFE BATTERIES.—12-volt unit consisting of 10 cells in crate, each cell is 1.2 volts 45 ampere hours. Price complete uncharged, £10, carriage 10/-.

BLOWER MOTORS.—Dual voltage, 12/24 volt. No. 10KB/115 recommended for car cooling or heating, 25/-, post 2/-.

TERRY ANGLEPOUSE LAMPS.—Complete with flex and S.B.C. holder, shade, etc. Will stay put in any position, wall, or machine fixing, 35/-, post 2/6.

VOLTMETERS.—0-300 volt A.C. 50 cycles. 2 1/2 in. flush moving coil, rectifier type, 30/-, post 1/-.

HIGH-SPEED RELAYS.—Twin 1,700 ohm coils or twin 100 ohm coils. Siemens. 15/-, post 6d.

GEARED MAINS MOTORS.—Universal Series Type for 230 volt A.C./D.C. 100 r.p.m., torque 7 lbs./ins. Klaxon No. EK3UBI-W3, complete with control box to enable speed to be varied, 115/-, complete.

VOLTMETERS for A.C. Mains 50 cy. reading 0 to 300 volt with clear 5in. dial only 50/-; worth double.



ELECTRO MAGNETIC COUNTERS.—Post Office type 11A, counting up to 9,999, 2 to 6 volts D.C., 3 ohm coil, 12/6 each, post 1/-.

Many other types in stock. Lists sent with order or send S.A.E.

VEEDER COUNTERS to 9,999, also others up to 99,999 only 7/6 each, Post 6d.

ROTARY CONVERTERS. From 24 volt D.C. to 230 volt A.C. 100 watts, 9/6 each; also available with 12 volt input, 102/6 each, carriage 10/-.

CLOCK MOTOR.—Sangamo synchronous, 230 volt, 2 1/2 watt geared to 1 rev. per min. 15/-, post 1/6.

AUTO CABLE for car wiring and all electrical purposes, waterproof. Single 4/- doz. yds., 20/- 100 yds. Twin 3 core or single voltage, 5/- doz. yds., 37/6 100 yds. 5 core, 6/- doz. yds., 45/- 100 yds.

VACUUM PUMPS or Rotary Blowers.—Ex R.A.F. Brand new, 7 cu. ft. per min. 10 lbs. per sq. inch at 1,200 r.p.m. Ideal for a brazing torch, etc. Size 6in. x 4in. x 4in., 2 1/2 in. shaft, 22/6 each, post 2/-.

BUZZERS, 3 to 30 volts. In mahogany case. Superior quality, 5/6 each, post 6d.

VOLTMETERS.—0-300 Flush D.C. moving coil, 10/6; 0-20, 2in. Flush Moving Coil, 7/6; 0-40, 2in. Flush M.C., 10/6, post 1/-.

AMMETER.—2 1/2 in. Flush, 0/25 amps. Moving Iron, D.C. 7/6, post 1/6.

MOVING COIL METER with 1 M/A movement, 2 1/2 in. flush, rectifier type, scaled 0/100 volts A.C. Resistance 100k. ohms. A very useful basic meter, 80/-, post free.

MASTER CONTACTOR.—A precision made clock movement, contact making and breaking twice per second, with regulator, incorporating heating device working on 12 or 24 volt automatically controlled by thermostat. Brand new in soundproof oak case, only 9/6, post 2/-.

PORTABLE ELECTRIC BLOWER.—This unit is a powerful 220 watts electric motor, operating on 220/230 volts. Enclosed type with handle. 8ft. of metallic flexible hose and nozzle is included, also 7 yds. C.T.S. flex for connection to the mains. These units are brand new and offered at about half the usual price, they have many uses where clean, dry air is required. 130/-, complete.

INSPECTION LAMP.—Complete with Battery Case. Fits on forehead. Leaves both hands free. 7/6, post 1/4. Takes a standard Ever Ready battery, No. 1215, 2/9, post 6d.

BALL RACES.—No. EE2 1/4 in. x 1/4 in. 3/-, 30/- doz., post free.

TESTER RACES.—1/16in/1/4 in. x 1/4 in. 1/6, 15/- doz. Post free.

WILCO ELECTRONICS

DEPT. P.M.,

204, LOWER ADDISCOMBE ROAD, CROYDON.

is now perfecting an electrolytic method of producing the metal—said to be quicker and cheaper than present chemical processes. From this we may receive crash-proof cars, lighter ships, stronger cycles. And not a spot of corroding rust in all.

Termite Research

Let us turn to another branch of science—the study of Nature itself. At a conservative figure we might say that £50,000,000 worth of damage is done annually in the world by termites. It is a problem worth tackling and its investigation reveals an organisation in incredible totalitarian order, workers, soldiers, kings and queens keeping strictly to their individual tasks. Now Dr. S. H. Skaife, President of the Royal Society to South Africa, has made a film of termites at home; a film made entirely in the dark of termite colonies.

Dr. Skaife holds the theory that the queen lays only one type of egg, but the varied members of a colony grow from this one type by specialised feeding. Here is a secret of Nature—breeding by diet—of great scientific interest, and the film (televised July 3rd, 1953) may open the way for us to learn something basically constructive as well as a means of destroying the termite which causes the damage.

From these minute creatures to the astronomical—science is advancing on all

scales. The most recent research at Mount Palomar, where the 200in. telescope was brought into use in 1950, reveals that the observable universe has been doubled since 1948. We can now “see” a distance of 2,000 million light-years. This fact, astonishing as it is—perhaps too vast to be appreciated—will mean little except to another astronomer. Yet perhaps a glance at the heavens now and again would remind all of us that time and space are so infinite that this little earth might well be more humble.

The Advance of Science and Its Cost

Practical science is also stepping forward—expanding like the universe. The Hydraulics Research Station has larger premises at Wallingford, for the National Physical Laboratory at Teddington is proving too small for the testing of tidal and river experiments. There are now two wave-basins, 125ft. by 80ft., both larger than that at the original N.P.L. In one of them a model of Lyttleton Harbour, New Zealand, is being studied. This harbour requires to be enlarged: the model in the tank will provide all the answers. Nearby is another item of wide interest to this country—a pilot model being built as the first stage of investigation by the Severn Barrage Scheme.

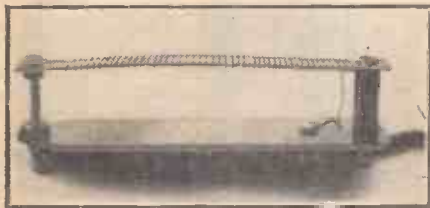
One more condition which advances with science is cost. The first “atom smasher”

built at Cambridge cost a few hundred pounds; the most modern, £2,000,000. This figure will be easily surpassed by the ten-nation Nuclear Research Laboratory now being built near Geneva where international science and research will be the responsibility of the ten governments concerned. That is the ideal of science—advancement for the benefit of all.

Germanium Research

Mention should also be made of germanium research in all its branches: The new transistor will play a vital part in radio, T.V., hearing aids and innumerable cases where the normal valve can be replaced, with a saving in space and current consumption. There is also the Boron-silicon Solar battery with its 50 watts output for an area of one square yard; possibly an important contribution to the small-scale production of power in remote areas.

Little need be said of the improvements which science is making in the everyday items of our life. Three-dimensional pictures, colour television, broadcast receivers without normal valves, innumerable discoveries in modern science, new synthetics, better aviation, guided missiles, food processing, and a host of inventions destined to bring safety or greater comfort to our labours. All of these are in the future as the task of science.



The completed flasher.

A THERMAL FLASHER

A Simple Automatic Switching System

By F. G. RAYER

THIS unit provides automatic on/off switching, at regular intervals, for one or more low-voltage lamps, or for similar equipment such as buzzers or bells. Though possibly most suitable for decorative lighting, it has various other applications in models of many kinds. If required, a change-over relay can be connected so that when one series of lamps is extinguished a second series (usually of a different colour) is illuminated. Made as described, it was found that the unit could be adjusted to provide cycles of operation between about two seconds and five seconds, any particular adjustment being well maintained during a period of operation. This is suitable for “blinking” signal indicators and many similar uses in models.

Arrangement of Parts

The arrangement of parts is clear from Fig. 1 and the construction of the bi-metal strip needs reasonable care. Two readily obtainable metals found to have suitable degrees of expansion when heated were aluminium and iron—the latter taken from a “tin” can

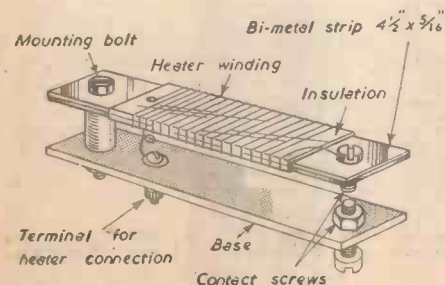


Fig. 1.—Constructional details of the flasher.

(these really being thin tinned sheet-iron, in most cases). The strips must be quite flat and cut with reasonable accuracy. The metal for the second strip was also taken from a domestic container—this time from the lid, which was found to be made from a light aluminium alloy.

Both strips are drilled at one end, filed flat at this point, and tightly bolted together with a 6 B.A. bolt and nut. The insulation shown was then put on, and consisted of two thicknesses of cellulose tape. The two metal strips must be tightly together throughout all their length. A second hole, for the mounting bolt, was then drilled through both strips. The strip is subsequently fixed as shown, a metal bush being used to provide spacing from the paxolin base.

The winding consisted of approximately 45 turns of 32 s.w.g. resistance wire. This iron wire would be suitable. The turns are spaced evenly along the insulation, being wound on tightly. One end goes to a small terminal; the other is soldered to the small bolt at the free end of the strip. This winding, with a bi-metal strip made as explained, was found to give a maximum movement of 3/16in. at the contact points, when an operating current of 1/2 amp was used.

Adjustment and Circuits

Both bolts which pass through the bi-metal strip must be absolutely tight. For an initial test, leads may be taken to the terminal shown in Fig. 1, and to the mounting bolt. With 1/2 amp the free end of the strip should move at least 1/4in. in about 10 to 15 seconds. If it is desired that the circuit be broken when the strip heats, as is usual, the strip is mounted so that the iron is on top, and the aluminium underneath.

The circuit for ordinary operation is shown in Fig. 2, the lamps being of such type, or so wired in parallel, if required, that a current of about 1/2 amp is obtained through the flasher

winding. The lock-nuts of the lower contact screw are adjusted so that the contact surfaces meet with moderate pressure when the strip is cold. This completes the circuit. The strip heats until contact is broken, thus interrupting the current, and the lamps are extinguished. As no current is passing, the strip then cools until the contacts touch, when the sequence is repeated. The interval may be adjusted to some extent by means of the lower contact screw. As there is virtually no inductance in the circuit, sparking was found to be extremely small with voltages up to 12.

When wiring up a circuit it is necessary to allow for the voltage drop in the heater winding of the flasher. If more current is

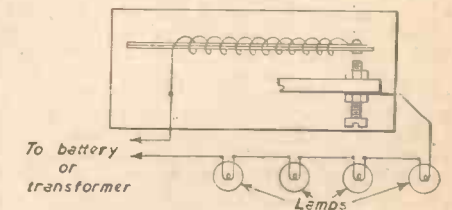


Fig. 2.—Circuit for flashing lamps.

available, at lower voltage, then it would prove helpful to use a winding of lower resistance—for this, 24 to 28 s.w.g. wire could be used. The contact surfaces should be filed flat and smooth. In use, a make-and-break movement of only about 1/20in. or less will arise.

Model Boat Building

By F. J. CAMM

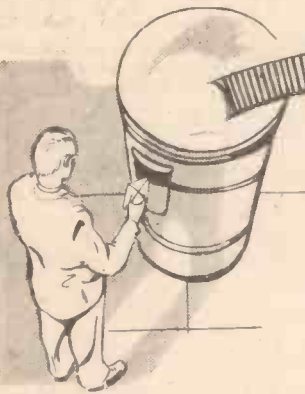
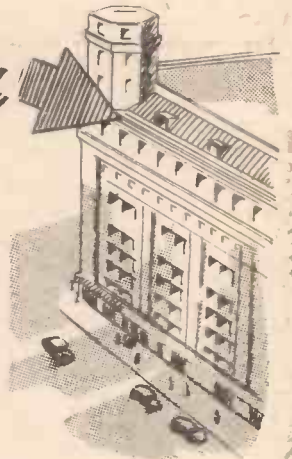
5/-, By post 5/6

From **GEORGE NEWNES, LTD.**,

Tower House, Southampton St., Strand, W.C.2

Letters to the Editor

The Editor Does not Necessarily Agree with the Views of his Correspondents



Chemical Soot Dissolvers

SIR,—With reference to a query raised by G. R. Mahy (Notts) in your June issue, on the question of chemical soot dissolvers, and to your answer to that question contained in the same issue, may we take this opportunity of agreeing with you up to a point. For years past the type of soot destroyer that has been available on the domestic market has been of the type you mention, whereby removal of soot is effected by heat. As you know, on an open fire, these soot removers require the use of a draw plate to be placed against the fire, to produce the necessary draught to clear the chimney of the "surplus" soot.

Since the winter season 1952-53, however, there has been available a new type of soot disperser, which has an entirely different action than has hitherto been accomplished by any other. Marketed by this company in association with the holders of the American rights for this formula, this material is in powder form and carries six applications in the small container and 12 in the large. It is *absolutely* safe in use, being non-inflammable and non-flaring, and does *not* require the use of a draw plate when applied to the open fire.

The action of this material is one which is volatile, and the gases given off act upon the soot and firescale binders, breaking up the formations and dispersing them. The ignition temperature of soot is reduced by 500 deg. and so allows the fine particles to be consumed safely. Also, these gases remain active on the sides of the flues for some time and prevent soot from forming.

Industrially, this material has been used in this country for four years, and for 18 years in America, and it has been conclusively proved that no deterioration of brick or metal flues is experienced.

We have on our files letters from all parts of the country praising this commodity and vouching for its safety in use. Chimney fires have successfully been extinguished by applying three-quarters of a carton on the fire bed, and the success on domestic water heating boilers of this material is quickly shown by the greater heat output at the hot taps than has ever before been experienced. —WILSON AND WOODS, LTD. (Rayners Lane, Middx).

Liquid and Powder Plating Preparations

SIR,—I feel I must add to the reply of your advice bureau in the matter of the reply given to D. E. Challis (Enfield) on the subject of liquid and powder plating preparations in the July issue of PRACTICAL MECHANICS.

I entirely agree that any preparation which purports to deposit a coating of nickel or chromium from powder or liquid without the aid of electric current is spurious; these preparations invariably containing mercury. I feel that the generalisation made is a little unfair and misleading as the inference is likely to be drawn from your reply that liquid or plating powders are useless.

I think that you will agree that the deposition

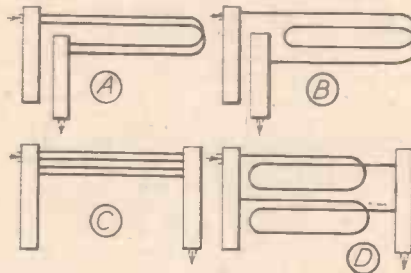
of a film of silver either from a powder or liquid has been practised for over half a century in the silvering of clock and watch dials. Admittedly such deposits are thin, but nevertheless they are permanent silver deposits; not fugitive deposits as with the mercury preparations.

Any-text book on electro-plating will give the formula for such "rub on" or immersion silver plating, one in particular being: "Electro-plating," Field and Weill, page 265. Another being "Electro-plating and Refining," Watt and Philip, page 239. Silvering, in such cases, is by the well-tried paste or liquid comprised of silver, common salt and cream of tartar, etc.—G. BURFORD (Battle).

Cupboard for Drying Clothes

SIR,—With reference to Mr. Hart's request for information on the construction of a drying cupboard, I would remind him that it is not heat which dries clothes so much as air, and the air is warmed because it can then absorb more moisture.

Since he has the flow and return pipes of the hot water cylinder running through the cupboard the best thing would be to use the hot water to heat the cupboard rather than an electric heater. However, since the tank has flow and return pipes I presume it is the central heating system and this would probably not be on in summer.



Suggested arrangements of pipes for drying cabinet.

Whatever the system the idea is to install a radiator of some sort horizontally in the bottom of the cupboard and then arrange a flow of water through it. The radiator could be an ordinary midget central heating radiator such as is used to warm closets; a discarded car radiator; or a homemade one consisting of several loops of copper tube in the form of a battery of copper loops linking two "busbar" pipes of larger diameter. The greater the area of copper pipe the more air will be heated. The larger the number of coils in a pipe the more the water will be cooled. Probably the forms shown in A or C would be best. To avoid flattening of the pipe when bending, it should be filled with Wood's metal, if obtainable, which melts in boiling water, or a low melting point solder.

If the hot water tank is that for the central heating, all that is needed is a "tee-in" to the "flow" pipe for the hot inlet on whichever "busbar" pipe is the higher, and another in the return pipe for the outlet, with a tap so that the heater can be turned off when not in use.

If the tank is for the domestic water supply the task is not so easy. If the radiator can be placed above the tank, then a pipe from the top of the tank to the inlet, and another from

the bottom to the outlet will provide the circuit necessary for convectional circulation.

If this is not possible then the only other method open using the hot water is to have water running through slowly and then going to waste; alternatively, if the mains pressure is so low as to warrant there being a reservoir tank, the outlet should be run back into the top of the reservoir tank.

As for the ventilation of the cupboard, it should be completely open top and bottom, and with the radiator covering all the bottom end area and not too many clothes in it. No fan should be needed. On the other hand with a fan, drying would be faster and efficiency improved.

If the hot water system of heating will not work, then a suitable length of heating cord supported by a perforated zinc sheet would be suitable. Heating cord can be obtained from The Technical Services Co., Shrubland Works, Banstead, Surrey, and probably also hints and advice as to the length and gauge of cord most suitable. This should be protected by at least one or two spaced zinc sheets above it, with all zinc earthed. Connection between the heating cord and power lead should be made *outside* the cupboard in a junction box, and the power lead (three-core) connected to a bakelite switched wall plug, with a three-pin plug. It is essential that the zinc sheets are properly earthed, and not just connected to the pipes running through the cupboard, as this could be dangerous in the event of a failure.—C. F. Cox (B.A.O.R. 15).

Flying Saucers

SIR,—I would like to comment on one or two points in J. W. Selwood's letter to you (May issue).

