HELICOPTER DEVELOPMENT

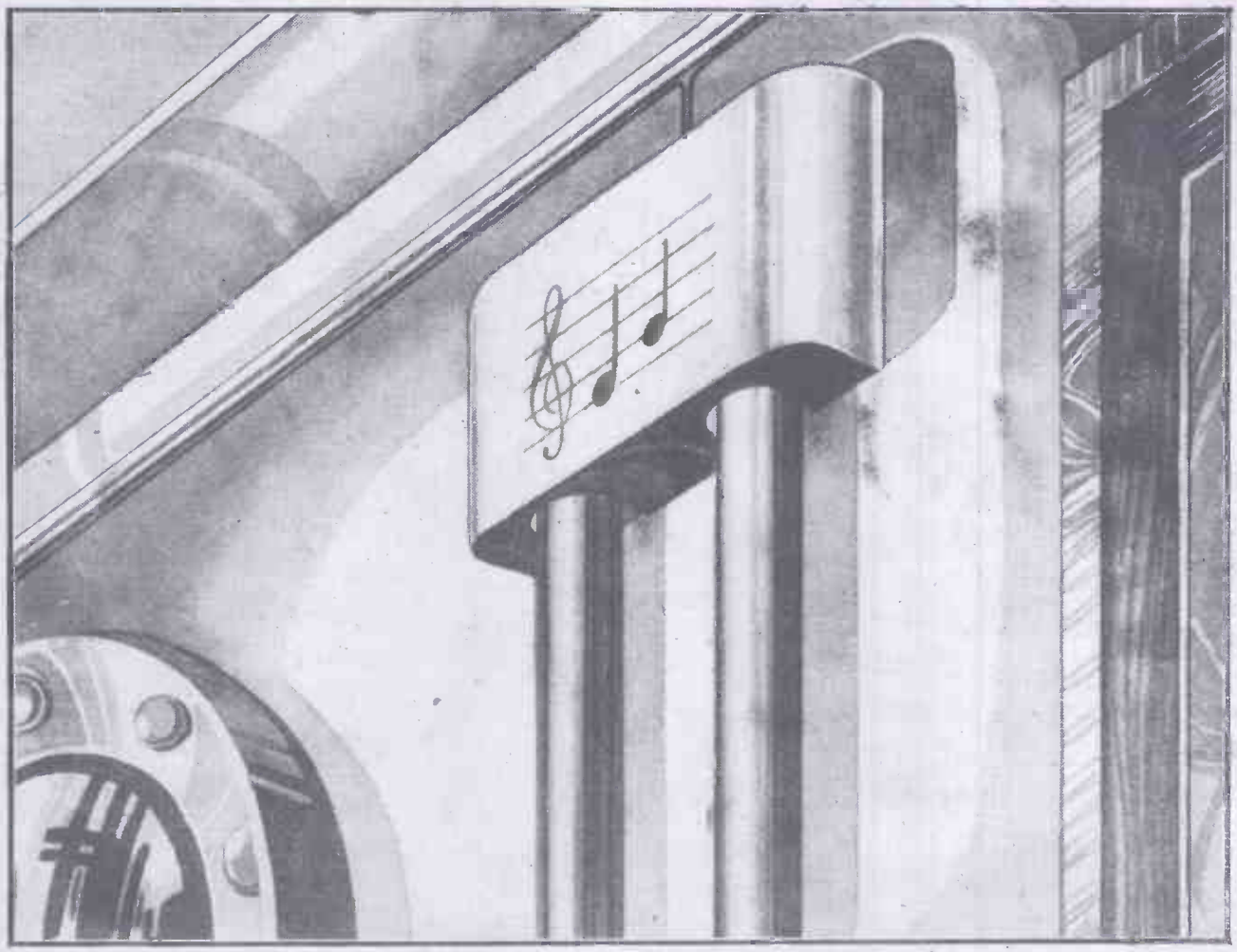
NEWNES

PRACTICAL MECHANICS

9D.

EDITOR : F. J. CAMM

MAY 1948



AN ELECTRIC DOOR-CHIME. FOR CONSTRUCTIONAL DETAILS—SEE PAGE 256

PRINCIPAL CONTENTS

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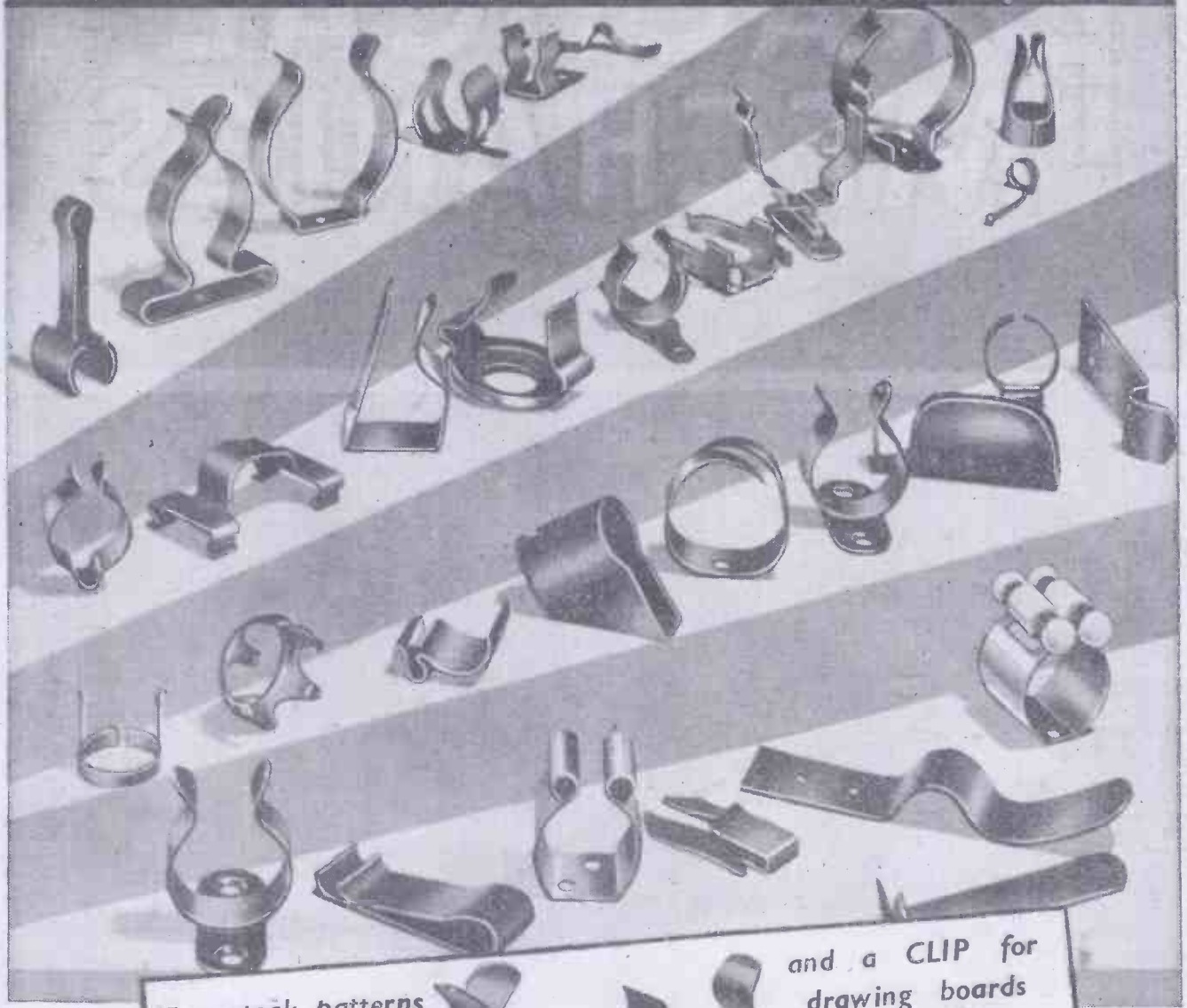

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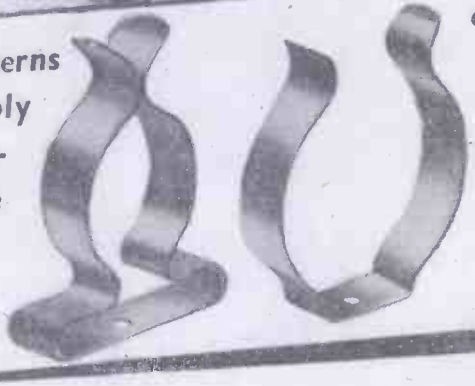

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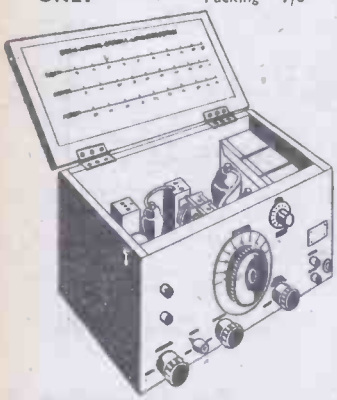

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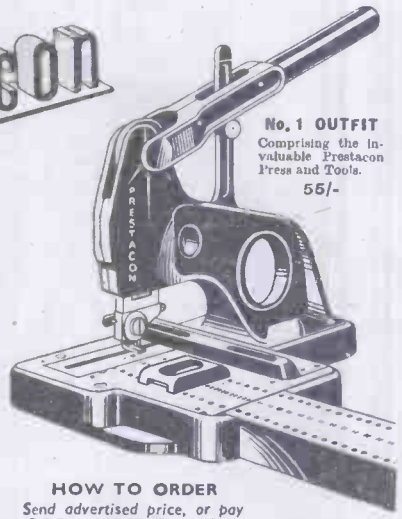

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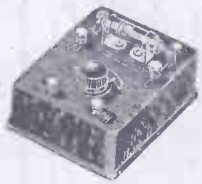

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PRACTICAL MECHANICS

Owing to the paper shortage "The Cyclist," "Practical Motorist," and "Home Movies" are temporarily incorporated.

Editor: F. J. CAMM

VOL. XV MAY, 1948 No. 175

FAIR COMMENT — BY THE EDITOR

Wanted Urgently—Your Waste Paper

I WANT to issue a special appeal this month to every one of my readers to search out every scrap of unwanted paper upon which they can lay their hands.

The Goverment needs 100,000 tons of paper by July, and the serious and urgent need for this new effort is twofold: (1) To save expenditure on dollars for paper and paper-making materials from North America. The collection of 100,000 extra tons in six months would be equivalent to a saving of 10 million dollars. (2) Maintenance of supplies of paper and cardboard, essential for the packing and protection of export goods, and for home food distribution.

Mr. Harold Wilson, in a written reply in the House of Commons, stated:

"... At the same time, we must salvage as much waste paper as is humanly possible, and for two particularly important reasons. The paper and board mills making paper and board for export packaging and for food cartons and containers, require greatly increased supplies of waste paper, which is one of their principal raw materials. In addition, our newspapers and many other users of paper are seriously short of supplies. There is an urgent need for an additional 200,000 tons of paper-making materials a year."

This quantity is fortunately available in this country in the form of waste paper, and if every home could save an extra pound of waste paper each week, we should meet this need.

The amount of paper lost in dustbins or by burning is 100,000 tons per annum. That is, half the additional amount required.

Over 100,000 tons of paper is needed by the building trade each year. Waste paper can supply the bulk of this amount. Part of the fibre content of building boards (for wall and ceiling linings), roofing and damp-course felts is provided by repulped paper. For blueprints and cement bags large quantities of paper are also needed.

An extra average sized carton from every household per week will produce 25,000 tons more waste paper in a year. That would make one-quarter of the amount required by the building trade.

Over two-thirds of the total amount of paper in circulation, which could be used for repulping, is being lost.

To offset this, every household should put out 1lb. of paper each week. The following would contribute 2lb. of waste:

A copy of the *Radio Times*	1½oz.
6 penny daily newspapers	6 „
3 average-sized cartons (sugar, soap, breakfast cereals)	3 oz.
1 Sunday paper	1½ „
12 cigarette cartons	3 „
Wrapping papers and bags from the shops	8 „
6 used envelopes	½ „
6 evening papers	5 „
1 weekly magazine	2 „
Old letters, bills and receipts and bus and cinema tickets	1½ „

An old *A.B.C.* weighs 2lb. A Penguin book 6 to 8oz. A novel ½ to 1½lb. *The Times* 2oz.

An *extra* 100,000 tons of waste paper are urgently needed during the next six months.

100,000 tons of waste paper can make *all* of the following, urgently needed packing materials:

For the Home

Cartons for our sugar rations for the whole year.

200 million cartons for soap powder.

200 million canisters for cleansing powder.

The fibreboard cases for packing our margarine rations for the year.

200 million cartons for breakfast cereals.

Packing cases for 3 million bags of flour.

6 million paper bags for your bakers' and greengrocers' goods.

For Export

4 million packing cases for clothing exports.

Every man, woman and child in the country is involved in this new call to action. Everyone can help to free dollars for the purchase of food abroad, by finding this valuable material at home.

Keep all used paper as clean as possible—and out of dustbins. Tie newspapers and magazines separately—put cartons and odd pieces into old carrier bags and hand to the dustman or put them out, apart, to be collected when he calls.

Some of the Articles Made Partly or Entirely from Waste Paper

Cardboard cartons and boxes for cereals, soap, cosmetics and cigarettes; wallpaper; book and catalogue covers; backing and packing papers for needles; match boxes; games and toys; surgical and wash bowls; paper and cardboard for packing; wrapping papers; paper patterns; toilet paper; jam-pot tops; book match covers; tea trays; bus, theatre and cinema tickets; building boards of various kinds for wall and ceiling linings in houses; roofing felt; boot and shoe stiffeners; tubes used in cotton, silk and woollen spinning; and strengthening for handbags and attache cases.

Our readers often ask us to help them. We now ask them to help us, in the matter of waste paper recovery. In fact, they will not be helping us so much as helping the country. The Government has enlisted our aid in asking us to draw attention to the grave paper shortage and invite our readers to help in recovering waste paper. Indeed, it may not be possible to maintain newspapers and periodicals at even the present reduced level if the public does not co-operate.

In every home there are old books, magazines, bills, letters, wrappings, cardboard boxes, and so on which will help to swell the total. In every office there are blueprints, receipts, files of unwanted correspondence, old catalogues, tracings, job cards, etc., which would provide a fair tonnage.

I should not devote valuable space to this appeal were I not assured that the need is vital and urgent.

The B.I.F.

WITH the world speed record standing at 75 m.p.h. for 2 c.c. model engines on powered control line planes, model builders everywhere are hoping soon to set up a new record. Already, according to a British firm who are to exhibit at the British Industries Fair, that record has been broken unofficially by an aero-modeller using one of their engines. These engines, and others which yield speeds up to 35 m.p.h. in model racing cars and 26 m.p.h. in speed boats, will be shown by this firm in the Toys and Games section of the Fair at Olympia, London, when it opens on May 3rd.

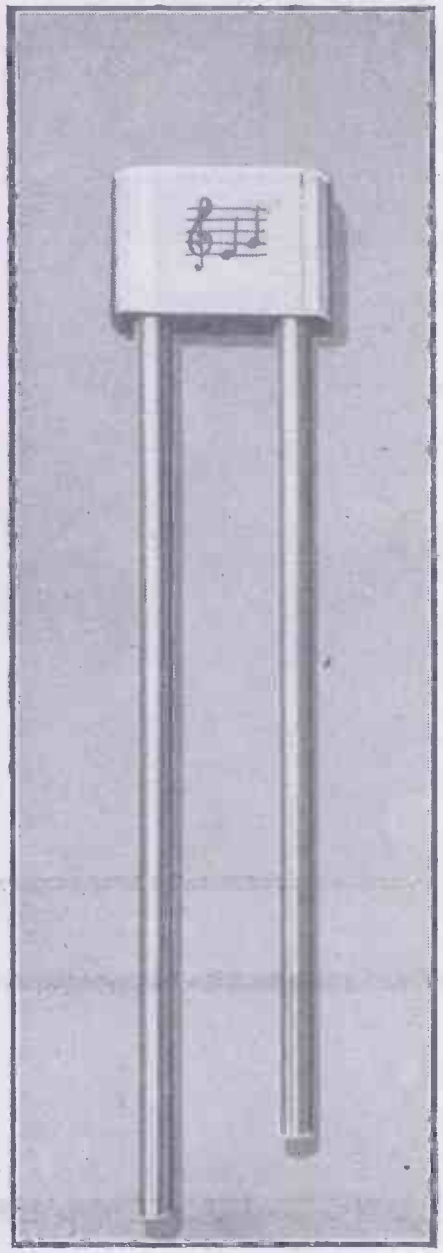
The toys and games section, which will occupy 58,944 sq. ft. (3,817 sq. ft. more than last year) will be a children's paradise. But, rather like the new model railway at Christmas, the children will hardly have a look-in. It will be a children's paradise for grown-ups—the overseas and home trade buyers who come to the Fair to see the new things which they can buy for their shops as soon as the Fair is over. The public (including children) will not be admitted except on certain days.

Mechanical and constructional toys, model toys and dolls, dolls houses and furniture, games and carriages, toys made from plastics and toys made from metal and other materials; all these in hundreds of variations will be found in the Toys and Games group.

An Electric Door-chime

Details of Construction of an Inexpensive but Effective Instrument

By E. S. BROWN



The completed electric door-chime.

ELECTRIC door chimes are extremely popular, and rightly so, as they give a dignified note of warning, and their unusual yet pleasing appearance is a sure attraction to the wandering eye. The door chime described in this article is of an easy and straightforward design, and can be made by the average handyman in a very few hours. With perhaps one or two exceptions, the material required can be salvaged from the scrap-box and, with a little care and patience, the result will be a first class instrument.

Before proceeding with the constructional details, a brief outline of its actuating mechanism will enable readers to follow its working principles. The actuating mechanism consists essentially of a solenoid working a spring loaded striker-rod against two parallel tubular chimes or gongs. Upon the depression of the door push-button, current flows round the solenoid coil and exerts a strong magnetic field which rapidly attracts the striker-rod, causing it to strike a sharp blow on one of the tubular chimes. When the push-button is released, breaking the circuit, the striker-rod is returned to its former position by the return spring, and when at the limit of its travel, strikes the other chime.

The Solenoid Former

To make the solenoid a former is required. This is made by folding a piece of thin cardboard 2½in. by 2½in. around a ¼in. rod, and well gluing the free edge down. The former should then be put aside to dry. Two end pieces are next made from smooth wood, ¼in. by 1½in. by 1½in., and are shaped as shown in Fig. 1. A $\frac{5}{16}$in. hole is drilled with a centre-bit in the exact middle of each end piece to accommodate the former. The striker-rod bearings are made from thin brass plates screwed on to both end pieces, and a $\frac{3}{16}$in. hole drilled in same concentric with the hole previously drilled in the end pieces. Next glue the former in the holes in the two end pieces, making sure that the former is pushed home as far as it will go, and that the whole assembly is in perfect alignment. Then put aside for the glue to harden.

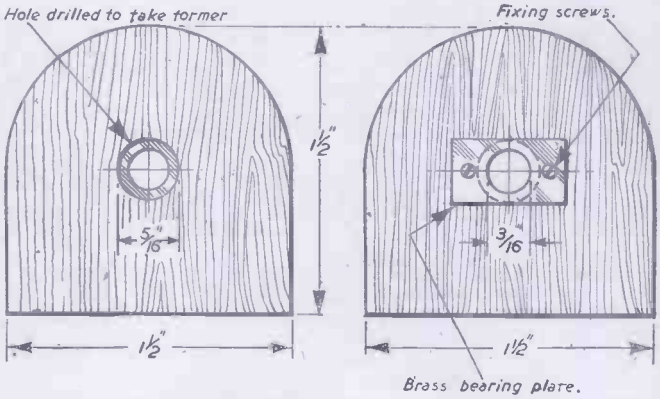


Fig. 1.—End pieces for the solenoid coil.

Winding the Coil

For the winding, two ounces of No. 26 cotton covered wire will be required. Commence winding by leaving a free end of about 6in. The winding should be carefully and evenly done, and after each row, glue or paste a piece of cartridge or drawing paper over same. This not only provides additional insulation, but enables the winding to be done far more accurately than would otherwise be possible. When the winding is completed, leave a further 6in. of wire at the finishing end. To prevent the wire unwinding, twist the two ends together, and paint the coil fairly liberally with shellac varnish. The coil should then be put aside in a warm place to dry and thoroughly harden. When dry, a second coat of shellac varnish is applied, and when same is "Tacky" a piece of cartridge paper, or thin cardboard is applied for finishing purposes. A pleasing appearance can be given by finally applying a short length of industrial tape to the coil. This tape is stocked in a variety of colours, and its glossy surface considerably enhances the appearance of the finished coil.

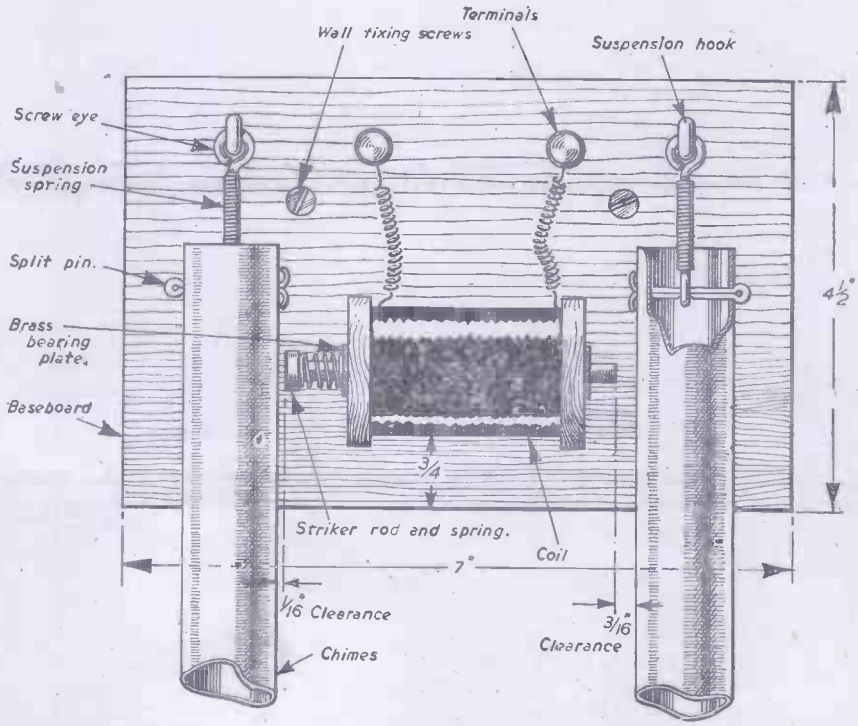


Fig. 3.—Baseboard layout showing the positions of the various parts.

Striker-rod

The striker-rod is made from a $\frac{3}{16}$ in. by 3in. iron bolt. The length of the bolt is reduced to 2in. with a hacksaw, and a piece of brass rod, $\frac{3}{16}$ in. diameter, and $1\frac{1}{4}$in. long is then carefully soldered on to the end of same, care being taken to see that both the bolt and the brass rod are in perfect alignment (Fig. 2). Readers are advised not to deviate in the measurements given for the striker-rod assembly, as these have been carefully calculated to obtain the maximum thrust from the magnetic field. The striker-rod should now be cleaned up and burnished with fine emery-paper, and should be tried in its bearings to make sure that it has free and easy movement. A light coiled spring $\frac{1}{2}$in. long is required, and should be placed into position between the bolt head and the striker-rod bearing, as shown in Fig. 3. Quite a satisfactory spring can be made by unravelling a length of light bowden wire, and winding one of the strands around the striker-rod until a spring of suitable tension and proportions is formed.

This completes the striking mechanism, and the baseboard can now be made from a smooth piece of wood $\frac{1}{2}$in. by 7in. by $4\frac{1}{2}$in. The coil is screwed to the baseboard in the

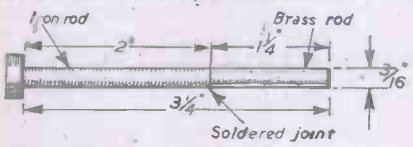


Fig. 2.—Details of the striker-rod.

position shown, and the connecting wires, after being coiled, are connected to two terminals screwed into the baseboard.

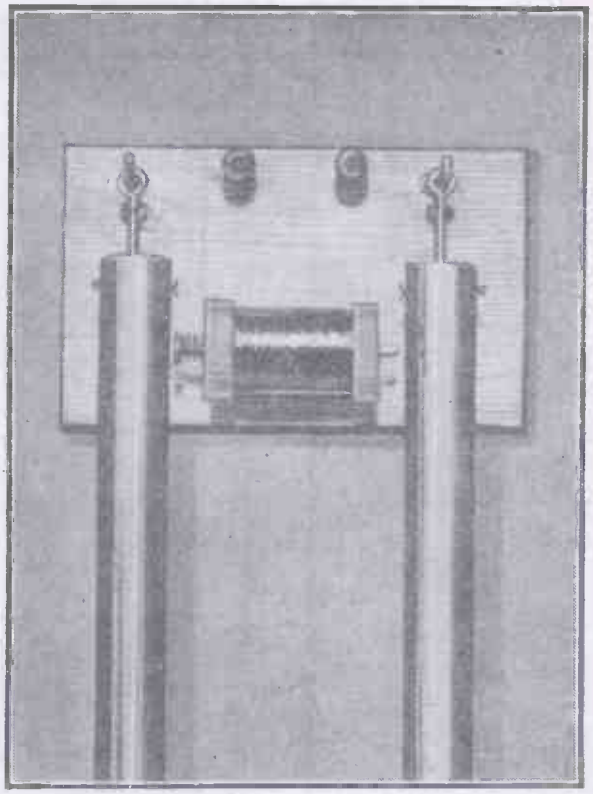
Tubular Chimes

For the chimes, the writer obtained two lengths of 1in. diameter solid drawn brass tubing, one length being 3ft., the other, 2ft. 9in. It was found that this tubing gave a deep, mellow tone, and the two varying lengths made of course, the dual notes which are a feature of the chimes. Should any difficulty be experienced in obtaining the tubing, it is possible that a musical instrument store can supply tubular bells, which would, of course, suit the purpose admirably. Or again, perhaps a second-hand store may be in the position to assist in this matter.

The chimes are suspended by two small springs from hooks placed as high as possible on the baseboard. The suspension springs are of 1in. length, and a small screw eye is screwed into each end of the spring. A suitable kind of spring is the type used for hanging curtains. This spring is stocked by popular stores, and a small length together with the necessary screw eyes can readily be obtained.

To attach the springs to the chimes, drill two small holes in each chime a $\frac{1}{4}$in. from the top, then holding the screw-eye in line with the two holes, pass a split pin through same and secure. It is advisable to file a small groove in the middle of the split pin prior to assembly, in order to locate the screw-eye in position.

The chimes should be located in relation to the solenoid as follows: The impulse chime, that is, the chime which is struck by magnetic impulse, should be located $\frac{3}{16}$in. from the extreme end of the striker-rod. The rebound chime should be positioned $\frac{1}{8}$in. distance from the opposite end of the striker-rod when same is normally at rest. It is not advisable to locate this chime in direct contact with the striker rod, as otherwise the note may be muffled. The rebound caused by the return spring will, of course, easily bridge the small clearance left between the chime and striker-rod.



The chimes with cover removed showing operating solenoid.

Cover

Having correctly set up the chimes, there remains only the cover to make to complete the instrument. The shape and dimensions of the two cover ends are as shown in Fig. 4. It will be noted that the bottom end has two "U" shaped holes cut in it, to accommodate the chimes. These holes can, of course, be easily made with either a fretsaw or keyhole saw. The top end has a $\frac{1}{4}$in. hole drilled in same, centrally located and $\frac{1}{2}$in. distance from the back edge, to allow connection to be made to the terminals with the external circuit. (See Fig. 3.) A piece of smooth tinplate 11in. by $4\frac{1}{2}$in. is next carefully shaped around the two ends and is secured into position with panel pins. The heads should be carefully punched below the surface of the tinplate, then filled in with soft-solder, and subsequently filed smooth until level with the surrounding surface. Any file marks should be removed with fine emery paper, and it should be impossible to detect the heads of the panel pins if the job is carefully done.

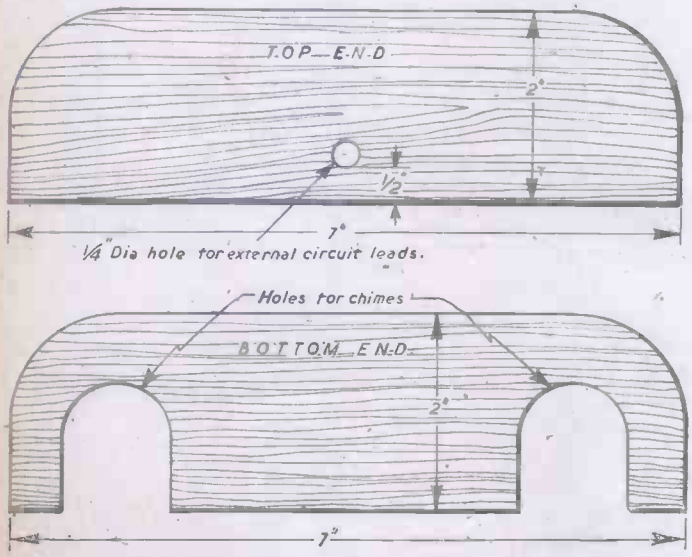


Fig. 4.—Shape and dimensions of top and bottom parts of cover.

Finishing

The cover should now be given two or three coats of good quality enamel, and when thoroughly dry, an ornamental motif may be applied or painted on.

