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EDITOR: F. J. CAMM

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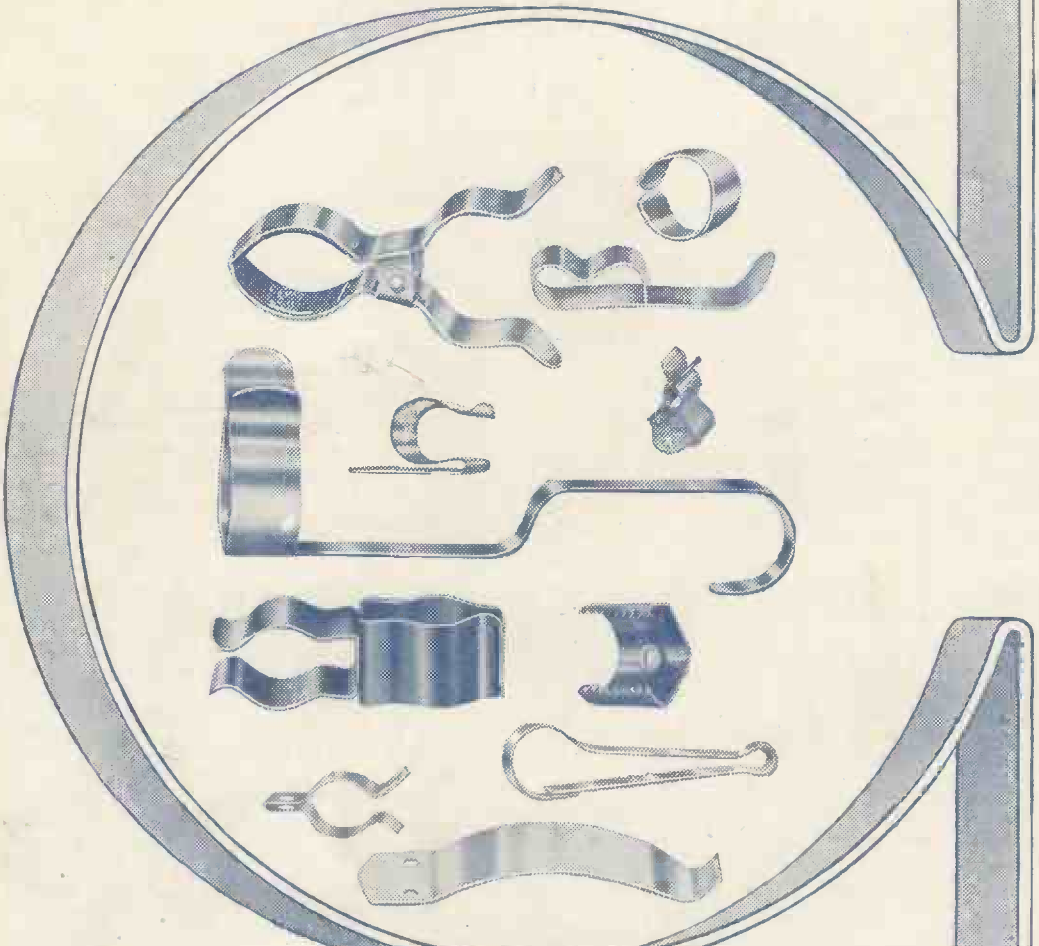

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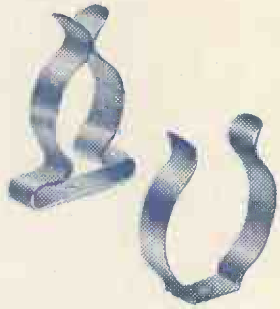

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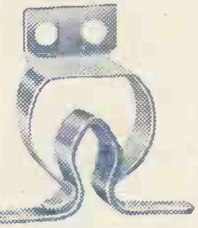

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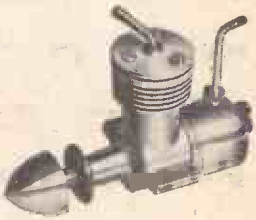

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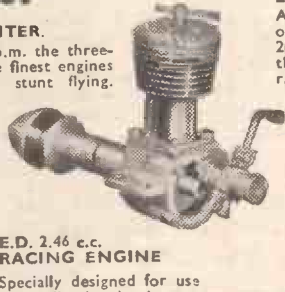

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JUNE, 1954
VOL. XXI
No. 246

PRACTICAL MECHANICS

EDITOR
F. J. CAMM

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

FAIR COMMENT

By The Editor

Solar and Atomic Power—New Discoveries

TWO announcements of world-wide importance have recently been made on the subjects of solar and atomic power. The Radio Corporation of America recently demonstrated a small atomic battery which makes it possible to convert atomic energy into small but usable quantities of electrical energy sufficient to operate a transistor. The battery is powered by a small quantity of strontium radio-active isotope and the electrical current derived from the battery was made to operate a telephone. This development, and that to be dealt with later, marks the beginning of a new chapter in man's effort to utilise for peaceful purposes the enormous as yet untapped energy within the nucleus of the atom for peaceful purposes, instead of for purposes of destruction. The radio-active source is connected to a transistor-like wafer which releases about 200,000 electrons for each electron it receives from the radio-active material. In its present stage it will prove of great value as a power supply for midget radio receivers, hearing aids and similar devices. Experiments to produce larger batteries to power transmitters and telephone communications as well as radio beacons are continuing. The new development must be coupled with the use of transistors.

The second announcement came from the Bell Telephone Laboratory. They claim to have produced a solar battery making use of the radiations from the sun. It converts useful amounts of the sun's heat directly and efficiently into electricity. It is a simple looking device made of strips of silicon, a principal ingredient of common sand. It may mark the beginning of a new era, leading eventually to the realisation of one of mankind's most cherished dreams—the harnessing of the almost limitless energy of the sun for the uses of civilisation.

The sun pours out daily more than a quadrillion (1,000,000,000,000,000) kilowatt hours of energy, greater than the energy content of all the reserves of coal, oil, natural gas and uranium in the earth's crust.

With this modern version of Apollo's chariot, the Bell scientists have harnessed enough of the sun's rays to power the transmission of voices over telephone wires. Beams of sunlight have also provided electricity for a transistor in a radio transmitter, which carried both speech and music.

The Bell scientists reported they had achieved an efficiency of 6 per cent. in converting sunlight directly into electricity. This, they asserted, compares favourably with the efficiency of steam and petrol engines, in contrast with other photo-electric devices, which have a rating of no more than 1 per cent.

"With improved techniques the efficiency may be expected to be increased substantially," they added. They observed that nothing is consumed or destroyed in the energy conversion process and there are no moving parts, so the solar battery "should theoretically last indefinitely."

The experimental solar battery uses strips of wafer-thin silicon about the size of common razor blades. These strips are extremely sensitive to light. They can be linked together electrically and can deliver power from the sun at the rate of 50 watts a square yard of surface.

The atomic battery produced by the Radio Corporation and referred to above delivers one-millionth of a watt. The new Bell solar battery, it is claimed, thus delivers 50,000,000 times the power of the R.C.A. atomic battery.

On Asking a Query

I RECEIVED a letter of complaint the other day from a reader who had sent in a query three weeks before, stating that he had not received a reply, although he had complied with the query rules. We take meticulous care with readers' queries, and except in those cases where research is required a reply is usually sent within a few days. Each query is numbered and entered against the corresponding number in a book, so we are easily able to trace date of receipt of a query and the dispatch of the reply. The book soon revealed that we had received the reader's query, the current coupon and a 6d. postal order, as well as a stamped envelope. There was, however, no address on the letter nor on the envelope, so there was nothing we could do, but to await a second letter. Some readers are particularly careless in this respect. An advertiser, for example, the other day telephoned to say that he had received a cheque for the purchase of an item he had advertised in this journal but the reader had omitted to append his address to his letter! Readers should take particular care to see that their name and address are included on the front page of the letter, and also on any enclosure.

Another point—please write plainly and leave adequate space between the lines. Some of the letters we receive are practically indecipherable. Also remember to cross your postal orders, and self-address the stamped envelope. Before posting your query make sure that you have complied in every way with the rules of our query service.

New Handbook—"Practical Television Circuits"

WE have recently published, at 15s., a new hand book of great value to all television enthusiasts, especially those who build their own receivers. The very first book on the subject, it contains in its 288 pages, illustrated by 156 practical diagrams and photographs, details of a number of highly efficient TV receivers, from a midget 3in. tube TV which may be built for £9, to a 17in. tube receiver which may be built for half the price of a similar type of commercial receiver. There are designs for an A.C./D.C. and a combined TV and broadcast receiver, as well as designs for pre-amplifiers, spot wobblers, E.H.T. generators, a pattern generator and a telesquare.—F. J. C.

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Small Wind Power Plants

2.—Rewinding the Dynamo Armature

(Continued from May issue.)

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

WE describe this month the process of rewinding a dynamo to make it suitable for windcharger conditions. No special experience or skill is needed—only a great deal of patience—and the work is well within the scope of most radio amateurs.

The dynamo used has several type numbers, depending on the year in which it was made. Some of these are A 900 R, A 900 T, A 900 C, A 800 C, etc., and any of them will serve the purpose. It is better known as a "Morris dyno-starter," and is chosen for several reasons. It was used on many old cars, and since it does not charge until 1,500 r.p.m. in its original form, and is therefore of little use to anybody, there should be no difficulty in obtaining one. What is more important, it has the large diameter armature necessary for slow speed working and easy winding. Choose one with good commutator and bearings.

A general view of the large model which employs the Lucas 900 C or 800 C dynamo.

Winding the Armature

Remove the wire from the armature, pulling off one turn at a time. If the insulation on the sides of the armature slots is well preserved take care not to damage it. Otherwise remove it all. The fibre discs at each end of the core are essential, and should not be damaged. Clean the connecting slots on the commutator segments now, while there is room to manipulate a small nail file, so that good soldered joints can be made later.

In the finished wave-wound armature each slot will carry two coils of wire, a bottom and a top one. The more turns in these coils, the slower the charging speed, but a compromise is necessary between wire diameter and current-carrying capacity. For 6-volt work the minimum number of turns per slot is 18—nine in each coil—and 18 s.w.g. enamel or s.c.c. will fill the slot under these conditions. This wire has a listed safe current of 7 amps., but since the current is generated in two parallel paths meeting at the brushes the maximum armature current would be about 15 amps. Under windcharger conditions, and with the cooling system described, this winding will work up to 20 amps. It cuts in at 6 volts at about 400 r.p.m., and in practice needs no governing, since the current reaches "saturation" at about 18 amps., and does not increase much more. It is a good example of "heavy-duty" winding and is particularly suitable for use with the minimum of skilled attention in windy districts.

A winding of 21 s.w.g. will carry 10 amps., and is the slowest winding recommended for use in this dynamo. With care 40 turns of enamelled or s.c.c. 21 s.w.g. can be put in each slot, but 30-36 turns of 20 s.w.g. enamelled wire is a better winding for general use. It is a convenient size of wire to handle, but good governors arranged to operate at 10 amps. are a necessity. It is slow enough for 12-volt working. The choice of wire will depend on individual conditions, but should be between the limits mentioned. Old dynamo field coils provide a useful source of suitable wire. When winding sit astride a stool with the armature held by the axle in a vice attached to the end of the stool, the commutator pointing away. If new insulation is needed use strips cut from old "linen-finish" playing cards.