One is, I do not quite understand what he means by asking if we had tried photographing any certain part of the moon while that part of the moon is moving. I have taken many photographs of certain parts of the moon, and received wonderful results. If he is referring to the same photograph as I, which appeared in PRACTICAL MECHANICS some months ago, then from what I could see the portion of the moon was quite considerable.

The second point is why Mr. Adamski should leave his companions behind just before he made contact with the man from the "Flying Saucer." Mr. Selwood's explanation of this was: "Old records show that 'Flying Saucers' had landed and taken off again with earth inhabitants inside. Then if he and his five companions were taken off, nobody would know the 'Flying Saucers' had landed. But if Mr. Adamski had been taken off alone, then his five friends could have told the world what had happened." Now this, to my mind, is a rather weak explanation, because I think that if Mr. Adamski had taken one or two friends with him as witnesses, three people would have been sufficient to tell the world what had happened.

(Continued on page 547)

READERS' SALES AND WANTS

The pre-paid charge for small advertisements is 6d. per word, with box number 1/6 extra (minimum order 6/-). Advertisements, together with remittance, should be sent to the Advertisement Director, PRACTICAL MECHANICS, Tower House, Southampton Street, London, W.C.2, for insertion in the next available issue.

FOR SALE

TRANSFORMERS, Rectifiers, Volt and Ammeters, Controllers, Cut-outs, Battery Chargers, Power Units; lists; s.a.e. Harry Gilpin, Manufacturer, Portobello Works, Walton-on-Naze, Essex.

STARLON PLASTIC ENAMEL PAINT in tubes, 1/- each, covering approximately 8 sq. ft., or complete cycle frame; suitable all paintable surfaces. Colours: rich brown, bright red, pink, bright blue, maroon, turquoise, cream, yellow, black, deep green, bright green, mid-grey, white and clear; home trade and export. Obtainable from Handicraft, Hobbies and other shops, or send 1/3 for sample tube and colour card, post free, to sole manufacturers: Starline, Southend, Essex.

NUTS, BOLTS, SCREWS, Rivets, Washers, and hundreds of other items for model engineers and handy-men; s.a.e. for list, Whiston (Dept. PMS), New Mills, Stockport.

FRACTIONAL SYNCHRONOUS GEARED MOTORS, 230v. A.C., S/Ph., 50c., final speed 1 r.p.h. and similar 2 r.p.h.; price 12/6 each, plus 1/- postage. Universal Electrical, 221, City Road, London, E.C.1.

HOW TO RE-WIND and Service Electric Motors, Generators. Complete Practical Book only 3/-; p.p.d. Below.

10,000 FORMULAS, Processes, Recipes, Trade Secrets. This is the 1,000-page money making and money saving book of the century. Limited number again available. Full approval against payment, 2/6 p.p.d. Below.

BUILD YOUR OWN PHOTO Equipment, 12 designs in two books. Enlargers, printers, dryers, timers, etc., 6/-; p.p.d. Below.

AMERICAN BOAT BUILDERS Annual; 28 boat plans, 8-22ft., and other helpful articles, 7/6; p.p.d. Below.

TELESCOPES—DESIGN AND CONSTRUCTION, only 3/-; p.p.d. Really outstanding American designs at lowest cost to make. Below.

LATHE HANDBOOK, 3 books in one, 5/-; p.p.d.; wood-turning, metal turning, metal spinning, lugs, attachments, special operations; 200 illustrations; outstanding, practical, "how-to-do-it" material throughout. Below.

CAR BODY REPAIRING. Complete A B C course; illustrated; 7/6; p.p.d.; lists free. American Publishers Service (P), Sedgford, Norfolk.

HOUSE SERVICE METERS, credit and repayment; available from stock. Universal Electrical, 221, City Road, London, E.C.1.

PLATED NUTS, Screws, Washers, Bolts, Soldering Tags, Hank-bushes, Self-tapping Screws, Grub-screws, Socket-screws, Wood-screws; large quantities or gross cartons. List sent post free. Snden Components Ltd., Dept. E., 117, Churchfield Road, Acton, W.3 (ACORN 8126).

PERSPEX for all purposes, clear or coloured dials, discs, engraving. Denny, 15, Netherwood Road, W.14 (SHE. 1426 5152.)

FOR MARKING STEEL in 4in. Letters; 8d per letter, post 4d. List for Branding Irons, Stencils, Name Plates, Swallows, 56, Garden Street, Sheffield.

COMPRESSOR EQUIPMENT. Miscellaneous items; catalogue, 11d. Fryce 157, Malden Road, Cheam.

COMPRESSORS for sale, 24 CFM, 180lbs. sq. in., on metal base, with driving wheel and receiver, price £3; 1/2 h.p. Heavy Duty Motors, price £3; carriage forward. Wheelhouse, 1, The Grove, Isleworth. (Phone: Hounslow 7558.)

TYPEWRITERS; moderate instalments; delivered everywhere expeditiously; satisfaction guaranteed. Verney Clayton, M.C., Market Rasen.

TUPNOL: Rod and Sheet, Perspex, Coloured and Clear Sheet, Clear Rod; Cements and Polishes; Acetate and P.V.C.; no order to small; price list on application. Lawrence & Jefferys Ltd., 16, Gloucester Road, Brighton, Sussex.

COMPRESSORS from 20/-; Nife Batteries, 10/-; many other cheap lines; s.a.e. for list. L. Unwin, Valleyfields, Bousley Rise, Ottershaw.

MALTA—50 different Stamps, 5/-; Magro, Government Buildings, Zachary Street, Valletta, Malta.

SWISS MUSICAL MOVEMENTS for use in cigarette boxes, soft toys, etc.; direct from the importer; s.a.e. for price and tune list. Mulco Manufacturing & Trading Co. Ltd., 72, Greyhound Hill, Hendon, N.W.4. Trade supplied.

COWL GILL MOTORS. The Motor with a hundred uses; works on 24 or 12 volt D.C.; contains magnetic brake and 4-stage epicyclic reduction-gear 625/1 reduction and reversing switch gear (removable if required); 26/6; p.p.d. Below.

BOMB SIGHT COMPUTERS contain-ing pounds worth of gears, shafts, bearings, electric motors, etc., in metal case; absolute bargain for model makers; few to clear at 47/6, c.p. Below.

REVOLUTION COUNTERS, mechanical with flex shaft, 21/-; ditto, electrical, with tachometer generator and cable connection, 32/6, c.p. Below.

CHART-BOARD LAMPS, miniature angle-poise lamps with dimmer switch; fully adjustable all directions—fix where you like by means of heavy clip-grip—or stand firm on flat surface; standard low voltage—2-pin bayonet holder. Below.

PARABOLIC Adjustable Angle Reflector Fittings—by Lucas, etc.; beautifully silvered, only require drilling to take standard lamp-holder; for workshop, shop lighting, footlights, studio, etc.; 12/6, c.p. Below.

Hosts of ex-British and U.S. Air Service surplus items. Send your enquiries. Staravia (Disposals Division), Blackbushe Airport, Camberley, Surrey.

NEW TIMBER. Imported Softwood, Quarterings, Boards, Battens, Weatherboards, Greenhouse Bar, etc.; cheapest in trade; all sizes stocked. Cannon's (Forest Gate), Dept. P.M., 383, 395, Romford Road, London, E.7.

FINISHING CLEAR VARNISH, Stone, Blue, Brown, Cream Cellulose Paint, 5-gallon drums, 40/-; Office Binders, ring type, 14in. x 10in., 2/6; Small Stencil Brushes, 6/- and 9/- dozen; Canvas Straps with Buckles, 5/-; x 2in., 3/-; Galvanised Wire Sheets, 1in. mesh, 27in. x 10in., 2/-; Rayon Thin Twine, 5lb. cheese, 20/-; very strong; Metal Gas Cylinders, small, 30/-; Casein Glue Powder, 7lbs. 15/-; carriage extra. Batley & Co., Stockport.

ELECTRIC MOTORS (A.C.) BAR-GAINS. 1/2, 1/4, 1/8, 1/16, 1/32, 1/64 h.p., reconditioned and fully guaranteed, cap start, 240/150, 1,425 r.p.m. Makes: B.T.H., Delco, etc.; prices, £9, £6/5/-, 88/6, 69/6, 59/6, 50/-, 42/-; terms c.w.o.; carriage paid. G. Surman, E/Dept., Chalgrove, Oxford.

ELECTRIC MOTORS FOR SALE. Shop soiled but unused: 1/2 h.p., 1,450 r.p.m., 230/150, £4/10/-; 1/4 h.p., 1,450 r.p.m., 230/150, £3/10/-; 1/8 h.p., 1,450 r.p.m., 230/150, £7. Bivac Air Co. Limited, Marland Street, Portwood, Stockport.

BENDELLE CHARTS solve sheet metal work problems, etc., 2/9, post free. Whitaker Enterprises, 233, Pear Tree Avenue, Bitterne, Southampton.

FOUR-WAY TOOLPOSTS, locating and non-locating, cheap; also various material widest range. 5d. Lists, Synek, 73, Sherbrooke Road, London, S.W.8.

SAWBENCHES and Spindle Assemblies, all sizes up to 36in. Saws, unmotorised, petrol driven, or motorised; Precision Planers; send 1/- for Handbook-Catalogue; price list on request; deferred terms. Let us quote without obligation. Beverley Products, Ranskill S21, Notts.

TOOL BARGAINS. — High-speed Lathe Tools, set of 12 by 12in. square, 40/-; p. and p. 1/-; 12 High-speed Drills, up to 1/2in., 12/6. p. and p. 6d.; Adjustable Tap Wrenches, 1/2in. to 1 1/2in., 12/6. p. and p. 1/4; Needle Files, 12 assorted, 12/-; p. and p. 6d.; 12 assorted Silver Steel, up to 1/2in., 8/6. p. and p. 1/6; Gordon Rings Spanners, set of 5 BSF or Whit., 1/2in. to 1 1/2in., 30/-; p. and p. 1/3. Send 6d. for bargain lists. Mibro Equipments, Dept. PM, 65 Knaresborough Road, Harrogate.

ANGLERS—Sets A1 Alloy Castings for 3 1/2in. trout reel, with check gear, 16/-; post free. R. Wilson, Brora, Sutherland.

H.S.S. NUMBER DRILLS, complete sets, 1-60; leading makes; brand new; 45/-; post free; actual value about £4. P. B. Crawshaw, 166, Pixmore Way, Letchworth, Herts.

GERMANIUM DIODES, 1/- each; larger quantities cheaper. BDC, 591, Green Lanes, London, N.8.

FENNER "V" BELTS, 46in. long, 1/2in. section, brand new, 2/6 each. Photo Electric Cells, brand new and boxed, £1 each. Achromatic lens combinations from 10mm. to 50mm. dia., focal lengths from 1in. to 10in. at 22/6 each. Thousands of Binocular prisms in stock. Burgess Lane & Co., Block "J", Sunleigh Works, Sunleigh Road, Wembley. (WEM. 2378.)

AMAZING BATTERY OFFER! Very large purchase of all-dry H.T.-L.T. Batteries enables us to make this special offer: 2 Batteries, 72v. H.T., plus 14v. L.T., for 5/-, post and packing 1/8. All of recent manufacture and are tested by us for full voltage before despatch. Note—These Batteries are layer built and will last for several years if properly stored. Apply now. Walton's Wireless Stores, 48, Stafford Street, Wolverhampton.

HOBBIES

SHIPS IN BOTTLES—The constructional kit that tells you how to make them; build for pleasure or for profits; kits 6/- ea. from Hobbies Ltd., and model shops, Cooper-Craft, Ltd., The Bridewell, Norwich.

MODEL DEALERS

HOBBIES LTD. have over 50 years' experience of catering for the needs of modellers, handymen and home craftsmen. Branches at 78a, New Oxford Street, London, and in Birmingham, Glasgow, Manchester, Leeds, Sheffield, Hull, Southampton and Bristol. Head Office, Dereham, Norfolk.

INVENTIONS

INVENTORS—Send s.a.e. for particulars of our Service for profitably developing and marketing your invention. Kelsey & Partners, Woodlands, Stroud, Glos.

ELECTRICAL

BARGAINS FOR ELECTRICIANS.—Brand new Cables in 25,100yd. coils: T.R.S. twin 1/044, 42/-; 3/029, 55/6; 3/029 and Earth, 63/3; 7/029 and Earth, 112/6; P.V.C. twin 1/044, 35/-; 3/029, 52/-; Transparent Flex, 14/36, twin, 15/9; all per 100yds.; Lampholders, 6/6; Switches, 1-way, 16/3; 2-way, 19/- doz. Requests lists. Jaylow Supplies Ltd., 93, Fairholt Road, London, N.16.

BRAND NEW Brooks 1/2 h.p. Motors ball-bearing, 230v., A.C. single phase, 50 cycles, 2,800 r.p.m.; ideal for driving woodworking machines, grinders, etc.; latest type in maker's sealed box; £8/15/-; also Capacitor Type, £9/15/-; carriage paid. P. Blood & Co., Wolsley Bridge, near Stafford.

WOODWORKING

PLYWOOD, 24 x 12 x 3/16, 9/6 doz.; 12 x 10 x 3/16, 5/- doz.; 8 x 6 x 3/16, 3/2 doz.; carr. pd. Parkmount, Burnley Rd., Rawtenstall.

MAHOGANY PLYWOOD, 72in. x 36in., 3/16in., at 15/- sheet; Oak Ply, 50in. x 50in., at 22/6 sheet; Hardboards at amazingly low prices. Send s.a.e. for samples, list to N. Gerver, 2-10, Mare Street, Hackney, London, E.8.

WOOD LATHES, Attachments, Motors and Control Gear, Circular Saw Blades, Spindles or Benches, Turning Tools, etc.; interested? Then send 6d. for illustrated literature, price list and H.P. terms. D. Arundel & Co., Mills Drive, Farn-down Road, Newark, Notts.

PHOTOGRAPHY

ENLARGER and Camera Bellows supplied; also fitted. Beers, St. Cuthbert's Road, Derby.

HAVE YOUR NEGATIVES ENLARGED BY EXPERTS. Post-cards, 6d.; 6 1/2in. x 4 1/2in., 6d.; 8 1/2in. x 5 1/2in., 1/3; 10in. x 8in., 1/8; 10in. x 12in., 2/6; money back guarantee. Raeburn Photo Service (P.M.), 113, Manchester Road, Burnley, Lancs.

BOOKS

NEW AND USED Correspondence Courses, Educational Books, bought, sold. Catalogue, Courses, 28, Dean Road, London, N.W.2.

WATCHMAKERS

WATCHMAKING—Broken parts made and replaced; part repairs or overhaul; list free. Yates, 18, Lower Chase, Malvern.

WATCH REPAIRERS, Hobbyists, etc. Send s.a.e. for list of watches, movements, etc., priced from 9d. each. Loader Bros., Dept. P.M., 36, Milestone Rd., Carterton, Oxford.

HANDICRAFTS

CRAFTWORKERS (either sex)! Soft toy assembling: the ideal profitable pastime; details s.a.e. Cuddlycraft Supplies, East Road, London, N.1.

MUSICAL MECHANISMS. Swiss made, for fitting in cigarette boxes, etc., 2/- each. Send s.a.e. for complete list of handicraft materials. Metwood Accessories, 65, Church Street, Wolverton, Bucks.

MAKE YOUR OWN HANDWEAVING LOOM. Plan for 9in. to 20in. looms; complete instructions, price 2/9, post free. Dane John Press Ltd., 1, Dane John Oast, Canterbury.

RADIO

CAN YOU SOLDER? That's all you need to make a really good radio from guaranteed Osrom components. Send 5d. (stamps) to-day for free circuits and lists. Dept. P.M.C.5; Osrom Radio Products Ltd., 418, Brighton Road, South Croydon, Surrey. (Croydon 5148/9.)

EDUCATIONAL

A.M.I.Mech., B.Sc., CITY & GUILDS, Etc. Guaranteed postal courses for all Exams. and Technical Divisions from Elementary to Degree standard. Approximately 95% successes. 144-page prospectus free on request. B.I.E.T. (Dept. 967), 29, Wright's Lane, London, W.8.

I.P.R.E. TECHNICAL PUBLICATIONS. 5,500 Alignment Peaks for superheterodynes, 5/9; Data for constructing TV aerial strength meter, 7/6; sample copy "The Practical Radio Engineer", quarterly publication of the Institute, 2/-; membership and examination data, 1/-; Syllabus of 7 postal courses free and post free. Sec., I.P.R.E., 20, Fairfield Road, London, N.8.

HANDICRAFT TEACHERS wanted urgently; craftsmen, wood or metal, prepared by correspondence coaching; success certain. Write for particulars: J. Director, Marriott's Charwood, Leslie, Fife, or Regional Secretary, Bushby, Leicestershire.

FREE! Brochure giving details of courses in Mechanical and Production Engineering, Draughtsmanship, etc., for the A.M.I.Mech.E., A.M.I.P.E., City and Guilds, and other professional examinations. Train with the Postal Training College operated by an industrial Organisation; moderate fees. Dept. PM30, E.M.I. Institutes, London, W.4.

WANTED

WANTED, surplus stocks of Twist Drills, Milling Cutters, Hack Saw Blades, Reamers, Chasers and all kinds of Hand and Cutting Tools. Send details to B. Draper & Son, Kingston Hall Road, Kingston-on-Thames. Cash on delivery.

MISCELLANEOUS

BOOKLETS, "How to use ex-Gov. Lenses and Prisms," Nos. 1 and 2, price 2/6 ea.; ex-Gov. Optical lists free for s.a.e. H. English, Rayleigh Road, Hutton, Brentwood, Essex.

BUILD YOUR OWN REFRIGERATOR, all components available at reasonable prices. Fridgairle flowing cold units, £5; small units, Kelvinator, etc., £4; 1/2 h.p. heavy duty Motors, £3; Chrome Cabinet fittings, new, £1; money back guarantee; s.a.e. for list and schematic diagram. Wheelhouse, 1, The Grove, Isleworth, Middx. (Phone: Hounslow 7558.)

"FORTUNES IN FORMULAS". 900 pages of American formulae, American technical books and magazines covering every interest; stamp for lists. Herga Ltd. (Dept. PI), Hastings.

LEARN CHESS. Postal course 55/-; or stamp for particulars.

Deposit of 1/- will also reserve our preliminary September prospectus. The Psychology Postal Service, Dept. M.5, 18, Thistlebarrow Rd., Salisbury, Wilts.