The cover is a push fit over the baseboard. Should it be found to fit loosely, slightly bend the projecting sides inward to increase their tension on the baseboard. The complete assembly is screwed to the wall by drilling two holes in the baseboard, and screwing into position. Care should be taken to see that the chimes hang absolutely vertical, as otherwise their position in relation to the striker-rod will be disarranged, and the chimes will not operate satisfactorily.

The chimes may be connected to the 8-volt circuit of a bell transformer, or alternatively to two $4\frac{1}{2}$-volt dry batteries connected in series. It is advisable to keep the external circuit wiring as short as possible, to prevent undue voltage drop. The chimes should function indefinitely without any attention beyond occasionally one or two drops of thin cycle or machine oil on the striker-rod bearings.

A Revolutionary M.G.B.

HAVING completed successful trials and just off the secret list for the second time in her career, the 110ft. triple-screw M.G.B. 2009—one of a flotilla originally built in 1941 by Messrs. Camper & Nicholson, Ltd., as anti-submarine boats for the Turkish Government, but subsequently taken over by the British Admiralty and used during the war for bringing ball bearings and high-grade steel components from Sweden to this country—is now fitted with a 2,500 s.h.p. Metropolitan-Vickers gas turbine driving the central screw while the two existing 1,250 s.h.p. petrol engines operate the port and starboard screws.

The gas turbine plant—fitted by Messrs. Camper & Nicholson, Ltd.—consists of a compressor, a combustion chamber, a compressor turbine and a power turbine. The only function of the compressor turbine is to drive the compressor. The combustion chamber is of the annular type and fuel is introduced through 20 jets circumferentially spaced round the chamber. After passing through the compressor turbine the products of combustion are expanded through a power turbine which is on a separate shaft from the compressor turbine and which drives the propeller through the reduction gear.

At the heart of the ignition system are 8 six-volt Exide battery units.

The eight six-volt units are arranged in two banks of four, each bank being available to operate the 24-volt starter motor for starting the gas turbine plant.

Helicopter Development

Historical Notes, Progress and Future Possibilities

By R. G. HUGGETT

A four-seater Westland-Sikorsky helicopter, one of the first commercial machines of its type to be seen in Europe, landing in a car park where just sufficient room has been left for it, at a demonstration in Middlesex last summer.

WHEN it is remembered that it is only forty-four years ago since the Wright brothers made the first successful controlled flights with their aeroplane, the subsequent rapid advances made in aeronautical engineering become very apparent. As with the motor-car—which was originally preceded by a man on foot with a red flag, but which now kills thousands annually almost as a matter of course—progress was at first slow and difficult. During and after the 1914-18 war theory had more or less caught up with practice, so that the designers' calculations gradually became regarded as being definite facts rather than expert opinions, although there was, and sometimes still is, a certain degree of divergence between theory and practice. Heavier-than-air machines of many designs have been constructed, developed, and flown successfully, but basically there are only two distinct types—fixed-wing and rotary-wing aerodynes, the ornithopter having proved a complete failure to date.

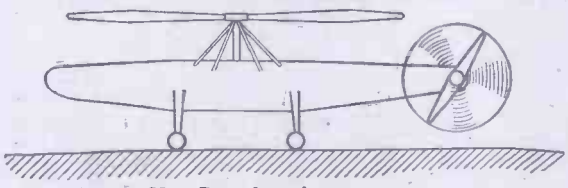


Fig. 1.—Von Baumhauer's rotor arrangement.

Rotary-wing Aircraft

Of the rotary-wing aircraft, the helicopter has appealed to designers and inventors for several hundred years, but it is in practically the last decade that it has been established as a machine which possesses many attractive characteristics which no other aircraft can offer. With helicopters in use nowadays for a multitude of purposes all over the world, and frequently featuring in the daily press, it is difficult to appreciate the tremendously rapid advances made with these machines until it is remembered that until 1937 no flight of more than a few minutes' duration had been made. Up to that time there had been no lack of attempts, but in general the autogyro was considered to be the most practical rotary-wing aircraft. However, the efforts and aspirations of the early helicopter pioneers are exceedingly praiseworthy, and although they cannot all be recorded here, some at least should be mentioned.

Early Pioneers

Leonardo da Vinci certainly conceived a helicopter in principle about 1490, although he made no claim to have invented it, and, in fact, appeared to be more interested in ornithopters, probably due to his valuable study of bird flight. Four centuries later inventors were still struggling to design a man-carrying machine which would provide controlled flight, but without success, although several models and toys had given encouraging indications. In France, Louis Breguet—of the now internationally famous aircraft firm—and Paul Cornu were both working on helicopters in 1907, and both managed to get their machines off the ground, but only for a very short space of time and for a very few inches, with control practically negligible. Nevertheless, progress had been made, and great interest was aroused among helicopter enthusiasts.

So far the chief causes for failure were lack of power for the weights involved, lack of stability and lack of control. By 1920 these problems still remained unsolved, and shortly after the highly successful autogyro, designed by Juan de la Cierva, temporarily eclipsed the helicopter, although the latter was still being developed by determined enthusiasts all over the world. Emil and Henry Berliner in U.S.A., Lewis Brennan in Great Britain, Oehmichen in France, and the Marquis of Pescara in Spain—each made valuable contributions, and in April, 1924, Pescara's helicopter actually flew for half a mile at Issy-les-Moulineoux. This machine had contra-rotating rotors about 20ft. in dia., the rotor blades being of the biplane type, and was powered by a 40 h.p. engine.

A Dutch project that appeared in 1930 adopted another method of torque compensation: this helicopter, designed by Von Baumhauer, had a single two-bladed rotor providing lift, and was driven by a 200 h.p. engine, whilst a separate 80 h.p. engine in the tail drove a small rotor mounted with its axis perpendicular to that of the main rotor to compensate for torque reaction. A sketch

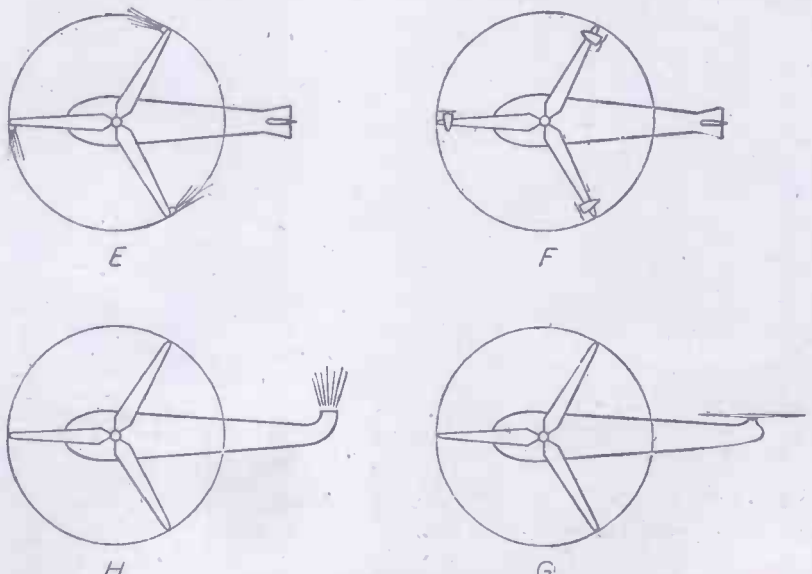


Fig. 3.—Single main rotor types.

showing this rotor arrangement is given in Fig. 1. Unfortunately, the machine was damaged before many tests were carried out, but in this basic rotor arrangement at least, it was the forerunner of many modern helicopters.

D'Ascanio's helicopter, with two main rotors mounted coaxially and driven by a 95 h.p. engine, achieved a flight of nearly nine minutes, control being accomplished by three small auxiliary propellers mounted well away from the C.G. of the machine, but this duration figure was beaten shortly afterwards, in October, 1933, when the Florine helicopter gained the record for Belgium with a flight of 9 minutes 58 seconds. This design incorporated two rotors, each about 24ft. in dia., one at either end of the body, and was driven by a 200 h.p. engine.

Meanwhile, other rotating-wing machines, such as the Cierva, Breguet and Kellet autogyros, and the Hafner Gyroplane, had achieved praiseworthy success, but although these aircraft could fly very slowly, besides being able to ascend and descend steeply, they could not hover over a fixed spot, fly backwards, or perform various other manœuvres peculiar only to the helicopter. This was due to the fundamental difference that, whereas the helicopter rotor was designed to provide the lift for the machine and to control it in flight by using power supplied by the engine, the autogyro was pulled through the air by a tractor airscrew as on a conventional aircraft, the rotor blades rotating and providing lift by virtue of the air passing through the disc.

In 1937, helicopter aeronautics received a considerable fillip due to the achievements of the Focke-Wulf 61, which raised the helicopter duration record to 1 hour 20 minutes 49 seconds, the distance in a closed circuit to 76 miles, and the altitude to 8,200 feet. This was an impressive advance, since previously these records had been a matter of a few minutes, just over a thousand yards, and well under 100 feet respectively.

Two 23ft. dia. contra-rotating three-bladed rotors, mounted on outriggers either side of a conventional fuselage, provided the lift, and were driven through shafts and gearing from a 160 h.p. Bramo Sh. 14a engine mounted in the nose. In place of the usual airscrew, a small diameter cooling fan was fitted. The accomplishments of this single-seater experimental machine were widely publicised, probably the most notable example being the beautifully controlled flights in the Deutschland Halle, Berlin, where the machine performed all its manœuvres over a floor space of only 100ft. by 250ft.

During the last world war the chief developments took place in Germany and

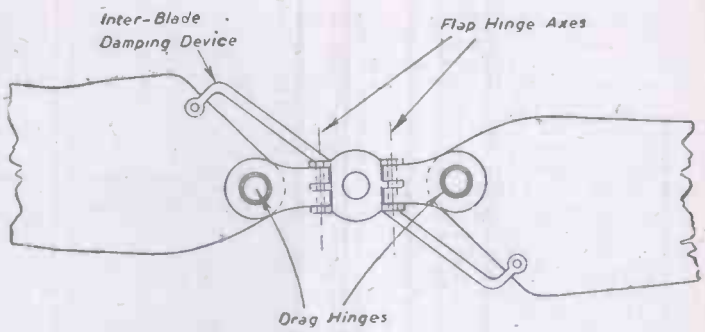


Fig. 5.—Diagrammatic sketch showing the hinges of articulating two-bladed rotor.

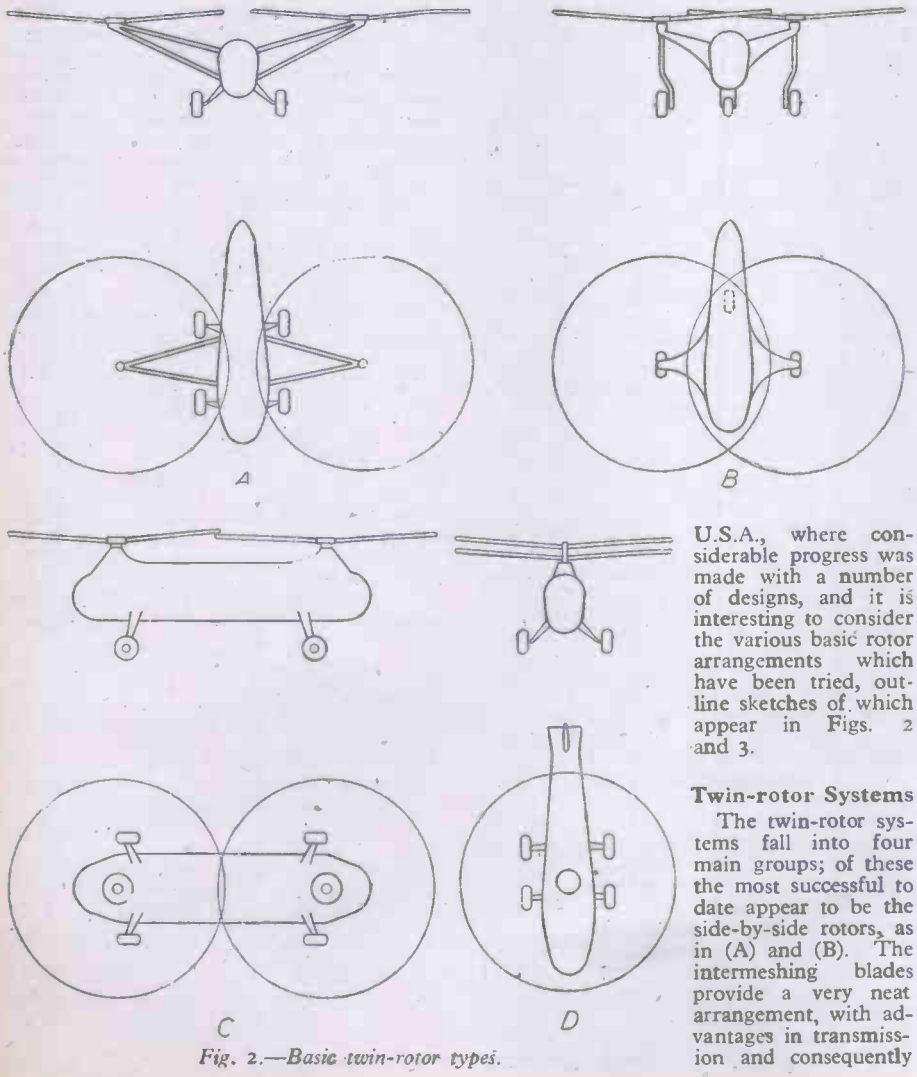


Fig. 2.—Basic twin-rotor types.

U.S.A., where considerable progress was made with a number of designs, and it is interesting to consider the various basic rotor arrangements which have been tried, outline sketches of which appear in Figs. 2 and 3.

Twin-rotor Systems

The twin-rotor systems fall into four main groups; of these the most successful to date appear to be the side-by-side rotors, as in (A) and (B). The intermeshing blades provide a very neat arrangement, with advantages in transmission and consequently vibration, but lose both a certain amount of lift from the blade overlap and also a degree of lateral stability compared with machines having rotors arranged farther apart. The side-by-side arrangement, in all cases, does not possess so much longitudinal stability as type (C), but this latter arrangement is, of course, not so stable laterally. The F.A.223, manufactured by the Focke-

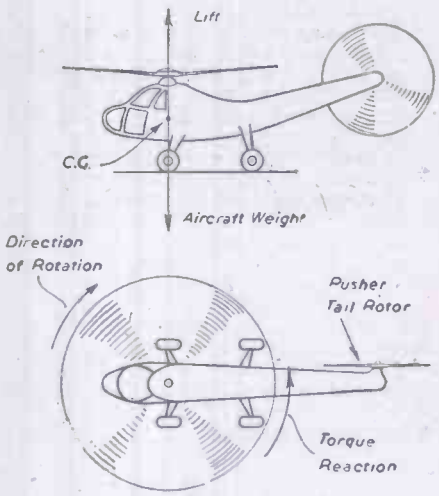


Fig. 4.—Balanced forces when hovering.

Achgelis Co., and the American Platt-le-Page helicopters are good examples of type (A), whilst the Anton Flettner and Kellett helicopters are typical of type (B). The Focke-Achgelis 223 was developed from the small Focke-Wulf 61, and was used considerably during the war, especially for increasing the mobility of mountain troops and maintaining their supplies. This machine was powered by a single B.M.W. 323 engine of 1,000 h.p., which drove the two 39½ft. dia. three-bladed rotors mounted on outrigger pylons; the gross weight was 7,050lb., of which over 1,000lb. could be composed of six passengers or freight; cruising speed was over 100 m.p.h. and the ceiling approximately 8,000ft. A further development of this machine is the French S.E.300, with which company Professor Focke is now associated. The crew of two sit forward, with four passengers in the rear cabin.

The Flettner F.L.282 was one of the first machines with intermeshing rotors, and was reasonably successful in flight, despite considerable discomfort due to vibration from the two two-bladed rotors which were mounted side-by-side direct to the fuselage frame. The performance of this two-seater helicopter was quite good, but it was found necessary to have both a large rudder area and a large dihedral tail stabiliser to obtain the necessary stability. A forward speed of about 80 m.p.h. was reached, and an altitude of nearly 14,000ft

More recently, the Kellet and Landgraf Companies — both American — have produced helicopters with intermeshing side-by-side rotors, which have been highly successful. The Kellet XR.8 two-seater machine is provided with two 36ft. dia. rotors mounted on hubs 4ft. apart, and driven by a 245 h.p. Franklin engine; a forward speed of over 100 m.p.h. can be reached, whilst the machine can hover up to 3,000ft.

The Kellet KH.2 is a much larger helicopter, with two three-bladed rotors stepped up to 65ft. dia., and driven by two 550 h.p. Continental engines. The gross weight is 11,600lb. and the useful load nearly 3,000lb., the pilot and 10 passengers forming a large proportion of this.

Another interesting machine which has great possibilities is the Landgraf helicopter, one of the first of this type to be fitted with a retractable tricycle undercarriage, the intermeshing three-bladed rotors being mounted on outrigger pylons. Another interesting feature of this machine—and its larger brothers—is the cyclically controlled aileron system on the rotor blade tips.

Of the type (C) rotor system, few modern examples exist, although this arrangement may prove more popular in the near future, possibly in this country as well as in U.S.A. The American P.V.3 utilises this rotor system and is designed to carry a crew of two with 10 passengers, whilst a much smaller machine has already flown very well in the same country.

The contra-rotating co-axial arrangement, as shown in (D), has been used since the early pioneering days, typical modern machines being the Breguet 611E and the American "Hiller-copter."

Single Main Rotor Types

The rotor arrangements mentioned so far have eliminated the bugbear of torque reaction by balancing the torques from the two rotors out against each other, but where only one main rotor is used the problem has to be solved by other methods. Fortunately, these methods are in most cases

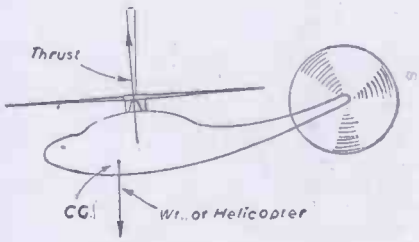


Fig. 6.—Forward flight.

highly satisfactory, which is one reason for the popularity of this type of helicopter.

The variations of single main rotor helicopters fall into two main groups, one of these balancing and the other eliminating the tendency of the fuselage to turn in the opposite direction to the rotation of the rotor blades. Of the latter group, the German Doublhoff helicopter was one of the first exponents, the rotor being driven by a jet at the tip of each hollow blade, whilst blade pitch was controlled by airflow pressure. Although hovering flights for periods of about 15 mins. have been made, the fantastic fuel consumption—298 lb./hr. for the jets and 70 lb./hr. for the engine of only 130 h.p.—has been a tremendous drawback. This type is shown in Fig. 3E.

Another German firm has achieved reasonable success with a small two-bladed helicopter having a single-cylinder 8 h.p. motor attached to each blade. Each motor drives a 21in. dia. propeller at 6,000 r.p.m., fuel being fed from a small cone-shaped tank on top of the rotor. The remarkably small h.p. of this Nagler and Rolz helicopter

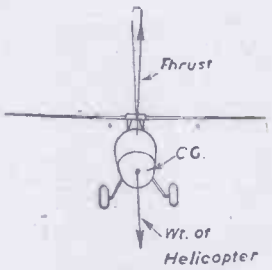


Fig. 8.—Sideways flight.

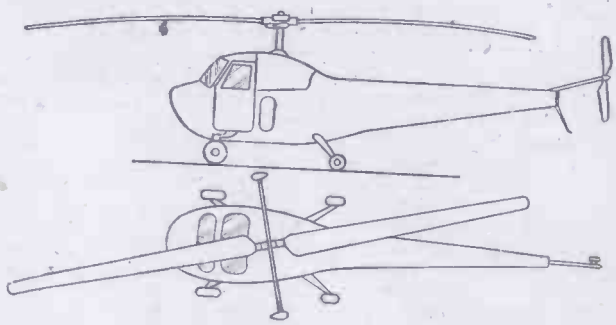


Fig. 9.—The "Bell" 47 helicopter.

is partly due to the very low weight, which is about 100lb. empty. This type is shown in Fig. 3F.

The last group, that is, helicopters having one main rotor and either a small tail rotor or jet to balance the torque reaction and provide turning control, is composed of those machines which have been particularly developed in U.S.A. and more recently in this country. There are now quite a number of successful manufacturers, but Igor I. Sikorsky must be given full credit for his foresight and determination in pioneering the type of helicopter shown at (G).

As far back as 1909 Sikorsky had seen Cornu's helicopter and had himself built one which was similar in layout, but which was not very successful, due to the familiar troubles of instability and lack of control. During the next 20 years he devoted his time and energy to fixed-wing aircraft which are known throughout the world, but in the late 1930's he built the experimental helicopter V.S.300 and first flew it on September 14th, 1939. This machine had an extremely adventurous life and underwent many changes before securing a resting place of honour in the Edison Museum. In its early days it was simply a tubular framework with the engine and main rotor just behind the pilot and having a long, upswept

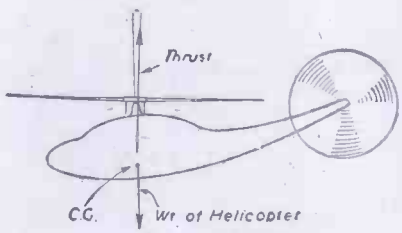


Fig. 7.—Backward flight.

tail on which were mounted the tail rotors to provide stability and control.

Among its many achievements, this experimental helicopter beat the world duration record previously held by the German Focke machine, with a flight of 1 hour 32 mins. 26.1 secs., on May 6th, 1941. Strangely enough, although hovering and many other manœuvres could be accomplished without difficulty, it was not until intensive development had taken place that comfortable forward flight was attained, the chief trouble being chronic wobbling during this manœuvre.

With the advent of full azimuthal or cyclic control a big step forward was made, both stability and precision control being obtained.

Although most of the descriptive terms used in conjunction with this type of helicopter are generally understood, it is probably as well to go over the chief features and problems at this stage, and to attempt to make the terminology quite clear.

When this type of helicopter is hovering in still air, that is, remaining motionless to an observer on the ground, a state of equilibrium exists between all forces acting on the machine. The natural force of gravity, acting through the C.G., is exactly balanced by the vertical component of the main rotor thrust; the horizontal sideways component balances the thrust of the tail rotor, the moment of which thrust about the C.G. counteracts the torque reaction due to the main rotor, as shown in Fig. 4.

Another function of the tail rotor is to turn the helicopter. Since the speed of the tail rotor is directly proportional to the main rotor, from which it is driven by shafts and gearing, it follows that if the tail rotor thrust is changed by varying the pitch of the blades, with no alteration in the thrust from the main rotor, a resultant turning moment will be provided; hence the helicopter can turn over a fixed spot as though rotating about the apex of a cone. Control is effected by various linkage systems, and is operated by rudder pedals as on a conventional aircraft.

For vertical ascent or descent it is evident that the main rotor thrust must be greater or less than the gravitational forces acting on the machine. This is achieved by having a control which varies the pitch of all main rotor blades simultaneously and is conveniently linked to the engine throttle, so that this thrust can be accurately controlled.

So far the mechanisms involved have been straightforward enough, but apart from instability, the means of translational flight have not yet been considered. On small autogyros it is possible to tilt the whole rotor head to obtain partial directional control, but with a rotor of large diameter and having relatively heavy blades the rotor is virtually a gyroscopic flywheel at operating r.p.m. Consequently, other methods have been developed to provide a controlled variation of the main rotor thrust axis, and are mostly based on Sikorsky's ideas. By using fully articulating blades as shown in Fig. 5, with movement about the drag hinges restrained by dampers, the mechanism becomes a pin-jointed structure with considerable flexibility of movement. The dampers are also claimed to eliminate any possibility of the unpleasant phenomenon of "ground resonance." This frequently caused early helicopters to break up due to the natural vibration frequencies of the main rotor and the undercarriage being synchronous, in much the same way that it is possible for marching men to destroy a bridge designed to take many times the load imposed.

Cyclic Pitch Control

To obtain directional control of the main rotor thrust axis, Sikorsky developed the Azimuthal control, better known in this country as cyclic pitch control, and superimposed it on the collective pitch control. Although there are now many variations, his idea initially was to arrange two plates in sandwich fashion, with the lower plate able to tilt but otherwise fixed, and the upper plate rotating with the rotor, pitch-change rods being interposed between the main rotor blades and attachment points on the periphery of the top plate. Originally, the bottom plate could be tilted from side to side

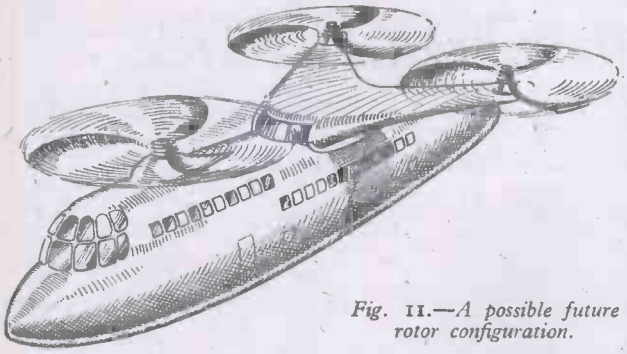


Fig. 11.—A possible future rotor configuration.

only, but it has been developed to tilt in any direction by the operation of a control similar to the conventional control column. Each pitch-change rod on the rotating plate must follow the contour of the tilted plate, giving a cyclic variation of blade angle superimposed on the collective pitch setting. For instance, to change the machine from a hovering condition to forward flight, the control is pushed forward and the bottom plate tilts accordingly; as each blade advances towards the front its pitch is decreased, thereafter increasing to a maximum value at the back, after which the cycle recommences. This is shown diagrammatically in Fig. 6, which also indicates that although the rotor hub axis is unchanged, the resultant thrust axis is inclined forward. Figs. 7 and 8 show movements in other directions. All manœuvres other than hovering or vertical ascent require no more than 60 per cent.-70 per cent. of maximum engine r.p.m.

A considerable amount of research, development and flight testing was necessary before the Sikorsky organisation had got the rotor systems and flight controls to their satisfaction, but once good control was established, work on other machines was started. The YR.4, built for the U.S.A.A.F., first flew on January 14th, 1942, was demonstrated the following April, and delivered by air in slow stages from Bridgeport, Connecticut, to Dayton, Ohio, in May of the same year. This achievement alone was of considerable merit—a distance of 761 air miles in 16¼ hours' flying time with varying weather conditions—but during the trip several endurance and distance records were also unofficially beaten. Since then Sikorsky helicopters have been used in many parts of the world, and several other models have been produced, among them the S.52 and the four-five-seater cabin helicopter, the S.51.

The Bell Helicopter

Another American machine basically similar to the Sikorsky is the Bell helicopter, two outline views of which are shown here in Fig. 9. This is the Bell 47, developed from an experimental machine which flew in June, 1943, and is fitted with two-bladed main and tail rotors, 33½ft. and 5½ft. dia. respectively. Both rotors are of solid wood, with a metal leading edge on the main rotor. A particular feature of this machine is the 5ft. long stabilising bar fitted below and at right-angles to the main rotor blades. The bar is linked to the rotor and tends to maintain the latter horizontal irrespective of the angle of the rotor shaft, which is rocked to control the rotor and non-articulating blades. A later machine, the Bell 42, is a larger 5-seater commercial helicopter with a cruising speed of 100 m.p.h. and a range of 300 miles. Among many other successful machines in the U.S.A. are the Higgins and Firestone helicopters.

In Great Britain the helicopter has not been overlooked or forgotten, but until recently the opportunity for the necessary research and development did not exist. The Cierva Company, well known for the C30A and other autogyros, have introduced the W.9 experimental helicopter, with a single main rotor whose torque reaction is balanced by a jet thrust at the end of the tail fuselage, as shown at Fig. 3H. A multi-bladed fan with variable pitch blades is used to cool the 200 h.p. Gipsy 6 engine which drives the main rotor. After cooling the engine, air is ducted along the fuselage and heated by mixture with exhaust gases before being ejected at the port side of the stern. Fan blade pitch is controlled by the rudder bar, the jet thrust being designed to just balance the torque reaction at normal setting.

The Bristol helicopter is basically similar to the Sikorsky, and has revealed considerable promise. In this case a 450 h.p. engine is used to drive the main and tail rotors, both of which are three-bladed and of wooden construction. Cyclic pitch control operates the blade pitch by means of a spider arm which can tilt inside the hollow rotor axle, giving a very neat appearance to the rotor head.

The machines mentioned so far can all be identified by the eight basic types shown, but there are other experimental arrangements in hand. The Fairey "Gyrodyne" is an interesting example, but this is not strictly a helicopter.

Two other machines, much larger than most of their contemporaries, are being built by the Cierva Company, and are named the W.11 "Air Horse" and the W.12. The former has been designed to meet the requirements of Pest Control, Ltd., for crop-spraying purposes, each of the three rotors circulating chemical spray in the slipstream to the underside of the crops. Two rotors are on tubular steel outriggers, the other at the stern, and all are driven by a Merlin 32 engine. Each rotor has a diameter of 46ft., and all rotate in the same direction. Longitudinal control is obtained by differential collective pitch change between front and rear rotors, lateral control by similar pitch change between the two front rotors, and directional control by a differential cyclic pitch of the two front rotors.

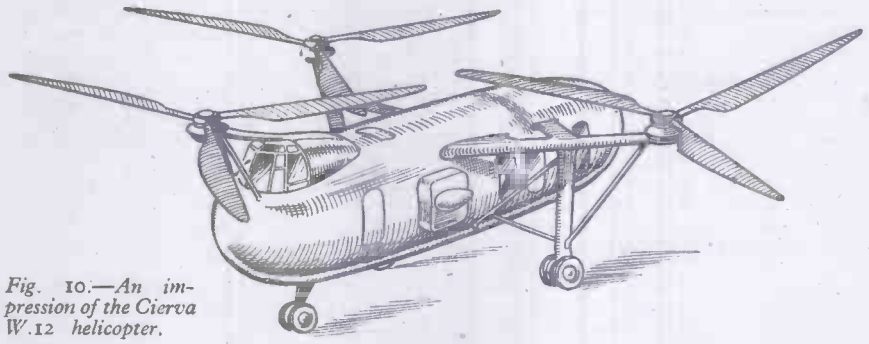


Fig. 10.—An impression of the Cierva W.12 helicopter.