The winding diagram (Fig. 1) explains the whole procedure, but probably is new to many readers. It is really the curved surface of the armature spread on a flat plane. A clockwise armature rotation is represented by a progressive movement of all the coils across the page over the four poles, which remain fixed. The working of the dynamo may be followed at once from this illustration, since elementary physics tell us that a current is induced in each wire as it moves through the fields, the directions of the currents being shown at any instant by the arrow-heads. In

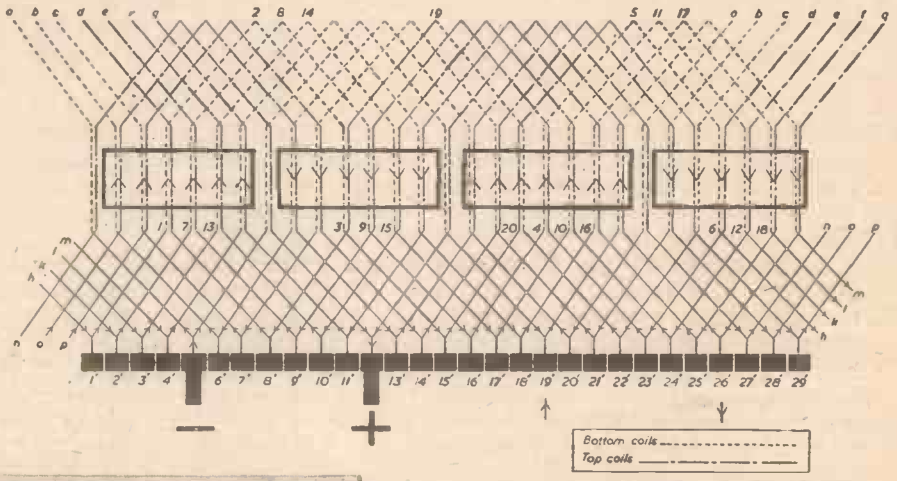


Fig. 1.—Winding diagram.

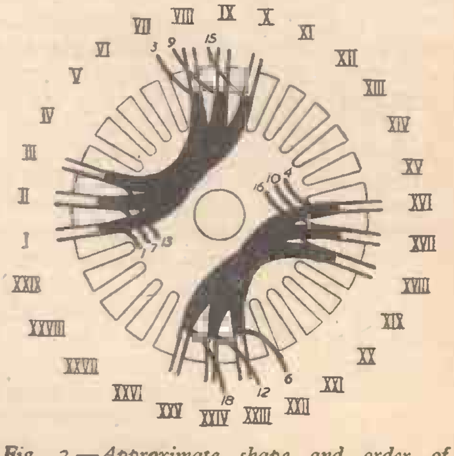


Fig. 2.—Approximate shape and order of winding of first six armature coils, commutator end.

each coil only the two sides lying in the armature slots will generate, the other two sides serving only to interconnect the system of generating wires in such a way that the small voltage induced in each wire will add to the total as the circuit is traversed. This is achieved when all arrow-heads are pointing the same way as one traces the current from one brush to the other. The only commutator segments with opposing arrows are those under the brushes, 5′ and 12′, showing that these are the only points on the commutator at which there is an accumulation of electricity of appropriate sign to be tapped off by the brushes. Detailed analysis would show that segments 19′ and 26′ also serve as brush points, which is clear in any case from symmetry. It is obvious that the winding is divided into two parallel paths, each carrying half the current flowing in the external circuit. (See Fig. 3.)

Now, select any slot, I (Fig. 2), and fit the card insulation in position. Count to slot VIII and fit another piece of card. Wind on

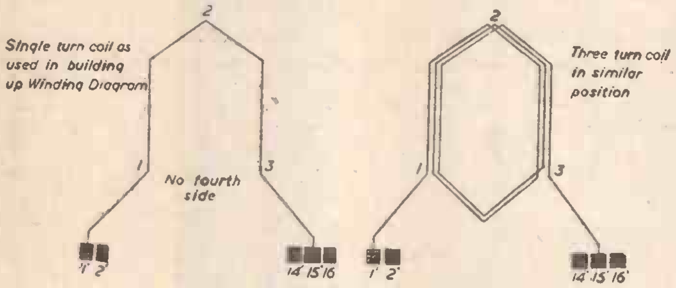


Fig. 3.—Simplified wiring diagram.

the first coil, 1-2-3, keeping the wire tight and laying each turn as far as possible side by side inside the slots. There is very little room on this armature for packing the idle sides of the coils, so shape these sides to use the space available as economically as possible, the first ones lying well down against the (insulated) axle. For the same reason the author wound the armature in two sections, diametrically opposite. The second coil, 4-5-6, therefore falls into slots XVI and XXIII. Go back next to slots II and IX. It is best to keep to this alternating system rather than to finish one section before starting the other, as it allows easier manipulation of the wires and helps to break the monotony of the job. A problem of insulation arises here, since the third coil crosses the first at each side almost perpendicularly, and s.c.c. wire is certain to short under such conditions, while enamel is scratched while tightening each turn. After a week of winding with 20 s.w.g. s.c.c. the author found that all coils except three were shorting to one another at the sides ! The only cure is to tape the sides of each coil thoroughly before winding on the next one. This also binds the whole winding together. Even when this is done continuity tests should be tried from coil to coil and from coil to core after each coil is wound, since faulty insulation would be covered up by succeeding winding if not discovered. A battery and flash-lamp bulb will do the job.

To press the wire into the slots, cut several small, wooden wedges, and tap the wire down after every few turns. It is a good plan to leave tight wedges to hold each coil until the next one is put on. In the same way the winding should be compressed at each end by tapping with a hammer and wooden block, so that the whole feels rigid all through the job, with no suggestion of "sponginess." Coil ends are arranged according to any neat system that suggests itself to the constructor, so that beginnings and ends of bottom and top coils can be recognised afterwards. The first seven coils of each section are bottom coils, represented in the winding diagram by broken lines, and all slots except XV are now half full. The next coil, 3-19-20, will fill slot VIII completely, and half fill slot XV, so that a change (see chain-dotted lines) appears on the winding diagram. All coils after this are top ones, shown by chain-dotted lines. A double strip of card should be tapped into each slot to insulate the two coils, which have the full generator voltage between them, and must be well separated. Proceed exactly as before until the whole armature is wound. The projecting edges of card should be closed into the slots and the whole tapped well down. Binding wires can now be put in position in the two grooves left for the purpose (Fig. 4). The author used brass wire, similar to that used on rabbit snares, putting it on over a double strip of tape with the maximum tension possible. It is secured by touching with a tinned iron at half-a-dozen places directly over the iron of the core, to avoid burning the winding.

The commutator connections can now be made, starting with the last coils wound, which can be traced most easily. All connections sloping in one direction to the commutator (dotted lines in Fig. 4) should be secured first. Wires coming from slots separated by the correct period, and showing continuity on a battery-and-bulb test, belong to the same coil. As each coil is located in this way its left-hand end (from the comm. end) is bent back over the armature out of the way, while the right-hand end is taken to the commutator, five slots ahead of the one from which the wire emerges, and soldered. This is repeated all the way around the armature, giving the series of parallel wires of which 1—8′, 7—9′, 9—16′, etc., are examples in the winding diagram. Put a small piece of the heavy wire originally on the armature in each commutator segment to make a foundation for soldering the small wires, as shown in Fig. 5. Better still, leave this piece in position by cutting the wires when unwinding the armature. When these wires are secured, bind over them well with tape from the edge of the commutator up to the edge of the armature core, and then lay the remaining wires to their segments four places in the other direction, so that altogether 15 segments separate the ends of any armature coil. All through this work every wire should be checked with a continuity test, although its beginning and end

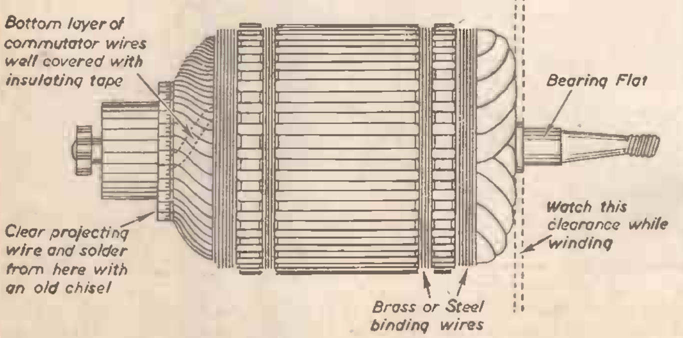


Fig. 4.—Sketch of finished armature.

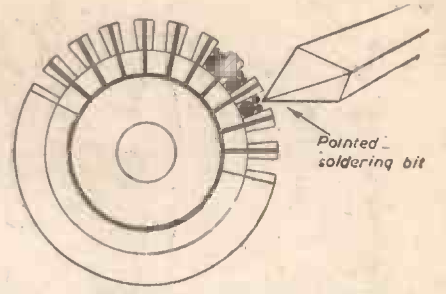
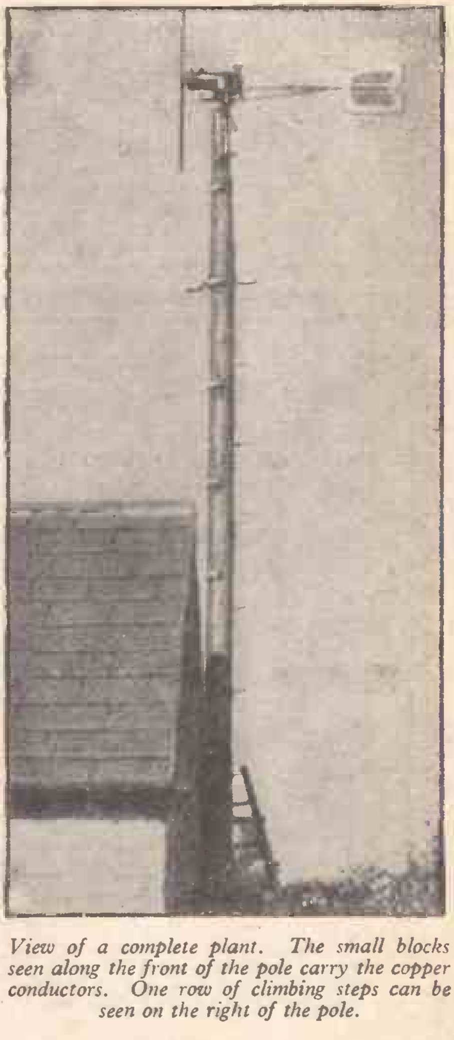


Fig. 5.—Method of soldering commutator by half filling grooves with pieces of larger wire.

appear obvious. Once the winding system is understood, this precaution will take very little time. A wrong connection may be very difficult to locate and correct afterwards, and will cause endless trouble. Fill in all the slots well with solder, and cut off projecting wire or solder with a sharp blow from an old chisel. While soldering and finishing, cover the commutator surface with tape to prevent damage and to protect it from flux. Put



View of a complete plant. The small blocks seen along the front of the pole carry the copper conductors. One row of climbing steps can be seen on the right of the pole.

two more bindings just beyond each side of the iron core, as shown in Fig. 4, and before removing the tape from the commutator give the whole winding a good coat of varnish. In the absence of shellac the author used a tin of outside wood varnish, intended for propellers, with quite good results !

Field Coils

Remove the pole-pieces, marking them with white chalk or file cuts so that the excitation field will be maintained. Four new coils are

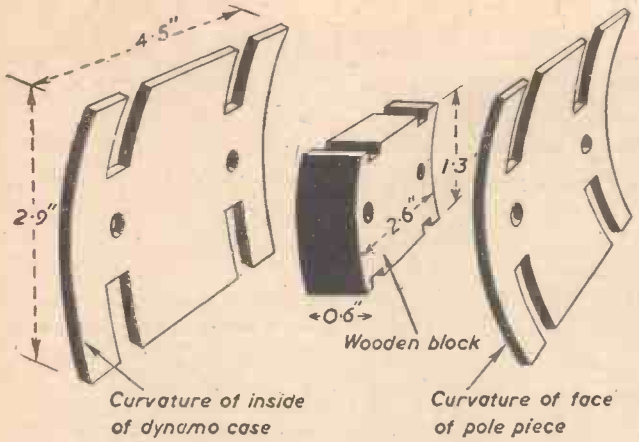


Fig. 6—Details of former for winding field coils.

needed, containing about 200 turns each of 18 or 19 s.w.g. wire. A former is necessary for the winding, and is made as shown in Fig. 6. The central wooden block is cut to size and shape slightly larger than the "neck" of the pole-piece. The two plates can best be of aluminium from an old chassis, with edges well filed to prevent damaging insulation. The system of cuts and grooves allows the coil to be tied by pieces of cotton-covered wire, so that the former can be dismantled and removed and the coil bound with tape. Each tying wire is removed as the binding reaches it. The winding should be done as neatly as possible, with good tension, but side-by-side placing is impossible after the first two layers. Wire from old dynamo field coils is satisfactory, if the insulation is sound. The wire used need not be identical on each coil so long as the number of turns is approximately correct. The former described will just hold about 200 turns of 18 s.w.g. enamelled wire when filled to the limit.