NON-FERROUS METALS

CITY METAL WORKS
ESTABLISHED 1800

CENTRAL 5760, 5769

THE MOST
COMPREHENSIVE
STOCK
AVAILABLE
WHOLESALE
AND RETAIL

BRASS
COPPER
PHOS. BRONZE
ALUMINIUM
DURALUMIN
NICKEL-SILVER
TIN-PLATE
ZINC-SHEETS
GUN METAL

TEE
RODS
TUBES
STRIPS
SHEETS
BLANKS
ANGLES
RIVETS
CHANNEL

STANTON BROS. (METALS) LTD.

73, SHOE LANE,
LONDON, E.C.4

G.E.C. & B.T.H. GERMANIUM CRYSTAL DIODES

G.E.C. GLASS TYPE 1/16in. x 3/16in.
B.T.H. LATEST TYPE MOULDED IN
THERMO-SETTING PLASTIC
Both Wire Ends for Easy Fixing.
4/6 each, postage 2/4d.
B.T.H. SILICON CRYSTAL VALVE
3/6 each, postage 2/4d.
Fixing Brackets 3d. extra.
Wiring instructions for a cheap, simple
but high quality Crystal Set included
with each Diode and Crystal Valve.

COPPER INSTRUMENT WIRE
ENAMELLED, TINNED, LITZ,
COTTON AND SILK COVERED.
All gauges available.
B.A. SCREWS, NUTS, WASHERS,
soldering tags, eyelets and rivets.
EBONITE AND BAKELITE PANELS,
TUFNOL ROD, PAXOLIN TYPE COIL
FORMERS AND TUBES.
ALL DIAMETERS.

Latest Radio Publications.
SEND STAMP FOR LISTS

CRYSTAL SET
INCORPORATING THE SILICON
CRYSTAL VALVE
Adjustable Iron Cored Coil.

RECEPTION GUARANTEED
Polished wood cabinet, 15/-, post 1/-.
A REAL CRYSTAL SET NOT A TOY
POST RADIO SUPPLIES
33 Bourne Gardens, London, E.4

"OFFICERS" Regulation Style Super Quality

**GABERDINE
RAINCOATS.**
AND WHAT ONLY
IS MORE NO
EXTRA CHARGE
59/11
FOR THE P.P. 2/-
LARGE MAN UP TO
48in. CHEST

Double yoke back and
front. Military epaulettes,
leather buttons. Belted,
fully lined. OR MER-
CHANT NAVY OFFI-
CERS' PATTERN in navy
blue, belted and fully
lined, bone buttons and
no epaulettes. Same price.
MARCUS STORES,
(Dept. 51), GRAVESEND.



"I NEVER THOUGHT THAT I COULD MAKE A RADIO SET"

say Satisfied
Customers. Yec
by using our
Home Constructor
Booklet (Price 2/6 only)
YOU too can build superb sets. Crammed
with Circuits, Super-Simplified
wiring diagrams, constructional details
and "Know-How." (State if free
RADIO CONTROL gen. wanted too.)
SUPACOILS, Dept. M.9,
21 Markhouse Road, London, E.17.



CABLE/FLEX CHEAPER IN ODD LENGTH COILS

No coil under 25 yds. unless requested. Prices per 100 yd. lot, less supplied, just add 5%. Full lists on request.

	1/044	3/029	Do. W/E	3/036	Do. W/E	7/029W/E	7/044	Do. W/E
RUBBER	39/-	49/-	59/-	68/-	74/-	101/-	156/-	195/-
PLASTIC	36/-	46/-	57/-	67/-	73/-	99/-	155/-	196/-
SINGLE V.I.E.	17/-	21/-	—	27/-	—	34/-	66/-	—
SINGLE PLASTIC	13/-	22/-	—	29/-	—	38/-	72/-	—

	Twin 14/36	25/36	40/36	3 Core 23/36	40/36	70/31
RUBBER	54/-	61/-	76/-	100/-	100/-	140/-
PLASTIC	41/-	54/-	78/-	83/-	89/-	133/-

FLEX—Plastic, T.T. or fat, 13/9; Maroon, 24/- (in 10-20 yd. coils, 20/-). EARTHWIRE 7/029 tinned, 7/8 per 100 ft. lot. Please add part carriage to small orders. Full 100 yd. coils can be supplied, add 1/6 in £1.
BRITISH DISTRIBUTING (P.M.), 591, Green Lanes, London, N.8. MOU. 0055/8.

THE FAMOUS HARRIS ELECTRIC WELDER

and Complete Kit

For Welding, Soldering,
Brazing and metal construction
& repairs in the home, on
the car or cycle. Instant heat
8,000° F. Works from 6v. or 12v.
car battery or transformer from
A.C. mains. Complete kit of Weld-
ing Tool, 9 ft. cable, clip carbons,
cleaning fluid, fluxes, filler rods, gor-
gles, instructions, hints. Thousands
in daily use. As supplied to Depts.
of H.M. Government, I.C.I., Standard
Telephones, etc. Welds all Metals.
Up to one-eighth inch.
C.O.D. IF REQUIRED.
Obtainable only from:
HARRIS ENGINEERING CO. (Dept. P.M.)
269 Kingsland Road, London, E.2.

53/6

Jubilee

The Finest Clip
in the World

Make SURE it's
a genuine "Jubilee!"

L. ROBINSON & CO. (GILLINGHAM) LTD.
—London Chambers, GILLINGHAM, KENT. Phone 5282—

RATCHET & REVOLUTION COUNTERS

Ask for
Leaflet No. 18/7
Speed up to
6,000 R.P.M.
B. & F. CARTER
& Co., Ltd., Bolton 5

HIGH QUALITY TOOLS For the Craftsman

Terms as low as 2/6 per week.
Send 1/- for catalogue containing over
400 items

H. J. BOULTING LTD.
21, Wellington Street, Leicester

ALUMINIUM BRAZING

MAKES PERFECT UNBREAKABLE JOINTS IN ALUMINIUM.
COMPLETE OUTFIT, INCLUDING PRECISION MADE
BLOWPIPE (SELF BLOWING) FOR USE WITH HOUSEHOLD
GAS SUPPLY, FLUX, RODS ETC., WITH FULL
DETAILED INSTRUCTIONS @ 6 POST FREE.

A.G.S. EQUIPMENTS 23 WESTERN
ROAD COWLESLY HUDDERSFIELD

CHEMISTRY APPARATUS

Send 2/6 stamp for
COMPLETE PRICE LIST

Booklets:
"Experiments" 10/6
"Formulas" 10/6
"Home Chemistry" 2/6
Post Paid.

BECK (Scientific Dept. A)
60 HIGH STREET,
Stoke Newington, London, N.16

Fluorescent Lighting...

SO EASY—WHEN YOU USE
ON EYES—A DYNALITE
AND PURSE! KIT

Write for details of new Dynalite range to:
DYNALITE ELECTRICAL
38, STEVEDALE RD., WELLING, KENT

Webley

AIR PISTOLS
AIR RIFLES - ACCESSORIES

Write for catalogue WEBLEY & SCOTT Ltd.
105, WEAMAN ST., BIRMINGHAM 4, ENGLAND

GOVERNMENT SURPLUS ELECTRICAL
RADIO EQUIPMENT NEW 76-
PAGE ILLUSTRATED CATALOGUE
PRICE 1/-, POST FREE INLAND.
2/6 OVERSEAS SEAMAIL AND 4/-
OVERSEAS AIRMAIL.

ARTHUR T. SALLIS
(P.M.),
93, NORTH ROAD, BRIGHTON,
SUSSEX. Tel.: Brighton 25806.

PORTASS 4 1/2" x 37" S.G. LATHE

Cast Iron Tray
and Peds in 2
lengths.

Charles Portass
& Son,
Dept. P.M.
Buttermere
Works, Sheff. 8.

You Can Become a HANDICRAFTS INSTRUCTOR

EXPERIENCE NOT ESSENTIAL
Men who enjoy making things in
wood or metal can turn their hobby
into a permanent and interesting
Career! Short hours, long holidays,
and security in a job you would
really enjoy, can be yours if you
become a Handicrafts Instructor.
Let us send you details of the easiest
and quickest way to get the necessary
qualification.

We definitely Guarantee
"NO PASS—NO FEE"

If you would like to know about
our unique method of preparing you
for one of these appointments, write
today, and we will send you an
informative 144-page Handbook—
FREE and without obligation. Mark
your letter "Handicrafts Instructor."

British Institute of Engineering Technology
591, College House,
29, Wright's Lane, London, W.8. **BIET**

Build your own air compressor

BRAND NEW Heywood
Bendix Compressors,
with Driving Shaft, 40/-
each, 2/6 Carr.
Approx. 2 c. ft.
at 600 r.p.m. &
100 lbs. per sq.
in.

TANKS, com-
plete with
gauge, taps,
etc., tested to
400 lb. per sq.
in. on plat-
form.
40/-, Carr. 6/-

C. H. VINCENT
47/49 Essex Road, Islington,
London, N.1.
Canonbury 3720

"40 POWER TOOLS YOU CAN MAKE"

This amazing book of plans for circular
saws, lathes, band-saws, jig-saws, planes,
tapping attachment, jigs, etc.,
has sold 250,000 copies, and is a
"must" for every home work-
shop. Over 200 illustrations. Post
Paid

A.P.S. (P2), SEDGEFORD, NORFOLK

POTTERY KILNS

3 kW. Electric kilns for the Home,
School, or Studio potter. Prices from
£12 to £50. Also clays, glazes and all
materials required for pottery making.

MILLS & HUBBALL, Ltd.,
244, Borough High St., London, S.E.1

HOW TO MAKE A 6in. ASTRONOMICAL TELESCOPE COMPLETE IN EQUATORIAL MOUNT.

Scale diagrams and full working instructions.
No lathework. 5/-, post paid.
Amateur telescope makers' require-
ments. S.A.E. for lists.

C. E. L. HINDS, 4, Keswick Gardens,
Ruislip, Middx.

Mr. Selwood also stated that Mr. Adamski had devoted his life to "Flying Saucers," but I think I am correct in stating that Mr. Adamski only became interested in "Flying Saucers" in 1945.—M. R. OLLIER (Catterick Camp).

SIR,—Reports are still coming in of the appearances of Flying Saucers, and your Editorial Comment of last month was, as usual, fair and unbiased regarding the many claims put forward. As you say, after several years of Flying Saucer stories we are still no nearer an accurate explanation.

Obviously these objects (and who can doubt their objectivity) are one of two things, terrestrial or extra-terrestrial. If the former, we could believe them to be something very much on the secret list of one of the nations; if the other, then it seems that they must be directed by beings from the planets, or further away in space.

To my mind there is nothing surprising in the fact that space ships, if such they be, should be elusive and avoid contact with earth dwellers. Would not our space ships, manned by earth men, adopt very similar tactics when reaching out in the not too distant future to explore our family of planets? I think that caution would be the watchword every time; landings and subsequent communications being attempted only after a considerable amount of information had been acquired regarding the physical conditions of the planet to be invaded, not to mention the nature of its inhabitants, their defensive armament, and dangers of microbic infection. We should, so to speak, spy out the land. Today, it may be that our own land is being spied out and reported on, so that adequate measures can be made to deal with whatever contingency is likely to arise in the event of a proposed invasion.

Surely, if these saucers contain space travellers, we must credit them with at least the amount of caution we ourselves would employ on such a mission.—C. J. WILLIAMSON (Scalloway, Shetland).

Effect of Atomic Explosions on Weather

SIR,—A recurring topic is that of the effect of atomic explosions on the world weather.

I believe there has been no categorical scientific statement on the problem, and as a layman I have found it difficult to visualise. I would appreciate readers' opinions on my amateur attempts set out below to reduce the scale of events to something which can be more readily imagined by the lay mind.

I have endeavoured to reduce the world and its weather to a small scale model on which the flare of a match would be equivalent to an atomic explosion. The figures are approximate only.

- Assumptions for the calculation are:—
 a. Match flare 1in. in diameter.
 b. Weather 8 miles high.
 c. I have no information on the diameter of atomic explosions but have worked out calculations for two guesses—5 miles and 10 miles diameter.

The reduced scale for the smaller explosion is the equivalent of a match flare on a globe 130ft. diameter with a weather layer of air 1½in. thick, and for the larger, a globe 65ft. in diameter with a ½in. thick weather layer.

If there is any semblance of accuracy in the analogy it does not appear likely that from an explosion and heat generative point of view the bomb has any effect at all.

Whether radio-active particles carried great distances in the atmosphere would have any effect I cannot imagine, and is I think beyond the scope of popular illustration.—H. H. PORRITT (Newcastle-upon-Tyne).

Petrol Engine Conversion

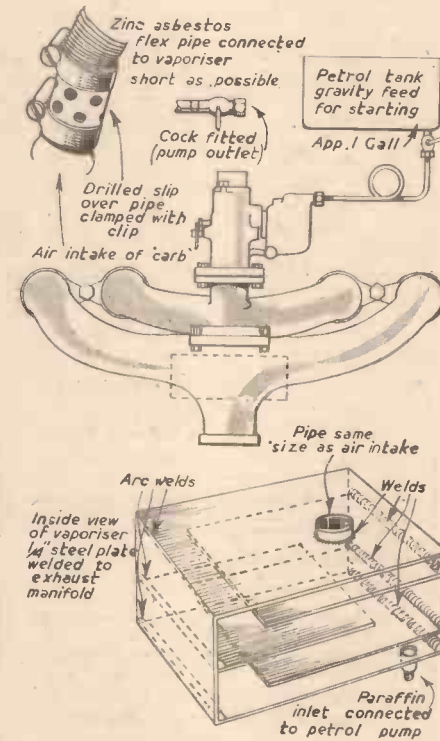
SIR,—With reference to Mr. Campbell's request for information concerning the running of an engine by paraffin, may I suggest the following conversion.

Fabricate a box out of ½in. steel plate, by size to suit an exhaust manifold; before welding the lid and side insert and weld the plates as shown in sketch. These will act as vaporised baffles.

Preheat the manifold over a coke fire and, when hot, arc weld the box to the side. Cool slowly by letting the fire gradually die out.

Connect the outlet of vaporiser to aid intake of existing carburettor, but first allow for air by fitting an extension and drilling ½in. holes closely together round the circumference. Suitable zinc-asbestos flexible piping can be purchased quite easily complete with pipe clips. Fit an auxiliary tank higher than the carburettor fed petrol. The existing petrol tank is now filled with paraffin.

To start, switch off the paraffin cock on the pump; switch on the gravity fed petrol cock. The carburettor is now acting in the normal



Details of petrol engine conversion.

way. When the engine is hot (also, of course, the vaporiser) switch off the petrol and switch on the paraffin.

If the petrol is switched off first, the petrol in the float chamber plus pipe will carry over the flat spot until the vaporiser gets filled with paraffin vapour.—R. G. COOK (Slough).

Building a Catamaran—Correction

SIR,—I am most interested in building the Catamaran described in the July PRACTICAL MECHANICS. To me it seems an ideal craft and bearing in mind the safety element, most suitable for the Senior Scouts. For river cruising the cockpit can so easily be made into a shelter for the night with a simple frame and cover.

Consequently, I have studied the drawings quite closely and have discovered two or three discrepancies. I think these can be easily remedied, but I hope you do not mind me pointing them out. They are:

Fig. 5 "B"—Should not be the base of the Frames 2 and 3 read 4in. x 1in. (not 1in. x 2in.)?

Fig. 6—"Bow knee" ½in. ply seems rather thin, especially to be screwed into.

Fig. 6—The height of the knee is not given. I take it to be 10½in.

Though I must say how interesting and

detailed I found the instructions, there was one point I could not see. How does the bottom of the mast fit into the mast step plate?—J. K. BEAUMONT, Scoutmaster (S), (Huddersfield).

[The author replies as follows: Regarding the "Catamaran," the detailed points you mention have been looked into.

Frames 2 and 3 should read, as you say, 4in. x 1in., the Bow knee should be ½in. ply and not ¼in. as stated, and the height 10½in.

The mast foot is squared to suit the square recess in the step and is retained upright solely by the three wire shrouds.

A simple and common method of making a cockpit cover is to use the boom as the ridge for a bivouac style of cover. All that is then necessary are a few fixings along the sides of the cockpit.]

Marking the Sundial—Correction

SIR,—I am a regular reader of your interesting and helpful journal and on looking up a back number for some information I came upon your treatise on the construction of a sundial in August issue, 1953.

To the best of my belief, there is an error in the column headed "Marking the Dial."

The two concentric circles have a radius of AB and BC, and not AC, AB.

I have made a few of both horizontal and vertical dials, and have checked up the methods from several formulæ I have to hand and also geometrically, and so to avoid disappointment I am writing this correction.—B. GRETTON (Derby).

BOOKS Received

Carburettors and the Fuel System (The Modern Car Easy Guide Series No. 5), 4th Edition. By E. P. Willoughby, B.Sc., M.I.Mech.E. Published by Temple Press, Ltd. 56 pages. Price 2s. net.

THIS volume deals authoritatively with Carburettors and the fuel system, comprising Carburettor Requirements; Why Carburettors Work; Mixture Control; Variable Jet; The Float Chamber; Down-draught; The Zenith, Solex, S.U., Stromberg, and Weber Twin-choke Carburettors; Petrol Injection; and Petrol Gauges, etc. It is well illustrated and should appeal to students in so much as it will provide them with the kind of information they require.

Spare Time at Sea. By Ronald Hope. Published by The Maritime Press, Ltd. 192 pages. Price 12s. 6d.

PUBLISHED under the auspices of the Seafarers' Education Service, it has been written for the seafarer, and it will be sought out by all those concerned with the right use of leisure-time. The chapters on keeping fit, indoor games, social entertainment, reading and writing, news and hobbies are every bit as relevant to life ashore as they are to life at sea.

The World of Oil. Published by The Petroleum Information Bureau, 29, New Bond Street, London, W.1.

THE above firm have sent us a copy of a new booklet which they, as a non-profit making oil industry public relations organisation, have just produced for distribution to the "man in the street" with a lively interest in science, industry and world affairs in general. Its purpose is to give the very many users of oil products, who may nevertheless have only a very slight understanding of the way in which those products are made available to them, an insight into the long sequence of operations between the discovery and production of crude oil and its subsequent conversion into refined products. Readers who are interested should apply to the Bureau for a copy, which will be sent free of charge.

Your Queries Answered



RULES

A stamped, addressed envelope, a sixpenny, crossed postal order, and the query coupon from the current issue, which appears on the inside of back cover, must be enclosed with every letter containing a query. Every query and drawing which is sent must bear the name and address of the reader. Send your queries to the Editor, PRACTICAL MECHANICS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

Wooden Floor Filling

I HAVE a ground floor of soft wood blocks about 8in. x 2in. x 1/2in., laid on concrete with some adhesive. These blocks have shrunk, particularly near the fireplace and in areas where the sun can reach, and there are now gaps as much as 1/2in. in the worst places.