The W.12 helicopter has a similar triangular rotor arrangement, but in this case one rotor is above the front cabin, with the other two on outriggers at the rear, as shown in Fig. 10. This machine is powered by two identical radial engines mounted one either side of the fuselage, and which enable a load of 12 passengers or freight up to 1¼ tons to be carried. The design performance is also very impressive.

Future Possibilities

The helicopter has already proved its worth in a number of cases, and one that is especially noteworthy is the coastguard helicopter which delivered blood plasma to a U.S. Navy destroyer in very thick weather on January 3rd, 1944, after an explosion had occurred aboard. No other aircraft could have undertaken this task, and a tremendous amount of time was saved.

Only 10 years ago the helicopter was severely criticised because of the extravagant power required to sustain flight, but although it is true that the power loading is now only about 8-10lb./h.p., it must be emphasised that for normal level flight at cruising speed, only about 60 per cent. of the power required for hovering and vertical ascent is needed. Furthermore, forward cruising speeds of over 100 m.p.h. are now the order of the day, which, coupled with the feasibility of almost door to door operation with passengers and freight, goes towards making the helicopter a business proposition.

So far manufacturing costs have been extremely high, but these should be greatly curtailed as fresh knowledge enables the designs and production methods to be simplified. Nevertheless, it must be a considerable time before the cost of a small helicopter fulfils Mr. Sikorsky's hope of being comparable with that of a medium-priced car. The transmission cost should be reasonable, but it is difficult to visualise cheap but effective rotors and controls; the blades themselves constitute a big problem, both economically and for aerodynamic efficiency, as can be seen by the wide variety of designs used. Possibly the mass-produced all-metal blade will prove the answer. Servicing, too, appears to be an expensive item, but this can be expected to diminish with future experience.

Despite the drawbacks, the fact remains that the potentialities of the helicopter must be considered, since there are so many advantages offered. The demand for small machines may be restricted for some time to specialist uses, such as police and coast-guard duties, forestry and aerial survey, emergency air ambulances, postal services to inaccessible places, etc., as well as obvious military duties. For the larger helicopter, with two or more rotors, however, there are very good possibilities, especially for freight and passenger operation. Instead of additional transport between airport termini and destination points, the helicopter offers a direct service without elaborate airfields and expensive runways. It is quite possible that before long products will be flown direct from their factory to their destination, in machines such as that shown in Fig. 11.

The Elements of Mechanics and Mechanisms—7

By F. J. CAMM

Potential Energy : Kinetic Energy : Indestructibility of Energy

HENCE, if two forces acting on two bodies of the same mass, say 1 lb. each, causing them to move with a velocity of 32ft. per second, and 64ft. per second respectively, it might at first be thought that the energy of the latter body was only twice that of the former. A little consideration, however, would show that this is not so, for if the bodies were thrown upwards with the velocities already mentioned, the former would rise 16ft. and the latter 64ft. The former would therefore do 16 foot pounds of work, and the latter 64 foot pounds of work, presuming each body weighed 1 lb. We can therefore say that in two bodies of equal mass if one has twice the velocity of the other it will have four times the amount of energy. *Energy therefore increases as the square of the velocity.*

Thus we see that the energy of a moving body is measured by multiplying its weight by the height through which it would fall in order to acquire the velocity it is known to possess.

Forms of Energy

The forces of nature are forms of energy and sources of power. They are closely related.

Gravity is the best known of all forms of energy, and all falling bodies owe their energy or power to this force, which is employed in many ways. For example, some mills are driven by the force of falling water, clocks by falling weights, and so on.

Cohesion is the attraction which all molecules of the body have for one another, and when we try to bend say a piece of metal the resistance offered by this force of cohesion can be felt.

Chemical attraction is one of the most important forms of energy. When coal is burned the carbon of which it is largely composed joins with the oxygen from the air and forms carbonic acid gas. The force causing this and which holds the molecules of carbon and oxygen together is known as chemical attraction.

Heat as a form of energy has wide uses. For example, a steam engine derives its energy from the heat produced by the combustion of coal or oil.

Magnetism as a form of energy has many well-known applications. The earth possesses some of this kind of energy. It is indeed the action of the earth's magnetism that causes the needle of a compass to point north and south.

Electricity is a form of energy somewhat similar to magnetism. By means of it we are enabled to operate the telephone, telegraph, radio, dynamos, electric light, etc.

Light is also a form of energy, caused by the rapid motion of the molecules of luminous bodies transmitted by the ether which pervades all space.

Muscular energy is the power possessed by all living animals, and it is known as the vital force.

Mechanical energy is the name given to the energy that all moving bodies possess.

Potential Energy

Energy may be stored or accumulated in a body. As an example, if two weights are attached, one to each end of a rope which is passed over a pulley, the pulley being suspended from a beam placed at such a height that one weight rests on the ground, we can demonstrate how energy may be stored in the weights. Let one weight be 1lb. and the other weight 3lb. The heavy weight, of course, will be the one resting on the ground. Now let the lighter weight be raised by means of the rope up to the pulley. In doing this we exert muscular force. If we raise the 1lb. weight a distance of 9ft. before it touches the pulley we shall have exerted 9 foot/pounds of force, which is now stored in the weight. Upon releasing the weight the energy is given back, and it may be made to perform useful work.

Since this stored-up energy can perform work it is known as *potential energy*. When it is released it will fall a certain distance and then pull up with a jerk because it will be unable to overcome the resistance of the heavy weight to which the other end of the rope is attached. As a matter of fact, by suitably adjusting the heavier weight the small weight can be made to lift the heavier a short distance from the ground, but it will at once, of course, fall back.

In operating a hammer we are making use of potential energy. We lift the hammer and give to it a certain velocity before it is allowed to impinge upon the object, such as a nail.

The pile engine is another example of a device which makes use of potential energy.

If a stone is thrown into the air it rises for a certain time, it is for a moment at rest, and then commences to fall under the action of gravity. In such a case potential energy depends upon the height of the stone from the ground. The bricks of which houses are built have potential energy stored in them—the energy used by the bricklayer in placing them in position. That energy will remain stored in the bricks until the house is pulled down. Such energy is often spoken of as *energy of position.*

The sun is a source of energy. It draws up water and moisture from the earth and changes some of it into vapour, forming clouds. In course of time the clouds become condensed, and the water falls as rain.

When the water falls on a hill it forms rivulets and streams which can be harnessed and made to turn watermills.

The property of elasticity is sometimes made use of in order to store up potential energy. A spring, a bow, or a piece of elastic provide examples of this. A watch or clock spring is another example of energy stored by the aid of elasticity.

Kinetic Energy

Kinetic energy is that energy which is actually being used. It is the energy of a body in motion. A bullet fired from a gun possesses a great amount of energy which is used in overcoming the resistance of the air and finally the much greater resistance of the target. The energy was originally stored in the gunpowder in the form of potential energy. The example of the hammer given earlier also demonstrates kinetic energy.

Whenever work is done it is kinetic energy which is performing it. Kinetic energy it will be seen exists irrespective of the source from which it is derived.

Now if two weights, one weighing 1lb. and the other 2lb. are released at the same moment from the same height they will each have the same velocity on reaching the ground. The heavier, however, will have over twice the energy of the lighter. Thus a hammer weighing 2lb. will have twice the energy of one weighing 1lb.

Hence, the energy of a moving body depends partly on the mass of the body, or on the quantity of matter which it contains. The body that has the greater mass has the greater energy.

In brief, *kinetic energy varies as the mass of a body.*

When the mass remains unchanged the energy will vary with the velocity. For example, if the bullet to which I have referred is ejected from the barrel of the gun with a velocity of 100ft. per second, it might pierce a piece of wood 3in. thick. If, however, it has a velocity of 200ft. per second, it would pierce *four* such pieces of wood.

Therefore, we perceive that *kinetic energy varies as the square of the velocity.* By doubling the velocity we have four times the kinetic energy. If we treble it we shall have nine times the velocity, and so on.

If the bullet is shot out with a velocity of 100ft. per second it will travel a certain distance. If the velocity is doubled it will travel 400ft. If it is quadrupled it will travel four times four equals 16 times 100ft., or 1,600ft.

Kinetic Energy and Momentum

Now when a force acts on a body its effects may be measured either by the quantity of motion, or momentum, or by the energy given to the body. If a weight weighing 1lb. falls for one second its velocity at the end of the second is 32ft. per second. Its momentum will therefore be $32 \times 1 = 32$ units.

As it has fallen only 16ft. however, its energy will be $16 \times 1 = 16$ft./pounds. Now double the weight. If it is allowed to fall for the same time, its momentum and its energy will be doubled.

It is important to remember the difference between momentum and energy.

Indestructibility of Energy

Matter cannot be destroyed, although it may be changed or altered. It cannot be got rid of altogether. In other words, it cannot vanish and become *nothing*. And so with energy. We have seen that energy is of two kinds—potential and kinetic. Energy can be changed from one kind into another in the same body, but it cannot be destroyed. Indeed, energy may be passed from one body to another but it will always remain energy.

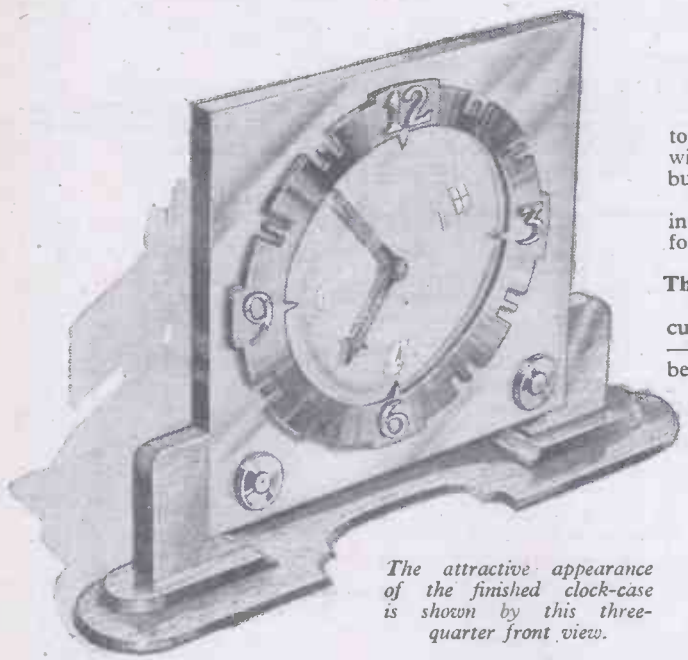
The pendulum affords a good example of this truth. When it is inert, that is to say, when it is not moving, it has no kinetic energy. In order to start the pendulum it is pulled to one side and the weight is thereby raised a certain distance.

(*To be continued.*)

A Modern Clock-case

An Attractive Conversion in Plastic and Brass

By GEORGE H. LOVE



The attractive appearance of the finished clock-case is shown by this three-quarter front view.

THIS design was produced to convert a bedroom clock to "something modern," and suitable for a sitting-room. The movement is a good, Swiss 8-day, and putting on larger hands has not affected its timekeeping which is still excellent.

Plastic Face

The six-inch square plastic face, is ¼in. thick and is opaque, dove grey Catalin, but tinted or coloured Perspex can be used just as effectively and can be obtained from Homecraft Supplies, Ltd., Fleet Street, London.

Before making any parts of the clock, obtain the glass—about 4in. diameter. Next mount the plastic square on a lathe face-plate and turn the recess as shown in the sectional drawing (Fig. 2). The glass should drop in easily and should be flush at its edge. The centre of the recess should be a full 1-16in. thick only, to permit the spindles to stand well through for the hands to be fitted. Bore the spindle hole in the lathe. The recess is turned with ordinary brass finishing hand-tools and can be polished with flour emery and buffed with its own swarf.

Now put the glass away in a safe place until ready for assembly.

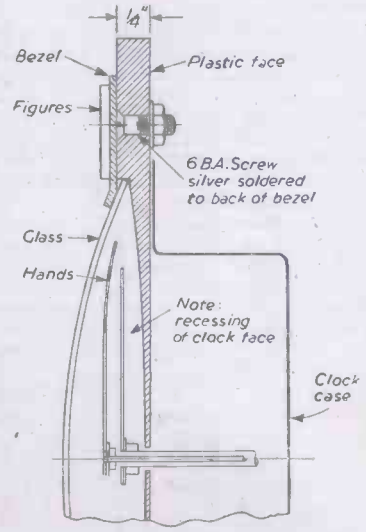


Fig. 2.—Section of clock face showing how it is recessed to take the glass and hands.

The Bezel

The bezel can now be cut from 16 gauge brass—the inside diameter being ⅛in. less than the glass, to give 1/16in. cover all round, and note that the little "nibs" at the quarter divisions should be left on.

The bezel must be cut neatly and accurately; in fact, the whole job calls for great care, but the bezel is a part that catches the eye, and it needs special attention.

For this piercing job, an abrafile is essential—and by cutting close on the lines filing is reduced to a minimum.

The four securing screws (6 B.A. countersunk) can now be hard soldered on the back and then the whole thing is cleaned up and buffed to a high polish. Drill four corresponding holes in the plastic face and test for fitting and alignment of the bezel.

Chapters

The making of the figures, or chapters, will be found a severe test of patience—they are cut from 16 gauge brass with a jeweller's piercing saw and cleaned up with needle files. If the edges are kept square and the corners sharp they look very attractive.

They are fixed by sweating them on, which *must* be done neatly, for any solder showing on the bezel will look untidy and cannot be removed without leaving scratches. The method used was as follows: the back of a figure is very carefully tinned with a small bit, and the tinning is gently filed away, so that only the thinnest wafer remains. The very lightest smear of Fluxite is applied and the edges of the figure cleaned, and it is then placed in position on the bezel and sweated on by applying a *clean*, very hot bit to the face of the figure. Should any solder show at the edges, remove the figure and start again

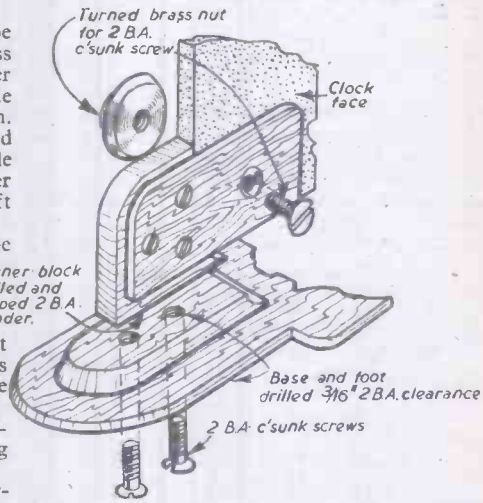


Fig. 3.—Exploded view of one corner of the base.

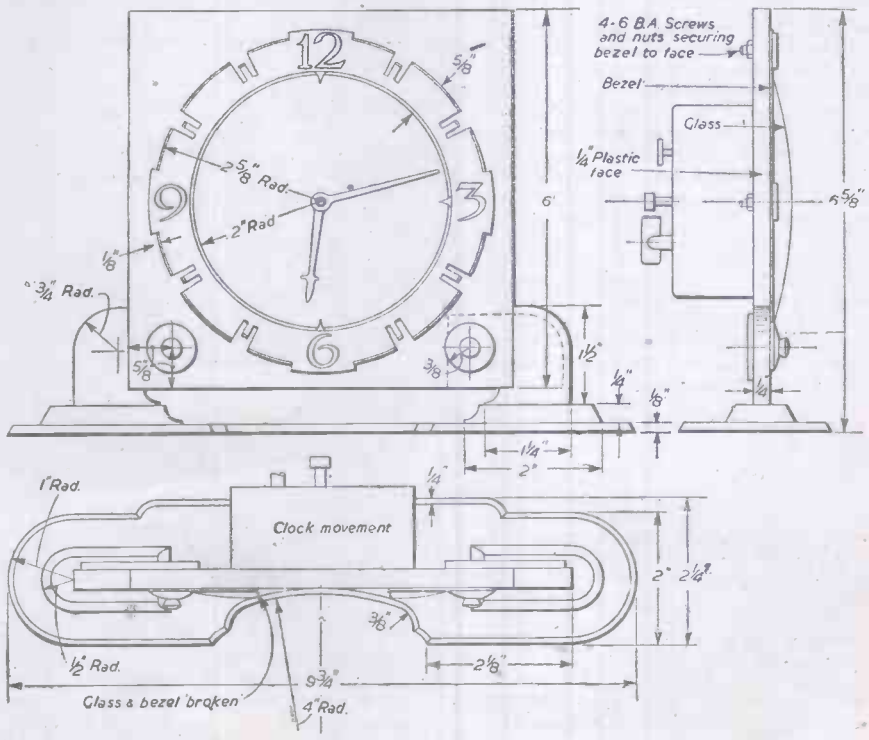


Fig. 1.—Front view, side elevation and plan of the clock case and base.

after cleaning up and repolishing the bezel.

Once the figures are on, the completed job must be cleaned up at once, to remove any dirt and oxidation. It can be done with metal polish, which is removed with a jeweller's brush. When the desired finish is obtained, warm the job slightly and apply one coat of good clear lacquer.

The movement comes next for attention. No explicit instructions can be given, as it all depends on the clock being adapted. The writer's case had a 4in. square front, and so the movement was secured by four 6 B.A. countersunk screws which are concealed by the bezel. Most clocks should lend themselves to conversion fairly readily; the great thing is to keep the dust out and to conceal the fixings behind an ample bezel.

The Hands

These were made from light-gauge brass filed exactly to shape (the "bosses" being large enough to cover those already on the "hubs") and then filed away as thin as possible on a small block of wood. The old hands were snipped off short, the new ones sweated on, cleaned up, polished and lacquered at once.

Making the base and supports is a fairly straightforward job, and the drawings (Figs. 1 and 3) are self-explanatory. Make all the parts and fit them together. Take them apart, clean up, polish and lacquer before reassembling.

If the clock is to stand on polished wood a piece of baize should be stuck on underneath and trimmed to shape when dry. Black Bostik is an ideal adhesive for the purpose.

A Water Softener "Booster"

A Useful and Easily Made Fitment.

By E. S. BROWN

THE portable water-softener described in the January issue of PRACTICAL MECHANICS, although very suitable for normal domestic use, may, however, be of insufficient output where large amounts of water are intermittently required, such as in cafés, small hotels, etc. This difficulty

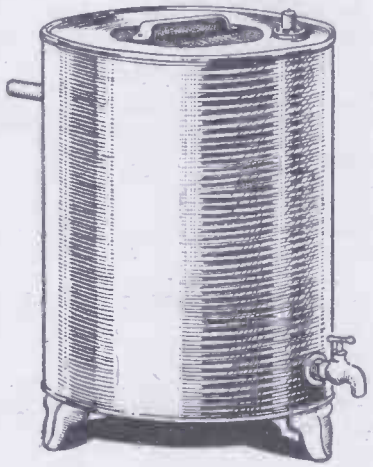


Fig. 1.—The completed water "booster."

can be easily overcome by installing a water "booster" or reservoir on to the delivery side of the softener. By this means adequate supplies of softened water are accumulated and are available for instant use.

The reservoir here described is of extremely simple construction and will prove a valuable addition to the softener where the conditions are more exacting than in normal use. The reservoir (Fig. 1) is constructed from a 5- or 10-gallon drum. If an oil drum is used it must be thoroughly cleansed with a strong boiling soda water solution and subsequently washed out with several changes of boiling water. Oil is very difficult indeed to remove, but as the slightest trace will contaminate the water its removal must be absolute.

Constructional Details

Many drums are fitted with a screwed thread at the bottom for the attachment of a tap, and one should be obtained and fitted. Such taps can be purchased from most motor accessory stores for a small sum. Where the drum is not suitably threaded the tap should be well sweated in with solder, having, of course, previously made a suitable hole for it in the drum.

If much water is required at a time, two or more taps may be fitted, according to individual requirements.

The water inlet-pipe is ½in. external diameter by 6in. long and is left open at both ends. The pipe is soldered into the drum within 3in. of the top, leaving 2in. protruding for connection with the softener (Fig. 2).

A suitable valve is required for the exit and entry of air during the filling and withdrawal of water from the reservoir. The valve must also fulfil the dual purpose of preventing the escape of water when the reservoir is full.

To make the valve, obtain either a No. 8 or 9 metal knitting-needle and drill a hole in the filler-cap of the drum so that the needle is an easy sliding fit. A vent hole ⅛in. diameter is next drilled in the cap in as close proximity to the needle as possible. The needle is then inserted into its guide and slightly flattened with a pair of pliers, 1in. from its upper end, to form a stop (Fig. 3). A piece of brass tubing 1in. diameter by 1in. long is soldered on to the filler cap, enclosing both the end of the needle and the vent hole. A metal disc is next soldered on to the end of the tube, having previously drilled a hole in the centre of the disc of slightly less diameter than that of the needle. The needle end is then carefully ground into the hole with fine emery powder and oil until a perfect surface results. The grinding medium is then removed with paraffin, and the whole assembly boiled in water to thoroughly cleanse.

A fairly large cork is slid on to the lower

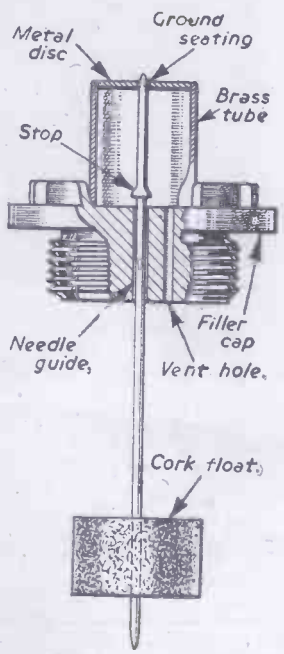


Fig. 3.—Details of the automatic air valve and filler-cap of drum.

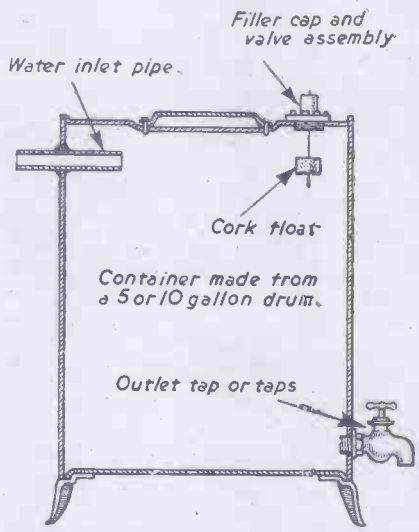


Fig. 2.—Section showing the internal arrangements of the "booster."

end of the needle and is positioned to within 3in. of the filler-cap. The position of the cork, of course, determines the ultimate water-level in the reservoir. The diameter of the cork must, of course, permit its easy entry through the filler-cap orifice.

Operation

The action of the valve is as follows: The weight of the cork pulls the needle down on to its stop and allows free entry and exit of air within the reservoir. When the water reaches its predetermined level, however, the buoyancy of the cork float forces the needle into its ground seating and so prevents any subsequent escape of water through the valve.

A stand will be necessary to raise the reservoir to a convenient height for filling receptacles. Any simple design will suit, but the reader is advised to make the stand as strong as possible, as a filled 10-gallon drum will weigh slightly more than 1 cwt.

The reservoir is given several coats of good quality enamel, and, when dry, is then ready for use. Connection with the softener is made by a suitable length of ½in. interior diameter rubber tubing.

When operating arrange the softener to deliver a gentle flow of water to the reservoir. During use there will be no need to turn the softener off when the reservoir is full, as under these conditions the flow of water through the softener is balanced by that contained in the reservoir, and a state of equilibrium results. It is, of course, necessary to occasionally check over the connecting tubing and filler-cap washer to ensure that there is no escape of water at these points.

When regeneration of the softener becomes necessary it is desirable to completely detach it to prevent the brine solution entering the reservoir.

Electric Water Heating Practice—3

Dual Type Water Heaters : Pipework and Plumbing : Electric Geysers

By G. A. T. BURDETT, A.M.I.I.A.

(*Continued from page 195, March issue*)

WATER heater manufacturers, aware of the need for a self-contained electric water heater in the small home, have developed what is known as the U.D.B., or Under the Draining Board heater. It has been developed to meet the demand for a trouble-free hot-water service for the small house and cottage, especially where space is restricted.

It is an entirely automatic water heater having 20 gallons capacity. Constructed similarly to the pressure type water heater described earlier, it consists of an inner water container (18 gauge copper) with copper moulded seams, but tinned inside and outside.

An outer steel casing surrounds the container with a lagging space between which is packed re-granulated cork to a thickness of 2in. all round. At the top the lagging is 3in.

Connections to the water heating system are made by means of two ¾in. unions. The cold-water inlet connection is situated in the side of the container near the bottom, while the hot-water outlet is brought out of the side near the top (Fig. 16). A drain cock is provided near the cold-water inlet at the bottom.

When used as an independent water heating system, connections are made as in Fig. 17, a cold water storage tank being essential. This type of heater can, however, be used in conjunction with an existing solid fuel boiler, when the connections are made as in Fig. 18. Most interesting feature of this type of water heater is that two independent elements are provided, each with a separate thermostat and are therefore independently thermostatically controlled. The heater is therefore actually two heaters in one.

For ordinary everyday use, to supply hot water at the sink and wash-basin, the top heater only is used and provides six or seven gallons of hot water. The temperature of the water will depend, of course, upon the setting of the thermostat controlling the top heating element. This element has a loading of 500 watts, and the lower heater, fitted near the bottom, has a loading of 2,500 watts and is master-controlled by a 15-ampere foot switch. This on/off switch, marked "Sink" in the off position and "Bath" in the on position, controls the current to the lower element and thermostat (Fig. 19). When switched to "Bath" the circuit to the lower heater is made and the thermostat controls the current and the temperature of the water according to the setting of the thermostat. Thus the total contents (20 gallons) are now heated to the desired temperature. The settings of the two thermostats need not be identical. For example, the top thermostat may be set at 160 deg. F. for normal use and the lower 140 deg. F. for bath use.

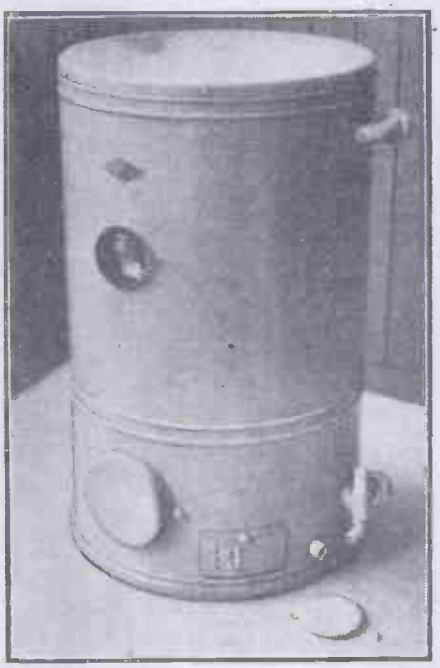


Fig. 16.—Dual water heater (Sadia) of 20 gallons capacity, having two sets of elements. One near the top (cover removed), which provides 6.7 gallons of hot water, and one in base which is controlled by foot switch. This is used when large quantities are required, viz., for a bath.

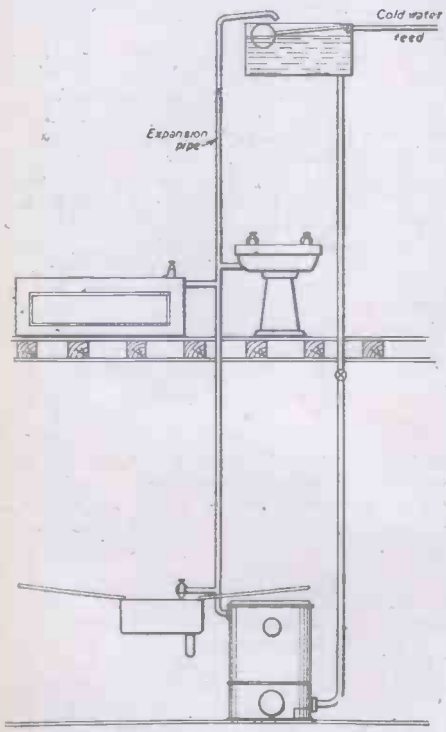


Fig. 17.—Plumbing connection of dual water heater. A separate cold water storage tank controlled by ball valve is essential with this water heater.

Normally only the top heater is in circuit, and when large quantities of water are required for baths or washing clothes the lower heater may be brought into use.

It will be seen, therefore, that appreciable savings in electric energy are made since, during normal periods, heat losses only take place through the top portion of the heater, e.g., the surface area in respect of six or seven gallons of water.

Generally, it is found that the six or seven gallons of water are sufficient for normal requirements, and since the lower heater has a comparatively high loading of 2,500 watts, the remaining 13 gallons are heated in about an hour.

A number of the recognised electric water heater manufacturers are making this type of water heater. One manufacturer, Aidas Ltd., has adopted standard types of elements, each having a loading of 500 watts. These are interchangeable, there being one in the top heater plate and five in the bottom to give the 500 and 2,500 watts loading respectively. These fit into a horizontal fitting in the same way as a lamp and are easily withdrawn, it not being necessary to draw off the water in the tank since they are housed in watertight metal tubes. As a further means of control (to switch off the top heater when the water heater is not required for long periods), a 3kW. switch-plug may be installed or, if desired, a 15 amp. main switch.

Plumbing

The plumbing arrangements are similar to those described for the pressure heater. A vent or expansion pipe is essential and must be taken to the highest point and, where possible, should terminate in a bend over the cold water tank.