The coils are wired in series from the + brush to the − brush, with alternating directions of current flow. If in doubt check the direction of each coil by means of a small compass needle, a dry cell supplying the magnetising current. If the final connections to the field coils are reversed the dynamo will cut-in with the wrong direction of rotation, so correct polarity of the field-coil connections may be found by trial and error. As explained last month, any of the suggested windings will generate when the dynamo is turned by hand, "crank-handle" fashion. Move the brush-holders while doing this, a voltmeter indicating the best position. The third brush is, of course, omitted. Some idea of the power developed by the propeller may be gained from the force with which the armature resists rotation when one tries to keep the voltage above five or six volts by hand. Cover the openings in the dynamo case by soldering pieces of tinplate over them, and give the whole machine at least two coats of good enamel.

(To be continued.)

A Small Sailing Boat

Constructional Details of an Easily-made Yacht

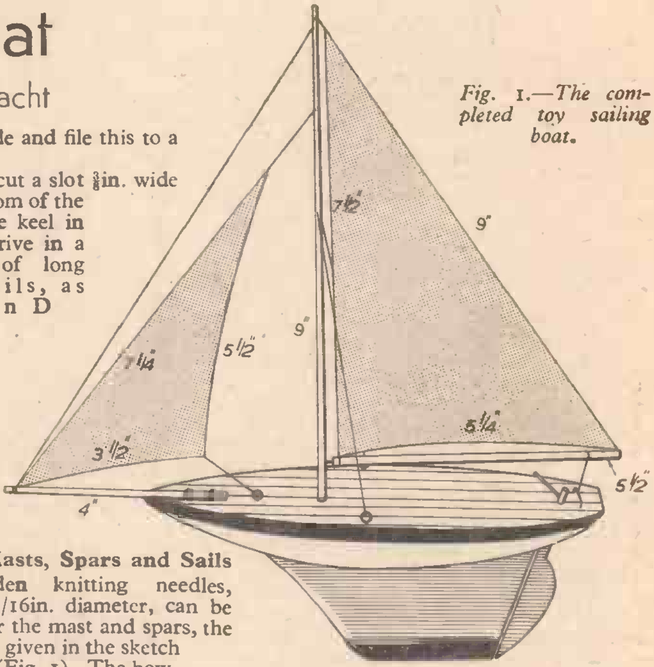


Fig. 1.—The completed toy sailing boat.

HERE is an easily-made boat which will sail well if care is taken in building it.

The hull is made from a piece of wood 9in. long, 2½in. wide and 1in. thick. Mark a centre line along the top and bottom of

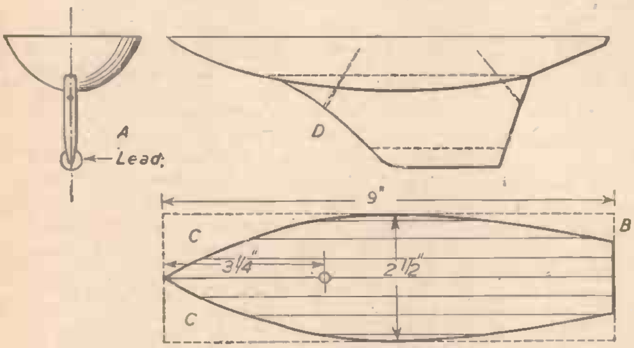


Fig. 2.—The shape of the hull and how it is marked out.

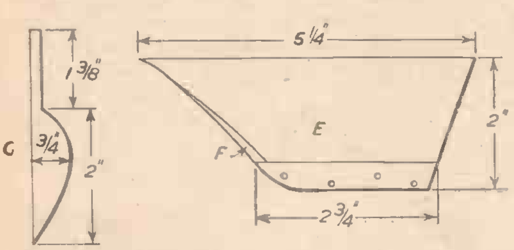


Fig. 3.—Details of keel and rudder construction.

the wood and then carefully outline the shape of the hull, as shown in Fig. 2. With a tenon saw, roughly cut away the parts CC, and also the corners at the back (see drawings). Now proceed to carve the hull to shape with a chisel. You will see by looking at A and D (Fig. 2) what the front and side of the hull should look like when finished. Give the hull a good rubbing all over with glasspaper. To represent planking, the parallel lines along the deck can be scored on with a bradawl, using a ruler as a guide.

For the keel, take a piece of ⅜in. wood, 5½in. long and 2in. wide, and saw it to the size given at E (Fig. 3). Taper the front part at F so that it forms a narrow edge. On each side of the bottom of the keel nail on a strip of sheet lead about ½in. wide and file this to a round shape.

To fix the keel in place, cut a slot ⅜in. wide along the centre of the bottom of the hull, and after gluing the keel in place, drive in a couple of long fine nails, as shown n D (Fig. 2).

The Masts, Spars and Sails

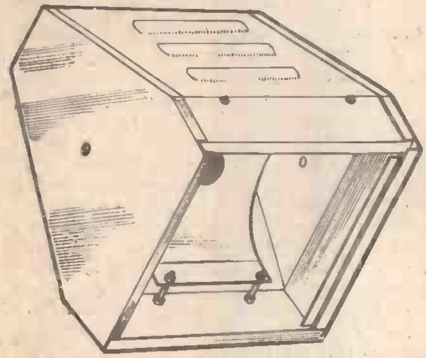
Wooden knitting needles, about 3/16in. diameter, can be used for the mast and spars, the lengths of which are given in the sketch of the finished boat (Fig. 1). The bowsprit is fixed to the deck by two wire staples, and the bottom of the mast is pushed into a hole about ¾in. deep in the hull.

The sails can be cut out of fine white linen to the sizes given, allowing about ¼in. extra all round for hemming. Use very thin twine for the rigging and attach the ends of the shrouds to small screw eyes fixed in the deck.

The Rudder

To complete the boat, a rudder can be fitted, fashioned out of a piece of 3/16in. fretwood to the dimensions given at G, the top part working in a hole in the hull, while the bottom part is held by two wire staples.

Give the hull two coats of white enamel and paint a ¼in. band of bright red or blue all round the hull. When quite dry, your smart little craft will be ready for its trial trip.



Perspective view of the completed floodlight.

MAKING A WIDE-ANGLE FLOODLIGHT

Constructional Details of an Easily Made Compact Lamp

By R. A. BARTHOLOMEW

THIS floodlight will give a wide-angle beam, very suitable for photography, lighting of shop-window displays, temporary floodlighting of posters or buildings, general stage work and, in fact, for any purpose where "directed" light is desirable or necessary. Amateur dramatic companies will find it extremely useful. Provision is made for accommodating colour frames and the reflector is so arranged that either 75, 100 or 150 watt bulbs can be used. An ordinary standard Cord-Grip B.C. lampholder is used and as the back of the casing does not get hot it would be quite safe to use a bakelite type.

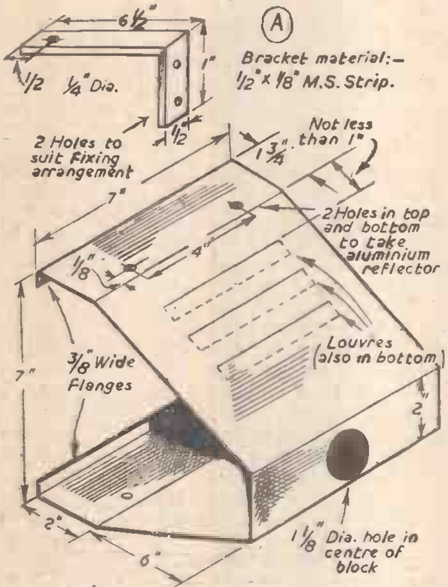


Fig. 1.—Details of the body and fixing bracket.

The casing is made from mild steel sheet and the reflector of aluminium. Licensing regulations generally require all lighting equipment for use on the stage to be made from not less than 20-gauge sheet metal. However, it is suggested that a heavier gauge be used when the floodlight is to be made for outdoor purposes and a lighter gauge when intended for photography and similar uses. The total cost of the finished floodlight would be only a few shillings.

Constructional Details

Details of the body of the casing are shown in Fig. 1. All dimensions given are inside dimensions. Ventilation louvres, which should be in approximately the position indicated, are essential to keep the lamp cool. They can be made by slitting the metal along one side of an oblong and forcing the metal outwards after placing a thick strip of metal either side of the oblong, and using another strip as a punch. The resulting gap should face away from the front of the floodlight or stray beams of light will result. Alternatively, the reader may prefer to drill a series of holes in the casing and cover these with a small metal shield to mask them.

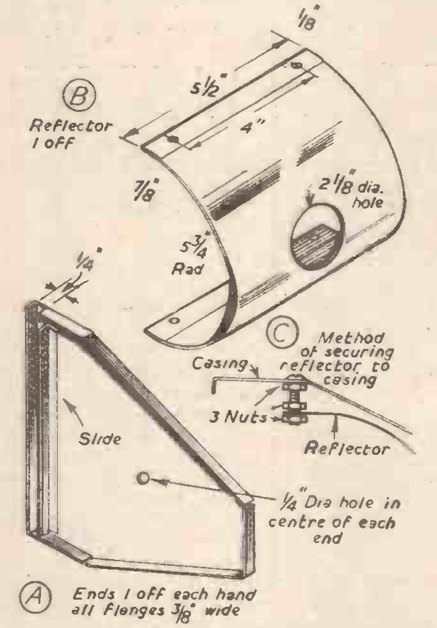


Fig. 2.—Reflector details and end piece of casing.

The casing ends are marked out to the same dimensions as the body and then the thickness of the metal being used is added to each edge, except the front, before the flanges are marked out. If this is not done these flanges will not go over the outside of the casing. To make the back slides for the colour frames, cut two pieces of the same gauge sheet metal $6\frac{1}{2}$in. long by $\frac{3}{4}$in. wide and fold down the centre to form an angle section. These are then riveted to the ends about 1/16in. from the bottom flange to enable this to go over the outside of the casing body, as shown in Fig. 2a. This should leave a gap at the top for the top flange of the casing body to fit into. The front slides for the colour frames are formed by the flanges on the front of the ends and the bottom flange on the body.

To assemble the casing the flange on the bottom front of the body is placed on the outside of the flange on the front of each end. All other flanges on the ends go over the outside of the body. The top flange on the body should be $\frac{1}{4}$in. from the front flanges of the ends, and in line with the back slides. This allows the colour frames to be inserted from the top of the floodlight. The ends are secured in position with rivets or, if preferred, small nuts and bolts, and the lampholder should now be fixed in the $1\frac{1}{8}$in. diameter hole drilled in the back of the casing.

Reflector

The reflector, made from a piece of 20-gauge aluminium, 11in. by $5\frac{1}{2}$in., has a hole $2\frac{1}{8}$in. diameter cut in the centre and two 5/32in. diameter holes drilled in each end. It is then bent as shown in Fig 2b and bolted to the casing with 4 BA by $\frac{3}{4}$in. long round-headed screws. By using three nuts on each screw an air gap is left between the reflector and the casing (see Fig. 2c).