I am informed that the only remedy is to relay the floors, costing about £50, but I should like to try filling these spaces with some suitable plastic material or some material in liquid form.

Can you please suggest any methods and materials?—C. R. Revans (Glasgow).

THE trouble with your wooden flooring appears to be that the blocks have been made in unseasoned, or badly seasoned, wood and probably that the floor has not been sufficiently levelled for their reception. It would, as you say, cost about £50 to have the floor stripped and relaid and, even in this case, you would have no guarantee that the trouble would not reoccur.

Our advice is that you allow the existing floor to remain undisturbed for as long a time as possible in order to give the wood blocks ample time to warp and shrink to a maximum extent. We suggest, for instance, that the floor should not be disturbed during the whole of the summer and autumn. At the end of this period the gap between the floor blocks should be filled in with a waterproof plastic mixture made as follows:

Obtain from Shawnigan Ltd., Marlow House, Lloyd's Avenue, London, E.C.3, a quantity of "Gelva resin No. 7" (which is a clear polyvinyl acetate resin). Half a pound of this material will be sufficient for your use. Dissolve 20 parts of the resin in about 80 parts of warm methylated spirit to produce a solution of varnish-like consistency.

Now make up a mixture of ordinary sawdust and wood flour (about equal parts). To this add a very small quantity of yellow ochre and umber (pigments which are obtainable from any paint shop or colour merchant) so that the colour of the resulting mixture approximates to that of the wood blocks. Then work this dry mixture into a little of the resin solution until you obtain a thickish paste. This should be at once packed into the

interstices between the wood blocks and rapidly levelled off with a small trowel. The paste will set hard overnight. It will be reasonably waterproof and not brittle. It will probably require a little subsequent sandpapering in order to give it a perfectly smooth surface comparable with that of the adjacent blocks, but after all this treatment it will take a good wax polish and will be very little distinguishable from the blocks themselves, provided that a good colour-match has been made.

Treating Buckskin Boots

I HAVE a pair of buckskin cricket boots and wish to know if you can help me on the following points:

Is there any method of removing the green grass stains which so readily disfigure them? Is there any preparation which, if previously applied, will help in preventing the grass staining the leather?

Are there any preparations which will prevent the leather of the soles from going hard and brittle and keep the buckskin supple?

Could you give a formula for a whitening preparation which will not damage the leather, and will not rub off as ordinary whitening does?—S. Green (Birmingham).

ADD 10 drops of strong ammonia to about a gill of turpentine and, having fitted the boots on the feet, apply the turpentine

with a stiff brush. Follow up this application with some fine pumice powder. Rub the boots with a flannel or a sponge dipped in the turpentine. Rub vigorously to remove the pumice powder. Repeat the same process once or twice and then hang the boots in the air to dry. There is no special preparation which will prevent the restaining of the leather by grass, since buckskin, being soft and porous, is very apt to pick up stains from its surroundings.

To keep the buckskin flexible, make up a mixture of equal parts of castor oil and neatsfoot oil, and apply this by means of a sponge sparingly to the leather. This preparation is excellent for maintaining the suppleness of the leather and for preserving

Readers are asked to note that we have discontinued our electrical query service. Replies that appear in these pages from time to time are old ones and are published as being of general interest. Will readers requiring information on other subjects please be as brief as possible with their enquiries.

it from cracking and deterioration, to say nothing of rendering the leather damp-proof. The treatment, however, is open to the objection that even when applied sparingly it will always tend to darken the leather. In fact, any oil treatment will have a similar disadvantage. A mineral oil, such as medicinal paraffin, can be substituted for the above oil mixture, but it will not have quite the same effect in maintaining the flexibility of the leather.

The reason why your ordinary whitening preparation rubs is because it does not contain an adequate amount of "binding" material. You can make a better quality whitening material by dissolving about 8 to 10 parts of glue in 100 parts of hot water. Knead white chalk into a paste with a minimum of the above glue solution. The paste should be fairly thick, of dough consistency. It should then be packed into moulds, slight pressure being applied to compact the block of paste. The mass is then placed in a gently warm oven and left there until all the moisture has been driven off. This paste is then applied to the leather with a wet rag in the ordinary manner. It will not damage the leather since it does not contain any deleterious ingredients. If you find that it rubs slightly, make a new block, using water having a higher glue content. This preparation has the great advantage that, if desired, it can be completely removed from the leather by means of vigorous rubbing with a wet rag.

Painting Over Tarred Surfaces

COULD you advise me of a type of paint that could be applied to felt roofs that have been coal tarred for many years? If there is such a paint could it be obtained in, say, slate grey colour? Where could I obtain it and what is the price per gallon?—L. MacKinnon (Tiree).

THE only type of paint which you can apply to a tar felting is a good bituminous paint, such as "Mariolene," which is manufactured by British Asphalt & Bitumen, Ltd., The Docks, Preston, Lancs. This is supplied in dark-red, brown and black, but not in grey, the price being about 15s. per gallon. You may be able to get a grey bituminous paint from Wailes Dove Bitumatic, Ltd.,

THE P.M. BLUE-PRINT SERVICE

- 12FT. ALL-WOOD CANOE. New Series. No. 1, 3s. 6d.*
- 10-WATT MOTOR. New Series. No. 2, 3s. 6d.*
- COMPRESSED-AIR MODEL AERO ENGINE. New Series. No. 3, 5s.*
- AIR RESERVOIR FOR COMPRESSED-AIR AERO ENGINE. New Series. No. 3a, 1s.
- "SPORTS" PEDAL CAR. New Series. No. 4, 5s.*
- F. J. CAMM'S FLASH STEAM PLANT. New Series. No. 5, 5s.*
- SYNCHRONOUS ELECTRIC CLOCK. New Series. No. 6, 5s.*
- ELECTRIC DOOR-CHIME. No. 7, 3s. 6d.*
- ASTRONOMICAL TELESCOPE. New Series. Refractor. Object glass 3in. diam. Magnification x 80. No. 8 (2 sheets), 7s.*
- CANVAS CANOE. New Series. No. 9, 3s. 6d.*
- DIASCOPE. New Series. No. 10, 3s. 6d.*
- EPISCOPE. New Series. No. 11, 3s. 6d.*
- PANTOGRAPH. New Series. No. 12, 1s. 6d.*
- COMPRESSED-AIR PAINT SPRAYING PLANT. New Series. No. 13, 7s. 6d.*
- MASTER BATTERY CLOCK.* Blue-prints (2 sheets), 3s. 6d. Art board dial for above clock, 1s.
- OUTBOARD SPEEDBOAT. 10s. 6d. per set of three sheets.
- LIGHTWEIGHT MODEL MONOPLANE. Full-size blue-print, 3s. 6d.
- P.M. TRAILER CARAVAN. Complete set, 10s. 6d.*
- P.M. BATTERY SLAVE CLOCK, 2s.
- "PRACTICAL TELEVISION" RECEIVER. (3 sheets), 10s. 6d.
- P.M. CABIN HIGHWING MONOPLANE. 1s.*
- P.M. TAPE RECORDER. (2 sheets), 5s.

The above blue-prints are obtainable, post free, from Messrs. George Newnes, Ltd., Tower House, Southampton Street, Strand, W.C.2.

An * denotes constructional details are available free with the blue-prints.

HIGHSTONE UTILITIES

Soldering Irons.—Our new streamlined iron is fitted with a pencil bit, 200/250v, 50 watts, 11/6. Standard Iron with adjustable bit, 200/250 v, 60 watts, 13/6. **Heavy Duty Iron.** 150 watts, 16/6, all post 6d. These Irons are guaranteed, and all parts are replaceable.

Meters.—20 amp., 2 1/2 in., m/i, 12/6; 15 v., 2 1/2 in., m/c., 9/6; 150 v., 2 1/2 in., m/c., 10/-; 3.5 amp., 2 1/2 in., T.C., 6/6; 4 amp., 2 1/2 in., T.C., 6/6; 9/6; 100 m/A., 2 in., m/c., 7/6, all post extra. **Meter Movements.** Units with 2-500 microamps, 7/-, post 1/-.

Bell Transformers.—These guaranteed transformers work from any A.C. Mains giving 3, 5 or 8 volts output at 1 amp., operate bulb, buzzer or bell. Will supply light in bedroom, etc., etc., 9/-. **Similar Transformer** but output of 4, 8 or 12 volts, 12/6. Both post 8d. **BELLS** for use with either the above or batteries, 6/-, post 6d. **BUZZERS.** 3, 9, or Heavy Duty, 4/6, post 5d.

Ex-R.A.F. 2-valve (2 volt) Microphone Amplifiers, as used in 'plane intercom., in self-contained metal case, can be used to make up a dead air outfit, intercommunication system, or with crystal set, complete with valves and Fitting Instructions, 20/-, post 2/-. Useful wooden box with partitions to hold amplifier, 2/- extra. Ditto, less valves, 10/-. **Hand Microphones,** with handles and lead, 5/6. **Tannoy 7/-.** Similar instrument, moving coil, 8/6. All post 9d.

Mike Buttons (carbon), 2/-. **Moving Coil 4/6.** **Transformers,** 5/-. All post 4d. each. **Spark Plug Neon Testers,** with vest-pocket clip, 3/6, or with gauge, 3/6, post 3d. **S.B.C. Neon Indicator Lamps,** for use on mains to show on switches, etc., etc., 3/6, post 4d. **Neon Indicator,** complete with condenser, pencil type, with vest-pocket clip, 7/6, post 5d.

Crystal Sets. Our latest model is a real radio receiver, fitted with a permanent crystal detector. Have a set in your own room, 12/6, post 8d. **Crystal Detectors,** 2/- each. When ordered separately, 2/6; with clips and screws, 2/10, post 3d. **Headphones,** brand new, S. G. Brown, G.E.C., etc., 23/- and super-sensitive, 30/- a pair. **Headphones in Good Order,** 6/- **Better Quality,** 7/6 and 10/- **Balanced Armature Type,** (very sensitive), 13/6. All post 1/-. **New Single Ear-pieces,** 3/6. **Bal. armature type,** 4/6 (two of these will make an Intercom. Set). **Ex-R.A.F. ear piece,** 2/6, post 4d. (All Headphones listed are suitable for use with our Crystal Sets.) Money refunded if not completely satisfied.

HIGHSTONE UTILITIES

58, NEW WANSTEAD, LONDON, E.11. New illustrated List sent on request with 11d. stamp and S.A.E. Letters only.

GOVERNMENT SURPLUS BARGAINS

1 1/3rd H.P. MOTORS. New, 230 volt A.C. single phase, 50 cycles, 1,425 r.p.m., 1 shaft. **CAPACITOR START,** usual price, 179/6. **OUR PRICE 119/6.** Carr., 8/6.

ELECTRIC FANS. New in maker's boxes. 230/250 v. A.C. 7 1/2 in. blades, suitable for circulation or extraction. Bargain at 50/-. Post 2/-.

HAND GENERATORS. Complete with handle and 72 1/2 gearbox. Output 28 volts and 300 volts. As described for **WASHING MACHINE** in P.M., Aug., '53, and **WRINGER** Mar., '54. Each 25/-. Post 1/9.

EPICYCLIC GEAR MOTORS (aircraft cowling motors), operate through four-stage 625/1 gear (5-25-125-625 one or more of these stages easily locked to give any of these ratios) 24 v. D.C. app. 5 amps. 12 v. D.C. app. 4 amps also operate 16/30 v. A.C. app. 5/7 amps. Each 25/-. Post 1/9.

TELEPHONE HANDSETS. Streamlined P.O. type suitable intercom. system. Each 17/6. Post 1/6.

PRESSURE TANKS (R.A.F. oil reservoirs) 5/-. Post 1/6.

Send 3d. Stamp for List of: **MOTORS, TELEPHONES, TRANSFORMERS, LAMPS, SWITCHES, CABLE, BOXES, etc., etc.** Hundreds of Bargains.

MILLIGANS

24, Harford Street, Liverpool 3
Money Back Guarantee.

WIRING ACCESSORIES

All goods are of a well-known manufacture and carry a money-back guarantee. All cables are manufactured to the latest British Standard Specification. C.O.D. or C.W.O. All carriage paid.

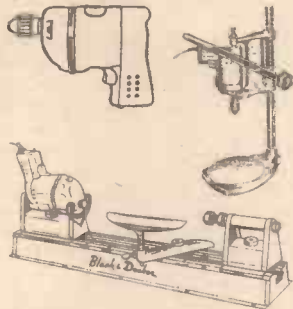
CABLE TRS.—Flat Twin, 1,044, 46/-, 3,029, 58/-. 7,029, 97/6. PVC Sheathed. Flat Twin, 1,044, 40/-, 3,029, 57/6. All per 100 yds. Our PVC cables are suitable for interior or exterior use and may even be buried in concrete. All types and sizes of cables available in 25, 50 or 100 yd. lengths. Heavy cables cut to desired length at no extra charge. **Switches,** 1/6, 2 Way, 2/-, Ceiling Roses, 10d. **Lampholders,** 10d. 3-pin SW, Sockets, 5 A., 4/6. 15 A., 6/6. Send for Price Lists of other accessories.

HUNT & CO.,

West Street, Exeter.

Phone: Exeter 56687

BLACK & DECKER ELECTRIC TOOLS on EASY TERMS



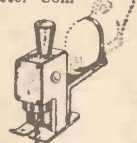
Build up your home workshop stage by stage on easy terms. The 1/2 in. drill shown drills, polishes, sands and grinds and can be used with the vertical stand and lathe, besides other attachments. Write for free full catalogue and easy terms schedule.

As illustrated	Cash Price	8 Mthly. Dep.	of
1/2 in. Drill	£5.19.6	30/-	13/3
Lathe only	£5.5.0	27/8	11/3
Stand only	£3.7.8	17/8	7/6
Items not illustrated.			
1/2 in. Drill and Stand	£12.7.6	44/6	28/6
5 1/2 in. Sander and Polisher	£17.17.6	72/6	40/3
6 in. Elect. Saw	£17.5.0	76/-	38/-

When ordering please send Cash Price or Deposit and state Mains Voltage.

THE "I & G" UNIVERSAL SAW

Fits any electric hand drill. Will Jig saw, Cross cut, Rip Saw, Hack saw etc. Complete with attachments and two extra saw blades. Send for leaflet.



Cash Price **49/6** (Postage 1/6) or **EASY TERMS**

If purchased with any Black & Decker equipment, 10/- deposit and eight monthly payments of 5/9.

BURGESS PAINT SPRAYER

For spraying Paint, Varnish, Lacquer, Light Oils, Insecticides, etc. As easy to handle as a brush. Just plug in and spray. A.C. mains only. State Voltage.



YOUR FOR 16/6 DEPOSIT!

Cash Price

75/-

Post Free

or

16/6 Deposit

and 4 monthly

payments of

16/6.

Send for Leaflet.

AUTOMATIC MINIATURE BLOWLAMP

No pumping—it's self-pressurising. No working parts to go wrong. Burns methylated spirits. Weighs only 7 ounces and is 5 1/2 in. in height. All parts are interchangeable and spares obtainable. Attains temperature of 2,000 deg. F. Ideal for **SOFT SOLDERING, SILVER SOLDERING, PAINT STRIPPING, GLASS BENDING and DRAWING.** This pocket size blowlamp is a valuable addition to every tool kit. Made of solid brass without soldered joints. **SEND FOR ILLUSTRATED LEAFLET.**



12/6

Postage 6d.

KINGSWOOD SUPPLIES (Dept.PM.I.) 2 & 3 SALE PLACE, LONDON, W.2. Telephone PAD 8189

PLASTIC FLOORS

YOU CAN APPLY YOURSELF!



LOOK! You can now have REAL Plastic Flooring at less cost than lino or tiling. POLYFLO is the new wonder plastic that ANYONE can install without previous experience whatever. Requires no mixing or special tools. You merely pour it from its handy container and, 'Hey, Presto,' it finds its own level! Yes, here at last, is the answer to your flooring problems. POLYFLO is ideal for EVERY floor in the house as well as for Window Sills, Table Tops and Shelves. It's GUARANTEED not to crack, lift or discolour, and can be applied to ANY clean surface without mess or fuss! Send for full details NOW!



POST COUPON FOR FREE LEAFLET

Post to:- THE SURFEX FLOORING CO., 48, HIGH STREET, CAMBERLEY, SURREY.

NAME (PLEASE PRINT).....

ADDRESS.....

Picture Marquetry



INN SIGNS SERIES

EACH INN SIGN SET CONTAINS MATERIAL FOR TWO COMPLETE SIGNS

Size of each Sign: Approx. 4 1/2" x 4", including frame.



Here is another subject in the popular Modelcraft series of Picture Marquetry Kits. The designs produced by you from the sets supplied form both interesting collections and perpetually new home decorations.

No. 1 SET "King's Head" and "Red Lion."
No. 2 SET "Cross Keys" and "White Hart."

Price of each set (including Purchase Tax) 7/-, postage and packing 6d. extra. From all Model, Hobby and Handicraft shops or send S.A.E. for full details to:-

MODEL CRAFT LTD. 77(L) Grosvenor Road, London, S.W.1.

SPARKS' DATA SHEETS 10th ANNIVERSARY

YOUNG ENOUGH To be Right Up to Date
OLD ENOUGH To have that Vital Experience and Knowledge which go to make

SPARKS' DATA SHEETS The Safest, The Finest, The Simplest **TEN YEARS & OVER 100,000 SATISFIED USERS IN ALL PARTS OF THE WORLD PROVE THE CLAIM THAT THEY ARE**

"SECOND TO NONE"

To Mark the Occasion, here are Two New Designs—

SHORT-WAVE

No. SW/DX.1. All-dry battery One-Valver. High Sensitivity. Band-spread. Latest Eddystone Coils from 10 metres upwards. Data Sheet, etc. 2/6, plus 21d. Stamp.
No. SW/DX.2. A 2-Valve version of above having Greater Output & Range. Data Sheet, etc. 2/6, plus 21d. Stamp.
(Note.—Those who make the 1-Valver can progress to the 2-Valve version without wasting a single component.)

MANY OTHER DESIGNS AVAILABLE See Last Month's Issue or Send 21d. Stamp for Latest List. **COMPONENTS AND DRILLED CHASSIS SUPPLIED**

GOOD NEWS FOR QUALITY ENTHUSIASTS

If you want to hear quality reproduction, send 21d. Stamp for preliminary details of the NEW Mullard 5-Valve 10 Watt High Quality Amplifier (A.C. only) which I am happy to announce I shall soon be publishing in my usual Data Sheet form. It is exceptional.