When used in conjunction with an existing solid fuel system, the plumbing arrangements are as shown in Fig 18. Two vent or expansion pipes are required. No other system of piping will be satisfactory, nor is it possible to dispense with one of the vent pipes.

When the boiler is lighted the top heater may be left on so that hot water is available should the boiler fire go out. If the solid fuel boiler provides sufficient heat the electric element will not operate, since the thermostat will not switch it on until the temperature of the water drops below the setting of the thermostat.

Where head room is restricted, such as in a bungalow, and the distance between the cold water storage tank and the water heater is not sufficient to give adequate pressure, a

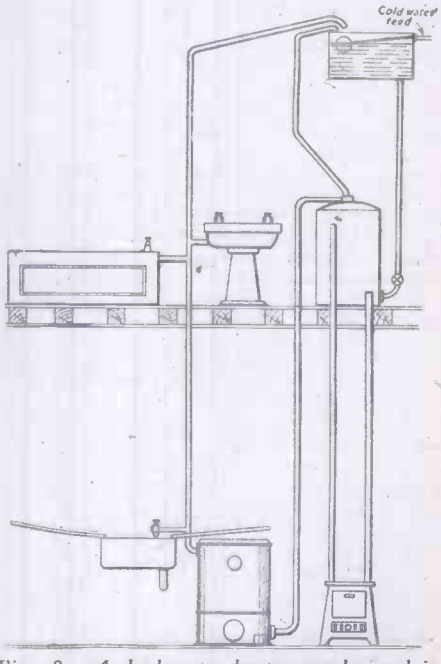


Fig. 18.—A dual water heater can be used in conjunction with existing solid fuel water heating system. Plumbing connections are similar to those made with the normal pressure type water heater used in conjunction with solid fuel system, as will be seen in the diagram.

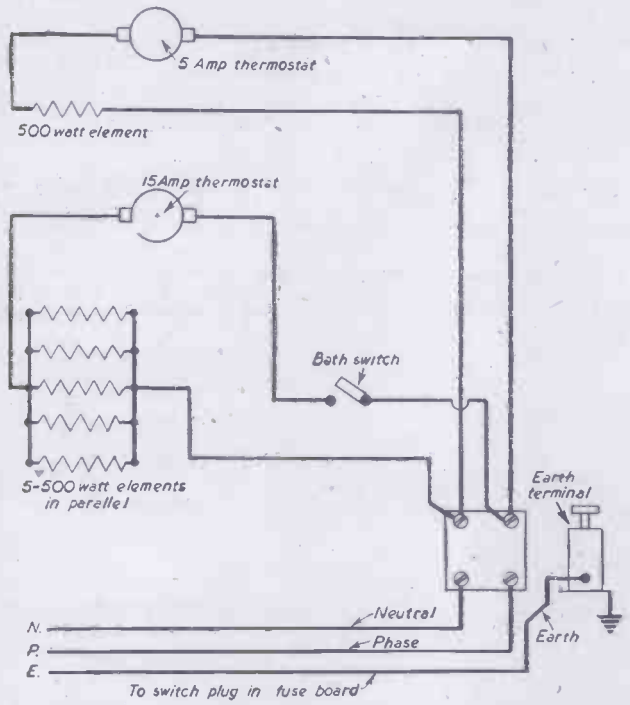


Fig. 19.—Wiring diagram of Sadia 20 gallons dual water heater. It will be noted that this consists of two independent circuits, each controlled by a thermostat. The larger heater, 2,500 watts, is also controlled by a switch and does not operate until this switch is "On." Connection to the electricity supply may be to a 3 kW. heating point, fuse board, or a separate main switch.

non-return valve is incorporated in the expansion pipe about 1ft. below the water from the taps.

A modified model of the dual water heater is also being made by Aidas, Ltd., which is connected to this firm's Circoil unit. This unit, Fig. 20, is installed in the flue system of a boiler or solid fuel fired space heater, harnesses the waste heat in the flue, and transmits it to the electric water heater; thus acting as a booster. Appreciable economy is attained with this unit.

Thermostats

These should not be tampered with other than for initial adjustment, but should they be removed, it is essential that the correct ones are replaced in their respective sockets. The bottom thermostat will control 15 amps, but the top one only 5 amps. As with all thermostats, if the supply is D.C., mercury switch types must be used.

heat-insulated vessel which contains the heating element, into the surrounding outer container. This outer container is lagged so that when the storage water is heated losses are reduced.

The method of operation enables a useful quantity of water to be drawn off while the main contents in the outer chamber is heating. This rapid heating of small quantities of water is also useful after a bath has been taken.

As with all pressure types of water heaters the ball-valve tank must be mounted above the highest outlet and a vent or expansion pipe provided from the heater outlet to the top of the cold feed tank. The maximum head of water must not exceed 25ft.

Both the outer and inner vessels are of Monel metal with electrically welded seams. While the outer casing is finished white enamel.

The water heater may be stood on the floor under the draining board, but is fitted with an easily removable flat table top cover.

The element has a loading of 3.45 kW. and can be connected to a normal heating circuit. A special thermostat must, however, be fitted where the electricity supply is D.C.

Installing the Jet Heater

The pipework should be carried out as in Fig. 21b, When this is completed, the system should be given a water test and an examination carried out by removing the table top to ascertain whether the water connections have been disturbed. The thermostat should then be set to 175 deg. F., the electrical connections made and the current switched on.

Two or three tests should then be made. First, a small quantity of water with the water valve off (lever pointing left), and then on full water content, by turning water lever to the right.

Should the water heater not operate correctly and all the electrical connections are sound, or should the heater fail after use, the makers should be consulted.

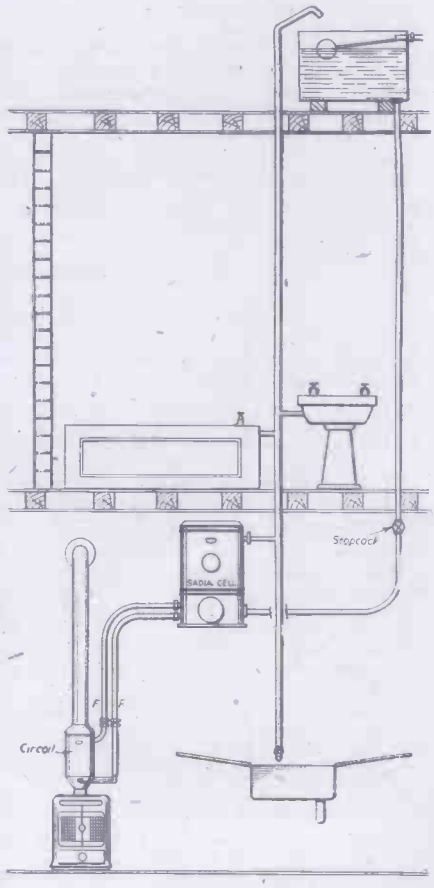


Fig. 20.—A modified pattern of the Sadia dual water heater. Two extra plumbing connections are made and operated in conjunction with the Sadia Circoil, waste heat from a solid fuel heater being utilised. The Circoil is fitted on top of the solid fuel fire.

Jet Water Heater

Most recent water heater introduced by a well-known firm of water heater manufacturers (Heatrae, Ltd.) is a quick-acting dual-vessel model termed a jet water heater (Fig. 21).

Of unusual construction, it is essentially hand controlled with a thermostat incorporated to prevent the water boiling and to minimise "standing" losses.

The water heater is a pressure type multi-point heater of 13 gallons capacity and must be fed with cold water through a break pressure ball valve cistern. For use in blocks of flats fed from a common cistern, a break pressure tank measuring 20in. wide by 12in. deep with 7in. projector, and containing the usual ball valve equipment, can be obtained from the makers.

Chief feature of its construction is that it consists of a small inner water container, which houses the element, and is situated within a larger outer container.

Its chief advantage is that one gallon of water 165 deg. F. or two gallons at 120 deg. F. (washing-up temperature) can be drawn off within four minutes of switching on. The thermostat, when set at 175 deg. F., cuts off after a period of 6½ minutes. Larger quantities of hot water can, however, be obtained by turning a valve lever so that circulation takes place through the inner

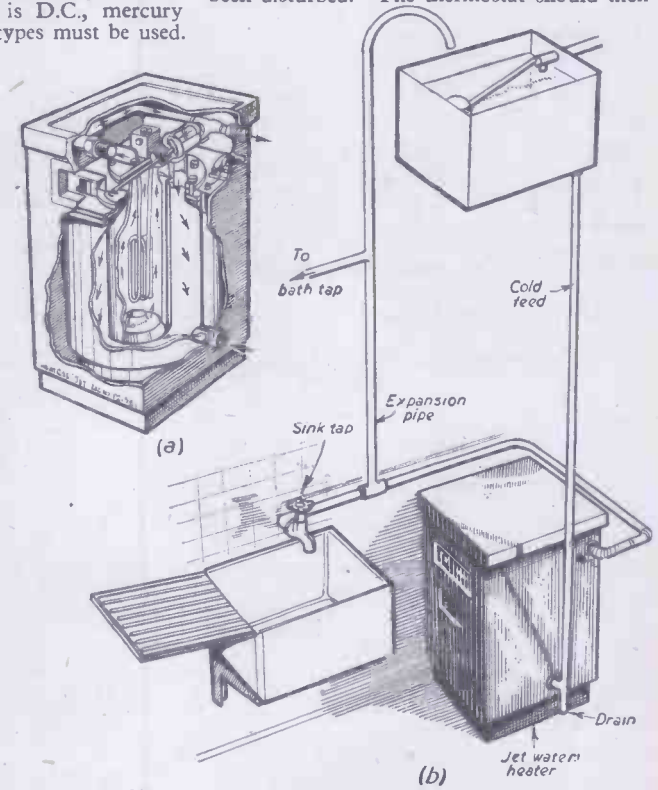


Fig. 21.—A jet water heater. A dual purpose water heater made by Heatrae, Ltd., with hand switch control and designed to provide small quantities of hot water rapidly. Large quantities up to 13 gallons can be obtained over a longer period. There are two containers, a large outer one in which is housed the small one for rapid heating.

Instantaneous Water Heaters

Commonly termed an electric geyser (Fig. 22), because it functions similarly to a gas geyser and heats the water immediately preceding its use. There is, therefore, no water storage. Electric geysers have not gained in popularity as have their gas counterparts, largely owing to their having an element of high loading which not only requires a comparatively heavy wiring circuit, but is not accepted by many electricity authorities.

Supply authorities who allow them to be connected to their mains charge higher rates for the electrical energy consumed; thus making them less attractive.

Advantages and Disadvantages of Geysers

Since there is no water stored, geysers are of small dimensions and therefore take up little space. Space occupied by an electric geyser is less than that of a gas geyser and, of course, no flue is required. A further advantage is that there are no standing losses as with a thermal storage type water heater. Chief disadvantage is, of course, the size or kW. rating of the element.

Compared with a normal domestic gas geyser which provides a hot water output (40 deg. F. temperature rise) of two gallons per minute, an electrical loading of 14 kW. would be necessary. To obtain a hot water output of 3½ gallons per minute (40 deg. F. rise in temperature) as obtained from a large domestic gas geyser, would require an electrical loading of 24½ kW.

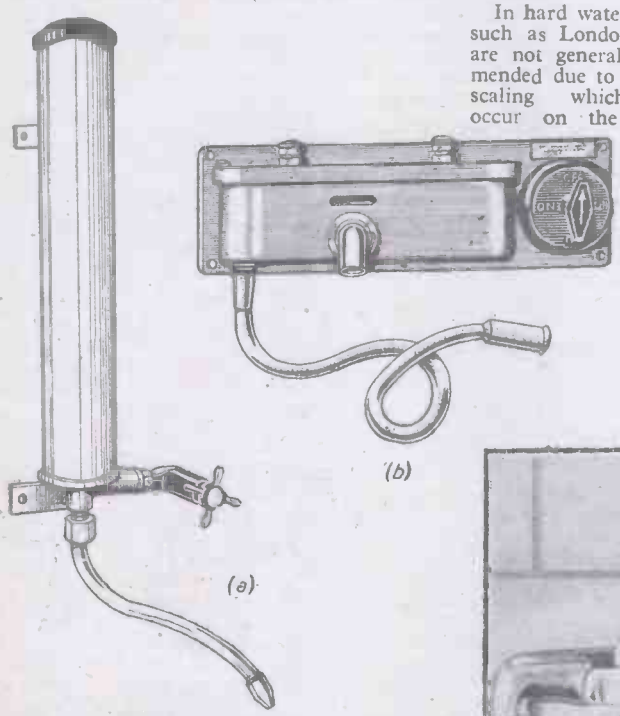


Fig. 22.—Three types of instantaneous water heater. One (a) has an electrical loading of 4 kW. and provides a constant flow of 2½ pints of water per minute with a temperature rise of 70 deg. F. above the incoming water supply, e.g., 45+70=115 deg. F., while (b) is a further type which for bath use has an 8 kW. loading. On the right is a small instantaneous water heater which can be placed on the outlet of an ordinary cold water tap. The local supply authority should be consulted before any of these are installed.

Since the current rating on a 240v. supply would be 56 amps. and 102 amps. respectively, it will be seen that the cable would be of prohibitive size unless the equipment were installed near the meter position.

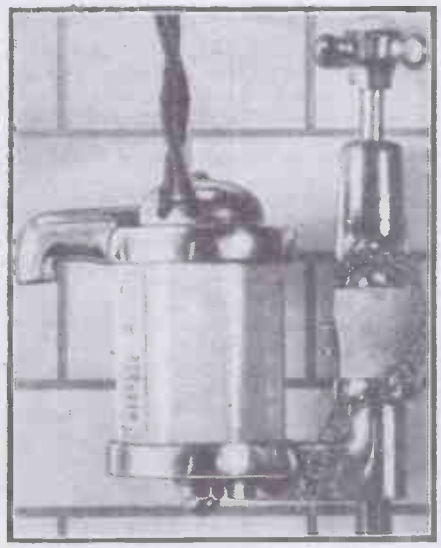
A further disadvantage of the instantaneous electric water heater is that, in view of the high heat transfer in a short space of time when the water passes over the elements, the immediate thermal efficiency is much lower than that of the thermal storage type. Steam is produced, which means loss of heat, and considerable scaling occurs. This loss is, of course, counter-balanced to some extent by the absence of standing losses.

Instantaneous water heaters are made in about two ranges of loading, one range for wash-basin and sink between 4-6 kW., and for the bath type 8-12 kW., the lower value being for a small bath, or where the user does not mind the greater inconvenience of waiting.

When choosing such a water heater, however, it is advisable first to ascertain the requirements of the electricity supply authority.

In hard water districts, such as London, geysers are not generally recommended due to the heavy scaling which would occur on the element. Geysers, not being storage or pressure types, can feed only one point or two adjacent points such as bath and wash-basin where a swivel outlet spout is incorporated.

In dental surgeries and where small quantities of hot water are required only occasionally, a small geyser is, of course, a very useful appliance.



Unlagged Water Heaters

Where low initial cost is of primary importance, and continuous hot water is not essential, a factory produced unlagged self-contained water heater will be satisfactory. This is an intermediate heater between a storage type and the geyser.

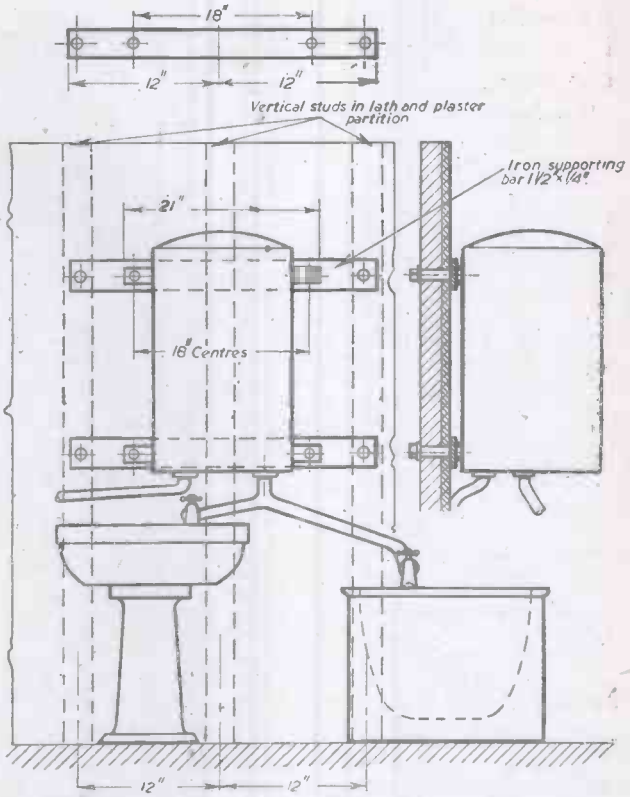


Fig. 23.—Where there is no solid wall to fix a water heater and a lath and plaster partition must be used, an iron batten should be fixed to the vertical studs and drilled so that the water heater can be bolted on the batten.

It usually comprises an unlagged water container which will supply one outlet only, such as a bath, and can be connected direct to the water main. In Fig. 23 the heater feeds two adjacent points, bath and wash basin, and is therefore a pressure type heater.

Resembling the single point storage heater described earlier, but unlagged, it often works on the displacement principle, having an open outlet into the receptacle; the hot water control being on the cold water inlet.

Most models of this type have removable lids for cleaning out the container, are finished in white enamel and are fitted with brackets for fixing to the bathroom wall over the bath. Immersion type elements are fitted and the loading is usually in the order of 4kW. for the 12 gallon size, which is the most useful model. This is high compared with the thermal storage types; a 12 gallon size normally having a loading of 1.2-1.5 kW.

Heating up time is however reduced, which is between one and two hours, depending upon the temperature desired.

Pipework and Plumbing

Where a hot water system is already installed, it is usually possible to utilise all or part of the existing pipework. Otherwise, one must start from scratch and install the best possible system.

Installing a self-contained storage heater in an existing system is, however, more difficult and requires careful planning and inspection.

Where the system is old, e.g., 20 years or more, or it is apparent that the hot water pipes have operated at high temperatures with the resulting furring of the pipework, no hesitation should be made to scrap the system. This safeguard is of particular importance in London and other hard water districts, for inspection of pipes which have been in use for even less than ten years in London has revealed heavy furring, and a ¾in. iron pipe has become almost completely choked.

(To be continued.)

An Inexpensive Telescope

Constructional Details of an Easily-made but Effective Instrument

By H. D. E. GOODALL

A TELESCOPE of sufficient power to bring into view the irregularities on the surface of the moon, the crescent of Venus and the rings of Saturn provides a source of never-ending interest. In the outer regions of space, beyond the limits of the solar system, the "fixed" stars can be seen shining with unexpected brilliance.

To construct a telescope capable of bringing these wonders of the heavens into view is not difficult and is well within the capacity of the practical mechanic.

In the present article the construction of such a telescope is given in general terms, since the final dimensions will depend on the sizes and focal lengths of the lenses available. The object glass and the eye-piece should be first obtained. For the object glass one of the old-fashioned, long focus camera lenses is well suited to the purpose and can often be obtained at a very reasonable cost.

Focal Length of Lens

The eye-piece should have a focal length as short as possible, that is, of the order of ½in. to 1in., since the magnifying power of the combined object glass and eye-piece is approximately equal to the focal length of the object glass divided by the focal length of the eye-piece.

An eye-piece of short focus may be a somewhat expensive item, but a really serviceable one can be made up using two or more fairly cheap magnifying glasses about ¾in. diameter. These have a focal length usually of the order of 1½in. to 2½in., and an apparent magnifying power of about two. If two such lenses are placed with their axes on the same centre line and their surfaces almost, but not quite, touching, the approximate focal length of the combination will be:

$$\frac{1}{f_1}+\frac{1}{f_1}=\frac{1}{F}$$

where f_1 and f_1 are the focal lengths of the individual lenses and F that of the combination.

Thus, if the focal lengths of the two lenses are 2in. and 1½in., the focal length of the combination will be 1.07in. If the focal lengths of the two lenses are the same, say, 2in., the focal length of the combination will be one-half of this, i.e., 1in. The same rule would apply if three lenses were used, and, if they were all of the same focal length, that of the combination would be one-third of that of a single lens. It is not, in the normal case, necessary to use more than the two lenses.

Object Glass

The lens for use as the object glass will usually be set in a brass mounting and may consist of two separate lenses. When selecting this lens two points should be borne in mind: (a) The larger the lens, the greater its capacity for collecting the light rays, this varying as the square of the diameter; and (b) the focal length should be fairly long, since, as already stated, the magnifying power of the completed telescope is approximately equal to the focal length of the object glass divided by the focal length of the eye-piece. It will be understood that, although the light-collecting power depends on the diameter of a lens, its focal length depends only on the contour of the lens itself.

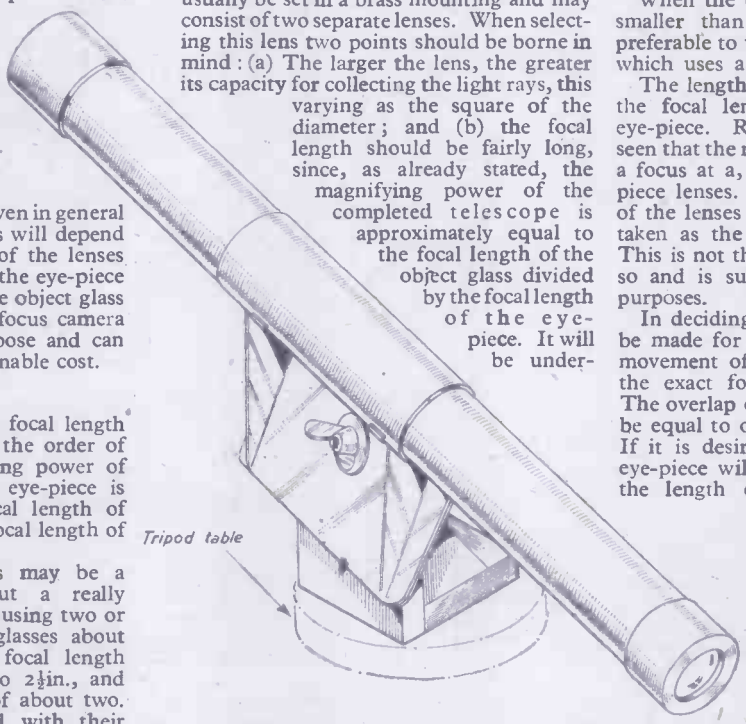


Fig. 10.—The finished telescope and its mounting on a tripod stand.

To find the focal length of a lens experimentally, pin up a piece of white paper and, by means of the lens, project an image of a distant object, such as the sun, on the paper. The distance from the lens to the paper which gives the sharpest image is the focal length.

If the object-glass lens is found to consist of two lenses, the individual units will be found to have focal lengths greater than the combination. The focal length of each lens should therefore be determined, and that with the longer focal length selected and replaced in the mounting.

The diameters and focal lengths of the lenses having been determined, the general dimensions of the telescope tubes can be fixed.

Objective Mounting

The mounting is usually of the general form shown in Fig. 1, and the main tube will require to be a good push fit in the housing, that is, its outside diameter will be as indicated at A. It is convenient to keep the main tube of the same diameter throughout its length, and therefore the eye-piece end will take the form of Fig. 2 or Fig. 3, depending on the diameter of the eye-piece lens.

In Fig. 2, the lenses are carried in a tubular mounting which is a good sliding fit on the main tube, thus allowing the object to be sharply focused.

When the eye-piece lenses are appreciably smaller than the object glass it may be preferable to use the housing shown in Fig. 3, which uses a reduced diameter sliding tube.

The length of the main tube is decided by the focal lengths of the object glass and eye-piece. Referring to Fig. 4, it will be seen that the rays from the object glass come to a focus at a, and are picked up by the eye-piece lenses. The distance centre to centre of the lenses (dimension f in Fig. 4) can be taken as the sum of the two focal lengths. This is not theoretically correct, but is nearly so and is sufficiently accurate for practical purposes.

In deciding dimension c, allowance should be made for the eye-piece housing to have a movement of about ⅜in. to the left, so that the exact focusing position can be found. The overlap d of the eye-piece housing should be equal to one and a half to two diameters. If it is desired to focus nearer objects, the eye-piece will have to move to the right and the length d increased accordingly. The length f will require to be equal to (A-e) and the length of the larger diameter tube. If the eye-piece housing is constructed as indicated in Fig. 2, the dimension e will become equal to c and the length of the main tube (f-c-h).

Construction of Tubes and Housings

The main tube can be of brass or copper (20 or 22 s.w.g.) if available in the correct size and length, otherwise sheet tin can be used and the tube constructed as described below.

Obtain a wooden mandrel of circular section to serve as a former, having a diameter equal to A (Fig. 1) minus twice the thickness of the sheet to be used and of a length about a foot longer than the dimension f (Fig. 4). Cut a sheet of sheet tin of width equal to the circumference of the former plus ½in. for overlap, and of a length equal to f (Fig. 4). Tin the two long edges, one on the front and the other on the back face; these two tinned surfaces come into contact when the tube is formed. Place one long edge on the former,

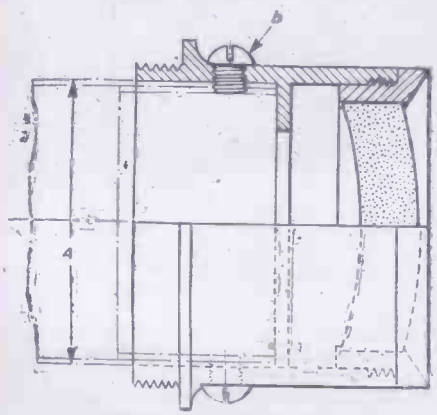


Fig. 1.—General form of objective lens mounting.

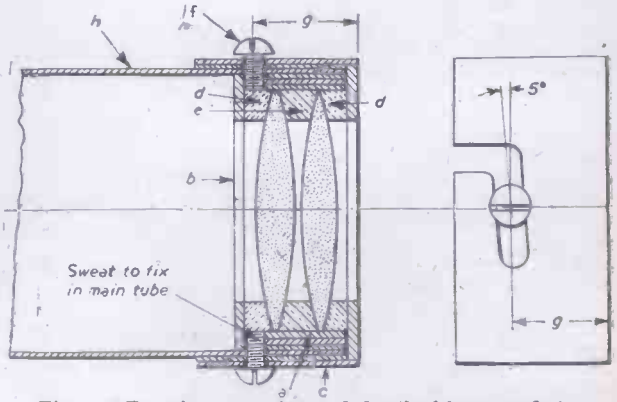


Fig. 2.—Eye-piece mounting and detail of bayonet fitting.

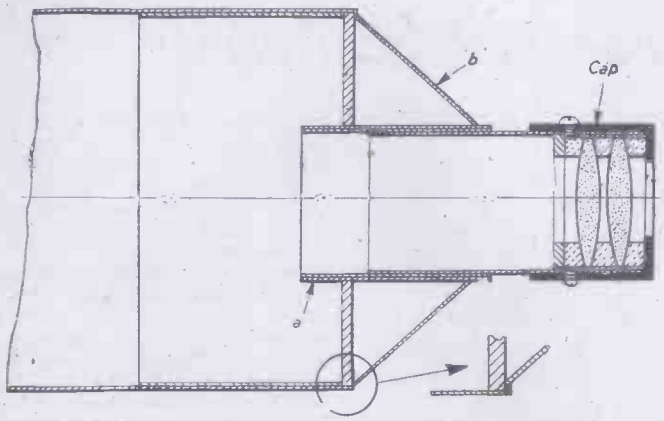


Fig. 3.—Sectional view of eye-piece end of telescope.

and tap the edge over to fit the contour; turn the sheet and tap the other edge over in the same direction. Place the sheet squarely on the former and work it round with the hands to form a cylinder. Secure the formed sheet tightly on the former with pipe clips or cord and, making sure that the ends are square, spot solder the joint in three or four places. Remove clips or cord and complete soldering, pressing the edges into close contact until the solder has set. Remove tube from former.

If a large enough sheet of tin is not available, the tube can be made up from sheet taken from tin containers, the length being obtained by joining two or more short lengths of tube. In this case the short lengths of tube should be made up as described above, leaving about 1in. of the longitudinal joint unsoldered at the end until the lengths are assembled. This is done on the former, two tubes being overlapped about ½in. and the sweating completed. If three lengths have to be joined up, two lengths should be made up as described, replaced on the former and spaced the correct distance apart; the third length (formed but not soldered) placed over them to give ½in. overlap, clipped down and soldered. When not reinforced as required in Figs. 2 and 3, the ends of the tube should be stiffened by sweating in a sleeve, as shown in Fig. 5.

If the eye-piece lenses are already provided with a mounting, this should be retained and built into the sliding housing. In this case the sliding tube would be designed to suit the mounting.

When no mounting is supplied a sliding housing on the lines shown in Figs. 2 and 3 will be required.

If the diameters of the object glass and the eye-piece lenses are not greatly different, the type of housing shown in Fig. 2 can be used. This consists of sweating in the sliding tube h a liner or liners a, to reduce the internal diameter to a little greater than that of the lens, together with a brass or double thickness sheet tin ring b, care being taken to ensure that the latter is perfectly normal to the centre line of the tube. The cap c is of the bayonet type, the slots in the tubular portion engaging with the screws f in the housing. These screws are tapped into the housing and locked by sweating.

After removing all sharp corners and cleaning up the housing is assembled by inserting a felt or rubber ring d, then a lens, next the distance piece e (preferably of metal or hard wood), which should be of such a width that the two lenses are almost but not quite touching, then the second lens and the second felt or rubber ring d, and finally securing the whole with the cap c. The thickness of the felt or rubber rings should be such that the lenses are held in place under fairly light pressure but without any shake.