A device can be made to focus the beam into a spot of light, the size and (to a lesser extent) the intensity of which can be varied. This focusing device is illustrated in Fig. 3b. A piece of sheet metal is cut and folded to fit into the colour frame slides of the floodlight and a hole 4in. dia. is cut out in the centre of this. Two metal tubes are then prepared, one 4in. dia. and the other slightly larger, to give a close fit over the outside of the first. These should both be approximately 6in. long, and can be

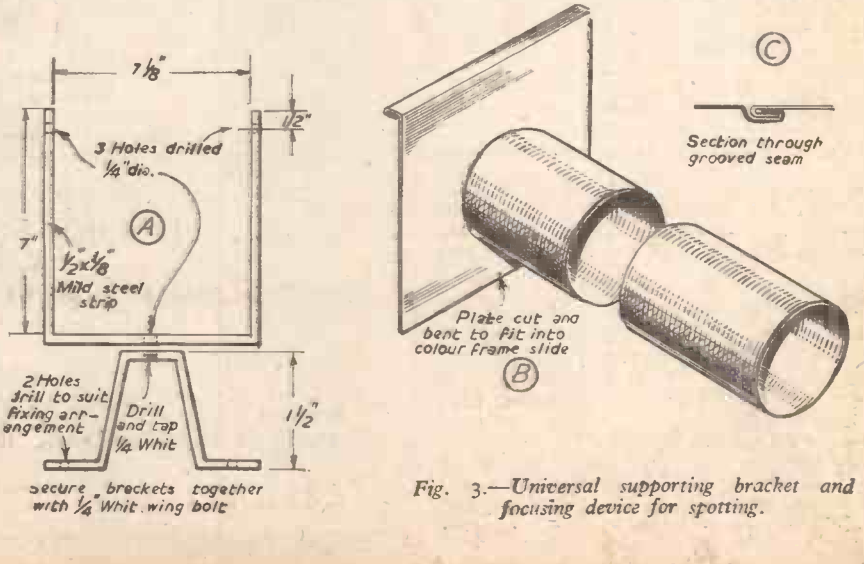


Fig. 3.—Universal supporting bracket and focusing device for spotting.

made from thin sheet steel, seamed by riveting or grooving. (A cross-section of a groove seam is shown in Fig. 3c.) If the seam is grooved the smaller tube should have the groove on the inside and the other on the outside. Alternatively, it may be possible to obtain some round tins of suitable diameter, removing the ends to form tubes. In either case it is advisable, on one end of the larger tube, to make a safe edge. When the tube is made from sheet a double edge should be folded and flattened before rolling. If a tin is used one end can be knocked over round a piece of thin wire forming a "wired edge." Make a series of cuts about ⅜in. apart in one end of the smaller tube to a depth of ⅜in., push the tube through the hole in the piece of sheet already prepared so that the ends of the cuts are in line with the back of the sheet, and slip the outer tube on the opposite end until it rests against the front of the plate. Now hammer over the ⅜in. flange protruding through the sheet, supporting the end of the outer tube on a firm surface. A series of lugs will be formed, some of which can be riveted to the sheet, thereby securing the smaller tube.

Adjusting the Spotlight

The completed device can be slipped into the colour frame slides of the floodlight, together with a colour frame if desired. By sliding the outer tube along the inner fixed tube the resulting spot of light can be easily adjusted. Naturally a really intense, concentrated spot of light will not be achieved without the use of a lens, but the degree of "spotting" achieved by this method will be found extremely useful for many purposes.

A number of these floodlights can be made and bolted together through the centre hole in each end, the whole being mounted by means of two of the brackets shown in Fig. 1a, using ¼in. setscrews and wing nuts to lock them at any angle. Each floodlight can also be set at individual angles of throw if desired.

Universal Mounting

When using the extra focus device it will be found desirable to be able to set the floodlight at various angles, both vertically and horizontally, and, therefore, a mounting bracket is shown in Fig. 3a which enables the floodlight to be swivelled round and also moved up and down. Both types of bracket can be screwed to either the floor, wall or ceiling.

The large holes in the reflector and casing can best be cut with a tank or bar cutter such as is used for cutting holes in chassis for radio and television. All the folds in the sheet metal can be made with the folding machine described in the April issue of PRACTICAL MECHANICS. The brackets can be bent in a bench vice. When wiring the lampholder it is, of course, advisable to earth the casing.

The Inventor and the Manufacturer

1.—Selling an Invention

By W. J. WESTON

THIS article and its successor concern contracts made between an inventor and a manufacturer. He either assigns to the manufacturer his right to take out a patent for his invention or he gives to the manufacturer a licence to use his patented invention in the making of goods for sale, and the manufacturer agrees to pay him a lump sum or a specified share of profits. The articles will deal with the nature of the bargain, with the points that call for close consideration, with the precautions called for, and with the wording of the clauses needed in order that the inventor may have assurance of obtaining the reward intended by English law.

It is not in the least likely that the ordinary British manufacturer will be other than scrupulously fair, but not every inventive genius is at the same time an astute bargainer; he is usually a little handicapped in the conduct of negotiations. It behoves him, therefore, to tread warily in the paths unfamiliar to him. For he must keep this in mind: the bargain once struck, the contract signed, he is bound by its terms. Quite recently a High Court Judge put that point in this way: "The mere fact that a simpleton in business has made an improvident or even ruinous bargain with a person astute and unscrupulous enough to take advantage of his simplicity does not of itself entitle the victim to relief. The Court will not intervene unless the case can be brought within some recognised exception to the general rule, that a person who, in the eye of the law, is capable of managing his own affairs is bound by any disposition he chooses to make, however damaging to himself it may be."

Inventor's Part

English patent law is in effect the exposition of a tacit bargain between the inventor and the public. The inventor's part is to publish his invention; he makes available for anyone who wants it a description, "sufficiently detailed to enable a person skilled in the art to operate the invention"; he even provides drawings when these are desirable to make the description clear. In exchange the public will, without expressly undertaking to do so, over a limited period, buy the goods in which the invention is incorporated at a price higher—at times a good deal higher—than the cost of making them. For the inventor has a monopoly enduring, so long as he pays the fees to keep it alive, for at least sixteen years.

Lack of capital is the usual cause when an inventor is baulked of the reward intended for him. The patent itself costs more than in most countries: the fees of a British patent, kept alive for the full sixteen years, amount to £132. And such an advertising campaign as will create a big market in a short time is far beyond the financial resources of most inventors. Therein lies the reason, the well-nigh compelling reason why an inventor needs the co-operation of a manufacturer in order to reap his due reward. The two enter into a binding contract and both gain by its fulfilment—nearly always, at any rate.

Questions Concerning Agreements

Troublesome questions may, indeed, arise through an agreement which is perfectly fair to both parties coming into being. Here is an instance of such questions. Doubtless you will think that the answer given to this particular question was not wholly unacceptable to the inventor. You may, in fact, look upon him as a lucky fellow, and you will say that most inventors would have lacked the temerity or, maybe, the knowledge, to raise the question. The case is Terrell *v.* Mabie Todd and Co.. Ltd. (Q.B., 1952).

The plaintiff had granted to the company a licence to make and sell fountain pens incorporating his invention. For this licence he had £5,000 and a promise of royalties on sales; and, as to these sales, the company undertook "to use their best endeavours to prosecute the sale of as many fountain pens incorporating the invention as reasonably possible, and with all due diligence to place the invention on the market and exploit it." There was a similar licence for the making and sale of ink-bottles called "Last-drop Bottles." Difficulties and uncertainties prevented the directors from doing much in the exploiting of the inventions, and the plaintiff asserted that they had not fulfilled their obligations "to use due diligence and their best endeavours to promote sales." The Court agreed with him and awarded damages. He was to receive £25,000 in respect of the pens and £5,000 in respect of the ink-bottles.

The new Orient liner "Orsova," 29,000 tons, leaving Tilbury recently on her maiden voyage to Australia. Unusual features of the liner are the absence of conventional masts and the extension on top of the funnel designed to keep smoke well clear of the decks.

A POCKET RANGEFINDER

Constructional Details of a Handy Instrument to Facilitate Positive Focusing

By "TEST ENGINEER"

In operation the rangefinder should be held as shown. This enables the person using it to make general observations with the right eye.

A PRECISION pocket rangefinder for use in conjunction with a camera can be quite simply made. The rangefinder constructed here is of the double-image type, that is, the range can be read from a calibrated scale when the two images viewed through the rangefinder coincide.

The principle of the rangefinder is quite simple. In Fig. 1 consider RQ as the fixed base of the rangefinder, PQ the distance between a semi-transparent glass Q and the object P. R is the adjustable mirror which is inclined by means of a calibrated disc.

To start with, R and Q are parallel, and are at 45 deg. to the base line RQ. The light rays in this position would be parallel. If R is rotated until the point P comes into view, then, when nearing coincidence point P will be directly seen through Q, and an image of P will be seen via mirror R. If the object is an arrow head, as shown in Fig. 2, then in the model to be described an illuminated circle is seen with the arrow directly viewed slightly darker than the reflected image. When the two arrows coincide, then we have the condition existing as shown in Fig. 1. From the formula $PQ = RQ \tan R$ the distance of the object from Q can be calculated. In the actual rangefinder calculation is unnecessary, the distance reading being taken from a calibrated disc attached by a lever to the mirror R.

Fig. 1 (Left).—The principle of the rangefinder.

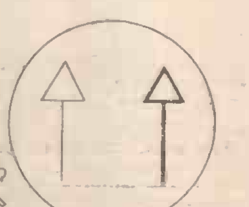


Fig. 2 (Right).—The two images seen through the rangefinder.

Case and Cover

The case is made of brass channelling of ½in. x ½in. external cross-section with a 1/16in. thick wall which gives an internal cross-section of ⅜in. x 9/16in. If any reader has difficulty in obtaining channelling locally, then it can be obtained from Stanton Bros. (Metals) Ltd., whose advertisements appear in these pages and from whom I obtained mine. Bending 16 swg. sheet does not give a satisfactory job due to the bending curve of the material and it spoils the appearance of the cover on the case.

The case, including the end plates, is 3in. long. To ensure maximum strength the end plates were silver-soldered to the case body. There must be sufficient overlap on the end plates so that when the cover is fitted it lies flush with the end plates. The cover was then bent from brass sheet to fit snugly over the case. The reason for brass being used throughout was that it is pleasant to work with and the finished job can be plated if so desired either commercially, or from information obtained in previous issues of PRACTICAL MECHANICS. Dimensions given need not be strictly adhered to, and the finish can be as desired. The weight of the instrument described in this article is about 2½ ozs.

From Fig. 3 the two main views of the case and cover can be seen. Parts 3E and 3B can, of course, be made without the locating spigot. Part 3A, the calibrated disc, was made from aluminium and tapped a BA thread to suit the thread on the spindle 3C and a suitable locking nut.