L. ORMOND SPARKS (M) 8, COURT ROAD, SWANAGE, DORSET

Collingwood Buildings, Newcastle upon Tyne.

These bituminous paints will resist the tendency to soften unduly in hot weather, bitumen having a much smaller temperature susceptibility than tar compounds and mixtures.

Cistern Repair

COULD you tell me with what I could line the inside of a porcelain lavatory tank to stop slight dripping of water on to the bathroom floor?

The tank appears to have a number of minute cracks in the front wall, causing it to be slightly porous.

Would some form of cement spread over the inside of the tank and left to dry do?—K. Kirkus (Stockport).

RUN the water out of the lavatory cistern and wipe the sides quite dry. Obtain a small tube of cellulose cement, such as, for example, the "Durofix" brand. Work as much of this cement as possible into the crack. Allow it to dry. Then obtain a small quantity of bituminous paint ("black varnish") from a local ironmonger. Put three separate coats of this on the crack. Then give the area a fourth coating and whilst this is still wet press down on to it a strip of stout, finely woven linen or similar cloth. Give this a coating of the bituminous paint also, so that the paint thoroughly impregnates the fabric. Give it three days to dry out. Then refill the cistern with water and use it in the normal manner.

Done in this way the repair will not look very unsightly, but it will resist water for years and the cost will be very small.

Another method is to work a little fresh putty or white lead oil paste into the crack. Give the putty two weeks to harden. Then paint over the area with bituminous paint, applying several coats.

It is doubtful whether cement would make a satisfactory leak-proof filling for the crack.

Repolishing Glass Paperweights

HAVING some old glass paperweights which have become scratched on the domed surfaces I should be glad if you could give me a technique for removing the blemishes and repolishing, at the same time retaining as far as possible the original contour.

I have several small fractional electric motors which I could use for the power.—O. J. Roots (Rochester).

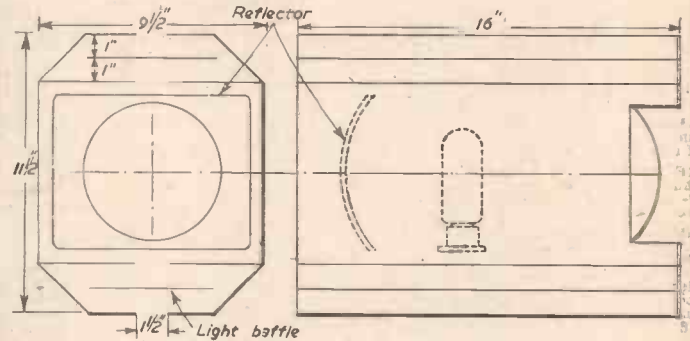
IF the scratches in the paperweights are deep it will be a heavy job to remove them. Unfortunately, the domed surfaces of paperweights are not spherical, but elliptical, but they will have to be treated to some extent as though they were spherical. We are quite familiar with them and have seen scratched specimens, though we have never attempted to grind them. We do not think you can use your motors; the grinding will have to be done by hand. Obtain a lump of pitch, soften this in hot water and press it down on the top of the paperweight; do not let it stick. This is to be the grinding tool. Next obtain some medium coarse carborundum powder, also some fine, some tripoli powder and some fine rouge. Start the grinding with the coarse carborundum powder with water under the tool, working the pitch tool with a circular motion and putting considerable pressure downward. Wash under the tap from time to time and examine. When the scratches have disappeared commence polishing; using the same tool, apply fine carborundum. Then make a fresh tool with more pitch and work up the surface with tripoli powder, finally, with a small fresh tool, polish the surface of the glass with rouge, using the finest jewellers' grade for the finish.

Spotlight Queries

THE drawing below is of a spotlight which I intend to construct for use as acting area flood and for general front lighting at distances of 24ft. and less from front of stage and also a spotlight proper at 50ft. The construction would be of tinsplate, finished matt black inside and out. Is the design sound and what paint would stand the heat?

Cooling would be by two 1½ in. slots with baffle between running whole length of body, top and bottom. Would this be adequate?

How can a soft edged beam be obtained and will there be any filament image? The lens is a single moulded condenser 6 in. dia. and 7½ in. focus, and the reflector is a Government surplus 8½ in. by 6½ in. 5½ in. radius of curvature reflector of honeycomb glass with 2 in. dia. hole in centre. Are these suitable? What type of lamp would



Spotlight queries.—G. B. Dodd (Spalding).

Information Sought

Readers are invited to supply the required information to answer the following queries.

Mr. G. W. Ottaway asks: "Could you please provide me with suitable sketches to show the construction of a septic tank capable of handling the waste from a small country house in which not more than six people would normally be living? What should be the fall of the pipe leading from the house to the tank? Should rainwater be piped into the tank or kept clear of it?"

Mr. N. G. Suffield, of Oldbury, Worcs, writes: "I wish to construct a small furnace for the hardening or annealing of tools.

I require it to have a cubic foot of heating space or, at the least, half a cubic foot. Gas and air are available, also electric power, although the former is preferred. I would be grateful for any information concerning sizes and materials required for this project."

The following is an extract from a letter from P. James, of Enfield: "I have a query on carbon arc welding/brazing and hope you can help me.

I have been trying the contact method of joining metals with a carbon rod, using 4 to 12 volts from a transformer, and although the metals can be made to run, their joining is prevented by the formation of soot. I understand a cleaning fluid should be used and also certain fluxes. Could you give me the composition of these fluxes and cleaner, or suggest any materials I might try? I have tried borax as a flux on both copper and steel but when this liquifies it forms an insulating barrier, and all work ceases until the borax glass is scraped off to get contact with bare metal."

E. West writes: "My job is with the making of rubber footwear. Have you, please, any information on how the printing, in various colours and patterns, is obtained on thin rubber facing as used for shoe uppers?

The points I think are my biggest problems are:—

be required?—G. B. Dodd (Spalding)

ORDINARY heat resisting paint should be suitable for the fitting, as this appears to be adequately cooled. Filament image is liable to be seen if the lamp is drawn too far back in the lamphouse, but this may be dissipated by the use of a light frosted gelatine, which can also be used to give a soft edged beam. The lens will probably be suitable, but we would advise you to use a spherical reflector without a hole through the centre. A 100 to 200 watt lamp with a concentrated filament would probably be large enough for your purpose.

(1) Should the marking roller be metal or otherwise?

(2) How is the feeding of that roller with the dye or paint accomplished?

(3) Should it be patterned before vulcanising or after?

(4) Could the pattern be applied as the rubber is being processed from the callender (which is, by the way, about 15 in. wide)?

I am able to have various equipment made so the only drawback at this moment is knowledge of working methods."

A letter from W. Ditchburn says: "Can you supply me with details of refrigeration by means of an electric thermo-couple which uses a junction of bismuth and bismuth Tethuride; also details of current and voltage and where I can obtain the materials for the construction of a small unit?"

Mr. A. E. Jones, of Enfield, writes: "Please inform me how to construct a medium weight frame tent, approximately 8ft. square, walls 5 to 6ft. high, total height 7 to 7ft. 6in."

Mr. P. Edgeley, of Ashford, says: "I have seen in several American magazines, advertisements for refrigerators with press button ice cube dispensers.

The business of removing ice cubes from the trays is always a nuisance and the prospects of having the press button dispenser I find most fascinating. Could you explain the principle by which these dispensers operate and the possibility of building such a dispenser, using the refrigerator components advertised in your columns."

Mr. T. S. Gooch, of Farnham, states: "I am shortly opening up a Bendix Self-Service Launderette and am using two De La Rue Rex D6 Heaters, which are gas fired. Even with a heat reclaim unit the gas consumption is considerable and I am toying with the idea of a possible conversion to oil firing. Have you any experience of such a conversion and/or could you put me in touch with any firm who could undertake the job? Also can you give me any comparative figures of gas versus oil firing costs?"

Mr. B. Frank, of Middlesbrough, desires information regarding a pipe cleaner which has recently come on to the market, known as the "Walton Mole."

U.S.A. THROAT MICROPHONES.—1/9 each, post 5d.; 12/- dozen, post free.

TOGGLE SWITCHES.—S.P.C.O. New. 7/6 doz., post 9d.; 72/- gross, post 2/6. Type 5d/531.

BATTERY CHARGING KITS.—New. G.E.C. 1.25 amp. 12 volt rectifier, matched transformer, to give output of 5-11-17 volts for charging 2-6 or 12 volt batteries, 27/6 each, post 1/6.

TEST PRODS.—Has 2ft. flex. ebonite rods, brass prods., ideal testing, 2/6 each, post 4d.; 24/- doz.

SMALL SEMI-CIRCULAR RHEOSTATS.—0-5 ohm variable, suitable meter shunts, W.W. 2 1/2 in. long, new, 9d., post 3d.; 7/6 dozen.

MOTOR CYCLE SILENCERS.—Chromed, new, suit Bantams, fishtail, fit 1 7/8 in., 10/- each, post 1/-; Also M/C Tyre pump connectors, 1/- each, post 3d.; 10/- doz.

PROJECTION LENS UNITS.—Contains 24 v. bulb, cover, mirror reflector, high grade lens, 40 mm. Achromatic, also Dalmeier concave dark lens, 10/-, post 1/-.

SELENIUM RECTIFIERS.—12 volt, 3 to 4 amps., new, 15/- each, post 1/2.

AUGER TWIST DRILLS.—Sizes 1/4 in. to 1 in., various sizes between, set of four mixed, 10/-, post 9d.

RELAYS.—Type P.O. 3,000 coil, 2,000 ohms, 3/6 each, post 8d. Coil, 200 ohms, 3/- each. Type 600 coil, 1,000 ohms, 3/6 each, post 7d.

METAL SPANNER BOXES BY FAMOUS MAKER.—3 sizes. Large 18 in. by 10 in. by 1 1/2 in. deep. Sections for sockets and other tools, 7/6, post 1/6. Medium size, 10 in. by 7 in. by 1 1/2 in. deep, socket sections, etc., price 5/-, post 1/2. Small size 7 in. by 2 in. by 2 in., price 3/6, post 7d. All new and half list price.

Send 6d. for our bargain list of surplus equipment.

We always have large stock of Single Phase 230 v. electric motors. Sample: 1/6 h.p. NEW CROMPTON 230, £4/10/- each, carriage 5/6.

THE SCIENTIFIC INSTRUMENT CO.

353, BEARWOOD RD., SMETHWICK. 41

*Phone: WOO 3165.

E.D. DIESELS

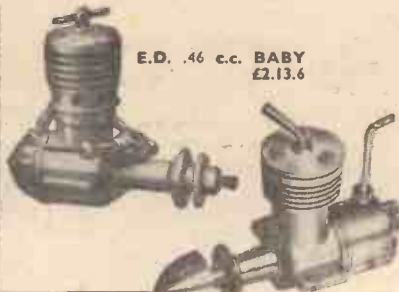
THE FINEST ENGINES FOR YOUR MODELS

Designed and manufactured by a team of skilled aircraft engineers, each engine is individually checked for accuracy and reliability up to a standard that ensures the greatest possible speed and performance for your models.

OTHER MODELS NOT ILLUSTRATED
E.D. 1.46 c.c. HORNET £2.17.0 (water cooled, £3.18.11)
E.D. 5 c.c. MILES SPECIAL. £8.6.3 (water cooled £9.19.6).

All prices include Purchase Tax. Order through your model shop.

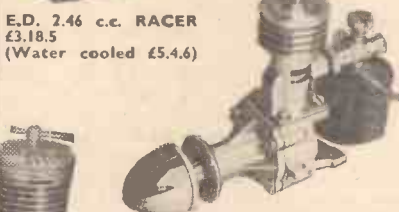
Ask for a copy of our 1954 illustrated folder which gives particulars of all E.D. Engines, Kit Sets, Radio Control Units, Spare Parts etc.



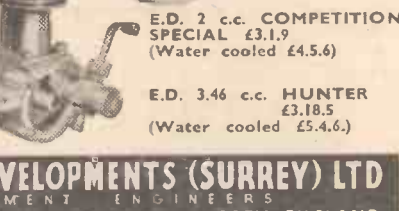
E.D. .46 c.c. BABY £2.13.6



E.D. 1 c.c. BEE £2.15.0 (Water cooled £3.16.0)



E.D. 2.46 c.c. RACER £3.18.5 (Water cooled £5.4.6)



E.D. 2 c.c. COMPETITION SPECIAL £3.1.9 (Water cooled £4.5.6)

E.D. 3.46 c.c. HUNTER £3.18.5 (Water cooled £5.4.6)

E.D. ELECTRONIC DEVELOPMENTS (SURREY) LTD
KINGSTON DEVELOPMENT ENGINEERS
4411-2 18, VILLIERS ROAD, KINGSTON-ON-THAMES, SURREY, ENGLAND.

ELECTRIC DRILL



Quarter-inch made by Black & Decker. 220/250 v. A.C./D.C. Domestic or power. Cash Price £5/19/6.

YOURS FOR 27/6 DEPOSIT.

ALSO SURFACE GRINDER

(As Illustrated) Ideal for removing rust, preparing wood-work, Buffing, Burnishing, Polishing 220/250 v. A.C./D.C. Domestic or power. Cash Price £8/7/6. Balance over 6 months. Post/Pkg. 2/6 each (With Cash or Deposit)

YOURS FOR 37/6 DEPOSIT.



Another Bargain! NEW ELECTRIC MOTOR

12/24 v. D.C. 33 amp. .38 H.P. 3,800 r.p.m. Size: 7 in. x 4 in. (approx.) **ONLY 8/6**

NEW EX-W.D. 12 VOLT STORAGE BATTERIES

New ex-w.d. Portable in strong wood case (similar to illus. but 12 v.). Heavy duty. 75 amp. 13 plates per cell. 15 in. x 8 in. x 1 1/2 in. Worth double. **ONLY 79/6**



1 AMP. BATTERY CHARGERS

Also useful as Eliminator. New and fully guaranteed in leading maker's original carton. 200-250 v. A.C. With Warning Indicator Light. Charges 6 v. and 12 v. batteries & maintains 1 amp. output at all voltages. **52/6**

Also 2 AMP. DE LUXE MODEL WITH AMMETER (Usual Price 128/6). **89/6**

EASY TERMS: Available for any goods totalling £5 or more.

NEW ILLUSTRATED CATALOGUE FREE. PRIDE & CLARKE LTD. (Dept. P.M.), STOCKWELL ROAD, LONDON, S.W.9. BRI 6251.

All items carriage paid and Money back guarantee.

TWIST DRILL SET
9 drills 1/16 in. to 1 in. complete with plastic case and stand. Brand new. **4/6**

UNBREAKABLE T SQUARE
Very strongly made from laminated resin-bonded plastic. Reinforced stock, bevelled edge. 24 in. long. Indestructible in normal use. Offered at less **9/11** than cost of materials.

SPIRIT LEVEL
Solid brass, built-in slide to protect glass **3/11**

ALL STEEL TOOL BOX
With removable inner tray. Strong hasp, staple and carrying handles. Size 1. 14 x 8 x 8 in. **25/-**
Size 2. 17 x 8 x 8 in. **30/-**
Size 3. 24 x 8 x 8 in. **36/6**

APOLLO SPRAY GUN
Ideal for model maker & handyman. Sprays paints, insecticides, etc. Will work from foot pump, spare car tyre, compressor, etc. New and boxed. **15/-**

Cash with Order. C.O.D. 1/- extra. Phone orders accepted. (PM11) 479 HARROW RD. LONDON, W.13 LADbroke 1718 HIGH ST., HARLESDEN, N.W.10.

SHERMAN'S SUPPLY COMPANY

Real Value

3/7 PER OZ

IT'S A GALLAHER TOBACCO

... it smells as good as it smokes!

WATSON'S SPECIAL OFFERS

WESTINGHOUSE Type R.G.C. 12. Output 90v. 8 amps. Control switching gives 36 charge rates from one 6v. battery up to the maximum. Complete with ammeter. Costs today about £35. Our Price £19.10.0.

AIRCRAFT LAMPS
7 in. diameter, easily converted to car spotlights. Matt black finish. Price 8/6, post 1/8.

ASTRO COMPASS. Precision observation instruments. Optical sight, four scales, two spirit levels. In case. 8/6, post 2/-.

PRESSURE GAUGES
0-150 lb. per square inch. Luminous, remote reading, with 40 ft. copper tubing and banjo connections. 8/6, post 1/6. Many other types also available.

MINE DETECTORS. A fine article with hundreds of uses for detecting concealed metal objects. £4/10.0. carr. 9/6. Scot. 12/6.

DYNAMOS
12v. 750w. Fine heavy duty machines, unused. 75/-, carr. 4/6.

LENS UNITS. Consisting of two 1/2 in. lens, in 2 in. brass focusing mount with adjustment 2 in. overall. 14/6. Post 1/-.

DYNAMOS
14/32v. 9a. 288w. Shunt wound, ball bearing foot mounted. Price 67/6, carr. 3/6.

COIL SPRING BELTS. 1 in. x 12 in. long, extends to 15 in. Any number can be joined together. 20 for 4/6, post 9d.

SIGHTING TELESCOPES. Mark M.700. 24 in. overall. Precision built. 23/6, post 2/-.

Hundreds of other bargains available. Send stamp for list.
EASTERN MOTORS, ALDEBURGH, SUFFOLK. *Phone 51.

Telephone: MUSEUM 9594

H. FRANKS

58-60, New Oxford St., London, W.C.1

One Minute from

Tottenham Court Rd. Station

INFINITELY VARIABLE SPEED GEAR BOXES, fitted 1 1/2 in. diam. shafts, mounted in ball-races, adjustable torque, reversible, overall size 5 1/2 in. x 5 in. x 4 1/2 in. approx. Precision made, 47/6 each.

DIPTO. Smaller type, overall size 3 1/2 in. x 3 in. x 3 in. approx. 40/- each.

PRECISION DIFFERENTIAL GEAR UNITS, fitted 1 1/2 in. diam. spindle, 48 D.P. Gears, size 2 1/2 in. diam. 1 1/2 in. deep, 8/- each.

CLOCKWORK-DRIVEN PROCESS TIMERS, variable, 5 to 30 mins. Fitted 5 amp. contacts. Totally enclosed crackle finish. 17/6 each.