If the lens' diameters require a mounting on the lines of Fig. 3, the same general line of construction is followed. It will, however, be essential for the smaller tube to be rigid and concentric with the main tube. To ensure true alignment, a wooden or metal rod, of a diameter such that the smaller tube will just slide over it, is inserted during assembly, lined up accurately with the main tube and held in position with packing or wedges. The whole is then soldered. To provide rigidity the cone b is made up and soldered in position as shown.

The attachment of the object glass to the main tube will, of course, depend on the form of mounting. The form shown in Fig. 1 is the most common type for the older make of photographic lens and will only need to be

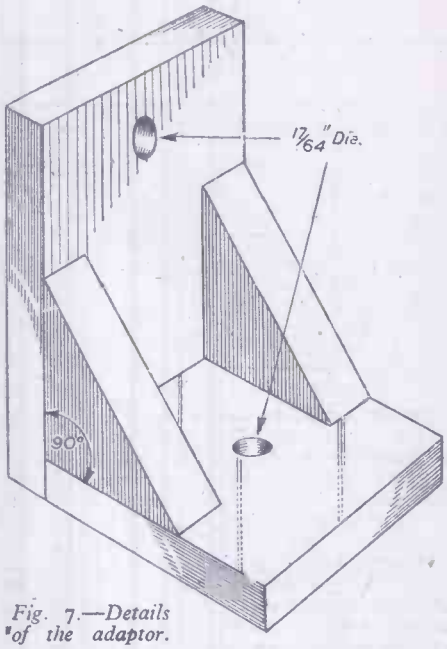


Fig. 7.—Details of the adaptor.

and brass or double thickness sheet tin ring b, sweated inside the main tube, at a distance from the end sufficient to allow room for the lens and two felt or rubber rings. Two screws are fitted and sweated in as before for the bayonet catch. The cap is similar to that shown in Fig. 2.

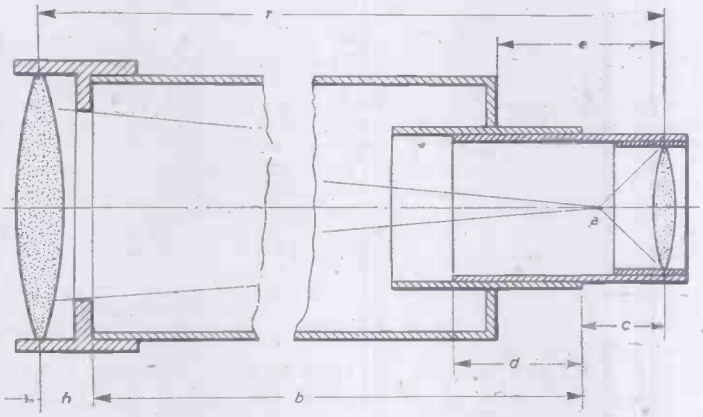


Fig. 4.—Section of both ends of a telescope showing the focal point of the object glass.

Telescope Mounting

It will be found that this instrument cannot be held sufficiently steady by hand, and that a stand of some sort is necessary. If the diameter of the main tube does not exceed about 1½in., one of the heavier types of camera stands can be used; if larger, a more substantial stand will have to be provided.

Some means of attaching the telescope to the stand will be required, which will also provide means for the elevation and swinging of the telescope. This requirement is met by using a simple angle fitting on the tripod. This, in turn, calls for means of attachment of the telescope to the angle fitting (see Fig. 9).

The bracket for the telescope is shown in Fig. 8 and consists of a sheet of thin brass or

placed in position and secured by means of the two screws b. The latter are tapped into the mounting body and pass into close clearance holes in the tube. If the mounting embodies an iris diaphragm, this should be retained, as it is often useful to control the light intensity and cut out halation.

If the object-glass lens has no mounting, one can be made up as shown in Fig. 6. This is on the same general lines as for the eye-piece mounting and consists of an internal sleeve a

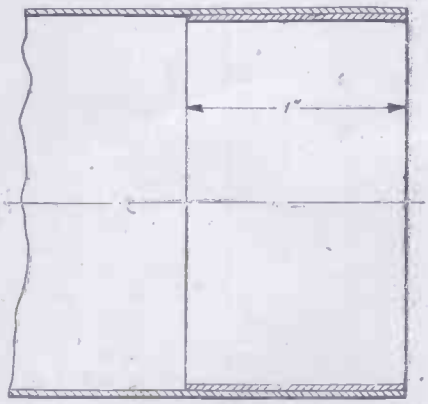


Fig. 5.—Method of stiffening the end of telescope tube.

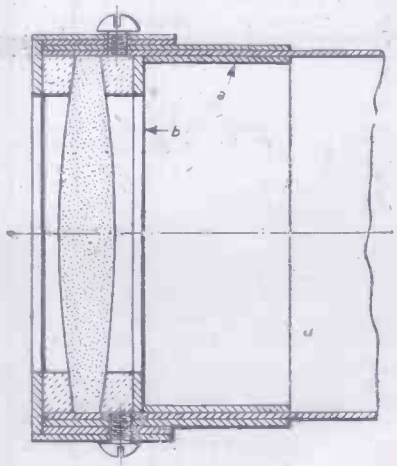


Fig. 6.—A "built-up" object-glass mounting.

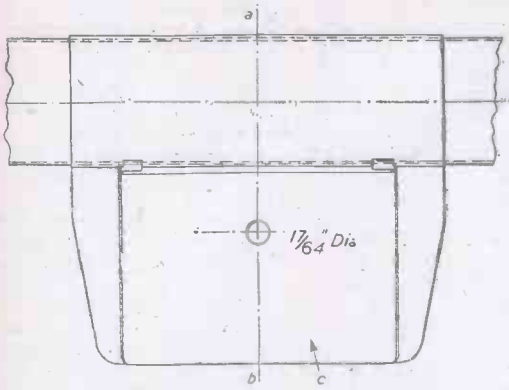
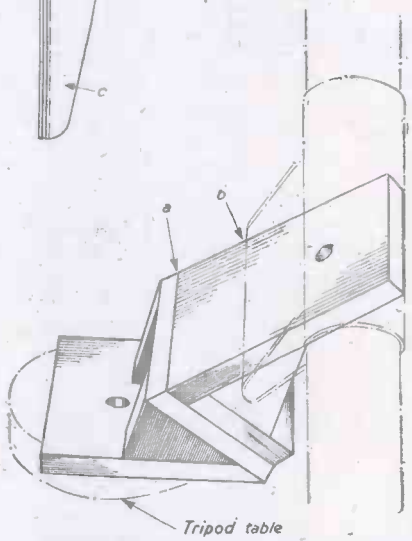


Fig. 8 (Left).—The bracket for the telescope tube.

Fig. 11 (Below).—Simple equatorial mounting.



sheet tin formed as shown and made a close fit round the tube. The bracket should be positioned on the main tube so that the centre of gravity of the complete instrument is on the line ab. This position can be determined by assembling the instrument complete with bracket, mounts and lenses, placing on a knife-edge at ab and adjusting the bracket along the tube until a balance is obtained. The bracket is then clamped and sweated, the stiffening piece c being sweated in position and the hole for the securing bolt drilled. It will be sufficient if the edges of the plates are tinned for a distance of about ⅜in., as the sweating of the whole surface is unnecessary. It is desirable, after drilling the hole, to sweat the edges together.

The adaptor can be made up from scrap hardwood, as shown in Fig. 7. On assembly with the telescope and tripod, a pad of felt is placed between each of the contact surfaces. This allows the clamping screws to be slacked back slightly and the instrument adjusted without entirely losing the friction grip between the surfaces and provides easy setting for any position of the telescope.

Equatorial Mounting

An equatorial mounting enables a star to be followed in its course by the adjustment of the telescope in one plane only. In other words, the adjustment of the telescope is made about an axis parallel to that of the earth. This can easily be provided, but unless a fixed stand can be provided and the special angle-piece secured permanently to it in its correct position it is doubtful if its advantages can be put to full use.

To obtain an equatorial mounting the telescope and adaptor must be turned through an angle so that the axis of the pivot bolt, which otherwise would be used to secure the adaptor to the table, is parallel to the earth's axis, that is, it points to the North Pole Star.

This angle-piece can be constructed, as shown in Fig. 9, the angle θ being the complement of the angle of elevation of the Pole Star. At the latitude of Greenwich, θ would require to be 38½ deg., Rugby 37¾ deg., Durham 35¼ deg., Edinburgh 34 deg., Aberdeen 33 deg. This angle-piece should be firmly fixed to the table or tripod and correctly oriented with regard to the Pole Star.

The assembly of the instrument and adaptor is shown in Fig. 10. A piece of fairly thick felt should be placed on both faces of the adaptor, which are secured by ¼in. bolts and wing nuts. Movement about these pivot bolts will give horizontal and vertical setting for the telescope.

If an equatorial mounting is fitted, this is secured to the stand in its correct orientation, and the adaptor and telescope mounted on it, as shown in Fig. 11. To follow the course of a star or planet, adjustment is made at a, the setting at b being left undisturbed.

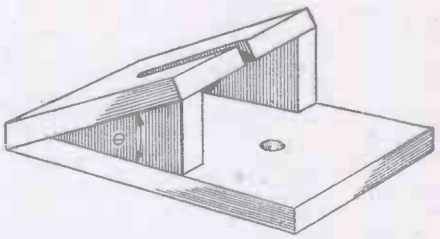


Fig. 9.—Angle-piece fitment for equatorial mounting.

Notes and News

British Lighthouse Equipment for Greece

CHANCE BROTHERS, LTD., the light-house engineering firm, recently received an order through the British Admiralty for lighthouses and harbour lights to be installed around the coasts of Greece.

A light of 125,000 candle-power and giving three flashes together separated by a continuous light of lower power, is to be installed at Cape Doukaton. Cape Keri and Cape Matapan (scene of a famous naval battle during the war) are to have lights of over 77,000 candle-power each, and will give double and quadruple flashes respectively. Further lights on Cape Parapola and Cape Lakka will exhibit five flashes, each of 76,000 candle-power, and double flashes, each of 30,000 candle-power, respectively.

All these lights are on the Chance Petroleum Vapour Burning principle, renowned throughout the world for its reliability and simplicity of operation. This system consists of a burner to which oil is supplied under pressure. The burner turns the oil into a gas, which is consumed in a mantle, and produces a light of great brilliance. Light from this mantle is condensed into beams of light by a revolving "cape" of glass prisms in such a way that the beams sweep the horizon and appear to the mariner as groups of flashes followed by a period of eclipse or of reduced light. Most of the lenses for these lighthouses are so heavy that they have to float in a bath of mercury so as to provide a turntable with very little friction. Each lens is rotated by a clockwork mechanism, which derives its power from falling weights.

In addition to the order for lighthouses Chance Brothers are to supply 15 port or jetty lights. Each of these consists of an oil burner, lens and lantern for giving continuous white, red or green light (as the case may be), and the lantern is mounted on a pulley arrangement, complete with mast and cabin, so that the lantern may be trimmed within the cabin and then hoisted to the top of the mast.

Handley Page Hastings Aircraft

ONE of the new Hercules-powered Handley Page Hastings aircraft, Britain's fastest and biggest military air transports, left England on March 10th for a 26,000 miles Australasian tour, arranged in conjunction with the Ministry of Supply.

The aircraft will tour Australasia for about a month. At Sydney, Melbourne, Canberra and in New Zealand it will be demonstrated to the R.A.A.F. and R.N.Z.A.F. authorities and the Australian Departments of Civil Aviation and Aircraft Production. It is to be seen also by representatives of various airlines interested in the Hermes 1 airliner and freighter, civil versions of the Hastings.

The Hastings' four 1,675 h.p. "Bristol" Hercules engines give it a maximum cruising speed of 305 m.p.h., and it has a 3,250 mile range, but no attempt is to be made during the flight to set up new performance records. The aircraft will fly to Australia in easy stages—via Malta, Habbaniya, Karachi, Negombo and Singapore.

"Bristol" New Type 170

ONE of the most intensive flight research programmes ever undertaken in the development of a British aircraft reaches its culmination with The Bristol Aeroplane Company's announcement that the New Type 170 has been granted a Certificate of Airworthiness at 40,000lb. (18,154 kilos.) all-up weight.

The New Type 170 is the 1948 version of the famous multi-purpose, twin Hercules-engined aircraft which in a series of major demonstration flights has toured aviation markets throughout the world. It incorporates increased wing span, propellers of greater diameter and a new type of engine cowling modifications which not only give increased payload but also result in greater range and vastly improved single-engine performance.

The story of New Type 170 development dates back to the early stages of a tour of the Americas in 1946, when there was recurrent proof that the aircraft could efficiently carry a much greater cargo than that permitted by its C. of A. at 36,500lb. (16,556.4 kilos.). Technical data yielded by this and other tours, supplemented by reports from operators in all parts of the world, determined the standards which were to be the performance target of the new version.

Rate of climb on one engine was the primary factor governing an appreciable permitted increase in A.U.W., and flight tests were concentrated on this vital aspect of performance. Initial tests with wing span increased by 10ft. (3 m.), but without embodying any drastic changes in design, resulted in a C. of A. at 37,000lb. (16,783 kilos.).

Letters from Readers

Electric Water Heating

SIR,—It is with great interest that I am following G. A. T. Burdett's articles on "Electric Water Heating Practice." These should be of great practical use to many plumbers who have occasionally to install water heaters or immersion heaters.

In the March issue (Fig. 15) the lay-out in theory looks good, but in fact has disadvantages. If heater is "Off" and boiler is working, storage contents of heater are cold. If boiler is "Off" the "bridge" pipe from feed to heater and sink should be valved, otherwise cold water will be drawn straight through. A valve should also be inserted in the inlet pipe near base of water heater when boiler only is used. This can make the system rather complicated from the layman's point of view.

In my opinion it is better in such cases to cut out the existing storage tank and use a type of pressure heater with side bosses for the primary flow and return.

Mr. Burdett also mentions "Kontite" fittings, etc. These are excellent but he will find that under freezing conditions "Simplifix" will hold much better and will not pull out so frequently.

Another thing worth mentioning in regard to the small displacement type of heater, is the combined restrictor and non-return device fitted to the cold inlet. These play a very important part in the correct working of the heaters.

I trust Mr. Burdett will forgive me for mentioning the above points but it is purely interest, and not any spirit of adverse criticism. Also your correspondent in "Letters from Readers" re the proposed cock in Mr. Burdett's diagram of January (Fig. 2) is in fact destroying the excellent recommendation which Mr. Burdett made in separating the draw off from the primary flow. Anyone not conversant with the system could turn on the cock between x–y and, of course, bleed the flow pipe. In any case most boilers are fitted with drain cocks.

By the way, when drilling any tank, drop a permanent magnet attached to a string inside. This will pick up all the filings, swarf, etc.—C. S. HALL (Greenford).

Mathematics as a Pastime

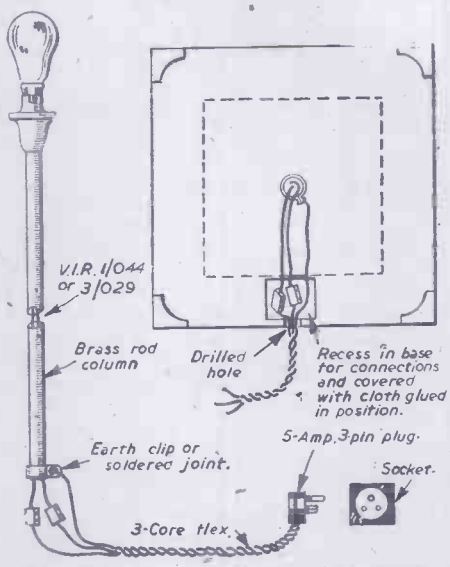
SIR,—I have read the articles "Mathematics as a Pastime" in PRACTICAL MECHANICS with considerable interest, but venture to think that an error has been made in that on the cycloid.

You state that "The distance travelled, therefore, between two contacts of the point with the surface *must* be four times the height (or diameter) of the wheel. That is to say, the path of the point in space is a curve, the *base* of which is four times the height." Why? You offer no explanation or proof as to why the *base* should be four times (exactly?) the diameter, and it seems to me that it must, in fact, equal π, as the distance travelled will be exactly the same as the circumference of the wheel. Your diagrams also make it clear that the ratio of 4 : 1 refers to the *base* and height measurements. As near as I am able to calculate, the path of the point in space between cusps, i.e., the length of the *curve*, will be approximately four times the height, and should be pleased to learn whether this is correct and if it is *exactly* four times the height.—E. W. ELTON (Northaw).

[*The author agrees.*—ED.]

Earthing a Floor Lamp

SIR,—I wish to draw attention to the absence of "earthing" in R. J. Chamberlain's article in the February issue on the construction of a floor lamp. The author suggests a brass curtain rod for the column, and this in itself is a very good conductor of electricity. Local and I.E.E. regulations for buildings state that all metal and metal tubes carrying electric wiring should be earthed.



Diagrams showing the method of earthing a floor lamp. (C. B. Taylor).

I suggest permanently wiring with 1/.044 or 3/.029 VIR down to a base block, two 5 amp. connectors fitted in same and an earth clip fixed to the bottom of the brass tubular rod. Then 3-core flex coming from base to a 5 amp. 3 pin plug, as shown in the accompanying diagram.—C. B. TAYLOR (Rugby).

Ballistics in Nuclear Physics

SIR,—Mr. Cousins must be congratulated upon his article "Ballistics in Nuclear Physics" in the March issue of PRACTICAL MECHANICS, especially upon the able way in which he condensed so much of interest into the space at his disposal. It is therefore, in no carping spirit that I find myself disagreeing with his definition of a neutron, where, in the list of particles used as projectiles he says, "(c) neutron . . . electron and proton closely bound. No electric charge."

It is admitted that at first such might appear to be the case; and I take it that Mr. Cousins reasoned as follows:—An electron with a charge –e and almost negligible mass, and a proton with charge +e will be attracted by reason of their unlike charges and become "closely bound." Thus forming a neutron with no charge and of mass closely approximating to that of a proton.

Unfortunately, the matter is not so simple as that, owing to the fact that the binding forces in the nucleus are much greater than ordinary atomic energy. The short range forces involved in binding the nucleus do, in fact, seem to be well accounted for by the quantum theory. It is probably for this reason that most of the authorities that I have read say simply that neutrons are particles of almost the same mass as protons and have no electric charge.

The matter can, however, be taken further, and it can be shown that it is *most unlikely* that a neutron could be made up in the way suggested by Mr. Cousins. Taking Prof. Peierls as our authority, it can be said that, according to the quantum theory, there is a limiting distance when the attraction between the electron and the nucleus is not powerful enough to confine the electron to a still smaller region and *it is for this reason that atoms can be stable.*

To confine electrons to a region less than the size of an atom; i.e., to the size of a nucleus, would require energy larger in proportion to the inverse square of the diameter of the region. As the diameter of the nucleus is approximately .0001 of the atom, some 100,000,000 times greater force than atomic energy would be required.

If this is true for a nucleus as a whole, how much more unlikely it is for an electron to become "closely bound" to a single proton. In fact the hydrogen atom consisting and *existing* as one electron and one proton seems to bear out my point still further.—L. A. PUDDEPHATT, M.B.E., M.Inst.B.E.

SIR,—Firstly, may I thank Mr. Puddephatt for his kind remarks and, secondly, acknowledge his academic correction of my definition of the neutron.

I am in complete agreement with the view expressed in his letter, and I wish I had been more prudent in my definition and simply stated *that the neutron is a basic constituent particle of atomic nuclei having no electric charge and a mass of about*

1.67×10^{-24} *gram.*

As it was, I used Dr. Charles M. Lack's Nuclear Physics chart of Electronics, page 33, August, 1937, for my definitions, and this *inter alia* caused me to overlook the inaccuracy of the statement, more especially in that I did not have the article vetted by a kindly critic.

Mr. Puddephatt has filled this most useful position, and I appreciate his remarks.—FRANK W. COUSINS

Removing Scale from Water Heaters

SIR,—A number of people have written to us recently concerning our Micromet material, following the information you were kind enough to publish under "Queries and Enquiries" in your March issue.

Unfortunately, most of the enquiries deal with hot water systems which are already scaled up, for which we usually recommend some form of acid treatment. We do not recommend Calgon or Micromet for removing existing scale as the process, in our opinion, is not really efficient and, in any case, would take rather too long.

For the prevention of scale accumulation, however, Calgon and Micromet, and particularly the latter for domestic installations, are very satisfactory.—ALBRIGHT AND WILSON, LTD. (Park Lane, W.1.).

THE WORLD OF MODELS

Model Boat in "Perspex" : A 3½in. Gauge "Pacific" Type Loco : Model of New Coventry Shopping Centre

By "MOTILUS"

DURING the last few weeks, the items of news that have reached me from model enthusiasts have been distinctive in their variety and diversity. Among them was one that brought back to me many reminiscences of past modelling days, in the shape of a 2½in. gauge, commercially-made, model of a 4-4-0 L.S.W. Railway locomotive, belonging to Mr. R. Burton, of Doncaster. Mr. Burton was given this model by his father, in 1924, it having belonged before then to a friend of the family who had had it since 1915, but, despite its vintage, the locomotive still puts up a good performance. Made of tinplate, hand-painted in the correct colours, the model has a brass, cylindrical boiler, standard double-action cylinders of the piston valve pattern, and is fired from a methylated spirit lamp. It also has reversing motion from the cab, exhaust goes into the funnel and there are a whistle, safety valve and spring buffers. In "model history," this locomotive followed the famous 2½in. gauge "Black Prince," and was introduced on the market by Messrs. Bassett-Lowke, Ltd., in the year 1903. At the time it caused quite a stir in the model news, because it was the first locomotive that was really a satisfactory working steam model on low pressure that still had a fair resemblance to its prototype. More than this, it was also placed on the market at the popular price of £3 10s. If you look at the photograph of Mr. Burton's locomotive (Fig. 1) you will see that it shows clearly the starting valve, which was in the form of a milled wheel in front of the smoke-box: the steam was taken from the dome by a pipe along the top of the boiler. I wonder how many model locomotives of this kind are still in existence and in such excellent running condition as Mr. Burton's appears to be!

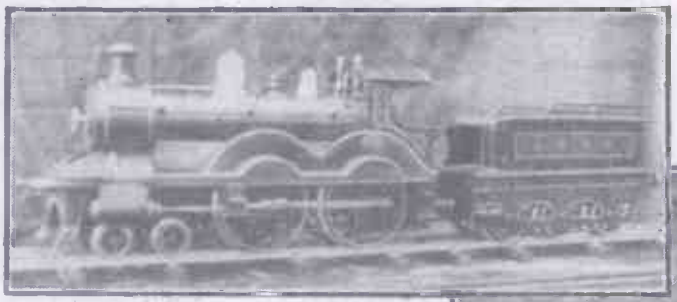


Fig. 1.—2½in. gauge tin-plate model of L.S.W. Railway 4-4-0 locomotive, a commercial model produced in 1903, 24in. long. (Photo kindly supplied by the present owner, Mr. R. Burton, of Doncaster.)

When in Paddington Station the other day, I noticed a crowd of youngsters gathered round a large display case just outside the inquiry office on the main platform. Being tall, I was able to stand behind the group and examine the contents of the display case, which I reckoned must be over twenty-five feet long, while I awaited a chance of closer inspection. The cause of the attraction was some splendid models, beautifully made, of a G.W.R. locomotive, King George V, a Great Western corridor coach, such as run on the Cornish Riviera Express and, as a contrast to these two magnificent examples of modern transport vehicles, a model of "Locomotion No. 1," built by George Stephenson, in 1825, for the opening of the Stockton and Darlington Railway, together with the first closed carriage, "Experiment." "Locomotion No. 1" was driven by Stephenson himself on the opening day, and the actual locomotive is still preserved on a pedestal at Banktop Station, Darlington. These models at Paddington (Figs. 2 and 3), which are all to a scale of about 1½in. to 1ft., were built by Mr. B. R. Hunt, of Johannesburg, who presented them as personal gift to the directors of the Great Western Railway. Mr. Hunt also made a set of model engine tools, which are displayed alongside the larger models: an original addition to the exhibit that must be of novel interest to laymen, and is fascinating for the engineer or modelmaker. Considering the expert workmanship and wonderful finish on all the models, I was not surprised to learn later that Mr. Hunt spent twelve years making them. They must be certainly some of the finest models of that scale and type in existence.

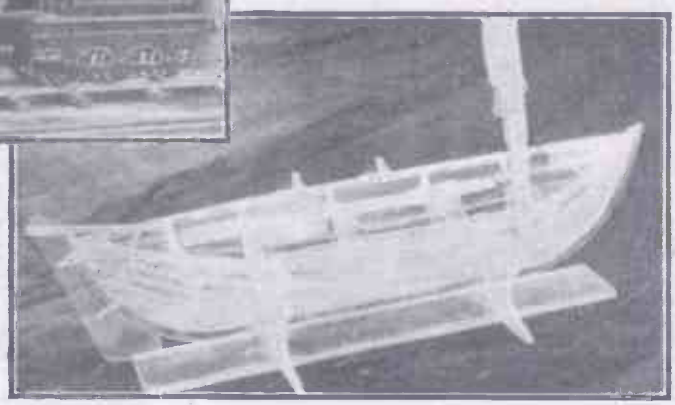


Fig. 4 (Right).—A model boat made entirely of clear Perspex, by Mr. R. Williamson, photographer, of Lerwick, who also supplied the photograph.

Model Boat in Perspex

An unusual addition to my varied collection of model news was sent me by Mr. R. Williamson, of Lerwick, who has very cleverly constructed a model boat in Perspex, 18in. long (Fig. 4). It is a model of a Shetland fourareen, the *Day Star*, a fishing boat in which Mr. Williamson himself sailed as one of the crew, with his father as "skipper." I understand these boats are no longer in use, but that at one time they used to be brought in on the north side of the Victoria Pier at Lerwick, so that their owners could sell their catches straight from the boat. *Day Star* was registered in 1886, having cost £4 10s. to build, including the oars! (To-day, she would cost something like ten times that figure.) Mr. Williamson has built his model in Perspex "planks," each 1/16in. thick. The sail is cellophane, and the halliards are made from clear gut, but all the rest of the boat, including the oars and the mast, which can be unshipped, is of Perspex. Mr. Williamson is to be congratulated on an ingenious piece of work, as Perspex is a material in which you cannot cover up any mistakes, however small.

A 3½in. Guage "Pacific" Loco.

In the February issue of PRACTICAL MECHANICS, I promised readers I would publish some photographs of the L.N.E.R. "Pacific" type, "Hielan Lassie," locomotive that I had seen in course of construction when visiting Mr. J. E. P. Hutchinson, of Barnstaple. I have since received the photographs (Figs. 5 and 6) from Mr. Hutchinson, who tells me that he has now had the engine under steam and that she is extremely powerful. The following technical data may be of interest to those who do not know the details

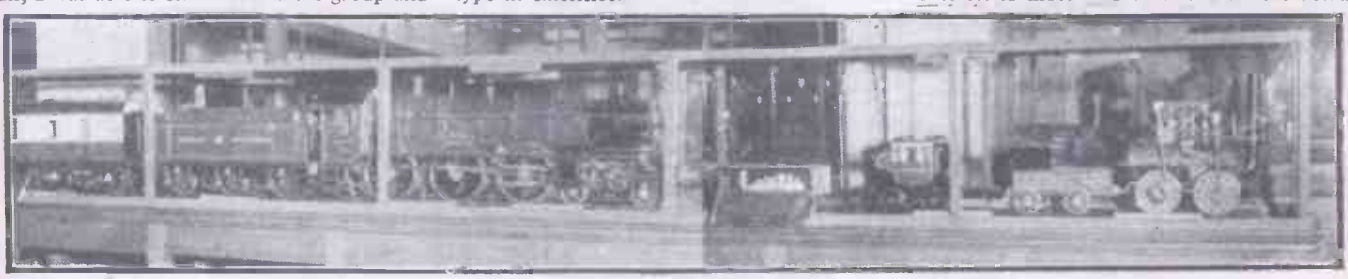


Fig. 2 (Left-half).—1½in. to 1in. scale model of the King George V locomotive. The model is complete with the bell that was presented for the prototype when this locomotive visited America. (By courtesy of British Railways.)

Fig. 3 (Right-half).—A model of Locomotion No. 1, built by George Stephenson for the Stockton & Darlington Railway, and model of the coach, "Experiment." The tools shown in the left-hand corner of the picture form part of the express-engine equipment. (By courtesy of British Railways.)

of this "Hielan Lassie" locomotive, designed by L.B.S.C., whose drawings have formed the basis for many models of this locomotive. It is an L.N.E.R. 4-6-2 type, built for 3½in. gauge. It has three cylinders, 1 3/16in. bore and 1¾in. stroke. The driving wheels are 5in. in diameter and the firebox is 5in. by 4in. The boiler is 28in. long by 4½in. diameter: it is fitted with 16 ⅜in. flue tubes and four 3/16in. superheater tubes. The boiler is also brazed throughout and tested to 200lb. per sq. in., having a working pressure of 100lb. per sq. in.

Mr. Hutchinson also sent me news of the formation of the North Devon Model Engineering Society, of which Mr. E. A. Bramwell, of 17, Mill Street, Bideford, has been elected secretary. By this time the society will be well-established. I understand they were to have held their first exhibition at Easter, but at the time of writing it is too early for me to have received any particulars as to how successful this proposed venture turned out to be.

Fig. 6.—Mr. J. E. P. Hutchinson's "Hielan Lassie" in course of construction, showing the boiler in position on the finished chassis.