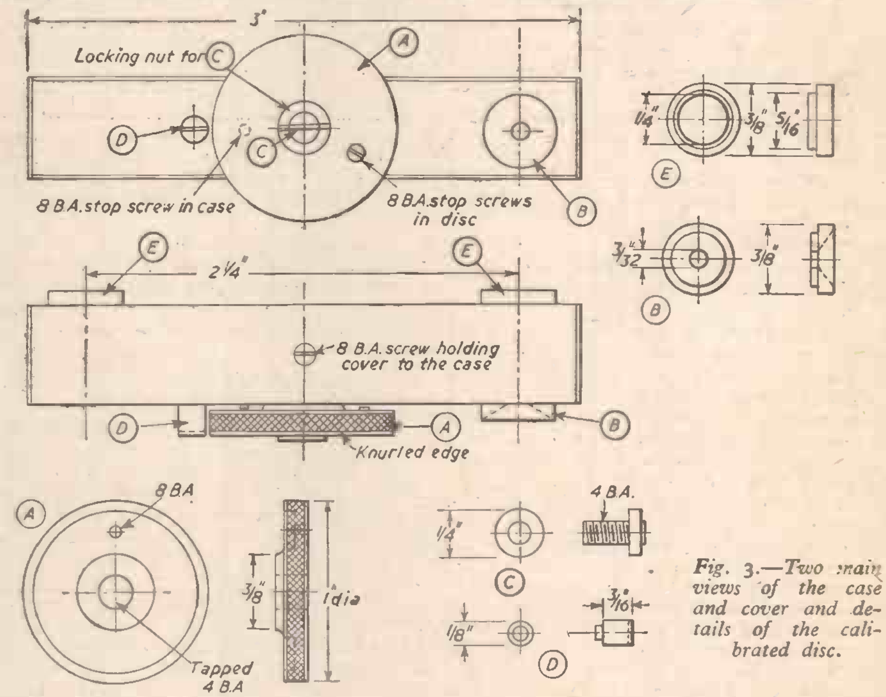
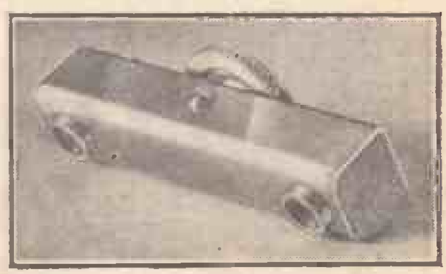


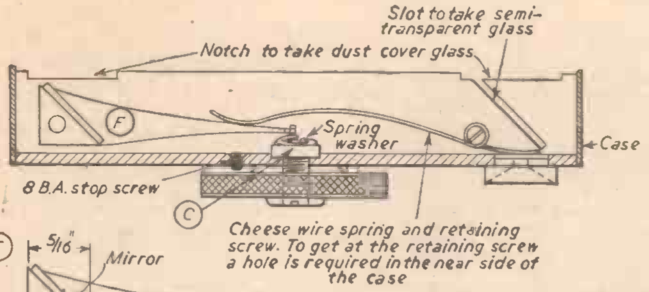
Fig. 3.—Two main views of the case and cover and details of the calibrated disc.

The Internal Mechanism

Fig. 4 shows a sectional view of the instrument with the cover removed. The 12 BA screw on the rocker arm (part 4F) gives the preliminary alignment of the instrument when final adjustment is made. A drop of adhesive on the thread prevents future turning of the screw. The block of part 4F is drilled to take 3/32in. dia. silver steel rod, about which point the whole arm turns. The mirror is attached to the 45 deg. face of the block, care being taken to prevent distortion due to uneven fixing. The mirror was a fragment of a 2¼in. diameter ex W.D. mirror, .04in. thick, and obtainable for a few pence from surplus stores. The mirror is ideal for our purpose as the reflecting surface is on the mirror glass and is not viewed through it like the normal household or



An alternative view of the completed rangefinder.



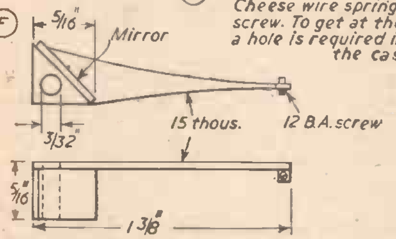
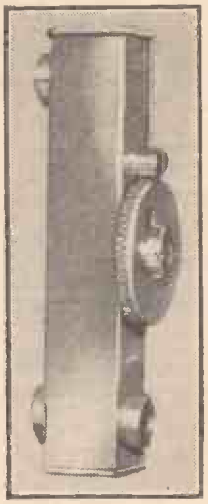


Fig. 4 (Above).—A sectional view of the instrument with the cover removed.

(Right).—A three-quarter view of the rangefinder with the calibrated scale removed to show the stop screw.



handbag mirror. With the silvering removed, it was also used for the dust-cover glasses. Extreme care must be taken while cutting this glass. The cheese-wire spring keeps the slight tension required on the rocker arm and is adjusted by experiment. A hole is required in the near side of the case so that the spring-retaining screw can be screwed into place on assembling.

Part 3C in Fig. 3 is the spindle for the disc, and when a spring-locking washer is silver-soldered by an end to the spindle it gives a spiral for the 12 BA screw to move on and it also gives a continuous movement of the rotating mirror for a full revolution of the disc. The washer was a copper one of the type used in instruments, the spigot on the spindle being the same diameter as the internal diameter of the washer which made certain that the washer was absolutely concentric with the spindle. The interior walls should be painted with a photographic "dead black" paint in order to cut down internal reflections to a minimum.

Hints

Sizes need not be strictly adhered to. For example, the inside diameter of 3E should be as large as possible, but not greater than the breadth of the moving mirror. This would not give a round disc of light, but a disc with a segment missing.

The longer the base line RQ of Fig. 1, the more accurate in operation the finished instrument will be.

The photographs show my mark II model where the cover and end plates are made of stainless steel. This material is extremely hard, due to its high nickel content, and, therefore, drilling and folding the cover is not so easy as working with brass.

The spring-locking washer on the spindle, Fig. 3, was preferred to a cut spindle as the washer "gradient" could be pushed around until the required "spiral" was obtained. It is, of course, rigid enough for its intended purpose.

Calibration

First you must decide what distances are required on your rangefinder. I made use of the same distances marked on the focusing ring of my camera, ranging from 3ft. to 30ft., and then infinity. In the garden by means of canes I then marked out the distances required from a fixed point and from this point used the rangefinder. Calibration was then quite easy. I focused on each cane in turn, up to 30ft., and marked the focusing disc accordingly. For the infinity setting a drainpipe on a near-by house was used.

The focusing disc can either have the distances engraved on it or a paper scale can be made. The best type of paper scale is obtained by photographing an enlarged drawing of the scale and then making a print on glossy paper.

Items of Interest

Oil Refinery at Geelong

THE Governor-General of Australia recently opened Shell's new refinery at Geelong, 40 miles west of Melbourne, Australia. With a capacity of about 1¾ million tons a year, it is the largest oil refinery in the Commonwealth of Australia, and will supplement the company's existing refinery at Clyde, near Sydney. Crude oil for Geelong is planned to come from the Middle East and the Seria oilfield of British Borneo, both virtually 100 per cent. sterling sources of supply.

A catalytic cracking unit is to be added to the refinery. Scheduled for completion about the middle of next year it will have a capacity of around 650,000 tons a year. Its construction will more than double the company's investment in the refinery.

A half-mile long jetty capable of accommodating tankers of up to 18,000 d.w. tons is being built by the Geelong Harbour Trust. Construction on this is proceeding from both the seaward and the landward ends simultaneously. At present the crude oil for the refinery has to be pumped from Geelong.

The refinery is connected with Melbourne by a 36-mile long glass-fibre-wrapped products pipeline. It is intended to pump both petrol and diesel oil through this pipe, avoiding intermixing by careful pressure control.

New Cannon for Jet Fighter

DETAILS of a new cannon, capable of inflicting "devastating" damage, which will be the armament of the Swift, Britain's swept-wing jet fighter, were recently disclosed by Mr. Sandys, the Minister of Supply.

With this powerful cannon the Swift is capable of bringing to bear against an enemy eight times more high explosive than was possible with earlier types of guns.

Recording Sound Magnetically

AMERICAN scientists have discovered that a mixture of rubber and iron-oxide formed into a band and mounted on a wheel can play back messages clearly millions of times.

It is not only much more efficient but also more economical than the old devices using tape or wire.

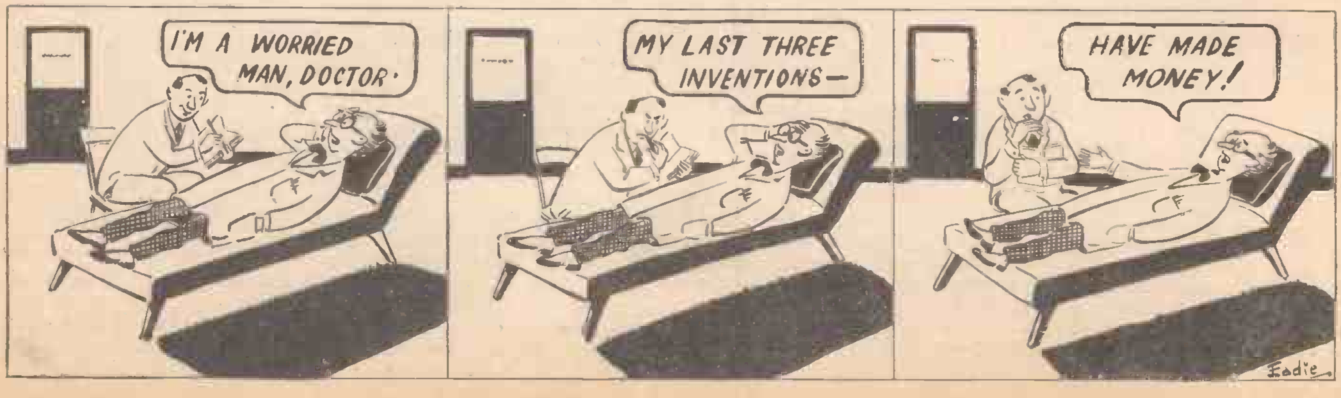
Britain's First Small Gas Turbine

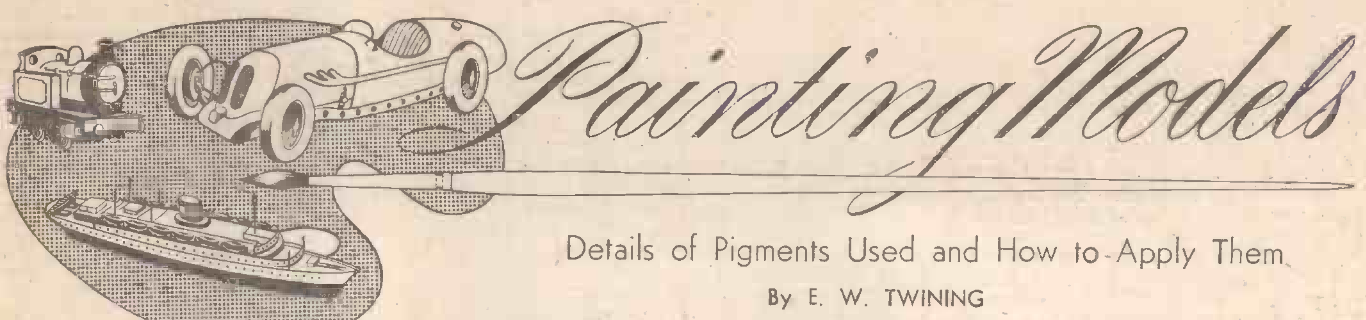
THE first of Britain's small gas turbine units to go into production is the Rover 1S/60 gas turbine engine. This unit is a direct descendant of the Rover 250 b.h.p. unit which powered jet one. The world's first gas tubine car is manufactured by Rover Gas Turbines, Ltd., Solihull, Birmingham.

Following the inception of the 250 h.p. unit, the decision was taken to concentrate on production of two small engines, both having as many common parts as seemed practicable. One of these was to be a 60 b.h.p. industrial engine of the "single-shaft" type without heat exchanger, whilst the other, a "two-shaft" unit heat exchanger, was to be suitable for propelling vehicles and boats. The single-shaft industrial unit was the first to go into production.

India May Make Rolls Jet Engines

ACCORDING to usually reliable sources in New Delhi, negotiations for the establishment of a Rolls-Royce factory to make jet aircraft engines are believed to have reach an advanced stage.





Painting Models

Details of Pigments Used and How to Apply Them

By E. W. TWINING

THE finishing and decorating of a model by painting should add such an important and prominent feature to it that unless the work is done with accuracy and skill of the highest class, the whole appearance of it will be marred and may even be spoiled. The fact is that painting is so entirely different an art from the making of a model, that very frequently the skilled craftsman, who has turned out a fine piece of mechanical work, falls short of perfection in the painting of it; so much so that it would have been better to have left the model unpainted. Often there are three chief faults that are evident; these are: roughness of the paint, incorrectness of colour, assuming that the model represents a definite prototype, and crudity and inaccuracy in the lining out, if the prototype was lined.