SANGAMO MOTOR UNITS, MODEL 7, final speed 1 rev. per 7 days, 200/250 v. a.c. 50 cycles, 30/- each.

Ex-Air Min. GEAR PUMPS. Type RPP1, made by Rolls-Royce, size approx. 6 x 5 1/2 x 5 1/2 in. Price 30/- each, post paid.

4 to 1 RATIO GEAR-BOX UNITS, ex-Wind-screen Wiper Units, mounted in ball-races, overall size 5 x 3 x 3 1/2 in. 14/6 each.

12/24 VOLTS HOOVER BLOWER MOTORS, Ref. 10KB/115, is recommended for car heaters in a recent issue. Price 27/6 each.

MINIATURE CLOCK - WORK TIMERS, variable, 10 seconds to 3 minutes. Ideal for model work, photographic timing, etc. With slight modification will run 15 mins. full wind, size 1 1/2 in. x 1 1/2 in. x 9/16 in., 3/6 each.

"VENNER" TIME - DELAY SWITCHES, manual set, electrical release, 12/24 v., 20 secs. delay, 10/- each.

SYNCHRONOUS CLOCK UNITS, Self-starting 200/250 v. a.c. 50 cycle, fitted Sangamo motors consumption 2 1/2 watts, size 2 1/2 in. diam., 2 in. deep, geared 1 rev. 60 mins., friction reset. Ideal movements for electric clocks. With gear train and 5 1/2 in. hands. Price 22/6 each, post paid.

"BULL" 1/100th H.P. CAPACITATOR START INDUCTION MOTORS, 230/250 volt a.c., 50 cys. Speed 1,425 r.p.m., 1 1/2 in. diam. spindle reversible. Ideal for projectors, etc., 23/12/6 each.

ELECTRO-MAGNETIC COUNTERS, P.O. type, Four digit, 6 volts, 3 ohm. coil, 10/- each. Ditto 24 volts, 400 ohm. coil, 12/6 each.

HIGH QUALITY ex-A.M. VACUUM PUMPS, size 6 in. x 4 in. x 4 in. approx. Flange mounting, weight 5 lb., spline shaft 2 in. long 1 1/2 in. diameter, needs a 1 h.p. motor to drive same. Price 37/6 each.

ALTIMETERS, Ref. 6A/1537. Ideal for conversion to barometers, etc., 7/6 each.

AIR TEMPERATURE GAUGES, Ref. No. 6A/510, fitted Mercury in Steel Capillary Tube, Transmuting type, Reading -30/0/50 + Centigrade. Suitable for greenhouses, etc., 15/6.

SYNCHRONOUS MOTORS, 200/250 v. a.c. 50 cys. with gear-trains. Final speed 1 rev. per hour. Ex-Time Operated Units by well-known makers, size 3 1/2 x 3 1/2 x 3 in. Price 21/6 post paid.

TUFNOL PULLEYS, Fitted ball races, external diam. 2 1/2 in., internal diam. 1 1/2 in., 2/9 each, 30/- per doz.

DIPTO, 4 1/2 in. external, 1 1/2 in. internal, 5/- each, 55/- per doz., 2,000 of both types available.

CLOCKWORK MOVEMENTS fitted "VENNER" Escapement, run 10 hours one full wind, final speed 1 rev. 75 secs. Price 9/- each, post paid.

500 - OHM ELECTRO - MAGNET COILS, 5/8 per doz.

60 - OHM ELECTRO - MAGNET COILS, 10,000 available of both types, 5/8 per doz.

VARIABLE RHEOSTATS, Graduated 1 amp. to 2 amps., 45 ohms. Ideal for chargers, voltage control, etc. Ref. 5C/728, fitted in bakelite case 4 in. square, 1 1/2 in. deep, 12/6 each.

HEAVY 3-CORE FLEXIBLE 50-AMP CABLE, in 150 ft. lengths. Fitted 3-pin 50 amp. Nipham plug and socket each end. This cable is braided, rubber and water-proofed, sample piece on request. Price 28/10/- per coil.

DYNAMOTORS, Ideal for car radio, input 12v. d.c., 1.2 amps, output 125 v. d.c., 40 ma.

"KLAXON", 24 volts d.c. shunt wound 1/20th h.p. motors, 2,500 r.p.m. continuous rating, 40/- each.

DRIVING GOGGLES by Zeiss, Goertz etc., supplied with spare set of clear lenses, set of anti-dazzle lenses, 11/- per set.

FULL MAILING LIST PRICE 6D.

GAMAGES
THOUSANDS OF TOOLS OF EVERY KIND
ALWAYS IN STOCK

HIGH SPEED STEEL SPIRAL FLUTE REAMERS

First quality U.S.A. make reamers with No. 1 M.T. shank. Set of five comprises 1/8, 1/4, 3/8, 1/2 and 3/4 in. **BARGAIN PRICE SET 31/6**
Post and Pkg. 9d.



Finest Quality Sheffield Steel GOLD CHISEL & PUNCH SETS

Comprising 3 flat cold chisels. Sizes 4 1/2 x 3 in., 5 x 4 in. and 6 x 4 in. Cross cut chisel 4 1/2 x 3 in. Nail punch, 4 1/2 in. Centre punch 4 1/2 in. Packed in a neat plastic wallet with press button fastener. **COMPLETE 13/- set.**
Post and Pkg. 11/-



'BAXTLU' FLEXIBLE SHAFT DRILL

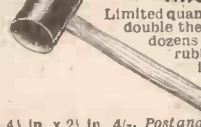
£5.10 OFF Original List Price!

Ideal for light grinding operations on castings, pottery, sheet metal, welds and light metal. Takes plain profile wheels up to 3 in. diameter. Shaft sizes 4 ft. x 8 mm. 1/2 h.p. motor, 230/250 volts A.C., 3,000 r.p.m. A.C. only. **LIST PRICE £18**
GAMAGES £12.10
PRICE
or 63/- deposit and 10 monthly payments of 20/9
Carr. and Pkg. outside our own van area.
Eng. and Wales 5/- Scot. 7/6.



RUBBER HEADED MALLETS

Limited quantity. Well worth double the price. There are dozens of uses for a rubber-headed mallet. Size of head approx. **3/-**
3 in. x 1 1/2 in. Post and Pkg. 1/4. Pkg. 9d.
4 1/2 in. x 2 1/2 in. 4/- Post and Pkg. 1/4. Pkg. 9d.



UNIVERSAL Fully Insulated SCREWDRIVER KITS

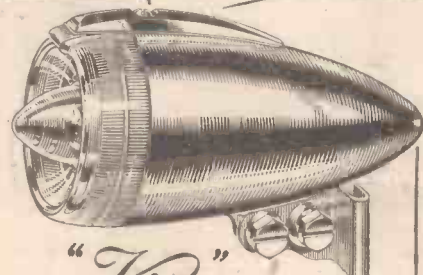
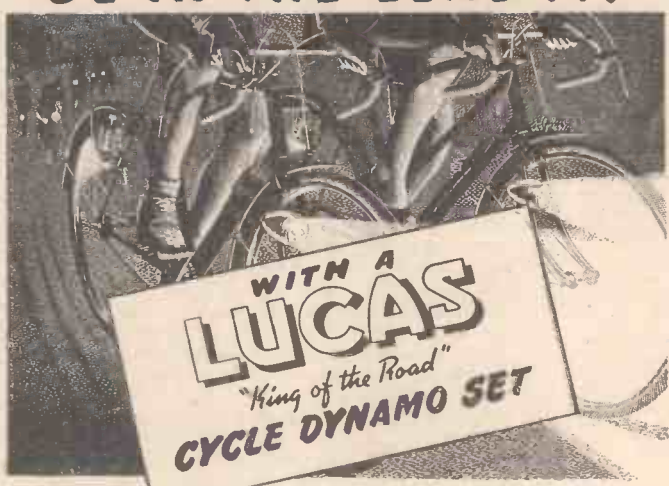
Five fully insulated to tip screwdriver blades and one handle to fit all television, etc. One each, plain screwdriver blade 4 in. x 1/4 in., 4 in. x 3/8 in., 4 in. x 1/2 in. Phillips cross-pointed blade and forked end blade 4 in. **10/6**
Complete in plastic roll. Post and Pkg. 5d.



HIGH GRADE 1/2 h.p. ELECTRIC MOTORS
Nearly HALF PRICE!
Fitted with on-and-off toggle switches. 220/230 volts A.C. 50 cycles. Single phase. 1,440 r.p.m. Spindle diameter 1/2 in. **BARGAIN PRICE £5.5**
Carr. and Pkg. outside our own van area 6/9 England and Wales.

GAMAGES, HOLBORN, E.C.1. TOOLS & MOTOR CAR ACCESSORY LIST FREE

BE IN THE LEAD ...



Weights only 6 1/2 ozs., has a single bulb light unit which projects an intense spot beam yet gives ample local light. 36/6 complete.

"King" SPORTS

JOSEPH LUCAS (CYCLE ACCESSORIES) LTD · CHESTER ST · BIRMINGHAM 6.

A.C./D.C. MOTORS 24 v. 2a., 6in. x 2 1/2 in. dia. spindle 1in. x 1/2 in. New 18/6.
Time Delay Relays supplied to your requirements.
Powerful small Blower Motors, 24 v. A.C./D.C., 14/6. As used for the Hedge Trimmer.
Type 6C Oscilloscope Unit. With VC138 3 1/2 in. Tube, and conversion circuit for standard "Scope". 50/6.
Transformers, Input 200/240 v. Sec. tapped 3-4-5-6-8-9-10-12-15-18-20-24-30 volts at 2 amps., 21/6. 17-11-5 volts, at 5 amps., 22/6. 17-11-5 volts at 1 1/2 amps., 16/6. 6.3 volts, 2 1/2 amps., 8/6. 12 months' guarantee.
Selenium Rectifiers F.W. 12-6 volt, 1 A., 8/6. 3 A., 14/6. 4 A., 23/6. 6 A., 30/- 24 v. 2 A., 30/- 250 v. 100 mA. H.W., 9/- 250 mA., 17/6. 60 mA., 6/6.
D.P.D.T. Relays. Operates at 200/300 volts D.C., 8/6. D.P. Make and Break, 8/6. Any combination or voltage can be supplied at varying prices.
0-5 amp. 2 1/2 Square M/c Ammeters, 11/- Vee-der Counters. P.O. Type, 24/50 v. D.C. 0.9999, 15/6.
M/c Microphones with matched transformer, 15/6.
6 volt Vibrator Packs. Self contained in steel box. Output 150 v. 30 mA., 22/6.
Rheostats, 12 v. 1 A., 2/6. 12 v. 5 A., 10/6.
Latest Car Lights Relay Assembly "Flasher" Unit, 6 or 12 v., 17/6. or with 2 lamps and switch, 50/- STATE BATTERY CONNECTION TO CHASSIS.
4 ft. Fishing Rod Aerials, Set 3, 7/6. Base, 3/6.
TR.1196. Transmitter Section. NEW and complete - less valves - 4.3-6.7 Mc/s. Easily converted, 15/- Valves are EF50, TT11, EL32, set 25/-.
4 1/2 in. dia. 0-100 Micro-amp. Meters. Made by Ernest Turners, 23/12/6.
All Carriage Paid in U.K.

THE RADIO & ELECTRICAL MART
253, Portobello Rd., London, W.11
Park 6026

LEARN A LANGUAGE THIS WINTER

By the Pelman Method

THE problem of learning a Foreign Language in half the usual time has been solved. The Pelman method enables you to learn French, German, Italian and Spanish without translation.

By the Pelman method you learn French in French, German in German, Spanish in Spanish, and Italian in Italian. English is not used at all. Yet the method is so simple that even a child can follow it.

Reduced fees for H.M. Forces.
Grammatical complexities are eliminated. You pick up the grammar almost unconsciously as you go along. There are no classes to attend. The whole of the instruction is given through the post.

Send for the Free Book.
The Pelman method of learning languages, which has now been used for over 25 years with such success, is explained in four little books, one for each language: **FRENCH, SPANISH, GERMAN, ITALIAN**
(Also Courses in Afrikaans and Urdu)
You can have a copy of any one of these books, together with a specimen lesson, gratis and post free, by writing for it to-day.

POST THIS FREE COUPON TO-DAY
To the Pelman Languages Institute,
130, Norfolk Mansions, Wigmore St., London, W.1.
Please send details of Pelman method of learning:
French, German, Spanish, Italian
(Cross out three of these)
Name
Address



VOL. XXII

SEPTEMBER, 1954

No. 388

All letters should be addressed to the Editor, "THE CYCLIST," George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

Phone: Temple Bar 4363

Telegrams: Newnes, Rand, London

COMMENTS OF THE MONTH

By F. J. C.

The New Brake Regulations

AS from September 1st, every adult's bicycle and tricycle used on the roads must have two efficient independent brakes if it is a free-wheel cycle and one brake if it is a fixed wheel. On the smaller cycles for children, that is to say those with a wheel diameter of 18in. or less, a single brake will be sufficient. The obligation to fit and maintain efficient brakes rests not only on the actual user, but on those who cause or permit cycles to be used, such as the parents of a child cyclist or the employer of a trade cycle. The police are given power to test and inspect cycle brakes.

Autocycles and cycles fitted with auxiliary motors are classified as motor cycles under the Road Traffic Acts, and the law already requires that they should have two braking systems. All free-wheel bicycles and tricycles which have any wheels of an outside diameter exceeding 18in. must, therefore, have two independent brakes, and a brake operating on the tyre does not satisfy the regulations. Where the pedals are in one piece with the wheels, that is to say where there is no gearing, chain or other device, brakes are not compulsory. In the case of three-wheeled tricycles which have any wheel of an outside diameter, including the tyre fully inflated, exceeding 18in., the two independent brakes must be fitted in such a way that if it has two front wheels one brake acts on both front wheels and one on the rear wheel, or if it has two rear wheels one brake acts on the front wheel and the other on one of the rear wheels. Alternatively, both brakes may act independently on the single wheel whether that be in the front or the rear, with the exception that if a tricycle is constructed or adapted for the carriage of goods, as in the case of a box tricycle, the latter arrangement is not permitted.

This new law merely regularises a position already in existence. But it does give the police power now to act; for hitherto it was not an offence to ride a bicycle not equipped with brakes. We have never seen a bicycle, however, without brakes, and it would seem that the new regulations are designed to give the police power to inspect and test bicycles with inefficient brakes. We do not think that cyclists will object to the new regulations, which are based on common sense.

International Cycling

ARISING from a suggestion from the Manufacturers' Union, the B.L.R.C. has met in London recently. Invitations had been sent to the N.C.U. and R.T.T.C., but when the N.C.U. delegates arrived they would not meet the delegates from the B.L.R.C.

In order, however, to try and reach a solution to the present unsatisfactory position it was agreed that each side should state a case independently to the representatives of the Manufacturers' Union.

The N.C.U. stated their case first, and when the B.L.R.C. delegates went into the conference room they were informed that the N.C.U. were not prepared to resume dis-

cussions in the Joint Committee until the B.L.R.C. gave an unqualified withdrawal of the possibility of legal action in connection with Clauses 6 and 8 of the Joint Agreement.

The B.L.R.C. solicitor had previously written agreeing to suspend the possibility of legal action pending further discussions. In order to prove their sincerity, the B.L.R.C. agreed that if the N.C.U. delegates would agree to the formation of the Overall Body (allowed for in the Joint Agreement) by September 30th, 1954, then the B.L.R.C. would unreservedly withdraw from taking any legal steps whatsoever in connection with the Joint Agreement and would, in the meantime, raise no objection to the B.L.R.C. members taking out N.C.U. International Licences for the purposes of racing abroad. Furthermore, the B.L.R.C. would return the licences to riders already penalised for so doing.

The B.L.R.C., to ensure equity in creation of the new body, made certain suggestions in conformity with the Tripartite Agreement. Notably they are that the overall body shall be formed on or before September 30th, 1954; each party to the existing agreement shall draw instructions in writing for submission to counsel to settle the constitution and setting out the history of the dispute and the views and wishes of each party on the formation of the new body; each party to accept the constitution as settled by counsel; at the date upon which the overall body comes into being all other forms of International Licences shall cease to be valid and only those issued by the overall body shall henceforth be recognised, and the Union Cycliste Internationale recognition shall pass to the overall body at the date upon which it comes into being. This presupposes that the arrangements meet with the approval of the U.C.I.

These provisions were conveyed by the representatives of the Manufacturers' Union to two representatives of the N.C.U., who agreed to sign letters containing the provisions which were to be submitted by an independent party to the B.L.R.C., R.T.T.C., and N.C.U. The following day, however, a representative of the Manufacturers' Union advised the B.L.R.C. National Secretary that the N.C.U. were not now prepared to sign the letter in question.

The B.L.R.C. naturally feels in the circumstances that it has done everything in its power to reach some reasonably satisfactory solution and it is still willing to discuss the matter. It is our view that the B.L.R.C. should not waste further time with the N.C.U., which is an unbending and uncompromising body, but should take the steps which are now open to it.

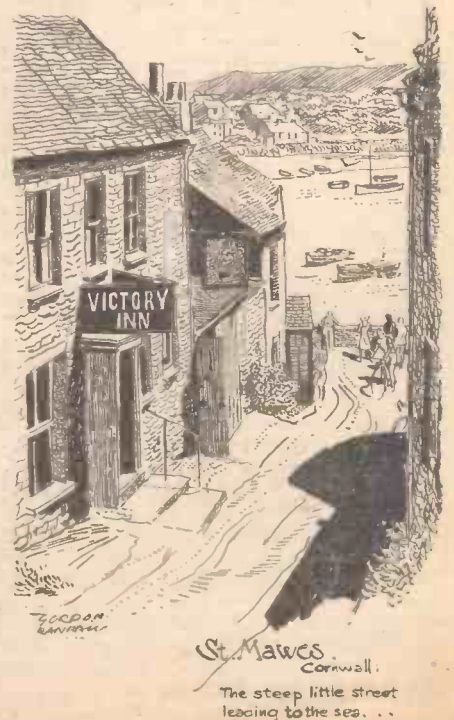
The dispute has been going on long enough and discussions merely regurgitate the old arguments. Boiled down to quintessence, the position is that the N.C.U. is not prepared to submerge its identity but wishes, in spite of its history in connection with sport, still to remain King Pin. The B.L.R.C. has a perfectly sound case to ask the N.C.U. to bend

the knee on this issue in view of its attitude over a long period of years. It is our view that unless there is a radical change in its policy it will eventually do great harm to cycling. It seems unable to discern which way the wind is blowing in spite of the omens provided by its own balance sheet. It has, unfortunately, accepted wrong advice from certain sections of the Press with axes to grind, and from others who saw that their power would wane if the fortunes of the B.L.R.C. were in the ascendant. The fact that in spite of all opposition it has reached the position where it is a power to be feared—and is feared by the older bodies, should show the N.C.U. that once again they have been the apostle of a lost cause. B.L.R.C. opponents have formed themselves into cliques, and it can be said for them that they presented a united front. Their ranks, however, to-day show some severe gaps as a result of the bombardment they have suffered.