Scale Model Houses

Among the interesting models on view at the *Daily Mail* Ideal Home Exhibition, recently held at Olympia, was a pair of model semi-detached houses (Fig. 7) illustrating the type of dwellings that are being erected by Messrs. O'Sullivan, Ltd., at St. Mary Cray, in Kent. The unusual feature about the construction of these houses is that they are built from concrete blocks and sections cast on the site. The model, made by Messrs. Bassett-Lowke, Ltd., of Northampton, is built to a scale of 1in. to 1ft. and stands on a platform measuring about 4ft. 6in. by 3ft. It shows a pair of houses, one an exterior model and the other with transparent walls of Perspex and well-lit rooms, so that the whole of the fully-furnished interior may be seen clearly. In these days of a housing shortage, many visitors to the exhibition must have gazed with envious eyes on these compact, six-roomed model dwellings, with their red-tiled roofs. On the ground floor are the entrance hall, kitchen, lounge and dining-room. Double doors that may be thrown open if desired, separate these two reception rooms. The lounge has a grate for a coal fire and the dining-room has an electric fire built into one of the walls. The kitchen is fairly spacious, with modern equipment, including an "Ideal" boiler, "Main" gas cooker, a gas copper and a cast aluminium sink and draining board (Fig. 8). There is also a pantry and built-in store cupboards and drawers. Upstairs there are two double-bedded rooms, one single bedroom and separate bathroom and lavatory. All the bedrooms have electric fires and built-in wardrobe cupboards. Outside the house, near the kitchen door, are the outbuildings, consisting of garden shed, coal store, and lavatory.

The model thus showed two very attractive residences and the method of constructing the houses was of added interest for those engaged in the building trade.

Fig. 5.—Mr. J. E. P. Hutchinson busy on his lathe, making a small fitting for his locomotive.

New Coventry in the News again

Of all the "blitzed" industrial cities in this country, I think Coventry must have suffered the most, and the City Authorities, with the able guidance of their city architect, Mr. D. E. Gibson, M.A., A.R.I.B.A., A.M.T.P.I., were also the first to produce a comprehensive plan for re-building. The entire scheme took shape in model form some time ago and a commencement has now been made on the new central roadworks, which will be opened by H.R.H. Princess Elizabeth on May 22nd. It is hoped to commence the buildings as soon as the national position is easier. Meanwhile, Mr. Gibson and his committee of the city council have revised the layout of the new Coventry shopping centre and main pedestrian way, and a model of this centre, made by Messrs. Bassett-Lowke, Ltd., to a scale of 3/10in. to 1ft., has recently been exhibited in Coventry.

The model measures approximately 9ft. by 3ft. by 3ft. and viewed from the west it shows, in fine and imaginative detail, a gay, colourful prospect, with the famous cathedral spire towering against a summer-blue sky at the eastern end of a long avenue. At the entrance nearest the spectator are two gentle cascades, flowing over shallow steps to a common, central pool, and flanked on either side by two stone panels sculptured in low relief.

The whole centre being reserved for pedestrians, the avenue is level and smoothly paved except, of course, where gardens, bridges or minor courtyards are introduced. The even building line is broken at the far end by two blocks of buildings, to be used mainly as offices, or possibly as an hotel, which project into the avenue on all floors except the ground floor, the overhanging part being supported by pillars, leaving free passage for shoppers on the ground level. Both these buildings have flat roofs, intended for use as sun parlours and cafés.

Shopping Centre

Between the decorative cascade and these massive buildings, there are shops on either side of the avenue, occupying the first two floors of the flanking buildings. Above the shops are light, airy offices, and as the model represents a summer scene, the window boxes on every floor are gaily decked with flowers. Behind these window boxes run galleries that are wide enough to allow tending of the

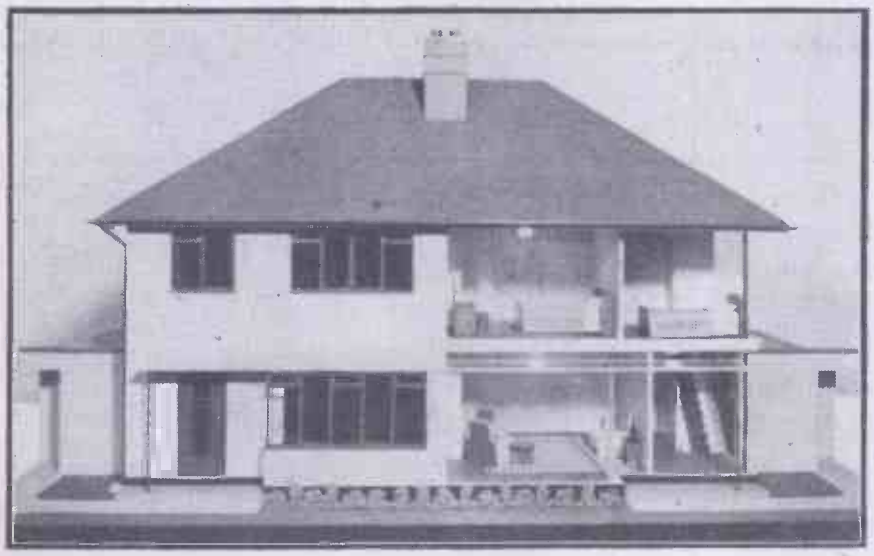


Fig. 7.—A pair of semi-detached model houses, showing the front of the houses, with one in section. This gives a peep into two of the bedrooms, the lounge and the entrance-hall.

Fig. 8.—The garden side of the pair of model houses, the one in section showing the kitchen, dining-room, bathroom, and the third bedroom. The outbuildings can be seen on the left.

boxes and cleaning of the windows to be carried out with ease. The ground floor shopping aisles are under cover and those on the first floor are protected by a glass verandah if on the southern side, and by striped sunblinds on the northern side, which will get most of the midday sun.

Busy mothers, intent on a shopping expedition, can leave their young children (when not at school or nursery), in the playground, which is in a central position, within full view of the shop parades. Beyond the children's playground is a small, sunken garden, which it is proposed to build around the "levelling stone," which is already in position in Coventry. Under this stone are buried the amazing records of the Coventry "blitz," for the benefit of future historians.

In the comparatively narrow strip of paving between the two large blocks of buildings at the end of the avenue, is another small square, showing a clever and intriguing mosaic plan of medieval Coventry, which is to be laid by the voluntary labour of members of the Association of Building Technicians and the local artists, during this summer. Nearby a slender flagstaff has just been erected, specially designed and presented to the city by Coventry Industries. This is also shown in the model, topped by a small, golden elephant (one of the symbols of the Coventry crest), which in reality must shine brightly on sunny days, high above the thronging shoppers.

Beyond the flagstaff lies a slightly raised, formal garden with flower beds and a large stretch of smooth lawn. In the centre, supported on a pedestal, is an equestrian statue of Coventry's traditional patroness, "Lady Godiva"; historial or legendry, the pattern would not have been complete without this gracious memorial.

The temporary shops already in existence in Coventry, erected as an emergency measure to house those displaced by the reconstruction scheme, are seen at the far side of the model, at right angles to the main proposed centre. Behind them rises the cathedral, blending the best of the old city with the bold, brave hopes for the new Coventry, which is now becoming reality.

For some years now, rigging blocks and dead-eyes for model shipbuilders have not been available, except in very limited quantities, and then hand-made. So ship modellers will be pleased to hear the good news that when I was in the London shop of Messrs. Bassett-Lowke, Ltd. (112, High Holborn), recently, I found they had placed on the market a series of rigging blocks and dead-eyes for ¼in., 3/16in., ⅛in., and 1/16in. scales. The smallest size, 1/16in. scale, are in ivory finish and the other sizes are all in brown.

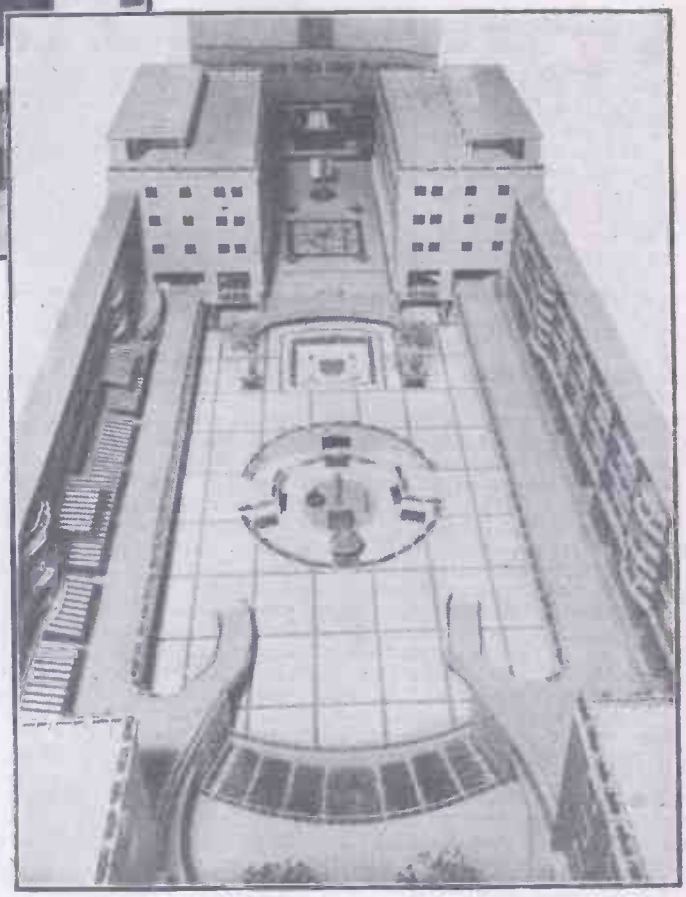


Fig. 9.—A bird's-eye view of a model of the proposed new shopping-centre and "pedestrians' sanctuary" of the new Coventry. The view of the cathedral, which is cut off in the photograph, will give a very pleasant effect to the vista when seen from the pavement in the main courtyard.

Bristol Freighter Tours the Americas

"BRISTOL" Freighter G-AGVC carried the names of nearly 100 different aerodromes on her fuselage when she came in to land at Filton, Bristol, on Monday, February 23rd, on her return from Canada.

The aircraft had been away for 18 months, having left Bristol in August, 1946, for a demonstration tour of Canada and the Americas. The tour lasted for five months and in the course of it G-AGVC flew for 276 hours and covered 41,000 miles. Afterwards, she undertook a series of freighting jobs in Canada and South America. The return journey to Filton brought total distance travelled to 100,000 miles, with total cumulative flying time of exactly 638 hours 41 minutes. The Freighter had flown in both extremes of temperature, had carried all kinds of freight—ranging from a damaged aeroplane to bags of cement and had been used for a variety of rôles, including flying ambulance, airborne "meat van," and military transport.

At the controls when the Freighter landed was Capt. C. I. Hopkins, of British Aviation Services, who brought the aircraft from Toronto to Filton via Montreal, Goose Bay, Gander, Keflavik (Iceland) and Blackbushe, near London. For the Atlantic crossing the machine carried extra fuel tanks in her hold. This enabled the aircraft to complete the crossing in two legs—Gander to Iceland and Iceland to Blackbushe. Flying time for these journeys was 11 and 8 hours respectively.

When G-AGVC ended her demonstration tour at Toronto early in January last year she undertook the task of flying supplies and machinery to a new mining outpost in Northern Quebec. Here her airstrip was the frozen surface of Knob Lake and it was at this stage that she met with a mishap while taxi-ing on thawing ice, and was in danger of being lost when the surface threatened to break up following an unexpected rise in temperature. A new undercarriage leg was immediately flown from England, however, and fitted in time to permit the Freighter to take off safely.

From Quebec, G-AGVC went to Venezuela and for two months flew meat from inland killing stations to the coast.

Trade Notes

Blocks and Dead-eyes for Ship Modellers

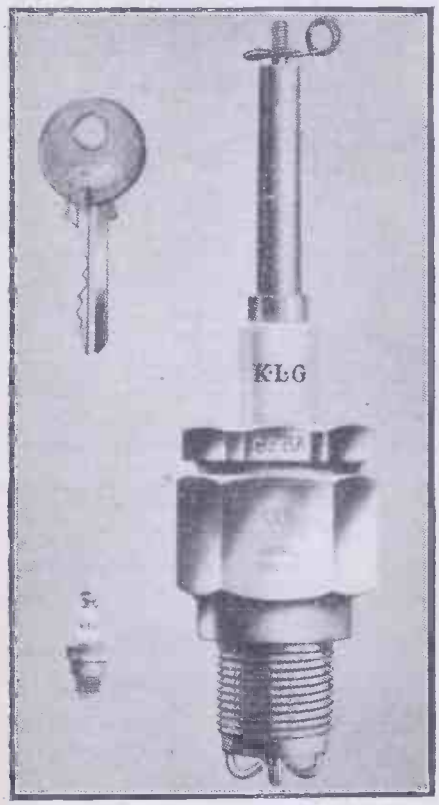
WELL-FINISHED blocks and dead-eyes for ship model builders have always been difficult and expensive items to manufacture. In pre-war days these were almost entirely hand-made in boxwood, and were thus both costly and not always uniform in size and proportions.

Messrs. Bassett-Lowke, Ltd., St. Andrew's Street, Northampton, have now placed on the market a range of rigging blocks, both single and double, and dead-eyes in various sizes. This range will supply the demand of the builder of small models, particularly clipper ships. The $\frac{1}{16}$in. rigging blocks and $^3/_{32}$in. diameter dead-eyes are available in white, since these are largely used for the rigging of bone and ivory models, but the larger sizes from $\frac{3}{16}$in. to $\frac{1}{4}$in. are supplied in brown. Prices for the rigging blocks range from 2s. 6d. to 4s. per dozen.

These fittings are well proportioned and finished in a style that will appeal to the most fastidious model ship builder.

K.L.G. Miniature Plugs

IN the middle of last year, K.L.G. announced the introduction of miniature sparking plugs for model engines. They are now in full production with these and have added to



The K.L.G. "Mini" plug for miniature engines (bottom left) compared with a latchkey and a gas engine plug.

their list an even smaller plug, the height of which is a mere three-quarters of an inch.

In every detail these small plugs are precision engineered miniatures of the famous K.L.G. plugs. Their weight, size and thread dimensions show us that they have been designed expressly for the small petrol engines which have become so popular in model aircraft, boats and cars.

Some idea of the size of these K.L.G. Mini plugs, as they are called, can be gained from the illustration, which shows one of these plugs compared with a gas engine plug and a latchkey.

Enthusiastic reports on the performance of these plugs have been received from many users and it is obvious that this new K.L.G. development is of great interest to model engineers. The K.L.G. improvements that were developed for the gruelling conditions of wartime flying have been incorporated in the K.L.G. Mini. It has "Corundite" insulation—hard as rubies and dielectrically perfect. It has the K.L.G. vitrified seal to guarantee permanent gas-tightness the whole length of the insulator.

Mini plugs are available with either $\frac{1}{2}$in. (32 t.p.i.) or $\frac{3}{8}$in. (24 t.p.i.) thread diameters and thread reaches of $^5/_{32}$in. and $^7/_{32}$in. respectively. Weights are .13 oz. for the $\frac{1}{2}$in. and .27 oz. for the $\frac{3}{8}$in. model. Price, 5s. each. Further details are obtainable from K.L.G. Sparking Plugs, Ltd.

New Bleaching Agent

A NEW bleach, known as Blanchit, and suitable for use on solid wood and veneered panels, has been placed on the market by Wm. Mallinson and Sons, Ltd., 130, Hackney Road, London, E.2. It is extremely simple and effective in use, and after the process is completed according to directions furnished with the material, the wood surface is ready for application of any usual finishing materials; that is, the wood may be finally sanded and finished with varnish, shellac, lacquer, or any other polish. There is no chemical reaction, as the activity of the chemicals used is neutralised when the material is applied as directed.

There are, of course, one or two woods the colour of which is almost unaffected by Blanchit, notably macassar ebony, rosewood and padouk; but most woods, particularly walnut, mahogany, etc., react very readily to this product. The degree of bleaching can be easily controlled and arrested at any desired stage, and extreme effects can be obtained by a second or third application, which in some woods results in an almost bone-white colour. In many woods, Blanchit will materially lessen the natural streaks and stains, which normally have to be cut away, and wood once treated with Blanchit will never revert to its original colour—the effect is quite permanent.

The Aeromatic Soldering Torch

A MEDIUM-WEIGHT general-purpose gas torch for soldering and light brazing work is now marketed by Primon Engineering Co., Ltd., 270, Old Brompton Road, London, S.W.5. Approved and used by important industries and gas companies throughout the country, the torch gives a high performance on low-pressure town's gas. With this handy appliance no adjustments, and no compressor or air line are necessary. The accompanying illustration shows how easily the torch is handled, the overall length (excluding gas cock) being 6in., and the height 7½in. Maximum gas consumption at 3in. W.G. is 10½ cu. ft. per hour. The price is £1 17s. 6d. complete with gas cock, but without flexible tube.

Smiths Braille Pocket and Wrist Watches

AMONG the community to-day move a section of people unable to take advantage of the visual beauty of life; every consideration should be shown by the more fortunate to this group of people who, through no desire of their own, have to take their way in a world of total darkness which to the ordinary and unafflicted human being would prove positively terrifying.

There are, of course, many aids and guides to make life happier. Special books have been prepared to help pass the odd hours; typewriters have been built; there is the radio with a great variety to please all.

With all these considerations in mind, Smiths English Clocks, the world-famous manufacturers of "Sectric" clocks, wrist and pocket watches, announce their new departure in the horological field in the production of a Braille pocket watch, to be followed shortly by the Braille wrist watch, both specially designed to meet the urgent demands of these folk, who, unable to read the time, must rely on their delicate touch for the time of day.

This Braille watch is being modelled on the style of a full Hunter. It is a 19-ligne, 15-jewelled lever movement in a chrome case. There is, of course, no glass, and the numerals

The Aeromatic general purpose soldering and brazing torch.

and hands are specially raised, also the motionwork gearing has been reinforced so that there is no likelihood of the hands being moved during the process of telling the time by touch.

Plessey Centrifugal Switches

THE wide and growing popularity of the small single-phase motor, particularly in the fractional horsepower class, has called for a simple, yet reliable, means of self-starting. A range of centrifugal switches has therefore been developed by the Plessey Company, Ltd., of Ilford, suitable for 2-, 4- or 6-pole, 50-cycle motors up to 1¼ h.p.

The switches are available in two sizes, large and small, the small one being suitable for motors up to ½ h.p., ¾in. dia. shaft and the large for motors up to 1¼ h.p. and 1 1/16in. dia. shaft.

Each switch consists of two parts, one being mounted on the rotor and the other on the stator end shield. When the motor attains some 72-82 per cent. of synchronous speed the rotor portion expands radially and, by engaging with the outer tongue of the stator portion, opens the switch and disconnects the motor-starting winding. When the motor is switched off and slows down the contraction of the rotor resets the switch for the next start.

These switches are now in production and are described in an illustrated brochure just published.

QUERIES and ENQUIRIES

A stamped addressed envelope, three penny stamps, and the query coupon from the current issue, which appears on page 64 (THE CYCLIST), 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.

Infra-red Lamps

I SHALL be glad if you would give me some information on the following queries :

Are the ceramic formers used in infra-red lamps ordinary electrical porcelain, and is the wire used for the element nickel chrome and/or nickel chrome iron ?

Some of the elements I have seen are of the open type, whilst on others the spiral has been embedded in some form of cement, which is then painted different colours. The colour in some cases indicating the specific wavelength. Where could I obtain the cement and heat resisting paint and does the wavelength vary in proportion to the watts loading ?

Are there any publications dealing with this subject ?—G. F. Marchant (Leicester).

THE formers used in the lamps you name are, for the most part, ordinary electrical porcelain ones, but sometimes steatite formers are used. The wire is, of course, an ordinary resistance wire, usually of nickel-chromium-iron alloy.

The cement to which you refer is of secret composition so far as its actual formula or make-up is concerned, and it is certainly not a commercially-obtainable product. It is usually coloured by admixture of some suitable earth colour, such as red oxide, rose-pink, Venetian red, etc. The cement has a basis of china clay or fireclay. It is usually bound by hydraulic compression (1½ tons per sq. in.) with or without admixture of a binder such as sodium silicate, and a little asbestos powder. It is very difficult to make these cements oneself, but, owing to the recent commercialisation of ethyl silicate, it is now becoming possible to prepare a heat-resisting cement by making a paste of china clay and an alcoholic solution of ethyl silicate which has been very slightly acidified. This sets hard in 24 hours and will resist heat.

Ethyl silicate is fairly expensive stuff yet, but it is obtainable from Messrs. Albright and Wilson, Ltd., 49, Park Lane, London, W.1.

An essentially heat-resisting paint can be made by mixing any earth colour (stable to heat) with the above-mentioned acidified alcoholic solution of ethyl silicate. Messrs. Albright and Wilson issue a booklet dealing with this product, and you might be able to persuade them to let you have a copy.

Wavelength is not just a question of watts. It is governed directly by temperature. The higher the temperature of the heating element, the higher the radiated wavelength. The watt is, of course, a unit of electrical power, and, other factors being equal, the more power you impart to a heating circuit the greater will be its generated heat, and, therefore, the higher its radiated wavelength. This, indeed, is usually the case.

There are no publications dealing with the making of infra-red electrical formers. The books on infra-red work usually treat mainly of its photographic aspects, as, for example, W. Clark : "Photography by Infra-red" (Chapman and Hall, 1939). There are, we think, one or two American books dealing with other aspects of infra-red work, and particulars of these you should be able to obtain through any good firm of foreign booksellers, such as Messrs. Ed. Bryce, Ltd., 54, Lothian Street, Edinburgh.

"Fumed" Oak : "Limed" Oak

COULD you please inform me of the method which I can employ to fume oak ? Also, can you tell me how to obtain the finish which I believe is called limed oak ? What I desire to obtain is a green finish with a white grain.—N. J. Leggett (Gillingham).

OAK is "fumed" by exposing it to the vapours of strong ammonia solution. It is a difficult process to adopt with big areas of timber, for which reason the process is seldom attempted. But for small articles, you can suspend them in a closed container over ammonia liquor for a week or more, the box being put in a warm place. Larger timbers can be similarly treated by constantly wiping over the wood a rag charged with strong ammonia. The resultant action is a rather characteristic darkening of the wood which is caused by a chemical action of the ammonia on some of the wood constituents. It is mostly noticeable in the case of oak, but may be observed in the case of other timbers. All the "fumed" oak of the present day is, of course, artificially obtained by staining methods.

In the case of "limed" oak, whiting is made into a paste with glue water and it is then forcibly rubbed into the open grain of the wood. The material which remains on the surface is quickly wiped away with a damp pad, or with a cloth-covered blade, and, after drying, the wood is lightly varnished or clear-lacquered over. The "pores" of the wood are thus filled with whiting, the surface of the wood being left its natural colour.

In place of whiting, any other mineral colour can be used.

To get a green finish with a white grain on your oak, lightly stain the wood with a spirit-soluble green dye (i.e., a dye dissolved in methylated spirit). Then apply whiting to the grain in the manner above described, giving, finally, a thin, clear surface-lacquering to the woodwork.

Limed and other "fancy" woods do not "wear" well. With use, they become dirty. The wood gets an unpleasant shiny surface and the grain filler tends to yellow.

Quick-setting Cement : Shellac "Manufacture"

(1) I am requiring a liquid cement that on exposure to the air will set instantaneously. I may have to use this in very large quantities so I require the ingredients to be as cheap as possible.

The chief qualities that I am looking for are instantaneous setting on exposure to the air, cheapness of the ingredients, hardness when set. Would shellac form a cheap base, or some resinous materials ?

(2) Could you kindly give me the manufacturing process of shellac, also its chemical formula ?—C. Tattershall Dodd (Gt. Yarmouth).

(1) The quickest-setting cement is collodion. This is made by dissolving nitro-cotton in a mixture of about equal volumes of alcohol and ether. It sets in about 10 seconds. It can be purchased from any dealer in chemicals, as, for instance, Messrs. Griffin and Tatlock, Ltd., Kemble Street, Kingsway, London, W.C.2, or Messrs. Vicsons and Co., 148, Pinner Road, Harrow, Middlesex. There is no rapid-setting cement containing shellac.

(2) Shellac is a resinous exudation of a tropical insect, the *Coccus laccae*. It is found on various trees in Bengal and Sumatra. The leaves are removed, gently heated and the molten shellac is roughly separated by straining from the leaves. The hardened drops thus formed are known as "seed lac." The material is then further purified either by exposure to moist air and sunlight or by treatment with chlorine, after which it is broken up into thin flakes, in which form it is known as "shell lac," or, more commonly, shellac. It contains from 68 to 78 per cent. of a resin, some natural wax, a red dye and a quantity of insoluble matter. Since it is by no means a pure substance, it does not possess any chemical formula. The chemistry of shellac is, indeed, not very advanced.

Barbola Paste

COULD you please supply me with a recipe for barbola paste, as it is very difficult to obtain at the present time ?—R. H. Davy (Plymouth).

A SUITABLE barbola paste for ornamental work can be made as follows :

Oil varnish	½ oz.
Boiled linseed oil	½ oz.
Glue	4 oz.
Whiting	sufficient quantity.

Dissolve the glue in water to a consistency of thin treacle. Add the varnish and the linseed oil. Sieve the whiting and add it to the mixture until the product forms a thin paste.

Test the product by placing a small amount of it on a flat, smooth surface. If it spreads, add more whiting.

Finally, pour the mixture into a jar which can be well sealed.

This paste can be used for modelling, or, thinned out, for painting on to a surface.

Walnut Finish French Polish

WOULD you please give me a formula for a walnut finish French polish with a hard glossy surface, and also an effective method of applying same ?—T. A. C. Michael (Aberdeen).

DISSOLVE shellac in methylated spirit to give a paint-like solution. Strain this through cloth. Then dissolve in it a small amount of Bismarck Brown and Antique Brown, or, alternatively, "Walnut Stain," until you have got the correct colour and shade. These spirit stains can be obtained from your nearest paint and colour shop.

The polish is applied to the wood surface with a soft cloth. It is allowed to dry on. If the colour is not quite right, it is adjusted with more dye which is added to the shellac solution. The wood surface is now sandpapered to give a matt appearance. Another coat of polish is put on, this, after drying, being similarly sandpapered. This operation can be repeated half a dozen times. Finally, the last coat of polish is put on very carefully, rubbing with a circular motion and using the minimum amount of polish medium.

If you cannot obtain materials locally, you will, no doubt, be able to purchase them from Messrs. James Beard, Ltd., 16, Great Ancoats Street, Manchester, this firm marketing ready-made stains and polishes of all types for woodworking.

Cement for Alabaster

I SHALL be obliged if you will advise me of a suitable adhesive for alabaster. I have tried several brands of glue but without success ; the parts to be repaired belong to an antique French shelf clock.—B. C. Poole (Rushden).

PLASTER of paris is often used for cementing alabaster and marble, but only in places where the joints would not be seen, since it is not a strong cement. A good, invisible cement can be made by dissolving 1 part of cooking gelatine in 3 parts of water (hot). This solution sets to a jelly when cold, hence it must be used hot. Spread it on both surfaces and bring them together under some pressure for two or three hours.

You can also use a casein glue for this purpose. A well-known one is "Casco" casein glue, which is manufactured by Messrs. Leicester, Lovell and Co., Ltd., Ebley Mills, Stroud, Glos. A casein glue is, to all reasonable intents and purposes, waterproof.

Flat-white Quick-drying Paint

I AM interested in making or obtaining a small quantity of white paint of a cellulose or other quick-drying type, which will be suitable for the dials of electrical measuring instruments.

I have tried some forms of white paint but have been unable to obtain a paint which has a flat finish and is absorbent to Indian ink. This appears to be essential to obtain good figuring and calibration marks.

Will you inform me where I can obtain a paint suitable for this purpose and the best method of applying same ?—H. K. Winwood (Hillingdon).

FOR cellulose paints and enamels of all types your best source of supply will be Messrs. Nobles and Hoare, Ltd., 3, Cromwell Road, London, S.E.1, who are specialists in these products. At the same time, if you obtain any good cellulose white enamel and thin it down with a cellulose thinner the enamel will dry "flat." You can use as a thinner ordinary acetone. This will give the paint a rapid drying rate.

All such paints are best sprayed, since, by this means, brush markings are obviated and, using a quick-drying paint of the above nature, a very finely "toothed" and "flat" surface can be obtained.

We note that you stipulate the use of a cellulose paint for your purpose, but there are quite a number of ordinary flat-white oil paints which should give equally good results.

Fly Ash

CAN you give me any information on the above substance ? I believe it is used in some manner in the foundry. I would appreciate it very much if you could give me its composition and its method of application, or uses.—T. B. Roach (Pretoria, S. Africa.).

"FLY ASH" is the fine, wind-borne dust of electrical power stations and other industrial boiler installations which often in an unguarded moment and when the wind is in the right direction, obtains

painful lodgment in one's eye. It is, in fact, the lightest of the ash from boiler installations and it is obtained in quantity from dust collectors and from the various forms of precipitators, electrostatic or otherwise, which are frequently used in conjunction with these industrial installations. In composition, it is merely coal ash plus a little unburnt coal and some free carbon, all of these ingredients being of extremely fine particle size.

In view of its inertness and its small particle size it has been used as a "packing" material for moulding sands in order to increase the compacting powers of the latter. Its use has also been suggested as a mild abrasive in metal polishes and other similar preparations. It has, however, no advantage over the purer abrasives such as fine silica, and we do not think that its usage as a moulding sand ingredient is very widespread. However, if you so desire, you can use it for this latter purpose to the extent of one third of the fly ash mixed with two thirds of moulding sand.

Bleaching Mahogany

I SHALL be grateful if you can let me have a list of the ingredients for bleaching mahogany, and details of the procedure for carrying out the process. Are the ingredients the same as for bleaching oak ?—J. Rice (Boscombe).