There are dozens of different types of models, but as regards painting, they can be grouped under a very few broad heads, and I think that for the amount of skill called for in executing it, added to the time and complication involved, the steam railway locomotive heads the list with the railway coach a close second. With the coach I would include diesel and gas turbine vehicles. On the principle of dealing with the most difficult thing first I will commence by describing the painting of a model locomotive which, since it is assumed to be picked out and fine lined, may be of either pre-grouping period, i.e., before 1923, or post-nationalisation. In between January, 1923 and 1948 engines were so neglected that often even new engines were turned out with but one coat of roughly finished paint.

Painting Model Locomotives

If the engine is still assembled and has been tested, the first thing to do is to take it all to pieces, or so much as may be necessary. If the model represents an old engine of date before grouping, the wheels will have to come out because, prior to 1923, nearly all engines with the exception of the Great Western, the L. and N. W. Rly., and some (not all) of the Midland had wheels the same colour as the rest of the engine. The G.W.R. were black after 1905. North Western were always black from 1871 onwards, and during Mr. Deeley's régime, 1903 to 1909, on the Midland the wheels were likewise black. In any engines of these three companies subsequent to the dates given, the wheels can be left in place and painted along with the frames. On models of other companies' engines they must be taken out, and in all cases, if the wheels are other than black they must be removed for painting, especially if they are picked out and fine lined.

By the way, "picking out" and "fine lining" are the correct terms, taken from official painting specifications; the first refers to the broader bands, nearly always black, on the edges of plates or removed from the edges to form a panel, and the second to the thinner lines on boiler bands, and everywhere edging the before-mentioned black bands. When it is stated that an engine or other vehicle is "picked out" in black, "fine-lined white," one can form a mental picture of the arrangement and effect of these colours.

If the model or its tender has any soldered work about it all parts to be painted had better be washed down with turpentine to remove Baker's soldering fluid or Fluxite, also any oil or grease. Now the paint that I propose for applying to the model is artists' tube colours. Note that it is artists' quality and not students' or decorators'.

Nearly all of the colours, to imitate the exact shade of the prototype, will have to be mixed and here I might call the reader's attention to the chart of actual shades of colours for painting the locomotives, coaches and rolling stock of all the old companies, prior to nationalisation, contained in Ernest F. Carter's book: "Britain's Railway Liveries," published by Burke, London.

I am afraid that space limits will prevent me from giving the names and quantities of the pigments which go to make up the colours of the engines of the many old pre-grouping companies, though there are a few which ought to be mentioned: otherwise the reader would not know what tubes he would have to purchase; for instance, the Midland crimson. This beautiful colour can be made with a mixture of Indian red, 1 part, and Alizarin crimson, 2 parts, with a further thin coat of crimson alone. The London, Brighton and South Coast yellow, Stroudley's colour: yellow ochre and Roman ochre, equal parts, with a thin coat of the Roman ochre alone. The olive green borders: yellow ochre and Prussian blue. Great Eastern blue: Prussian blue with a little white and with ultramarine blue laid over when the other is dry. North British Railway brown borders of all panels, etc., raw umber. Panels and boiler, cab sides, splashers and wheels, raw umber lightened with yellow ochre.

All green engines will be painted with mixtures, in varying quantities according to prototype, of chrome yellow, mostly pale chrome yellow and Prussian blue. The Great Western green is pale chrome with a large proportion of Prussian blue. The British Railways colour is middle chrome yellow with Prussian blue.

The Southern Railway, sage or olive green (it varied a lot in tint) can be got with Prussian blue, yellow ochre, with Roman ochre added.

Most of the engines had red or red-brown frames and were chiefly either pure Indian red or that colour with burnt umber or raw umber added, according to the railway company. The L.B. and S.C. frames were, when the upper works and wheels were yellow, the same deep crimson colour, or thereabouts the same, as the Midland red.

The Caledonian blue was Prussian blue; in D. Drummond's time it was dark, but was much lighter under Mr. MacIntosh, being lightened with white. The Somerset and Dorset Joint Railway locomotives and carriages were blue, though not quite so bright as the Caledonian or the Great Eastern. Prussian blue with white and a very little black added will give the colour.

From the foregoing list of tubes it will be seen that very few locomotive colours call for the mixture of more than two tubes and in one case, at least, the Somerset and Dorset, the third pigment in the mixture, the black, will be used in the picking out.

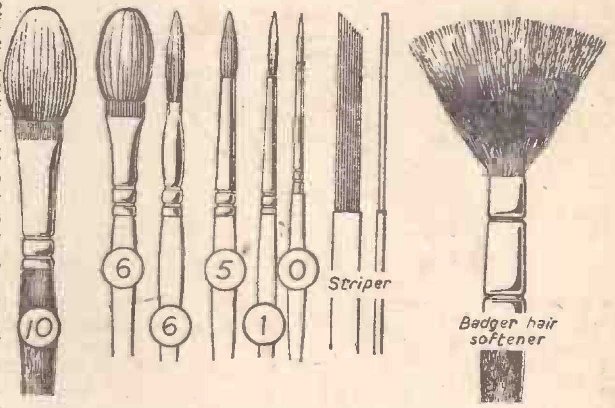


Fig. 1.—Brushes for model painting.

There seems to be a prevalent idea that many of the old locomotive colours were complicated in their make-up. For instance, I have seen it stated that the L. B. and S. C. yellow was made up of about six or seven pigments of which a green was one, orange chrome another, and burnt sienna another. This is all nonsense, if such brilliant colours as orange with burnt sienna were cut out the green would not be wanted. I have tested the thing out by making the mixture named and found that it means going a roundabout way to achieve a simple result which result can be got by two simple pigments only and those the two I have named. So it is with the greens; all the railway companies who painted their engines green got their great variety by mixing different shades and different proportions of chrome yellow with Prussian blue. There are two blues possible, ultramarine and Prussian blue, and three yellows: pale, middle and deep chrome. With these a whole range of greens may be got by varying the colour and the quantity. In the case of olive green Prussian blue can be added to a little middle chrome yellow and much Roman ochre or raw sienna and this yields a beautiful olive.

Preparing the Colour

Having purchased the tubes of colour required and supposing it is a green engine we are going to paint, squeeze some of each pigment out of its tube on to a piece of glass or on a palette and mix them thoroughly with a palette knife. Add more yellow or more blue as required until the exact shade is reached. Having got the colour right spread it, as thinly as possible, on a sheet of art paper and allow it to remain for ten minutes or a quarter of an hour, then scrape it up and replace it upon the palette. It will be found that now it is very much stiffer than when it was spread on the paper. The object of the spreading is to extract some of the oil from it and this the art paper does by reason of its clay surface. Newspaper would extract the oil as well, but in scraping up the colour the paper fibres would come too, which would spoil the paint; no fibres come off the art paper. The pages of high-class magazines are quite suitable for the purpose. The surface is very glossy and absorbent of oil and I know of nothing else so suitable.

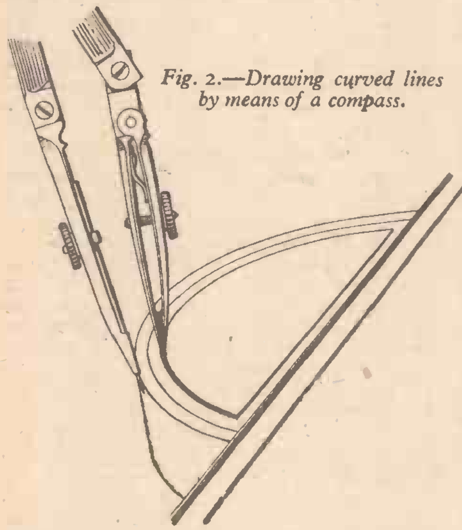


Fig. 2.—Drawing curved lines by means of a compass.

Having got the colour back on to the palette, add to it a mixture, in equal parts, of turpentine and Japan gold size. Mix thoroughly with the palette knife and let the consistency be about equal to that of running cream. This means that the colour can no longer be kept on a flat surface, but must be transferred to a small pot, one with a screw-on cap for preference.

Now, selecting the part of the engine most convenient to start the painting, begin to lay the paint with a very soft-haired, flat brush in a nickel ferrule, such as No. 6, of which two views are drawn in Fig. 1. In this drawing are illustrated all of the brushes which will be found most useful for all kinds of model painting. The first, No. 10, will be used only on large model locomotives of about 10¼in. gauge though it may be suitable on 7¼in. gauge; for smaller scale engines the No. 6 will be best.

First Coat

To apply a first coat of paint and then a second over all the parts may seem a long job, but I advocate even a third coat for the reason that in order to get a perfectly smooth and uniform appearance, with no brush marks, the coats should all be thin. To paint the wheels go over them with two coats of the main colour: then mount them between centres in the lathe and spin them to paint on the black tyre and any lines or black axle ends. Any white or yellow lines are also added with brush No. 0 whilst the wheel is revolved slowly.

The boiler lagging bands will have been taken off the boiler and painted black, if the model is an early engine of pre-grouping period, 1922, and, by the way, white and black paints should all have the oil extracted on art paper; to add the white lines (or other colour according to prototype being dealt with) on their edges, the bands must be straightened and fastened down flat on a board and, using a straightedge as a guide, rule the lines with a draughtsman's ruling pen, with white paint in the pen. Make a trial line first on a similarly painted surface, to be sure that the colour is of exactly the right consistency, for if it is the least bit too stiff it will not flow or if too thin it will flow out and make a pool on the work. Filling the pen too full with colour is another reason for getting flooding.

Next we will take the panelling of the splashers. A compass is best for this. Set the instrument so that the needle leg is longer than the pen leg. Lay the engine on its side, unless it is possible to remove the splashers. Fill the compass nibs with black and, using the outside of the splasher as a guide, draw the line, carefully keeping the compass radial to the splasher as it is moved around the curve, as sketched in Fig. 2. You will thus get a uniform width to the black, though if the black is a wide band two lines will have to be drawn and filled in between them. With the white line, or lines, you will get them parallel with the splasher edge all around.

The cab and the tender panels can be done in the same way if the scale of the engine is anything up to one inch to one foot, but probably the tender will not provide all the guiding edges that are required, therefore marking out will be necessary and a striper brush used for the broad black bands with fine lines of white drawn, when the black is dry, with the draughtsman's pen used against a straightedge. For marking out, dust the surface with powdered chalk applied by a pounce, i.e. a bag of muslin, two thicknesses, tied around the neck after filling. Dab this all over and then draw lines through it with a bluntly pointed stick of soft wood. Then follow the drawn lines with the pen, first the black and then the white, allowing plenty of time in between for drying. On large models proceed in the same way, but using the striper brush for the broad black lines instead of the pen, as in Fig. 3.

The question of how the white lines, or others, shall be drawn depends upon their thickness. Thin lines, up to about one-sixteenth inch, can be done with the pen and straight-edge, but thicker ones can be either drawn with the pen, making two lines and filling in between them with the brush, or they can be done straight away with the striper. Everything depends upon the scale of the model, for instance; a ½in. scale engine would call for the exclusive use of the pen for both thick black and fine white or coloured lines, whereas a 15in. gauge engine would not be taken to pieces nor turned on its side and all lining would be done with a striper. Here the broad lines would be at least ½in. or ⅝in. wide, and the thin lines from 1/16 to 3/32in. wide.

For the smoke box and chimney, and any other parts that get hot, the black had better be left on the art paper until nearly all the oil has been extracted, then scraped up with the palette knife and thinned with Japan gold size and turpentine, but here the proportions may be two parts of gold size to one of turps. Thus, as there will be less oil in the paint there will be less possibility of its blistering with the heat.