H.P. Restrictions Abolished

THE abolition of all hire purchase restrictions has given a fillip to cycle sales, and dealers report that the effect was immediate. When these restrictions were first introduced the sales of bicycles fell very considerably almost overnight and caused depression in the trade and some unemployment.

Much better h.p. terms now take their place. Most manufacturers are asking for £1 deposit on all models and the balance over a minimum period of two years or more.



St. Mawes, Cornwall.

The steep little street leading to the sea...



In the heart of lovely Dovedale. Ilam Rock (right) towers above the little river that gives its name to this beautiful dale.

Pleasant Retirement

IT is pleasant to sit back and contemplate the position occupied by the sport and pastime of cycling without worrying over the trials and its troubles. That may seem selfish, but when one has given half a century to official life in one form or another, it is comfortable to leave the worries to other people and just go on your way rejoicing. I am one of the lucky fellows who have kept on riding for the sheer pleasure of the game and I find that habit is now a jolly compensation for all the arguments that appear to be disturbing the modern politics of cycling, especially as regards its sporting side. If I talk these matters over with my friends, I end by making the best of my activity and enjoying the pastime in my own simple way. I let the younger generation settle their difficulties, without unduly worrying about the results or even feeling envy that, being out of the hunt, I'm even a back number; for I ride and love it, and any part of this glorious country is mine for just as long as I can escape from town.

Talking about the pastime proper, while the touring emphasis is all on Continental adventure, I think the home country is being neglected, and I cannot avoid thinking that the rider who does not know his own land fairly intimately is missing the build-up of a native pride that leads to contentment and a higher regard for the pastime and all it connotes. I have young friends who know Continental countries fairly well and to hear them talk one would imagine we had no Scotland, no Lake District, Pembrokeshire coastline, or the miniature intimacy of Wales, to say nothing of the moors of Somerset, Devon, Cornwall and the sterner lands of the Yorkshire Dales.

The Outdoor Garage

I WENT out lonesomely the other Sunday morning and feeling idle an hour's easy ride put me into the deep Warwick lanes by a ford of the Blythe. And there a green bank with a back rest invited me to smoke, watch the wind-swayed trees, and the great cumulus piled white against the blue go sailing eastwards trailing their shadows over a drowsy land.

I had scarcely time to fill and light a pipe when a car came quietly down the lane, stopped at the ford's edge and out got a man I know by sight and his young son rising ten. They unshipped a stirrup-pump, the lad

waded into the stream, and the pair of them thoroughly bathed that car, much to the enjoyment of the younger generation, who was given his turn in directing the pumped stream while father did the handle exercise. It struck me as quite a good way of practicing cleanliness, even if it was only a car; rather than make a mess at home and possibly get into trouble.

Soon the man joined me to enjoy a smoke and pass the time of day in expressing his wonder that he saw me so regularly riding a bicycle to town and home, saying in compliment, I suppose, how well I looked and if cycling was the cause of it then cycling must be good. "I rode a bicycle

further restrictions in connection with town traffic, not desirable, but imperative if we are to move round on our lawful occasions.

The Old Days

I SUPPOSE men of my age have lived through one of the most interesting periods of history, political and mechanical, and that last paragraph reminds me of the fact. When I was a youth, home from school, we frequently drove a pony and trap to town for the purpose of shopping, and it is difficult now to remember how quiet the streets were when they were free of the noisy trams. To go touring in those days along the quiet main roads with their wide grass verges (since gathered to the tarmac) was, indeed, to roam in another age, with a country welcome everywhere awaiting. The old houses of call then were in the doldrums of trade, lingering between the stage coach and the motor-car, and only the touring cyclist was the likely customer for accommodation. Of course, we fellows (youth in its early teens and young men who thought they knew everything) certainly did not know what was coming to us, and had the present picture been shown us on the screen of the future, we should never have believed it.

Sometimes people say to me when this subject crops up, "What a splendid time you cyclists must have enjoyed." We did; yet having lived through the great changes, I do not think the modern rider should be less happy—I certainly am not. He shares the highway with the million compared to our hundred of the mid-nineties, but it is a better highway and his mount a better bicycle. And—praise be—he still has his lanes, the real saviours of the British countryside and, from a wheeling point of view, our richest heritage. Often enough I wonder why he doesn't use them more generally, for they are good roads to-day serving many of the places the highways serve, but collecting on their routes a dozen little hamlets which the big roads have had no time to gather.

Wayside Thoughts

By F. J. URRY, M.B.E.

for many years," said he, "but—" It was the old story; married life, the need for a car for business purposes, the line of least resistance and cycling was over. Yet how unnecessary it is to totally drop the cycling habit, to imagine all wisdom is invested in a car, and travel, pleasure confined to a built-in vault, flying over the roads. To say he agreed with me would be an exaggeration, but at least he said there must be something in it to keep an old man reasonably fit and on the sunny side.

How to Solve the Problem

I OBSERVE that Authority is beginning to think of the road problem in terms I named in these columns long ago. It is the city and town road congestion that is the main trouble to-day; I see it every morning, and have been watching it grow, and sometimes almost congeal, for years. In the country you need not use the main roads to make your excursions by bicycle or car, but at the verge of the cities and towns, sooner or later, whatever route you choose, the way leads to the great congestion, and it is then that tempers are frayed. This traffic gathering has grown to such an extent that the idea I mentioned years ago is being discussed by responsible people. This is to leave the centre of the towns free of cars except public vehicles and delivery vans, and park the private cars at selected spots beyond the city centres. When I had the temerity to mention this question just after the end of the war, the criticism of such an arrangement was very severe, and, of course, I was charged as a fanatical anti-motorist, when really I was only a pro-cyclist with a good daily view of the traffic trouble then, and which has since enormously increased.

There is still severe criticism for any such scheme, but the critics do not appear to be of the constructive kind, for the only alternative they offer to some such control is to widen the streets, and that in the best of circumstances can only be a long distant hope. In the meantime, the traffic congestion is piling up in a way that suggests an almost complete "freeze" in the near future. The one-way street has become common and is accepted with a little grudging, and it may be that conditions will impose on all of us some

Make Your Own Selection

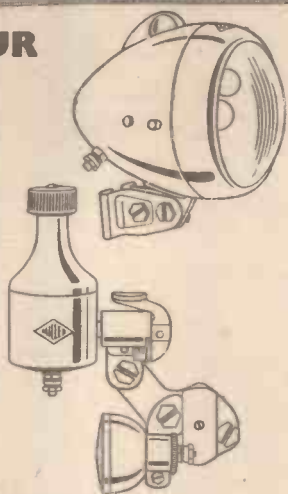
THE people who say the roads are too crowded for the enjoyment of touring do not know the roads—only the highways. Too frequently they ask for routes supplied by their organisations, which nine times out of ten follow the great arteries, instead of learning to map read, choosing their own ways and really becoming acquainted with the land. Sometimes you will make a mistake and include a slice of undesirable country, but that kind of error never lasts long and, in any case, gives you a personal knowledge of places you have heard of and wondered what they were like.

Years ago a friend of mine who came to live in Birmingham from the Cotswolds looked at his map one Sunday morning, saw the delectable nomenclature "Swan Village" and travelled the route. Swan Village is in the middle of the Black Country, a region of desolation now, and it was worse thirty years ago; but, believe it or not, that fellow said he quite enjoyed the trip among the iron works and abandoned mines, for it gave him the values of contrast, something he had never wholly realised because of his country up-bringing. I do not suggest that you and I should make such experiments, but I do seriously say that the map-reader cyclist has far more interest in planning his route and using the lanes and rough paths than following a prescribed programme sent to thousands of enquirers. Actually it is only since motor travel has become common that the fashion of routing the land has grown, and made people lazy. The old rider took his map and his bicycle and trusted to luck where he stayed for the night.

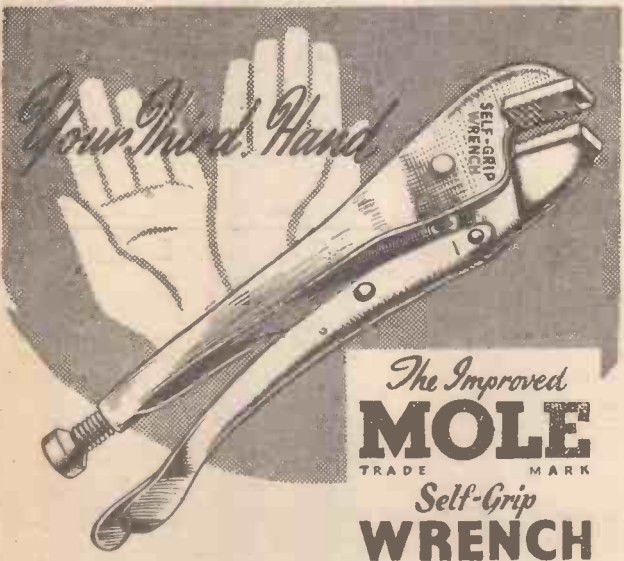
CHOOSE YOUR DYNAMO LIGHTING

—WITH THE SAME CARE YOU CHOSE YOUR CYCLE

No cycle is complete without efficient Dynamo Lighting. Make absolutely sure you get the best by choosing Miller. For with Miller you buy much more than a set—you also get years of unfailing service—in terms of thoroughly reliable Cycle Dynamo Lighting at all speeds.



H. MILLER & CO., LTD., BIRMINGHAM, 6



The Improved **MOLE** TRADE MARK **Self-Grip WRENCH**

Give yourself that extra hand you are always wishing for—the Mole Self-Grip Wrench. This versatile tool can be used as a vice, wrench, clamp, super-pliers and so on. It locks on to work with tremendous power, leaving both hands free, yet can be released by just a flick of the centre lever. Sturdy and compact, the Mole Wrench is a MUST for all handymen and mechanics.

Obtainable from your local Ironmonger, Motor or Motorcycle Accessory Dealer.

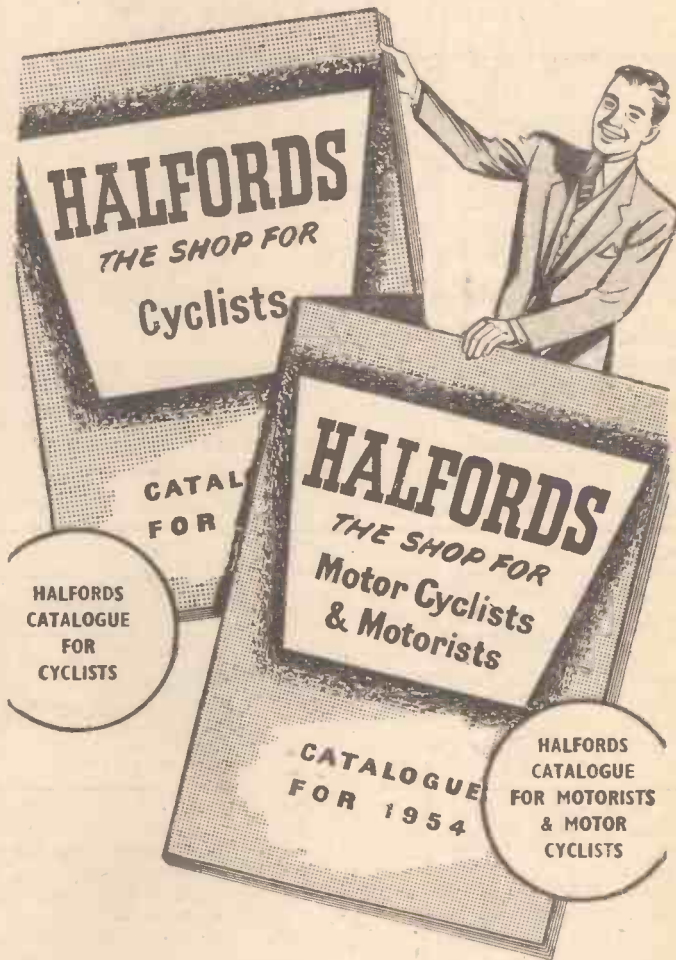
7"-12'6
10"-15'6

If any difficulty, write to:—

M-MOLE & SON · LTD · BIRMINGHAM · 3

NOW READY!

New guides to the finest selection and best possible value in accessories for Cyclists and Motor Cyclists & Motorists.



They're **FREE** from your nearest Halford's Branch, or post this coupon.

To:

THE HALFORD CYCLE CO. LTD
(Dept. PMc), 239 Corporation St, Birmingham 4

Cyclists Motorists and Motor Cyclists

Tick Catalogue required

Name.....

Address.....

NEW!**RADIO & T.V. OUTFITS****LEARN THE PRACTICAL WAY**

Whether you are a student for an examination; starting a new hobby; intent upon a career in industry or running your own business — these practical courses are intended for YOU and may be yours at a very moderate cost.

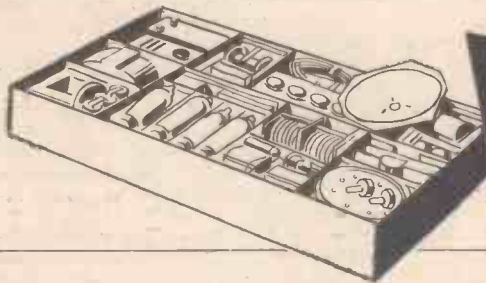
EASY TERMS FROM £1 A MONTH

With these outfits, which you receive upon enrolment, you are given instructions which teach you in easy stages the basic principles of the subject concerned. A tutor is available to give individual help and guidance during the Course. The specially prepared equipment remains your property.



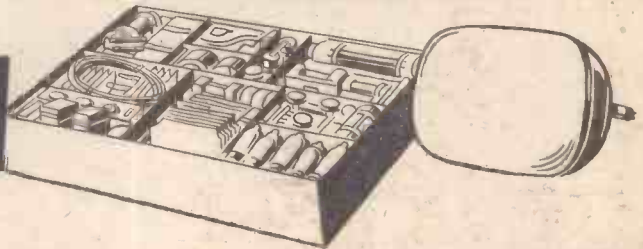
BEGINNERS RADIO OUTFITS—For carrying out basic practical work in Radio and Electronics, from first principles and leading to the design and building of simple Receivers.

ALL EQUIPMENT SUPPLIED IMMEDIATELY AND REMAINS YOUR PROPERTY.

**2****ADVANCED RADIO OUTFITS**

—With this equipment, you are instructed in the design construction, testing and servicing of complete modern T.R.F. Superhet Radio Receivers.

TELEVISION—With this equipment you are instructed in the design, construction, servicing and testing of a modern high-quality Television Receiver.

3

OTHER COURSES WITH EQUIPMENT INCLUDE:

**MECHANICS - ELECTRICITY
CHEMISTRY - PHOTOGRAPHY
CARPENTRY**

**ALSO DRAUGHTSMANSHIP - COMMERCIAL ART
AMATEUR S.W. RADIO - LANGUAGES - ETC.**

POST THIS COUPON TODAY

Please send me your FREE book on Practical Courses:
I am interested in Radio 1 , Radio 2 , Television .

Subject(s) of interest

To: E.M.I. INSTITUTES, Dept. 144x, 43 Grove Park Road,
Chiswick, London, W.4.

NAME

ADDRESS

September, 1954.

(We shall not worry you with personal visits)



E.M.I. INSTITUTES The only Postal College which is part of a world-wide Industrial Organisation

AROUND THE WHEELWORLD

By ICARUS

Silicone Polish

IN my notes on cleaning a bicycle, which appeared in the August issue, I mentioned a silicone polish which I had found to be most effective, and I referred to it as "Two-In-One." The manufacturers, E. R. Howard, Ltd., of Ipswich, Suffolk, point out my error, for I should have referred to it under its correct trade name of "3-in-ONE." It is obtainable, as I have said, from most cycle and hardware stores at 2s. 6d. per small bottle.

MacMillan's Bicycle

I WAS glad to notice at the recent Model Engineer Exhibition a large scale model of MacMillan's bicycle. The very first model of this machine was made by the editor of this journal and photographs, as well as scale drawings, appeared in these pages. I hope the maker of the model exhibited at the exhibition found these drawings of interest! Incidentally, the editor's model is to be exhibited at the forthcoming Cycle and Motor Cycle Show at Earls Court.

Public Relations Officer

FOLLOWING the resignation of Mr. R. Williamson, the British Cycle and Motor Cycle Manufacturers' Union has established a Public Relations Department for the two industries under the direction of Mr. H. Watts. Its headquarters will be in London. In view of the constant misrepresentation of the cyclist's point of view in the daily papers such an office is very necessary to-day. I feel, however, that all notices affecting cycling should come through the Manufacturers' Union and not from either the N.C.U. or the C.T.C. Their views have been so consistently biased that they have done the cause great harm. The Manufacturers' Union would, in my view, be a more impartial body. The C.T.C. some years ago headed their handouts with the phrase "What do Cyclists Say? Ask the C.T.C." If you did, it is practically certain that all that you would obtain is the biased C.T.C. viewpoint. It is noted that where

they have been at variance with Government policy they have nearly always lost. It is nice to know, however, that they still retain the right to erect "Dangerous Hill" notices at the top of hills which are no longer dangerous.

The Amateur Circuit of Britain

THE first Amateur Circuit of Britain sponsored by the Quaker Oats Food Co. shows that the B.L.R.C. are not daunted by the turn of events in connection with the Tour of Britain, the fourth of which was held this year under the aegis of the *Daily Express*. The full story of this event is now told in an illustrated 48-page booklet which may be obtained from them for 2s. It is a stage-by-stage report of the race and I suggest that in future editions they adopt the correct publishing practice of numbering their pages!

The Amateur Circuit of Britain shows, as I have repeatedly said, that there is no lack of sponsors for National events of this calibre. In one of the League handbooks, I pointed to the risk the League was taking in tying themselves up to one newspaper, stating that when the race had served its purpose it could be dropped. Now that the League has acted as a really independent body, I hope that its Amateur Circuit of Britain continues year by year.