GENERALLY speaking, mahogany can be bleached by similar methods to those used in the bleaching of oak. In many instances, however, the degree of bleaching may be milder in the case of mahogany than it is with oak, since the colouration of mahogany is less resistant to bleaching effects.

A surface treatment of the wood with a solution of one part caustic soda dissolved in three parts of water effects a mild bleach, but tends to soften the wood unduly. A better and a stronger bleach is chloride of lime. Make this into a paste with water. Spread it on the wood surface. Then brush over a dilute solution of hydrochloric or acetic acid (better the latter) of strength, say, one part in four of water. Chlorine gas will be evolved and the wood will undergo bleaching, particularly if the operation is carried out in sunlight and repeated two or three times.

Another type of bleach consists in staining the wood with a permanganate solution, and then by washing over the stained surface a solution of sodium sulphite (not sulphate), acidified with a few drops of hydrochloric acid. The permanganate stain will be entirely removed and the wood lightened at the same time.

After all these bleaching processes, the wood must be thoroughly well washed in plenty of cold water and then allowed to dry naturally and without heat.

If one bleaching action is not sufficient, it can be repeated.

Illuminating Microscope Object

I HAVE a microscope the high magnification lens of which is only 1/32in. (approx.), above the object when focussed and my difficulty is putting top light on the object. Could you please give me any information on how to construct a light source that will give me a small concentrated beam of light ?—D. G. Fowle (Plymouth).

YOU appear to be using what is known as an "oil-emersion" object. In this instance, you should place one drop of thickened cedarwood oil between the front lens of the objective and the coverglass of the slide. This drop of clear oil will gather additional light and will thus enable the objective to function properly.

Cedarwood oil for this purpose may be obtained from Messrs. Flatters and Garnet, Ltd., Oxford Road, Manchester, 13.

On the other hand, if you are not using an oil-emersion objective, it is possible that you are endeavouring to observe an opaque object, that is, an object through which light cannot be transmitted. In this instance, you require a "vertical illuminator," which consists of either a mirror or a prism device which is fitted to the nosepiece of the microscope (above the objective) and which directs light downwards on to the opaque object. These instruments have to be very accurately made. They are consequently expensive, but you will, no doubt, be able to obtain one from Messrs. Flatters and Garnet, Ltd., address as above.

As a rough (but often quite effective) means of illuminating an opaque object on the slide, you can use an ordinary bull's-eye lens and by means of this throw a spot of bright light obliquely on to the object on the slide. This will not give the full illumination which you require but it will brighten the object considerably.

White Modelling Clay

COULD you please inform me as to the composition of a modelling clay suitable for making small statuettes which will dry pure white, and can be baked in an ordinary domestic oven to sufficient hardness to stand up to ordinary use. —D. Plumb (Mansfield).

FOR pure white modelling clay, you will have to use china clay, with or without admixture of titanium white to increase its whiteness. Mix the material with sodium silicate solution (waterglass), mould as required, and then heat in a hot oven. Please note, however, that none of these clays will "stand up to ordinary use." Statuettes, etc., are all made either on a plaster of paris or on a magnesite or similar basis, in which a definite chemical action with the creation of a new material comes into play. For such purposes, you can use plaster of paris, white cement, both slaked with water. Alternatively, you can use ground calcined magnesite, this being slaked with a solution consisting of 40 parts of magnesium chloride dissolved in 60 parts of water. This takes two day to set, but it gives very hard, sharp castings.

Medicinal Paraffin

COULD you please let me know how "Medicinal Paraffin" is made ? Also, are there any textbooks dealing with the subject ?—Robert Bunting (Rochdale).

MEDICINAL paraffin is nothing more than a special fraction of petroleum distillate which has been very carefully purified with acid and alkali and which, after careful washing, has been redistilled until it is water-white in colour. From the final distillation, only the fraction or portion of the distillate having a given viscosity (at a given temperature) is collected.

Chemically, the medicinal paraffin is a complex mixture of the higher paraffin oils in a state of high purity. The mixture is chemically inert, this being a particular reason why it is used medicinally.

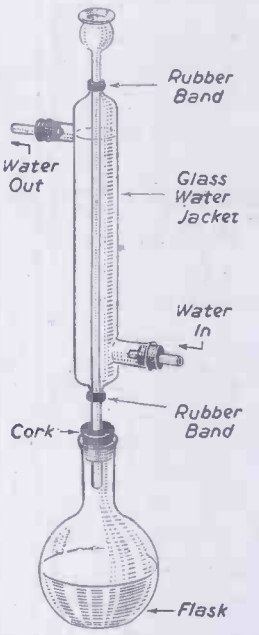
"Liquid paraffin" is only produced by a small number of firms. There is no textbook specifically dealing with its manufacture, but you will find mention of it in the many textbooks on petroleum which are to be found in the Manchester Reference Library. Refer to it, also, in the current issue of the Pharmaceutical Codex, which is to be seen in most large reference libraries.

Reflux Condenser

CAN you please advise me of the constructional details of a reflux condenser suitable for affixing to a laboratory still? —J. Mann (London, N.W.).

A LABORATORY reflux condenser is readily fitted up merely by securing an ordinary Liebig's condenser vertically over the flask or other vessel in which the liquid is being heated. The hot vapours ascend the inner tube of the vertical condenser, and, being condensed by the cold walls of the latter, they drop back into the flask.

The same device can be constructed in metal, but it is very seldom used in this guise. The all-glass Liebig condenser can be purchased from any firm of laboratory equipment dealers, as, for example, Messrs. W. and J. George and Becker, Ltd., 17-29, Hatton Wall, E.C.1, or Messrs. Vicsons and Co., 148, Pinner Road, Harrow, Middx.



A laboratory reflux condenser. (J. Mann)

Cooling Container for Food

I AM desirous of constructing a cooling container in which to keep perishable foodstuffs in the summer months.

The type I have in mind operates, I believe, on the evaporation principle, apparently having sides and back of porous material, the lower portion of which rests in a tray of water.

Any advice you could offer as to precise nature of the porous material, etc., would be appreciated. —W. Sayers (London, E.).

WHEN a liquid evaporates, it performs work in changing its physical condition from liquid to vapour, and this work is performed at the expenditure of heat energy. Consequently, when a liquid evaporates it extracts heat from its surroundings, and the quicker the evaporation rate, the more is the heat which is utilised. Hence, the cooler the surroundings become.

On this principle, if you construct a light wooden frame and cover it with a double or triple layer of cloth which is kept perpetually moist, any foodstuffs which are placed within the enclosure thus formed will have their temperature lowered.

You can also use a porous (unglazed) pot if you can get it at the present time! In fact, anything of a porous, water-holding nature can be utilised for the purpose quite successfully. Asbestos sheet can be used; so, too, can various woollen, felt, hair, glasswool and other fabrics. Even clean, plaited straw has been used for the same purpose.

Fabric Bleaching Solutions

I UNDERSTAND that the fabric bleaching solutions so widely sold, are prepared by passing an electric current through common salt solution. If this is so could you please give me particulars.—K. G. Foott (Brentwood).

A LARGE number of bleach liquors, industrial and commercial alike, consist of stabilised solutions of sodium hypochlorite, this liquor having a very high bleaching power.

On a small scale it is difficult to produce sodium hypochlorite solutions, but on an industrial scale, such solutions are produced by the continuous action of many different types of electrolytic plant. In general, a typical electrolytic hypochlorite apparatus consists of a battery of cells having graphite anodes and stainless steel cathodes. The solution of sodium chloride ("brine") is allowed to circulate around the cells at a constant rate and at a constant temperature, the solution being of a constant strength. By a complex series of reactions, sodium hypochlorite, NaClO, is formed in the solution, which latter, is, at a certain stage withdrawn from the cells. Such solutions always contain a certain amount of sodium chloride in addition to sodium hypochlorite in order to stabilise them and to prevent the decomposition of sodium hypochlorite, which, otherwise, would rapidly "lose strength."

Synthetic Rubber Moulds

I UNDERSTAND that a flexibile mould for casting plaster objects can be made from synthetic rubber and gelatine. Can you please give me the formula and the methods used in making such moulds ?

I should be glad, too, if you would let me know the best colouring materials and a source of supply of suitable plaster or other casting materials. —A. Stanley (Leicester).

SYNTHETIC rubber and gelatine are not mutually miscible. They are entirely different in nature and they tend to resist each other. We feel, therefore, that you have been misinformed in the matter of moulds having been made from these two materials only.

The moulds may, of course, be made by running a synthetic rubber material, such as the I.C.I. "Neoprene plastic polymer" into plaster moulds; or they may be made by dissolving gelatine in an equal amount of water.

For plaster objects, the best colouring materials are the ordinary mineral and oxide colours, such as red iron oxide, green chromium oxide, yellow cadmium sulphide, ultramarine, zinc white, carbon black, etc. All of these are to be obtained from any paint stores.

Plaster of paris and related plasters are obtainable from: Messrs. Cafferata and Co., Ltd., Beacon Hill, Newark-on-Trent, Notts., and Messrs. Thomas McGhie and Sons, Ltd., 605, Tower Building, Liverpool.

Wax for Artificial Flowers

I WOULD be much obliged if you could tell me the type of wax used in the manufacture of artificial flowers. Also, if the wax is not obtainable in various colours, how to colour the same ?—R. F. Butler (Ilford).

A MIXTURE of beeswax, 2 parts, and paraffin wax or ceresin, 1 part, is quite suitable for making artificial flowers. Even simpler is to use pure ceresin wax, which is dead white in colour. These waxes may be stiffened up by melting a little pale resin into them.

They are dyed various colours by adding a small amount of a wax-soluble dye into them when they are in the molten condition. These wax-soluble dyes can be obtained in large quantities from the various branches of I.C.I., Ltd. In smaller amounts, they are obtainable from one or other of the many firms of chemical suppliers and laboratory furnishers, such as Messrs. Griffin and Tatlock, Ltd., Kemble Street, Kingsway, London, W.C.2, or Messrs. Vicsons and Co., 148 Pinner Road, Harrow, Middlesex.

Marking Powder: Sandblasting

I SHALL be very pleased if you will inform me:

(1) What is "red marking powder" as used by engineers to make scriber marks show up on a smooth metal surface ? What other uses has this powder got ?

(2) How can I write my name in small letters on plate glass, similar to the way that brewers have their name on tumblers ?—L. W. Halsall (Liverpool).

(1) Most of the red marking powders to which you refer consist of red oxide mixed with china clay. About equal quantities of these ingredients are used. Sometimes, stearic acid is dyed with a wax-soluble dye, after which it is powdered and used to rub on the machine components. This particular type of "powder" has great clinging powers.

(2) Inscriptions of glass tumblers and similar articles are usually sandblasted on to the glass. The glass article is covered with a metal stencil and a spray of fine, hard sand is directed against the stencil, resulting in the marking of the glass.

Alternatively, glass can be marked in this manner by coating it with a layer of soft wax (such as a mixture of paraffin and beeswax) and then by scribing the wax layer with the requisite characters. The wax stencil thus formed is then exposed to the vapour of hydrofluoric acid which is given off when fluorspar is heated with strong sulphuric acid. The whole process is, however, dangerous, since hydrofluoric acid is very highly corrosive. Moreover, it is not as reliable as the more usual sandblasting process.

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Editor: F. J. CAMM

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Phone: Temple Bar 4363
Telegrams: Newnes, Rand, London

Comments of the Month

By F. J. C.

Paris-London Road Race

THE Paris-London Road Race, so successfully promoted last year by a London morning newspaper, is again to be run this year at Whitsun—from May 15th to 17th. It is a pity that the race, which is of an international character, has promoted such bitterness between the R.T.T.C. and the N.C.U. As, however, the N.C.U. has no right nor power to intervene in road racing, our support must go to the R.T.T.C. on this occasion.

Starting from Le Bourget Airport, Paris, the field will consist of teams of 12 riders from France, Belgium, Great Britain and possibly Luxemburg, each team being the official Olympic "possible" selection of the competing country.

The first day's racing, which will be under French rules, that is, massed start, will end at Arras. On the Sunday, the field start together again and race, still massed start, to Calais. Each rider will be individually timed and his two daily figures added to determine the leading rider at Calais.

After crossing to Folkestone on the Sunday evening the race resumes on Whit Monday morning and under British time trial rules. The riders will start one by one from the coast to finish the 250-miles journey with one circuit of Herne Hill track, London. Times taken over the British stage will be added to the two-day total in France to determine the winner of the race.

The first prize will be only £15, this being the maximum permitted under N.C.U. rules (under whose jurisdiction the general running of the race falls), but the winning team hold the *News Chronicle* £400 Gold Cup for a year.

Last year's winner was George Fleming, of the Belle Vue Club, London, who covered the 236 miles in 10 hrs. 51 sec., with F. de Canali, of France, second, 10 hrs. 18 min. 18 sec.; the team race was won by France.

Notwithstanding, therefore, the niggling attitudes of the N.C.U. and the R.T.T.C., the race is again to be held—which demonstrates the weakening power of these two bodies, a power weakened by ineptitude and internal bickering.

A New International Body

IN view of the lack of unanimity between these two bodies, we cannot be surprised that a move is on foot to inaugurate a new international body. In fact, we have suggested this many times during the past ten years. Owing to the refusal of the Union Cycliste Internationale to recognise the reasonable claims of established cycling organisations in different parts of the world, a meeting has already taken place with that object in view, and it is being watched with close interest by nations such as Holland, Denmark, Sweden, Finland, Norway and France who have long been critical of the dictatorship of two or three big nations in international cycling affairs.

At the meeting France, Ireland, Scotland, Australia, Wales and England were represented on behalf of the Scottish Cyclists' Union, the British League of Racing Cyclists, The National Cycling Association of Ireland and the Commission Federale de Cyclisme.

A welcome was also extended to the representative of the Union Velocipedique Française.

J. Kain, of the B.L.R.C., was elected as General Secretary, H. Segard, France, as Assistant Secretary, and J. Thompson, of Scotland, as Treasurer.

The Provisional Committee includes T. Cullen, President, National Athletic and Cycling Association; H. Johnson, Australia; J. Sweeney, Ireland, and A. Campbell, Scotland.

A resolution was passed "that the delegates present, representing the Australian Cycling Association, the British League of Racing Cyclists, the Federation Sportive and Gymnique du Travail, the National Cycling Association of Ireland and the Scottish Cyclists' Union, consider that the International cycling situation justifies the creation of a new International Cycling Organisation.

"It is therefore decided to nominate and instruct a Provisional Committee which will draft regulations of a Ligue Internationale de Cyclisme, and to send to all countries inviting them to participate in a Constitutional Congress of the Ligue, to be held in Paris on May 18th, 1948."

There was an amendment by the Chairman of the B.L.R.C. that the discussion be exploratory and not final, but the delegates all stated that they had complete authority to proceed without reporting back to their organisations, and Mr. Derman, in the absence of a seconder, withdrew his amendment.

The new organisation is to be known as the Ligue Internationale de Cyclisme, and will consist of the National Cycling Organisations affiliated to it. Membership will be open to all cycling organisations including those affiliated to the Union Cycliste Internationale.

The objects are:

To control amateur, independent and professional cycle competition throughout the world, and to frame definitions and make rules for the control of such competition, to arrange for the annual decision of all world's championships. To encourage the nations affiliated to the Ligue Internationale de Cyclisme, to promote international races and matches, and to grant permits to the proposed promoters for such races and matches. To ensure a fair and equitable administration of justice to all competitive cyclists, and to endeavour at all times to create good fellowship between the cyclists of all nations. To watch the relations between cyclists, railway companies, shipping companies, airways or other public international carriers and customs, with a view to securing a fair tariff for the conveyance and carriage of members, and their cycling equipment, when travelling from one country to another. To protect and promote the interests of international cyclists and international cycling generally.

A sum of £5 is payable by each federation as a provisional membership subscription. It was decided to accept the offer of the F.S.G.T. to provide the conference hall for the congress on May 18th, without charge. All delegates are to pay the cost of their own travelling expenses. Each nation represented will have one vote each, and there will be an interpreter at the congress. All notices and agendas will be printed in French and English.

Each affiliated body will have sole control within its own boundaries.

It is early days, of course, to express opinions, but the first step has been made and it will be interesting to observe the reaction of the older English bodies towards the new one.

No doubt they will regard it as an infractive body and the usual strings will be pulled. If, however, the new body attains the same prominence as the B.L.R.C. its success is assured, and we shall watch its progress with great interest.

With about 10 million cyclists in this country alone there is room for a new organisation unfettered by the traditions of the past, operated by new blood, and free from the influence of those who regard themselves as the proprietors of the cycling movement and have done it such great disservice in recent years. It is time that cyclists had a central clubhouse in London and that efforts were made to put cycling back on the standard where it was in the early part of the present century. Its status needs to be raised. For this purpose we should like to see greater care exercised in the selection of "appointed" teahouses. The conduct of some cyclists at these places is not a good advertisement for cycling, nor for cyclists, and there is little wonder that the latter have earned the perhaps undeserved reputation of being young hooligans. Certainly, many of them conduct themselves as such.

It would appear that almost anyone owning an ill-equipped hovel can secure appointment as a recognised teahouse for cyclists.

Let the N.C.U., for what it is worth, retain its control of track sport and issue licences to a few hundred track riders. Track events in any case have long ceased to be of interest to the public and we cannot foresee that track sport will ever provide a profitable gate.

Herne Hill is likely to be the largest white elephant in the whole history of cycle sports promotion.

Bicycles on Trains

THE Camping Club of Great Britain and the Youth Hostels Association are both joining the National Committee on Cycling in asking the Minister of Transport to receive a deputation to hear the case for the better carriage of bicycles by passenger train.

PARAGRAMS

Thanks to His Bicycle

SIX-YEARS-OLD Freddie Davies, of Stoke-on-Trent, who has spent six months of his short life in hospital with infantile paralysis, is now getting back to health with the aid of a new bicycle. During his illness he talked of nothing else but what he would do when he got a bicycle. Mothers of the children attending his school organised a dance and raised £8 10s. towards the £12 3s. which the bicycle cost, and now Freddie has his wish.

Bad Show, Boys!

THE headmaster of a Gainsborough (Lincs) school, in common with several other schoolmasters, has decided to hold inspections of his pupils' cycles at irregular intervals to check their roadworthiness. His first check showed, rather surprisingly, that on the whole the boys' cycles were in worse condition than those of the girls', in spite of the average boy's mechanical leanings. It may be that the boys prefer a spice of danger with their cycling and keep on riding so long as their machines hold together, or perhaps the proud fathers of daughters make sure that the girls' cycles are in good condition.

Sidecar Pushes Cycle

INSTEAD of having a cycle sidecar that uses up energy to get it along, George Shoppe, a handyman who lives at Plainfield, New Jersey, has built himself a sidecar that actually propels his cycle and provides a useful reserve of power when the rider gets tired. A converted car generator drives the 10-inch sidecar wheel through Vee belting and is powered by two 6-volt batteries. The electric motor is controlled by means of a hand switch on the cycle handlebars and a foot switch on the frame. This powered sidecar gives a fairly low speed, but it has a mileage of about 30 miles to one charging of the batteries and proves particularly useful with a head-wind blowing.

Free Cycle Racks

A FIRM of advertising agents have offered to supply and erect cycle stands for use in Peterborough, free of any cost to the ratepayers, on condition that the City Council permit the stands to carry advertisement panels. The offer is being considered by the Council. The absence of cycle stands in the city has been an inconvenience for many years.

25 Years Old

OVER 100 members and their guests were present at the annual dinner of the Leicester Forest Cycling Club, which is 25 years old this year. Speakers referred to the club's past and future activities, and its plans for the season, and awards were presented to the winners. Among those present was Mr. Davie Dowie, of the Grimsby Section of the East Midlands Clarion Club, who had cycled from Grimsby for the occasion.

Fair Exchange

"ONE bicycle going over to Canada brings back enough wheat for a family of four for twelve months," said Mr. Gerald Mawson, in a talk on the subject of food to a gathering of women Liberals. So, if that new machine seems to be a long time coming, just think how much worse it would be if we all had bicycles but nothing to eat.

The Old Fighting Spirit

A BOSTON solicitor who appeared at North Holland Sessions explained that he had an unusual role to play: that of being defending solicitor on the hearing of two charges against girl cyclists of riding without lights. The two girls said they had their lights on when the police car drew up behind them, but dismounted because of the strong wind and switched off their lights; and their solicitor said this was the girls' first contact with the law, and they were "incensed and shocked" at being disbelieved by a policeman. They meant to fight back, whatever the cost, he told the Bench. The magistrates were convinced with the girls' defence and dismissed the summonses.

Dual Purpose Sidecar

A CYCLE sidecar to carry a child, and which can quickly be detached and converted into a pram, has been invented by Mr. G. B. Hill, of Whaddon, Cheltenham, and patented. As a pram it has two wheels at the back and a single wheel in front, but by disengaging the handles and pushing them fully forward the front wheel and the right-hand side rear wheel are retracted, leaving a single wheel so that the pram can be attached to a cycle and used as a sidecar. The baby is protected by a hood and windscreen in bad weather, and there is a compartment at the back of the sidecar-pram for carrying home the rations.

Another "New Look"

CHECK plus-fours and ankle socks produced the bottom half of the "New Look" affected by two Kettering cyclists, members of Kettering Friendly Cycling Club, who set off the other night on a 120-mile ride from Kettering to Manchester. They started at 11 p.m. and rode through the night, just to see what a long night ride would be like, and completed the trip in the actual riding time of 7¼ hours. After a few hours' sleep and a look round they set off on the return journey, following the same route homewards and riding in daylight to see what they had missed during the night. One of the riders is 17 and the other 21.

Staying in South Africa

TOMMY GOODWIN, of Birmingham, who is now touring South Africa with the British cycling team, plans to settle in South Africa after the completion of the next world championships. He will take up a business appointment in Johannesburg, and he has already arranged to join a local cycling club out there.

Thanks for the Lift!

A WEARY cyclist who accepted the offer of a lift from a lorry driver the other day has now decided that, however tired he may be in future, he will keep on cycling. The driver overtook him and offered the lift, which was accepted. The cyclist put his machine in the back of the lorry, and was just about to climb in when the driver went off with the lorry and bicycle, leaving the unfortunate man to walk several miles home. Luckily, he knew the driver of the lorry, but he had quite a job finding him and getting back his bicycle before he could go to work again next morning. To mention hitch-hiking now in his hearing is just asking for trouble!

Not Safe Either Way

A HUNTINGDONSHIRE man who felt in need of a visit to the local, but thought that it would be a bit risky to make the journey by car, decided he would get out his faithful old cycle. However, in spite of his intention not to be a criminal, the police got him after all—for riding without a rear light.

Meat in the Sandwich

"I DON'T feel so happy about cycling as before the accident. I feel distinctly nervous," explained a cyclist to Peterborough County Court Judge during the hearing of his claim for damages against two Army motor-cyclists. The cyclist was struck on the right side by a motor-cycle handlebar and felt himself losing his balance, but before he fell he was struck on the left side by the other motor-cycle and was thrown to the ground. It was admitted by one of the motor-cyclists that, four days after this accident, he was involved in another road accident and was convicted of careless driving. The judge awarded the cyclist £130 damages, with costs, against the two motor-cyclists.

Long Distance!

WHEN 11-years-old Maurice Marlow, a Leicester schoolboy, wobbled to a standstill on his heavy old-fashioned bicycle on the outskirts of Loughborough, and collapsed in a heap on the roadside, he was taken to Loughborough Hospital where he was found to be suffering from shock and exhaustion. His parents were notified, and when Maurice recovered he explained that he had just completed a ride of 75 miles from Leicester to Matlock and almost back again. His only "food" had been gassy lemonade and ice-cream. The exertion of the ride, which Maurice explained he had made in order to find a camping site for the summer, proved too much for him, but after a day in hospital he was completely recovered. He completed his 75-miles ride in a single day.

Cyclists Beat Harriers

THE fact that it was a dry day for the race between Kettering Wheelers and Kettering Town Harriers upset all the calculations of the Harriers and resulted in their losing the event. There had been plenty of mud on the course, but the sun and wind had dried it up—after the cyclists had previously put in quite a bit of practice at riding through mud with low gears—and the cyclists were able to ride practically all the way. Six of them arrived at the winning post before the first of the runners appeared.

Sporting Gesture

WHEN Tom Brabbins, Northamptonshire crack cyclist, entered the Kettering Amateur Cycling Club's low-gear 25-mile event at Kettering he started from scratch and won in 1 hr. 13 mins. 48 secs., and was only prevented from breaking the 1936 club record for the course by a strong head-wind. After he had won he declined to accept the first prize and asked that it should go to the rider who came in second.

New Cycle Store

THE Cleethorpes Cycle and Electrical Company have opened a new store for the sale of cycles, accessories and electrical goods at 8, Cambridge Street, Cleethorpes.

Cycling Down the Mine

SOME United States metal mines are making use of four-wheel cycles down the mines in order to save the time of foremen and other workers who have to be continually moving from one place to another. The cycle frame is almost the same as a standard machine, except that the pedals drive two rear wheels and there are two more wheels in front. The wheels have wire spokes but outsize rims, and these rims are designed to fit the standard mine railway tracks. A wire basket is clipped to the frame between the front wheels so that the rider can carry his tools or any light articles. When a train comes along the track the rider simply lifts his cycle off and waits till the line is clear again.

Who Causes Accidents?

THOSE motorists who always seem to try to put the blame for accidents on cyclists do not always find support for their contention. This is borne out by the Warwickshire county road accident bulletin, as well as other accident reports. According to the Warwickshire bulletin, drivers of motor vehicles at fault totalled 39 per cent., as compared with 6.4 per cent. of adult cyclists and 2.3 per cent. of child cyclists. The bulletin also suggests that a good many of the accidents blamed on bad weather conditions could have been avoided if greater care was exercised.

Big Business

WHEN a 20-years-old labourer appeared before Nuneaton magistrates on a charge of cycle stealing it was alleged that he had stolen, during the month before he was caught, 17 cycles valued at £117, which works out at a mere £1,404 worth of cycles a year. The man pleaded guilty and was sentenced to six months' hard labour. A number of the cycles were sold at a local auction sale, but altogether £96 worth had been recovered before the hearing of the charges.

Rolled it Out!

A SEVENTY-FOUR-YEARS-OLD Cleethorpes cyclist was very glad the drinks were not on him the other day when an 18-gallon beer barrel, which was fortunately empty, rolled off a lorry and dropped on the cycle, considerably damaging it. The cyclist was not injured, but suffered from slight shock. For rolling out the barrel at the wrong time the driver of the lorry was fined 20s., with 5s. costs, at Grimsby County Police Court.

Planning to Help Hospital

THE Chesterfield and District Cyclists' Combine is making arrangements for the holding of sports evenings on the Queen's Park cycle track, Chesterfield, between May and August (inclusive) in order to raise funds to help Chesterfield Royal Hospital. It is hoped to raise at least £100 for the hospital. Arrangements are also being made to hold an evening road time trial.

Something Missing

ONE of the entrants in a Beat the Basic competition held at the Haycock, Wansford, Northants, on Easter Sunday turned up with one of the earliest cycles. The cycle had only one wheel and there were various other essential parts missing, and an explanation from the proud owner of how he proposed to beat the basic on it would have been most interesting, but was not forthcoming. The winner of the competition turned up on his bicycle, towing behind him a small truck containing a child.

Pump to Raise the Wind!

REMEMBERING how often cyclists found they had flat tyres and no pump, employees at the Whitemoor Loco Sheds, March, Cambs, have thought up a brilliant idea for helping to raise funds for the St. John's Ambulance Brigade. A bicycle pump was provided at the loco sheds, with a collecting box nearby, and every user of the pump is asked to put a copper or two into the box. So far over £9 has been raised by the scheme.

Around the Wheelworld

By ICARUS

George Harrison on the N.C.U.

THE *News of the World* is another of the enlightened newspapers which is supporting the B.L.R.C. It contributes £500 in prizes each year. As this newspaper has the largest circulation of any newspaper or periodical in the whole world, its influence is considerable.

George Harrison is the sport columnist of that paper, and this is what he recently wrote :

" Undisturbed by the shots being continually fired across their bows by the National Cyclists' Union's big guns, the ' unrecognised ' British League of Racing Cyclists and its affiliated clubs are going merrily ahead with an impressive programme of road races, of which to-day's Nidderdale event is one of the brightest.

" The N.C.U., as most of you are aware, are the controlling body for track cycling in this country, but they flatly refuse to budge an inch from their cobweb-covered determination to have nothing whatever to do with the road racing side of the sport.

" In fact, it might be whispered that they have gone somewhat further than not recognising the mass-start game. On occasions it has been known for behind-the-scenes wires to have been pulled in definite attempts to outlaw the B.L.R.C. shows as being against the Ministry of Transport regulations.

" The League and its clubs just won't lie down to the dictatorship of the N.C.U., and the situation is rapidly reaching the stage when the track-racing folk will have to admit that the League does run its own side of the sport properly and well."

Cycle Radio

QUITE a few enthusiasts who combine the hobby of radio with cycling have built themselves radio sets for use on a cycle, with varying degrees of success. Now, however, experimental work is in progress by an American firm on a miniature radio which is only about three inches square. The tiniest of valves are used, and the circuit, instead of being wired, is printed in a metallic substance on an insulating background. This set can be clipped to the cycle handlebars, or even to the rider's wrist, and it is claimed that it will transmit and receive on the short waves and receive normal broadcasts. These sets would be just the thing for enabling riders to keep in touch at all times except, of course, for one snag—the cost of the sets.

Bidlake Memorial Plaque

THE Bidlake Memorial Plaque was presented to Reg Harris at the Kentish Wheelers race meeting at Herne Hill on April 24th.

Raising the Speed Limit

I HAVE received the following letter from the Secretary of the National Committee on Cycling :

" May we appeal to local Safety Committees everywhere to protest to the Minister of Transport, if they have not already done so, against a proposal which would increase the present dangers of the roads to all users ?