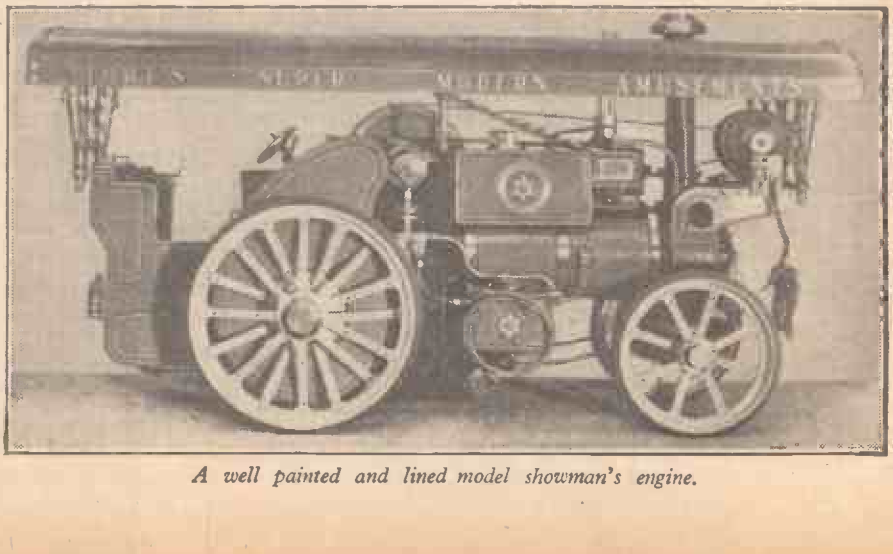
Lettering and Numbering

The fine brushes: 0 and 1, in Fig. 1 (they are really water colour brushes) are wanted for the lettering, numbering and painting the company's coat of arms. Lettering and numbering will be done in the main with gold leaf; obtain transfer gold leaf, it is easier to handle and apply. Paint the letters in first with any suitable yellow, such as chrome yellow or yellow ochre and white. Use it as it comes from the tube, but mix it and thin it with varnish and turpentine. Give it plenty of time to become tacky, or nearly dry, and then, but not before, press down on it the gold leaf. Dust off the superfluous leaf with a dry soft brush, such as No. 5 in Fig. 1, and the job of painting, except for the blocking of the letters with suitable colour, is finished and the engine can be reassembled.

Varnishing is important. Most people prefer to see a brilliant finish, but unfortunately such a glossy surface can only be obtained by a heavy varnish which means rounding off corners and filling in all angles with fillets where everything ought to be sharp and clean. Here again the size of the model must decide. A half-inch scale model can have only one coat of picture copal varnish, a 1in. scale 2 coats of the same, whilst larger models can stand heavier commercial varnishes such as pale oak or copal. The brush used for applying the varnish must be much stiffer than any of those illustrated in Fig. 1. Get a fairly long-haired hog hair of about No. 5 or 6 size, the kind that would be used for picture painting in oils.

Ships

Now a few words about the painting of ship models. The majority of models made are in wood, especially those in glass cases, and it is these which call for a high class finish. Like the locomotive the model ship will have to be taken down; that is to say, it



A well painted and lined model showman's engine.

will have all its deck fittings and other parts removed for painting, and all of these which are made of wood, such as hatches and skylights, will be sized and varnished natural colour. Ventilators, funnels and other parts in metal will be treated as such, that is, in the same way as the locomotive, the funnel, providing it is circular, being put in the lathe and slowly revolved for painting. I think that the best paints for these items are the cellulose varieties, such, for instance, as the semi-gloss Robbioloid, and other makes of such paints.

The hull needs to be carefully treated ; in most cases it is found necessary to paint it with successive coats of lead colour priming, and even with a filler in local hollows, well rubbed down with glass paper No. 1 and No. 0. The first priming coat should be a

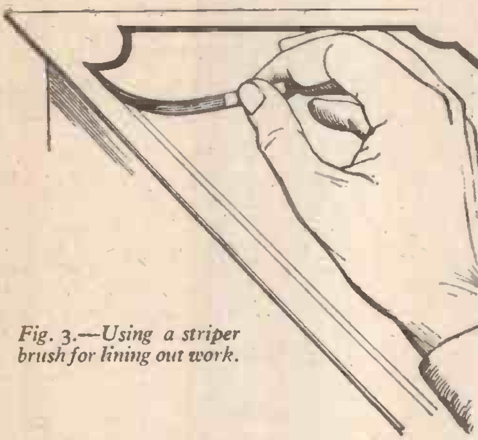


Fig. 3.—Using a striper brush for lining out work.

little thinner and flatter than the succeeding coats ; the effect of being thinner will be to enable it to more deeply enter the grain of the wood. When fully primed give the hull two coats of black or whatever the colours are, the last one having the water line carefully drawn, in a dusted chalk line or, in the case of some light undercoats, it can be drawn in strong black pencil. Whatever it may be the upper edge for the water line will be painted in with a long-haired striper. The paint used will probably be of a colour imitating that of red lead which can be made with orange or pale vermilion to which is added a little Light Red or Venetian Red. There may be other lines on the hull as well, but above the L.W.L. the colour is usually black. For varnishing a good quality pale oak varnish may be used.

There is another way in which a ship's hull can be finished and this is especially suitable for the treatment of models of sailing ships. It involves the use of a spirit stain with shellac. A small quantity of spirit black is added to a weak shellac solution (brown shellac flakes in methylated spirit). This is painted on the wood in thin coats, two such coats being usually sufficient. Then the copper sheathing is painted on, either with pale green paint or copper bronze powder made into a paint with clear cellulose lacquer. Finally, the whole hull is french polished, using the white polish, not the amber-brown variety.

Whichever way the hull is treated, I think it should be done before the ship is rigged, and before the chain plates have any stays and dead eyes put on them ; in fact, before anything is added which would offer obstruction to the polishing rubber.

Railway Coaches

Railway coaches will, if they are built of wood, be treated in much the same way as ships, i.e., they should have at least one coat of lead colour priming, all over first, this being rubbed down with No. 0 glass-paper. They may then be dealt with, as was the locomotive, by laying on two or three successive coats of the final colours, very thinly. It may be necessary, or advisable, to evenly distribute the colour by very lightly brushing over the surface, as soon as it is completely covered, with a badger hair softener. This brush, shown in Fig. 1, used dry, is held vertical to the surface and only the tips of the hairs allowed to touch the paint. It is an expensive brush and only on models measuring 24ins. long and upwards may it be necessary. Much depends upon the consistency of the paint and the nature of it. Dark transparent pigment would not need it, unless it had to be used for stippling the colour, but heavy colours containing much white, such as cream upper panels of carriages, and light green on locomotives, probably would, and that is why I advocate laying a number of thin coats of these colours so as to get a perfectly uniform depth of paint and so possibly dispense with the use of the badger-hair softener.

Lining and lettering of railway coach models should be done as described for the locomotives, using a draughtsman's pen and straightedge. Radii at the corners of panels can be put in with the fine brush, No. 0 or No. 1 according to size.

There are certain kinds of models of which cranes, bulldozers, bridges, etc., may be cited as examples, all of which are required to have only one colour put on them, all over, which colour may be red oxide, lead colour or black. Now although it is a one-colour job it requires to be done with care because the model will have nothing else to depend upon to make it attractive but good workmanship. Where there is lattice girder work it is so easy for a paint-laden brush to be dragged over the overlapping of plates and strapwork and the paint runs down out of sight until the other side comes to be painted when the excess paint, which has run down, will possibly be found to be dry. The way in which to avoid this sort of thing is to give two thin coats. Large models of structural work can often be spray painted, and this is a very good method. It is not economical as regards paint, but often a commercially made paint could be used; such as one of the many shades of flat Ripolin which I have found excellent for this kind of work. There is no need to use tube colours unless you have to match exactly several colours adopted for the prototype and which may be unobtainable in fine grade commercial flat paints.

This model steam launch is a good example of how careful painting and lining adds to the smart appearance of a model.

Architectural Models

The paint which I recommend for decorating all of these, whether they are to a large scale as would be an elaborate single building, or tiny houses and buildings in a garden city, to a scale of 30 or 40 feet to an inch, is Ripolin.

There are about fifteen colours made as standard tints which can be used without any mixing for reproducing the colours of building materials or the paintwork on doors, windows, etc. Only three materials call for mixtures: blue brick, grey slate and green slate, and all three are very readily obtained with black and white, black and a concrete colour and black, white and a little green, respectively.

Three warm greys are available for concrete and stone, there is a bath stone colour, three reds for different kinds of brick and tile, a red suitable for structural steelwork, crimson, browns and three greens suitable for doors, gates, windows and rainwater down pipes of houses and, lastly, black and white.

Ripolin paints require to be thoroughly well stirred up in their tins, only a little taken out for use, into a small tin cup or a tin lid, and the main stock tin sealed and turned upside down. Then when you want more, give the tin a thorough shaking, turn it right way up, open and take as much as you need and seal again. Always keep the tins with lids downwards. The quantity taken for immediate use will need a few spots of turpentine added to it and still further turps as the colour is exposed to the air. For painting small buildings never put out for immediate use more than about a tablespoonful of paint at a time.

The brushes to be used are the round sables Nos. 5, 1, 0 and No. 4. Take the whole of the buildings and paint the walls first, dark red brick, light red brick, stucco, roughcast or whatever it may be, then deal with chimneys and roofs, slates or tiles, and lastly paint window frames, doors and rain-water pipes. Before the buildings are stuck down the surface of the base, the roads and footpaths, must be painted, a dark grey for the one and a light concrete for the other.

REWINDING AN ARMATURE

Simplifying a Difficult Job

By "HANDYMAN"

THE successful re-winding of an armature depends on an even distribution of the turns.

The amount of wire in each slot should be exactly the same, so that an even current is produced and a perfectly even mechanical balance is obtained. The armature dealt with in this article has 12 slots and 12 segments, as shown in Fig. 1. First, make a wooden stand from three pieces of wood (Fig. 2) on which to mount the armature. See that it revolves freely.

The inside dimensions of the stand can be obtained by measuring the distance between A and B on the armature (see Fig. 1); the distance between C and D is the back end of the winding. Count the slots and segments, and note where the top coil starts and finishes, which will give the coil span. The span of the armature described is 1 and 6—that is, it starts in No. 1 slot and finishes in No. 6.

Dismantling the Old Windings

Remove the top coils at the back of the armature and count the number of wires in the coil. Dismantle the old wire and insulation and remove the stray wires attached to the commutator. Run a three-cornered file along the mica which separates the copper bars on the commutator, and then cut a small nick on the riser of each commutator bar in readiness to receive the new wires when the armature is wound. Test the commutator with a lamp in series, both for short circuits and also leakage to the spindle.

The Winding Process

Insulate the spindle between the commutator and laminations and also the spindle at the back of the armature (½in. more than the back of the winding), as shown in Fig. 1, C and D. Empire cloth should be used for the insulation, but paper is sufficient where the voltage is not more than 50 volts. The papers for the slots should be cut so that they overlap about 1/16in. at the ends of the armature, leaving about ¼in. to spare at the top of the slot. To commence re-winding make a knot in the wire, allowing about 2in. for connections to the commutator. This is placed in slot No. 2, with the knot at the back end of the slot, as shown in Fig. 3. Thread the wire into slot No. 1 and wind in a clock-wise direction to slot No. 6.

Keep a gentle strain on the wire as you are winding, and when 25 turns are wound on, twist the starting and finishing ends together and cut. Push the twisted ends into slot No. 2 so that they are out of the way, place papers in slots Nos. 12 and 5 and wind another 25 turns.

The winding sequence will then be: 1-6; 12-5; 11-4; 10-3; 9-2; 8-1; 7-12; 6-11; 5-10; 4-9; 3-8; and finally 2-7. Carefully pack the wires and insulating papers into the slots with a flat piece of fibre sheet, and slide a small piece of thin fibre sheet into each slot, so as to prevent the coils from throwing out when revolving.