World Championships

THE B.L.R.C. in a press statement states that the team nominated for the World's Championships by the N.C.U. did not, in their view as a controlling body for professional and independent road racing in Great Britain, represent the best team which could be selected from the riders available to represent Great Britain in the World's Championships. If agreement had been reached on the subject of International licences, the B.L.R.C. could have nominated the following riders as a team: Krebs; Maitland; Cristisson; Mitchell; Bedwell; Parker; Ilseley; Robinson; with reserves, Steel and Greenfield.

Tricycles

THERE are still those who like to trundle that clumsy, antiquated and absurd vehicle the tricycle, preferring the disadvantages and discomforts of three wheel tracks instead of one. For myself, I have only ridden a tricycle on odd occasions, but never found any advantage over the two-wheeler except at a traffic stop when one could remain sedately seated. Of course, this is an advantage when old age creeps on and the rider cannot nimbly swing his leg over the saddle. The fact that it has practically disappeared from most manufacturers' catalogues is an indication of the declining demand.

The tricycle was originally introduced for those who found it too difficult to learn to balance on two wheels. If you have never ridden a bicycle, you will learn to ride a tricycle quite quickly, but otherwise you will find it a most tricky instrument to master.

Protagonists of the tricycle, in my view, write their eulogies as a result of nostalgia rather than logical reasoning. It is undoubtedly an old man's instrument, but it is lumbering, requires more effort to propel unless the gear is made ridiculously low, which means fast pedalling even for an average speed of 10 miles per hour, and it is certainly uncomfortable.

Liverpool to London in Under 8 Hours

KEN JOY recently broke the Liverpool to London record in 7 hours 55 minutes 37 seconds, which counts as 7 hours 56 minutes for record purposes. This is 23 minutes under the tandem-trike time of Arnold-Crimes and 1 hour 2 minutes better than the ride of Richard Kemps pre-war record for the same journey. His average speed for the 211 tour mile record was over 25 m.p.h., and he nearly approached beating the 100 mile record.

The End-to-end

EILEEN SHERIDAN recently broke the W.R.R.A. Land's End to John O' Groats record with a phenomenal ride of 2 days 11 hours 7 minutes, which is only 4½ hours outside the record for this journey made by F. H. Ferris in 1937, and it beats the ride by Edith Atkins, riding as an amateur last year, by 6 hours 57 minutes. It breaks Margaret Wilson's 1939 record by 11½ hours. When Margaret Wilson was wiping up the records almost weekly we thought it would be many years before this blonde bombshell would be matched. Allowing for the intervening war years, when record breaking was at a standstill, I have no doubt that her records, or at least some of them, would have been beaten, since some of them were records made not broken. Eileen Sheridan's riding shows that each generation can produce riders to equal the stars of the past.

Then there is the record of Arnold-Crimes over the same roads to record. They made the fastest ride to John O' Groats from Land's End in 2 days 4 hours 26 minutes, continuing to make the fastest 1,000 miles in 2 days 14 hours 1 minute.

It must appear that this record is approaching the point where they must unhappily be put on the shelf for all time. I say unhappily because I think it is one of the most romantic, if not the most romantic, of all the R.R.A. records. The thought of a lone rider pedalling away day and night on a very tortuous journey is in itself thrilling. The R.R.A. will shortly have to think of some other record to replace it. The original end-to-end record was over the short course in which the riders were assisted by three ferries. Over the course trundled, in the early part of this century, such giants as Peck and Olley, and the redoubtable Harry Green, many of whose records stood for over 20 years. The late G. P. Mills held the record for a time.



Newport, Isle of Wight.
Early morning down by
the old town quay.



The great medieval Castle at Warwick.

CYCLORAMA

By H. W. ELEY

Mellow Fruitfulness

SEPTEMBER again, and as always Keats's lines about the "season of mellow fruitfulness" come to my mind as I ride out into the countryside. Apples are ripening in the orchards; and one feels a sense of fulfilment and completeness as one gazes

parsley was a sin, and that it played into the hands of the Evil One! Before I left the cottage, after my cup of tea and smoke, I had learned that to stamp on a holly berry and crush it was sure to bring bad luck, because the robin is a holy bird, and in winter time feeds upon holly berries!



The 14-Cent SWAN HOTEL, Thames Ditton.
A delightful Thameside inn near Hampton Court.

out over the stubble fields. In some districts the corn is already garnered; in others it still awaits cutting, waving in the soft September breeze like a sea of gold. Over the stubble the little brown partridge is foraging for food—and over by the old warren there are rabbits a-plenty, and at their best. A goodly time this month of September, and the rider is wise who makes the most of the golden days. All too soon winter will follow mellow autumn, and the hollyhocks and sunflowers and Michaelmas daisies will be gone.

In Superstition Land

I HAVE referred before to the number of quaint and curious superstitions which still linger in the heart of the countryside, and the other day, while talking to an old woman who lives on the fringe of the ragged common at Tideswell, I heard of more strange beliefs. The old dame is quite a friend of mine, for I often call at her tumbledown cottage for a chat. She likes a pipe of tobacco, and brews a very strong cup of tea. We fell to talking of the many superstitions connected with flowers, and she told me that the Canterbury bell is a sacred flower and should never be grown in the ordinary garden. "If anyone picks one, it means the tolling of the death bell in the village within a fortnight." I had never previously heard of this strange belief, but I had always known that the Canterbury bell was supposed to bring good luck to all the gardens in the fair city of Canterbury, and that the flower got its name from the fact that the small bells worn by the horses of the pilgrims to à Becket's tomb resembled the bloom. We fell to talking of superstitions about gardens and gardening, and my old friend assured me that to transplant

my mind to make a tour of the district, to discover these charms which my good correspondent has known for many years. He also mentions an ancient inn at Over, near St. Ives—The Ferry Inn—with thatched roof, stone floor, walls of old hair plaster, and a beamed ceiling. According to my correspondent this good inn stood in King Alfred's day, and legend has it that it was while that defeated monarch was fleeing from the Danes he found an osier-cutter in the reeds and told him that if he would ferry him across the river he could have the inn!

A legend maybe, but a picturesque one, and we will leave it at that. I am indebted to my "pen-friend" for some charming notes, and I shall explore the district he describes as soon as ever I can.

Bunyan and Bedfordshire

MUSING among some old touring notes the other day I came across some references to a tour made, many years ago, of some parts of Bedfordshire, and among the notes was a sketch I had made of the

The Fen Country

A FEW weeks ago I received a charming letter from a reader of "Cyclorama"—and he told of the delights and beauties of the Fen country round about the ancient town of St. Ives, in Huntingdonshire. Two villages mentioned particularly were Hemingford Grey and Hemingford Abbots, and my correspondent writes "they have a quiet charm, compounded of old cottages, quiet river, lush meadows, and delectable little old pubs." Well, that sounds an entrancing description, and already I have made up

The Mushroom Mystery

YEARS ago I always used to "bank on" September as the month when, walking over grass-land, I should find plenty of succulent mushrooms. But these days I see them but seldom, and have walked for hours over the kind of pastures which once yielded generous crops and gone home empty-handed. Some of my country friends say that the disappearance of the mushroom is due to the continuing use of chemical fertilisers on the land. This may well be so, although quite near to the fields, without a single mushroom, one may sometimes come across a patch of ground covered with them. "They be chancy things," said one of my farm friends in the inn the other day, and I am inclined to agree with him. What I do know, and grieve over, is the fact that my early morning walk over likely fields secures me no tasty "button" mushrooms to go with my rasher of breakfast bacon!

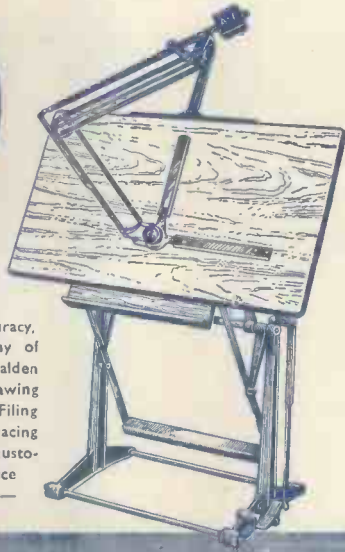
The Bicycle Carries the Banner

TALKING the other day with a man engaged in the cycle manufacturing industry, and who had just returned from a world-tour on behalf of his firm, he told me how splendidly the British bicycle "carries the trade banner" and acts as an ambassador for our commerce. None of our exports has a greater reputation for high quality and dependability. Everywhere the British cycle goes it gains new friends.



GLEN COE, Argyll. The scene of the great massacre of the MacDonalds on Feb. 13-1692.

**MODERN
DRAWING
OFFICE
Furniture**



No finer range of Drawing Office Furniture is available than the Halden range. Every up-to-date refinement making for greater accuracy, greater ease in use, and economy of space has been introduced to the Halden designs. The range includes Drawing Tables, Cabinets, Drawing Boards, Filing Cabinets, Trestles and Glass Tracing Tables, Large size boards made to customer's own specification. For all office furniture and accessories consult —



**Haldens
OF MANCHESTER**

J. HALDEN & CO., LTD. 8, ALBERT SQUARE, MANCHESTER, 2.
Branches at:—London. Newcastle-on-Tyne. Birmingham, Glasgow, Leeds and Bristol

*It's exciting to see
your photos in colour!*



Yes, and you can colour them yourself, too! You'll find it so easy with Johnson Photo Tints. Ordinary black and white prints can be transformed into vivid colours—makes something really surprising to show your friends! You can obtain any desired tone by blending the tints. The smaller Johnson Photo Colouring Outfit contains 9 small bottles of normal strength tints and a camel-hair brush—everything you want to make a start. Price **5/6**

There is also a more expensive set consisting of 12 one ounce bottles of triple strength tints with two camelhair brushes and two china palettes. Price **19/6**

Full instructions are enclosed with each set and individual tints can be replaced.
THE WORLD FAMOUS MANUFACTURERS OF PHOTOGRAPHIC CHEMICALS, APPARATUS AND ACCESSORIES

LONDON N.W.4. Established 1743

JOHNSONS OF HENDON LTD

"ZYTO" AND MYFORD LATHES FROM STOCK

The "Zyto 12" 3 $\frac{3}{8}$ in. Centre Screwcutting Lathe



12 $\frac{1}{2}$ in. between centres, back-gear, Gap bed; screwcutting, sliding and surfacing. Full compound rest, set-over tailstock.

PRICE **£28/1/-**

or first payment of **£7/1/-**, balance over 12 or 18 months.

Illustrated leaflet free and post free

The Myford ML.7 Lathe

3 $\frac{1}{2}$ in. x 20 in., complete with standard equipment. Fully illustrated brochure.

PRICE **£48/5/-**
Balance over 12 or 18 months.



Best quality Sheffield turning tools with polished handles

Sets of 3: 1 gouge, 1 chisel, 1 parting tool. **12/- set.**

Sets of 5: 3 chisels, 2 gouges. **25/- set.**

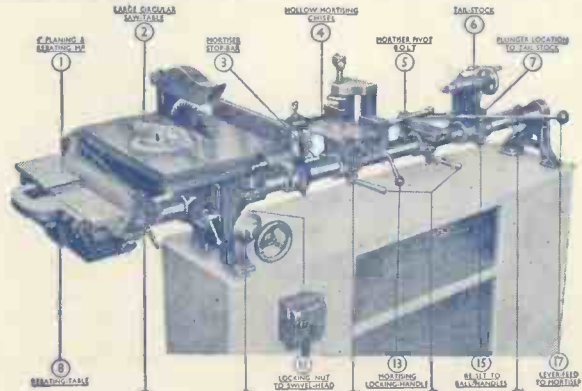
Sets of 6: 3 chisels, 2 gouges, 1 parting tool. **28/6 set.**

Set of 3, 17/9.

S. TYZACK & SON LTD.
341-345, OLD STREET, LONDON, E.C.1.

Telephone: SHOREDITCH 8301 (Ten lines.)

Send Now for New Brochure detailing all points and interesting features; answered questions you would ask, showing machines in use and articles such as toys, patterns and turnery made on these machines. Ask also for details of fittings to the "Coronet" range and other makes. Is long hole drilling a problem to you? Send now for details of BORING ATTACHMENT and long drills, to suit any lathes



FITTINGS AND ACCESSORIES FOR ALL LATHES:

- CUP CENTRE** No. 1 Morse Taper Shank.
- 4 Prong DRIVING CENTRE** (Positive Drive for large or small work).
- GRINDING WHEEL ARBOR** No. 1 Morse Taper—suit any machine with No. 1 Morse Taper.
- REVOLVING CENTRE.**
- 5" WOBBLE SAW**—Ploughs $\frac{1}{8}$ " to $\frac{1}{4}$ ". Index for quick setting and fine adjustment.
- TURNING TOOLS**, set of six 18" overall, beautifully handled.
- WOODSCREW CHUCK** to suit any machine No. 1 or 2 Morse.
- 3 Jaw CHUCK** and Self Centering 4 jaw Independent Chuck.
- COMPOUND SLIDEREST**—for wood and metal turning.
- ELECTRIC MOTORS**, Brook $\frac{1}{2}$ and $\frac{1}{4}$ h.p.
- GRINDING WHEELS, SLIPTONES**, etc.

Write, Dept. P.M., enclosing stamp, for Catalogues showing photographs and price, etc.

CORONET TOOL CO. 8, MANSFIELD ROAD, DERBY
Also at CITY ROAD MILLS, DERBY.

"Practical Mechanics" Advice Bureau. **COUPON**
This coupon is available until September 30th, and must be attached to all letters containing queries, together with 6d. Postal Order. A stamped, addressed envelope must also be enclosed. **September, 1954.**

Free Guide — SUCCESS IN ENGINEERING

One of the following Courses taken quietly at home in your spare time can be the means of securing substantial well-paid promotion in your present calling, or entry into a more congenial career with better prospects.

132-PAGE BOOK FREE!
SEND FOR YOUR COPY

ENGINEERING, RADIO, AERO, ETC.

Aero. Draughtsmanship	Elec. Draughtsmanship
Jig & Tool Design	Machine
Press Tool & Die Design	Automobile "
Sheet Metalwork	Structural "
Automobile Repairs	R/F Concrete "
Garage Management	Structural Engineering
Works M'gmt. & Admin.	Mathematics (all stages)
Practical Foremanship	Radio Technology
Ratefixing & Estimating	Telecommunications
Time & Motion Study	Wiring & Installation
Engineering Inspection	Television
Metallurgy	Radio Servicing
Refrigeration	Gen. Elec. Engineering
Welding (all branches)	Generators & Motors
Maintenance Engineering	Generation & Supply
Steam Engine Technology	Aircraft Mainten. Licences.
I.C. Engine Technology	Aerodynamics
Diesel Engine Technology	Electrical Design
Ordnance Survey Dr'ship.	

BUILDING AND STRUCTURAL

L.I.O.B.	A.I.A.S.	A.R.San.I	M.R.San.I.
A.M.I.San.E.	A.A.L.P.A.	L.A.B.S.S.	A.R.I.C.S.
Building Construction	Builders' Quantities	Carpentry & Joinery	Building Inspector
Costs & Accounts	Surveying & Levelling	Clerk of Works	Quantity Surveying

GENERAL, LOCAL GOVERNMENT, ETC.

Gen. Cert. of Education	Common. Prelim. Exam.
Book-keeping (all stages)	A.C.I.S., A.C.C.S.
College of Preceptors	A.C.W.A. (Costing)
Woodwork Teacher	School Attendance Officer
Metalwork Teacher	Sanitary Inspector
Housing Manager (A.I.Hsg.)	Civil Service Exams.

BECOME A DRAUGHTSMAN—LEARN AT HOME AND EARN BIG MONEY

Men and Youths urgently wanted for well paid positions as Draughtsmen, Inspectors, etc., in Aero, Jig and Tool, Press Tool, Electrical, Mechanical and other Branches of Engineering. Practical experience is unnecessary for those who are willing to learn—our Guaranteed "Home Study" courses will get you in. Those already engaged in the General Drawing Office should study some specialised Branch such as Jig and Tool or Press Tool Work and so considerably increase their scope and earning capacity.



★ OVER SIXTY YEARS OF CONTINUOUS SUCCESS ★

NATIONAL INSTITUTE OF ENGINEERING

(Dept. 29)

148, HOLBORN, LONDON, E.C.1

SOUTH AFRICA: E.C.S.A., P.O. BOX NO. 8417, JOHANNESBURG

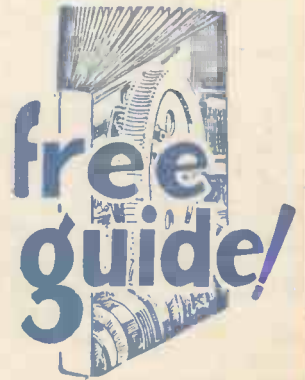
This remarkable FREE GUIDE explains:

- ★ Openings, prospects, salaries, etc., in Draughtsmanship and in all other branches of Engineering and Building.
- ★ How to obtain money-making technical qualifications through special RAPID FULLY-GUARANTEED COURSES.

MANY INTERESTING COURSES TO SELECT FROM!

A.M.I.Mech.E., A.M.I.M.I.,
A.M.Brit.I.R.E., A.M.I.P.E.,
A.M.I.C.E., A.M.I.Struct.E.,
A.M.I.Mun.E., M.R.San.I.,
A.M.I.E.D., A.F.R.Ae.S.,
London B.Sc., Degrees.

Fully guaranteed postal courses for all the above and many other examinations and careers. Fully described in the New Free Guide



THE ACID TEST OF TUTORIAL EFFICIENCY SUCCESS—OR NO FEE

We definitely guarantee that if you fail to pass the examination for which you are preparing under our guidance, or if you are not satisfied in every way with our tutorial service—then your Tuition Fee will be returned in full and without question. This is surely the acid test of tutorial efficiency.

If you have ambition you must investigate the Tutorial and Employment services we offer. Founded in 1885, our success record is unapproachable.

ALL TEXTBOOKS ARE SUPPLIED FREE
PROMPT TUTORIAL SERVICE GUARANTEED
NO AGENTS OR TRAVELLERS EMPLOYED



Free Coupon

To NATIONAL INSTITUTE OF ENGINEERING (Dept. 29), 148-150, Holborn, London, E.C.1.

Please Forward your Free Guide to

NAME

ADDRESS

My general interest is in: (1) ENGINEERING
(2) AERO (3) RADIO (4) BUILDING
(5) MUNICIPAL WORK



(Place a cross against the branches in which you are interested.)

The subject of examination in which I am especially interested is

To be filled in where you already have a special preference.
(1)d. stamp only required if unsealed envelope used.)

FOUNDED 1885 - FOREMOST TODAY