" The Minister seeks to raise, from 20 to 30 m.p.h., the speed limit for heavy commercial vehicles, those gigantic users of the public highways which become still more unwieldy with a trailer in tow. That increase in speed inevitably means greater wear and tear of the road, with a consequent reduction in surface safety for all traffic ; but, still more dangerous, it increases the strain on the driver who has to stick to a rigid schedule. It may be that the driver will be able to pull up within 30 yards if his lorry is fitted, as many of them are not, with the latest type of braking. But, even if he can, these 30 yards may well be fatal.

" Let all Safety Committees, then, who seriously aim at keeping death off our roads, protest at once."

At a recent meeting of the Committee, Sir Harold Bowden, Bart., G.B.E., was re-elected president, Mr. H. R. Watling, O.B.E., J.P., chairman, and Mr. Robert Williamson, honorary secretary. It was agreed to have a deputy chairman to preside when the chairman could not be present.

Joe Louis on his Roadster

Cycling for Joe Louis

ON Thursday, March 11th, Joe Louis, World's Heavyweight Boxing Champion, selected a cycle from the stock racks of the Dayton Cycle Company's factory at Park Royal, London, rode it round the factory grounds by way of trial, and pronounced it eminently suitable for him. Cycling will form part of the Brown Bomber's training schedule for his return fight with challenger Joe Wallcott to take place in June.

Thus, it is evident that there is a growing appreciation of cycling for fitting an athlete for other sports than cycle racing.

Gentle cycling is an active yet relaxing method of getting plenty of fresh air coupled with an untiring freedom of movement for his legs.

The model chosen by Louis is a standard Dayton lightweight roadster, having 531 tubing and duralumin components. These models are already well known overseas, it being a favourite line in the export drive.

Although the fairly soft rear tyre was flattened by big Joe's 224lb. of brawn, and the saddle too low for his 6ft. of height, he sat the cycle well, and after an initial wobble, cruised quite at home with his new " training partner." An attractive coloured lady's model was also presented to Joe Louis by Daytons for his wife.

A Not-so-new Rearlight

I HAVE reprimanded our Paragrams Editor, who referred in a recent issue to a new type of rear lamp containing direction arrows, controlled from the handle bars, being manufactured in America. It is true that an American firm is making such a lamp, but these were on the market in this country long before the war.

Herne Hill Without Harris

SOME fine-spirited racing was witnessed by a large crowd, up to the present capacity of Herne Hill track, on Good Friday, when in brilliant sunshine tempered by a boisterous, cool breeze, amateurs from France, Holland, Denmark, Switzerland, Italy and Belgium demonstrated their superior fitness over their British opponents in all departments during the Southern Counties C.U. meeting that opens the track season.

Unfortunately, Reg. Harris, world sprint champion, was involved in a car crash the day previously and had been taken to Derby Royal Infirmary suffering from spinal injuries which it is feared will cause his absence from the track for at least a month. Otherwise, our continental visitors may not have had such an easy passage, so far as the sprint events were concerned. Sprinting was the feature of the meeting, and in the International Sprint Race for the *News of the World* Golden Globe trophy, blond, 6ft., 18-year-old Joe Hijselendoorn, of Holland, beat Lew Pond, Poly (fresh from the South African track tour), and Eugen Kamber, Switzerland, in his heat, and Mario Ghella, chubby Italian, and Henri Sensever, France, in a well-fought-out series of 1,000 metre dashes. Ghella, carrying over a stone of spare flesh, is obviously not yet on top form, so is worth watching in view of the Olympics. Hijselendoorn won because he was expected to " fade " before the line. Pond was certainly catching him in the heat, but the gap was too big to close. Ghella and Sensever waited for the Dutchman to come back to them in the home straight, but the latter held his speed over the line. Last 220yd. times were taken of each competitor, but this was of almost no use, as fifths of a second do not register the fact that a man can gain over a length in distance on his opponent.

The second event, a series of motor-paced matches between Harry Grant and Wally Summers, confirmed that Grant is streets ahead of the younger of these two motor pro's. Grant caught Summers in both pursuits and was six seconds better in the mile time trial.

The race that " got " the crowd was the Britain versus The Rest of the World Italian Pursuit, in which an Italian was the hero. Benfenati was lying fourth when Faanhoff, Holland, dropped his speed. Benfenati chased, caught his team-mates, then when his turn came he rode the two laps that he and Faanhoff should have ridden and was only a fifth of a second down at the gun. This Italian stylist also won the International Australian Pursuit by a clear margin over Charles Marriner of three seconds.

Wayside Thoughts

By F. J. URRY

Chale
Isle of Wight

The weatherbeaten old church overlooking Chale Bay

Down the Years

OCCASIONALLY I wonder what would happen to me if I gave up cycling. The thought comes into mind when I meet an old friend whom I have not seen for a considerable time, and generally his greeting is "Still at it, I see; how you stick it, I don't know." Sticking it is a simple matter; you just keep on, and enjoy the activity and the blessedness of being simple. Yet the query makes me reflect that the process of growing older will not cease, although that fact has not disturbed me up to the moment, and I hope it never will, for, if I lost my activity, while I should cherish many happy memories, the function of adding to them by the process of wandering on two wheels would be a heavy loss. These last years I find I've grown more contented with my own company and have come to the conclusion that it is a natural development, for with it comes a sharpened sense of beauty and a higher pleasure in the little things of passing interest which mean so much to the observer and nothing at all to the fellow in a hurry. I like company along the road, and particularly at the end of a day when pipes are lit and a review of the incidents the day has brought are discussed, together with the hope of a gay to-morrow. I like, too, the slow emotion of that comfortably tired feeling when the bed is awaiting you and the dottle in the pipe is smouldering out. Still, the fact that I can enjoy a day or so "on my own" adds another delight to my cycling, for I like to think it is preparing me for the time when even my modest ten an hour will droop and few of the younger generation will seek my company on the way. It is well that a man should feel the pulse of these things before they arrive; it gives him time for adjustment, without losing the delight of travel activity.

Know Your Land and Folk

THERE is nothing frightening or forlorn in this matter, it is just a natural development to expect after 50 years of constant riding. The ancient is mobile and fit, a happy man still learning the delights of the countryside. And I say this, after many years, that no individual is mentally and physically whole who does not know something of the land that bred him and the people who are his compatriots. It is difficult for rich people to acquire this knowledge, for in this connection riches are a handicap; but go to the country as an ignorant townsman and mix with the people as one of them, and all your desires to live a different kind of life—supposing you possess them—will be granted for the period of your sojourn. I always wanted to be a countryman, and perhaps that is one of the many reasons I am and shall remain a cyclist; but fate planted me in town until the highway of life had mounted the hill and was on the downgrade. Yet there have been ample compensations, the greatest of which has been and is the ability of invasion at week-ends and holiday times in the guise of a wanderer asking, rather than demanding. For I find the man of the land, yea, even the tramp, knows so much more of his country than I do that the effort of learning from him is for ever worth while. You can do it in the company of a bicycle, but it is difficult with a car, and utterly impossible if you are superior, for your town-bred smartness will not penetrate the mentality or provoke the humour of the farmer, the land worker and the keeper. You may get to know your Boniface—it is part of his job to be pleasant—but if you go humbly ignorant to the man of the land the grace of the countryside will surely enter into you and your erudition expand.

The Heart of England

PERSONALLY I hope to spend four or five days of freedom shortly amid the delectable hills of the Cotswolds. One of my converted friends will be my companion, and he has chosen this area for the simple reason that he has never been over those little red lanes that wriggle among the valleys joining the various main roads that cross these comely hills of the Midlands shires. For us the Cotswolds will be particularly convenient, for we can make contact with their outlines in 30 miles and weave our way through parts of Warwickshire, Gloucestershire and Oxfordshire without the need of train help. I have not been intimate with the hills since the war ended, and prior to that the area was overcrowded with war personnel, and the air continually shaken with the roar of 'planes. Now, I am told, peace has descended on the little stone towns once more, and although there are scars most of them are hidden and many are returning to nature. The district is full of romance, history and beauty, so we expect to wander from place to place, and when we see the attractive house to welcome us, cast anchor for the evening, stretch our legs in front of a welcome fire, light out pipes and talk to our hearts' content. A holiday without haste or planned purpose, the kind of roaming when we can stop and look and listen when the vista is good, or lean over the bridges of those delightful streams, the Evenlode, the Windrush and the Colne. Belloc wrote of the Evenlode:

> The gentle Evenlode that makes
> Its rushes bend to hear the sound
> Of water mingling in the brakes—
> And binds my heart to English ground.

Yes, this will certainly be English ground, probably the homeliest and the comeliest north of the mature Thames.

Another Outlook

HOW delightful it is to persuade people to alter their habits. I spent an evening with a friend who has long ago given up cycling, and time and again the talk veered to the vexed question of petrol, and, despite all the Government information on the matter, he was adamant that the cancelling of the basic ration was just nonsense. Now, I don't pretend to know the mind of authority that decided this ban on petrol for pleasure so I cannot argue the matter, only listen and stare and wonder how folk can imagine any Government would risk public popularity by putting a penance on petrol users. When I suggested he should try a bicycle—a return to the old active days when his performances were outstanding—he simply snorted. Gently I asked why his reaction was so emphatic, and the answer startled me. "My workpeople do that." "So do mine," was my reply, "and I find the folk in the works rather admire the regularity of my cycling, saying how well the 'old man' sticks it." But there was no moving him from an attitude far too many people adopt, and in so doing miss many simple and satisfactory things that put colour and active joy into life. It is rare to find a man denouncing cycling for such a reason, though I fear there are thousands who think similarly, but remain silent.

Ignorance and Accidents

WITHIN a few days prior to writing this paragraph I have had a couple of close shaves. The first occurred on a corner round which a youth drove a horse-float on the wrong side of the road, with the animal completely in charge of the boy; the shaft just missed my shoulder as I swerved into the gutter, and the wheel caught my pedal, dislodged the chain and bumped me against a wall. The excuse of the driver was that the mare was fresh and he could not hold her, but when I interviewed his employer he readily agreed where the fault lay and has taken the young man back into the warehouse. No damage, due more to the fact that I can ride a bicycle better than that hobgoblin young man could drive a horse. Two days later the road was filmed with ice as I started to work in the morning. A car shot past me on the first hill and within ten yards had to brake fiercely because there was no room round a stationary bus. His vehicle skidded sideways, pushed me over and came to rest against the rear of the bus, with a goggle-eyed driver wondering what on earth had happened to him. It is astonishing how few motorists realise when a road surface is tricky. A crumpled front guard of the car and a little less paint on the bus were the only casualties, and it is to be hoped "what might have been" will enter into the mind and future conduct of one more driver. I once heard an insurance expert say that the best thing a novice driver can experience to engender future care in him is a slight accident just to prove how easily it can occur. The difficulty is to guarantee that qualifying adjective, slight.

Good Reasons

I AM often taken to task because my insistence on buying the best in bicycles and equipment a man can afford is said to be a criticism of the cheaper article ridden by the occasional cyclist and the individual using it for daily work journeys. I am told the purchaser cannot afford the best or even the next best, and on that point I can only say that in my experience the good-class machine not only lasts longer, and is far easier to ride, but mile for mile it is cheaper. The utility bicycle is a marvellous production—but it is utility, which means in essence that it does not pretend to be so good as a machine costing double the money. When a man, and especially a manufacturer, says to me, "the cheap model suits the public" he is probably right; but they forget I'm one of the utilitarians with a daily journey of sixteen miles, including four over granite setts. And I say without equivocation that the better the bicycle the easier I ride, and I'm quite certain from a cost point of view I'm well in pocket as a result of my selection. I've a Sunbeam—John Marston brand—made in 1922, as good as ever it was despite its battered appearance, and another machine by a well-known local maker has been helping me to work and home again, in addition to touring journeys, for thirteen winters. On both these mounts, rims, tyres and brake blocks have been the only replacements, and the rims were changed when it was possible to replace the rusty ones with stainless steel. Even the saddles have carried me through the years with one re-blocking, and though I use inverted levers on the cable brakes I've never been troubled with a broken wire or a faulty nipple. That is the answer to my critics, and having found it pays to buy the best to insure comfortable and care-free riding, I am bound to say so. And I believe the use of the best scores in the matter of cost.

The Opportunity

NO man can tell what is in store for him, but at this time of the year a good many peope will be making long cycling journeys for the first time, and some of them will be in trouble with punctures and adjustments and all those little things that seem to worry the novice. If you can be helpful to such in their distress, take the chance, because such deeds mean much to the comradeship of cycling and make the stranger within its orbit a happier individual. And there will be some also who will be physically distressed, mainly because they are unfit, are riding the wrong type of bicycle, too high in the gear ratio and are badly positioned to get the best out of it. That is the worst thing about bicycle salesmanship to-day. People are "fobbed off" with a machine totally unsuited to them just because that machine happens to be in stock, and no thought is given to the fact that one such disappointment may prejudice the sale of many more bicycles. I have seen it happen so often that I firmly believe the slogan that "cycling is hard work" derives from the victims of the misfits. You may be able to help in the matter of position, and your advice on moderation in gearing may win a convert to a great game; and in any case it is worth the risk. How do I know these things? To tell that would be a long story; sufficient to say I have loaned bicycles to rabid non-believers and converted them, and to save one critic from the ruck of cycle denouncers is worth quite a lot of effort.

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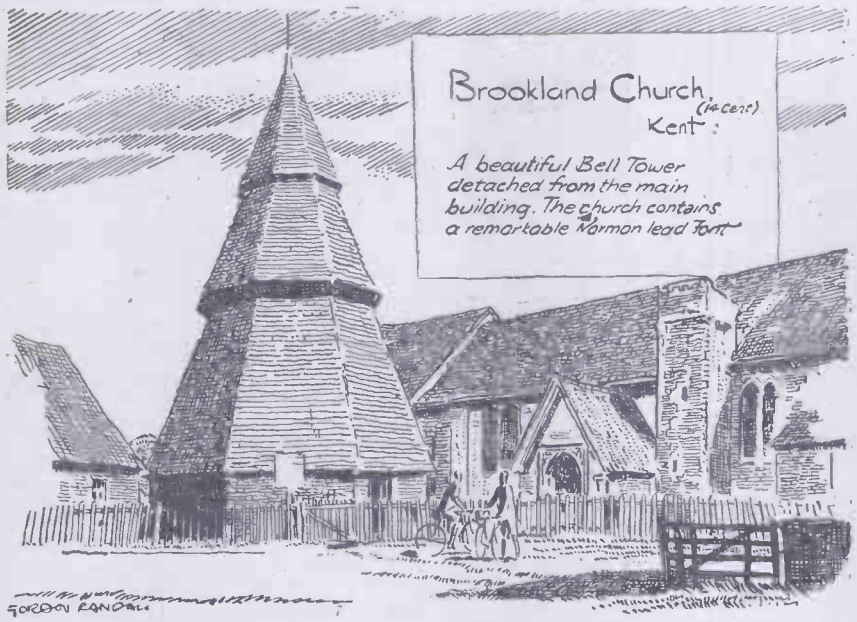
CYCLORAMA

By H. W. ELEY



A Dunlop "Jubilee" Function

AS mentioned in the April issue, it was a very appropriate and commendable function which took place at Fort Dunlop, when my old friend Bob Carlisle, that worthy veteran of the cycle race at Belfast in 1889, placed a commemorative wreath on the John Boyd Dunlop plaque, which the late Sir Eric Geddes unveiled some few years ago. "Bob"—still active and in harness—has many unique memories of the pioneer days of the pneumatic tyre industry, and was closely associated with Dunlop himself in those far-away days when the first experiments were made—to the derision of the wiseacres!

The Merry Month of May

NO month in all the year appeals to me more than May . . . the gateway to spring, and very much the month of flowers. It is the month when the cuckoo really begins to treat us to his monotonous notes from bush and tree; and it is the month when the ardent ornithologist has such ample opportunities of studying bird life. Nesting is in full swing, and all the countryside is green and lovely. In the orchards, the fruit trees are laden with pinky white blossom, and from every hedge-row there is a chorus of song. Yes! I love my cycling in this green and flowery month, when the sun can be warm on one's back, and the cares and frets of the winter can be chased away. . . .

Our Exports Must be Quality Exports!

RECENTLY, a business man much experienced in export matters, was in my office, and we were chatting about the "big drive" to increase our exports, and the progress which various industries were making. My friend, who is a "globe trotter" in the interests of British business, struck a warning note . . . pointing out to me that it was vital that all our exports should be of high quality, and that the traditional British "quality ideal" should never be sacrificed. He even indicated that in one or two territories he had visited, he had found shoddy British goods, and that their importation was calculated to do us immense harm. And I believe very strongly that we must maintain, at all costs, and in spite of *quantity* considerations, the very highest possible quality—perpetuating the traditions which won us our best markets in the golden past. BUT . . . I pointed out that as far as the cycle industry was concerned, there need be no fears! Our industry has "kept faith" and remained true to the ideals which established the British bicycle as the best in the world.

"Runs" Cards

THE other day, in connection with my advertising work, I had occasion to look at a number of the "runs cards" issued by various cycling clubs. Most were attractively produced, bearing in mind the present difficult situation in relation to paper, and high printing costs. Others lacked imagination. I think that club secretaries should remember that these cards constitute a valuable advertising medium, but the advertising manager will only be impressed if he is shown an attractive card, and is provided with all the relevant information he needs in order that he may make up his mind whether he should take space. As to the runs programmes, many of them intrigued me greatly, and I had nostalgic feelings when I recalled some of the happy tours and trips I had enjoyed around some of the places enumerated on the cards! Rides in the Home Counties; rides in the West Country; rides in the quiet areas of Suffolk and Norfolk . . . all bringing back happy memories, and cementing my determination to do as much riding in the countryside as I possibly can this year.

One Tourist's Idea

IT is always well to have a plan, and to make out a cycling programme for a season. The other week, chatting with an ardent tourist in a village inn, nestling 'neath the Chilterns, we discussed touring, and plans for this coming spring and summer. And my friend, with whom I smoked and sipped ale, had a happy notion. He intends, this year, to visit as many English cathedrals as he can . . . starting, he told me, with ancient St. Albans, and then going east to view the beauties of Norwich. What a vista I had of awe-inspiring beauty—of architectural treats— of dreaming spires, and mellow stones, and exquisite rood screens! I gave my friend some hints, for I have visited most of our cathedrals. I told him of the majestic loveliness of Lincoln . . . of Durham, set on the hill—of the rare beauty of Lichfield, the "lady of cathedrals." Yes, I think this is a charming and commendable idea, and possibly other riders may adopt it. Although we may hear a little too much about "planning" in the national sphere, I cannot but think that it is a good thing in our private lives!

Old-timers

IT was my pleasure recently to attend a luncheon of the Fellowship of the Motor Industry . . . and to listen to speeches by men who were in "at the beginning." Tales of the earliest cars . . . of crazy journeys which have become epics . . . of curiosities of design. And I wondered, as I toyed with the sandwiches permitted by the Minister of Food, what had happened to the "Fellowship of Old Time Cyclists." I have heard nothing of this grand body for some time . . . can anyone tell me of its present health? It was—and I hope is—a choice organisation, which must be preserved at all costs.

Garden Note . . .

AS I write, on a fair April morning, the daffodils are waving gently in a breeze; a blackbird is struggling with a fat worm on the lawn; a grey squirrel slips nimbly up the smooth bark of a beech tree . . . and overhead, birds are singing like an ecstatic choir. Good to be alive, and good to get out the bike and ride into the incomparable English countryside!

My Point of View

By "WAYFARER"

Alfriston . Sussex .

A view of the fine church (sometimes called the "Cathedral of the Downs") from near the Lullington Road . . .

Queer Point of View

THE Paris correspondent of a Midlands daily newspaper ended his article about the French capital with an extraordinary reference to "a Continental Sunday almost as agonisingly dreary as our own English Sunday." I suggest that our friend should indulge in a spot of introspection and find out what is wrong with himself. The English Sunday is anything but "agonisingly dreary"—if only it is properly used. To me it remains the best day of the week, for normally it permits me to spend many hours in the open air and to achieve a cycle journey to the tune of 70 or 75 miles. Mine is the pageantry of the ever-changing countryside; mine is many and many a long-distance view of shapely hills; mine is the loveliness of the heavens; mine is good companionship. Sunshine and cloud fall to my lot, and, after tea in the winter, "night's sparkling hosts" illumine the sable sky. There is "the wind on the heath," too, and there is the remoteness of the little country cottage (with its generous log fire) where, as a rule, I pause for tea. Nor must one omit to pay tribute to the healing charm of the land and the seclusion of the lanes. The English Sunday, as I see it, is anything but "agonisingly dreary." On the other hand, it provides one with a succession of joys—not to mention advantages.

Bits and Pieces

IN the process of clearing away an accumulation of newspaper cuttings the other day, I came across several with which I have somehow omitted to deal. It appears to me that they are far too good to miss; so let's have a look at them. Here, for instance, is a letter from a lady who suggests that, instead of a fixed reflector "on the mudguard," small reflectors should be fixed "to the back of each pedal." While I am not certain which is the "back" of a pedal, it is interesting to learn that "these moving glow-lights are far more eye-catching for motorists, and far safer for cyclists." I am often tempted to wonder whether there is not a better way in which people who are so intensely interested in the safety of the cyclist can achieve their objective. I rather think there is!

And here is a headline: "Driver blinded by rain;" that was the "explanation" offered at the inquest on three girls who were killed when the lorry in which they were travelling collided with a stationary lorry. The driver of the moving vehicle "did not see the lorry until I was on top of it." The obvious retort is: "Why drive blind?"—but nobody seems to think of that. Another headline: "Motor-cyclist's fatal crash into lorry." The lorry was stationary, while the driver was having a few minutes' rest. No information emerges on the question of lighting—though, in my view, this is immaterial. My verdict is "Carelessness"—the motor-cyclist should have seen the lorry with the aid of his own lights. Another cutting contains a letter from a man who emphasises that cyclists should not use after dark a suburban road he names, "owing to its narrowness and bad lighting." He, himself as a motorist, declared his intention of avoiding that road because of the two faults in question, and because of the danger of "hitting cyclists." My eminently simple mind would impel me to recognise the hazards (if any) arising from restricted space and poor lighting and I, personally, would drive accordingly. The poor lighting can be neutralised by a car's lights—by a cyclists' lights, for the matter of that—and a narrow road surely suggests the need for careful and reasonably moderate speeds. That, at least, is the lesson I would learn. And then there is another letter from a motorist who, driving five miles in the dark every evening, finds the "near misses" he registers, owing to the number of cyclists who fail to carry rear lights, very nerve racking. I hold no brief for cyclists who ignore the law, but motorists who possess adequate lighting—and that, surely, is an elementary precaution for them to take—should experience not the slightest difficulty in locating these erring cyclists. There should be no danger of those "near misses" which, apparently, are so frequent.

This problem of overtaking is no new one—if, indeed, it is a problem at all. We cyclists know something about it; the problem is the same for us, relatively, as for motorists. The latter possess a far higher speed potential, accompanied by very superior lighting. We cyclists do not write to the Press to complain of "nerve-racking" journeys and "near misses." We look where we are going; our pace bears strict relation to our forward illumination; and we do not travel blind.

Having Eyes . . .

EXPERIENCE after experience tells me that people do not trouble to use the eyes with which they have been endowed. I was waiting my turn near a revolving door the other day when a stray individual stepped up and took the space I was just about to occupy, and which was mine by right. I uttered a few well-chosen words of protest at this intrusion, and he apologised, saying: "I never saw you!" My retort was: "Well, dammit! I'm big enough!" and we left it at that. Soon afterwards I saw a motorist plunge into a road obstruction, which, of course, he had not seen—although it was broad daylight. When the road-man in charge had "said his piece," he turned and told the spectators that, on the previous evening, an unseeing motorist had driven into a similar obstruction which was guarded by no fewer than 25 red lamps! A day or two later I encountered the driver of a "Queen Mary" proceeding the wrong way in a one-way street. The warning notices meant nothing to him. Possibly, however, his eyesight would improve as a result of his experience. The only manner in which he could extract his unwieldy vehicle from the entanglement was to reverse until he arrived back in a two-way road.

This matter of using our eyes is the concern of everybody—*not* excluding motorists.

Stored Knowledge

THE job of work by means of which I am at present earning part of my living entails a lot of travel, and the knowledge which I have secured and stored up in connection with my cycling expeditions is standing me in very good stead. When a committee of inspection was having a look at me, and trying to decide whether or not I was the right person to undertake the task, one of the members asked me if I knew the district. I was able to reply, with confidence and without boasting, that I was very familiar with the region as a whole, and I was then given the job. This knowledge, of course, was an unexpected benefit in connection with my persistent cycling operations during the last 25 years, when I have travelled so widely in the Midlands. So once again a word of praise has to be accorded to the little old bicycle.

The Mystery Lamp

STILL on the subject of lamps—but now of a different type—I was rather intrigued the other day by the reaction of a boy of 12 who inquired the way of me, and with whom I rode for a couple of miles. Suddenly he pointed to my acetylene lamp and asked: "What's that?" He had never seen one before—which is not to be wondered at, having regard to his age and experience. I told him what it was and how it worked, and he was duly impressed at the thought of "burning water."

Complimentary

A FRIEND who came up alongside me the other day, and gave me his company for the next few miles, commented on the circumstance that a cyclist properly mounted on his machine, and propelling it in an efficient manner, constituted a very pleasant sight. The direct personal application of the remark was not obvious to me at the moment (the penny has since dropped and I have come to the conclusion that a complimentary statement was being made about myself), and I at once accepted the bait and we discussed the matter generally. It certainly is nice to see a cyclist properly mounted—sitting correctly (and firmly) on his steed and ankling his way along. This type of cyclist is in the minority nowadays, the most popular sort of rider being one who plunges the pedals downward with his heels or his instep, and who adopts a posture which is like nothing on earth. In my view, another pleasant sight is a "well-found" tandem couple travelling, seemingly with very little effort, at a nice bat. (Incidentally, one of the finest sitters-on-a-bicycle that I have ever come across was the late Andy Wilson, who was quite statuesque as a cyclist.)

Three Newspaper Cuttings

SOME of the worthies who write articles in the daily Press cause me to "see red"—especially when the existence of the bicycle, and the pastime of cycling, is completely overlooked. A recent special contribution to one of the newspapers I normally read began thus: "Journeys for pleasure having been drained from us . . . we have been forced to take an indefinite farewell of many a beautiful view gained by a run into the country by car. There remains the utilitarian train . . ." Of course, if "journeys for pleasure" can be achieved in only one way, then the people who see no other method of obtaining fun along the road deserve to lose, for ever and ever all the "beautiful views" they used to enjoy. The cycling way of getting into the country is still available for very large numbers of the folks who have lost their "basic." They must get fit for the job; they must learn how to ride; they must be prepared to supply the necessary energy; they must be ready to endure discomfort if the weather should turn bad on them. If only they will do these things, then I make bold to say that the "beautiful view" will seem much more beautiful—because they have earned possession of it. Try this game, my friends—those of you who think that "journeys for pleasure" have been "drained" away. The pleasure is still there, in big heaps—and supported by other benefits.

In the same newspaper was an article written from Mexico City, and it opened thus: "The romance has has been taken out of travel—we are only two days from England." Think of it: the aeroplane has destroyed all the fun of travel because of its very speed. In my view, none of the romance has been extracted from travel merely because one type of journeying is so rapid. I am two days' cycle travel from the heart of Ireland; I am three days' cycle travel from Galloway; I can reach the New Forest in less than two days of cycle travel; I can be in the Wye Valley, by means of my bicycle, in half a day. I trip over romance wherever I go, and I assert that not one jot of romance has been removed from the process of travel. The world may be a lot smaller, thanks to the aeroplane, but the eternal romance of travel remain, and will endure.

The third paragraph to which reference has been made takes the form of a letter to *The Times* from that engaging writer Miss Rose Macaulay, who speaks "as one reduced to bicycling" owing to the withdrawal of the basic petrol ration. The word "reduced" sticks in my gills. Had it been supplemented by a reference to the "humble" bicycle, I don't know what I would have done! Perhaps it is something of a come-down from a lordly car to the handy two-wheeler. Nevertheless, those of us who habitually give the bicycle its proper place in the general scheme of things cannot admit of any "reduction." We realise how much better people would be if, normally, their method of locomotion was by way of the magical bicycle.

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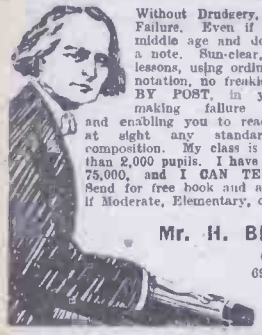

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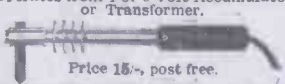

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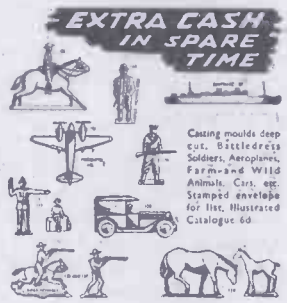

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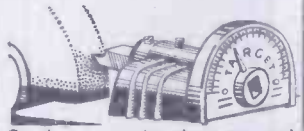

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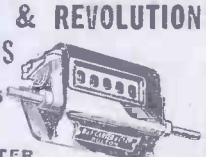

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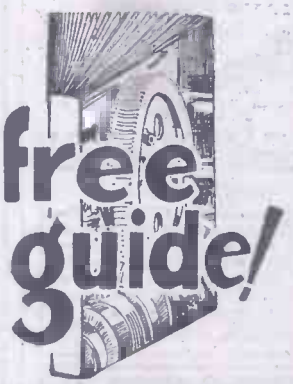

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