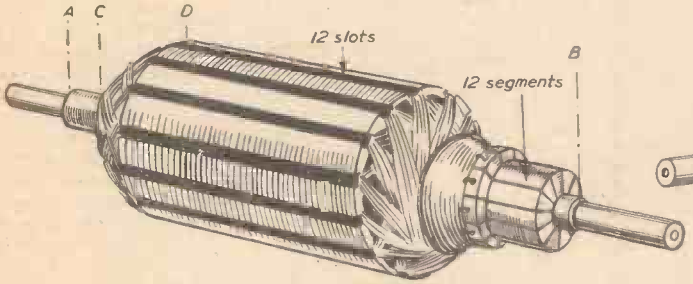


Fig. 1.—Showing the type of armature described in the text. It has twelve slots and twelve segments.

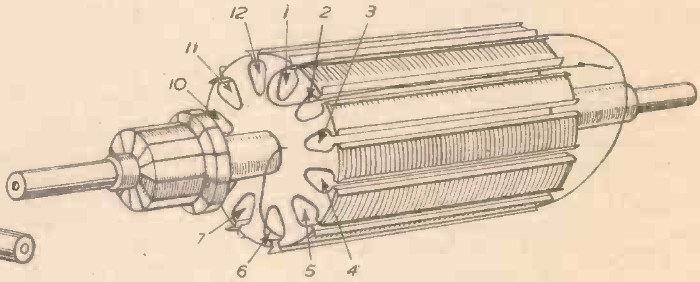


Fig. 3.—Start of the re-winding process.

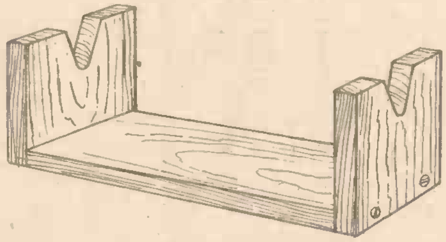


Fig. 2.—Details of the wooden stand on which the armature is mounted for re-winding.

These coils will now have to be tested to make sure that there are no short circuits between them.

Lift the 12 twisted ends and bare them for about ½in. Arrange these ends so that they are clear of the armature, join them together with very fine fuse wire (see Fig. 4) and test each coil by cutting the fuse wire and placing a lamp in series.

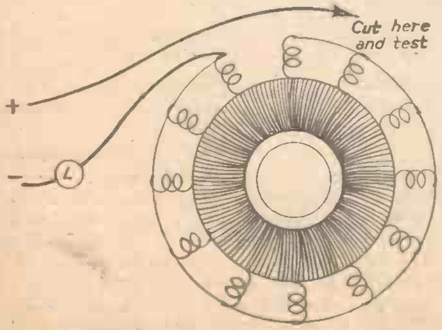


Fig. 4.—How to test each coil separately.

Short Circuits

Assuming that the first coil is corrected, cut the second and test, and so on all round the armature.

Should your lamp light whilst making this test, then the coil which is being tested is making electrical contact with another coil. This will have to be located before the work can proceed.

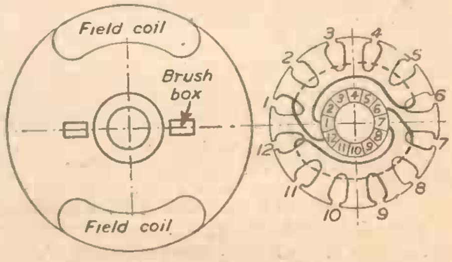
The commutation point must now be found. The field coils and brush boxes on most small motors are generally fixed.

In the case of the motor, which generally is being re-wound, the brush boxes are at right angles to the field coils (see Fig. 5). Therefore, find two of the coils on the armature which are not cutting lines of force and place the ends of these coils on to the commutator bars, which are under the brushes as shown in Fig. 6. In this case, coils 1-6 and 7-12 are not cutting lines of force and therefore the ends of these coils are brought under the brushes.

Finishing the Re-winding

Take the knotted end of coil 1-6 and bend it back out of the way; then twist the finishing end of coil 1-6 to the knotted end of coil 2-7. Clean the ends and place them on to segment No. 1 and the finishing end of coil 2-7 to the starting end of coil 3-8. They are then placed on to segment No. 2 and so on until the commutator is filled.

Carefully solder up and turn the commutator on a lathe. It is then dipped in baking varnish or shellac, and baked in an oven until the varnish is hard. Clean the surplus varnish from the armature and test. The armature should now revolve.



Figs. 5 and 6.—The diagrammatic arrangement of the brush boxes and field coils.

Packaged Electricity

A New Method of Electrical Power Generation

By "PHYSICIST"

A NEW and revolutionary method of power generation recently demonstrated in New York by the Radio Corporation of America promises to render normal methods of electrical power generation and transmission obsolete. This method makes use of the radiations from radioactive materials, which are converted directly into electricity.

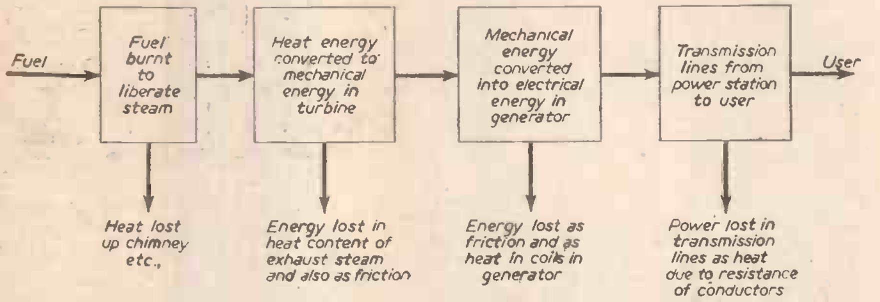


Fig. 1.—Block diagram of conversion of energy from fuel into power supplied to the user. The losses are such that only about 30 per cent. of the energy from the fuel is converted into electricity.

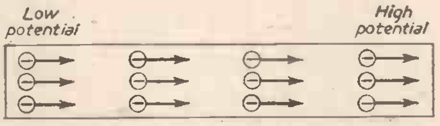
In normal methods of power generation the fuel from which the energy comes is first made to yield this up as heat, which is converted into mechanical energy in the turbine and this in turn is converted into electricity in the dynamo. It is only to be expected that this repeated conversion of energy from one form to another is very wasteful and the overall efficiency of the process is low, a considerable amount of energy being dissipated in every phase of the conversion process, e.g., as heat lost in the hot gases which escape up the boiler chimney, as heat remaining in the steam after passing through the turbine and also, as energy used up in overcoming friction (Fig. 1).

There are further losses in the transmission of the electrical power from the generating station to the user. Because of the multi-step nature of the process, it is not feasible for each user to generate his own power, and cable transmission systems are both costly and difficult to lay down and maintain, especially over large distances.

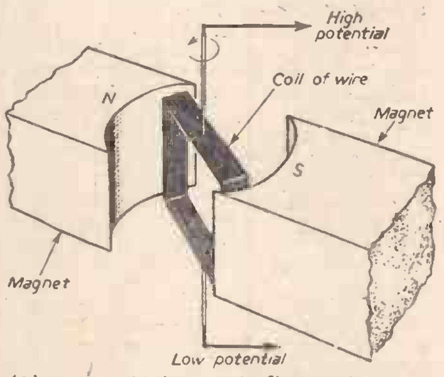
Attempts to store electricity in accumulators or to obtain it directly from primary cells or batteries have never really proved commercially satisfactory. Primary cells are expensive and accumulators are too cumbersome to be easily transported between the user and the recharging station, hence they are used only where power is absolutely essential and there is no other means of obtaining it, for example, in submarines, for propulsion when submerged.

Power Generation

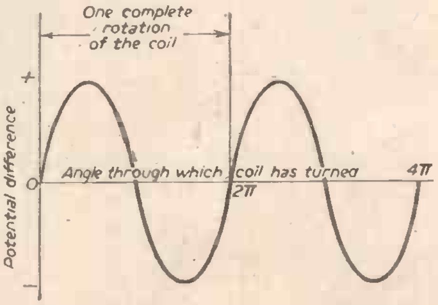
An electric current may be regarded as nothing more than a stream of electrons which move through conductors from a region of low to a region of high potential. Thus, in an electrical generator, a difference of potential is developed across the ends of a coil of wire which is rotating in a magnetic field and, consequently, a stream of electrons will flow through any closed system of conductors which are joined across its ends. Of course, as the coil is rotated in the magnetic field the potential across the ends of the coil will vary continuously and the current in the circuits across the ends of the coil will also vary, both in strength and direction, and is therefore known as alternating current or A.C. (Fig. 2).



(a) Negatively charged electrons move along a conductor from a region of low potential to a region of high potential



(b) Coil rotating in magnetic field develops a potential difference across its ends. Electrons therefore flow from the coil into the external conducting circuits



(c) Because coil rotates continuously potential difference across its ends varies continuously as shown

Fig. 2.—Diagrams illustrating the flow of electrons along a conductor, and how they set up potential differences across its ends.

If the direction of motion of the current remained unchanged (i.e., D.C.) we could look upon the electrons as moving from the coil through the external circuits and back again into the coil, and continuing to do so so long as the current flowed. Their actual speed along the conductors is quite low. Therefore, for alternating current of normal frequency, i.e., 50 cycles per second, each electron only moves to and fro over a portion of the circuit.

Power from Batteries

Batteries and accumulators rely upon chemical reactions to provide electrical energy. The effect was known long before electromagnetic induction was discovered and the practical use of electricity became a possibility. Without exception, they consist of two plates, usually of different materials immersed in a solution of a salt which is called the electrolyte, but to facilitate transport and handling this is often prepared as a paste or gel. The quantity of energy which is evolved in chemical reactions is usually small, and in most batteries some of this appears as heat, so that little power is obtained from large quantities of, sometimes, expensive materials.

There is no simple explanation of the manner in which electricity is generated in a battery, but the effect can be broadly explained as follows. Whenever chemical reaction occurs the atoms of the reacting materials recombine together in different forms. Thus, when hydrochloric acid reacts with zinc, viz.,

$$2HCl + Zn = ZnCl_2 + H_2$$

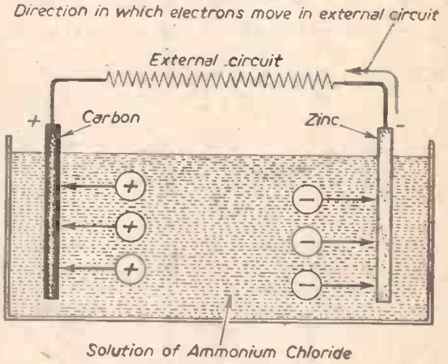


Fig. 3.—Diagrammatic representation of mode of action of a dry battery. (Carbon-ammonium-chloride-zinc.)

(1) *In solution. Ammonium chloride splits up into ions, viz. + and −, i.e.,*

NH_4cl	→	NH_4^+	+	Cl^1
ammonium chloride		*ammonium ion*		*chlorine ion*

(2) *Chlorine ion which is negatively charged migrates towards zinc plate, there it combines with the zinc forming electrically neutral zinc sulphate and gives up an electron, which travels round the external circuit to the carbon rod. The positively charged ammonium ions are thus attracted to the carbon rod and receive an electron, thus becoming electrically neutral. They then decompose to give ammonia (NH_3) and hydrogen (H_2) which are liberated as gases.*

which equation indicates that the chlorine atoms from the hydrochloric acid break away from the hydrogen atoms, forming zinc chloride and liberating hydrogen gas. But, although the above equation is correct in a chemical sense, it is quantitatively inaccurate, for it does not indicate that energy is usually absorbed or liberated when atoms recombine together. This energy can be given out as heat, light or sound and in certain cases as electricity. Obviously, the chemical constituents of batteries are those which undergo reactions in which the energy liberated as electricity is a maximum.

The components of the battery are such that a chemical reaction occurs between one of its plates and the electrolyte. The electrolyte is made by dissolving a salt in water and as the salt dissolves its molecules split

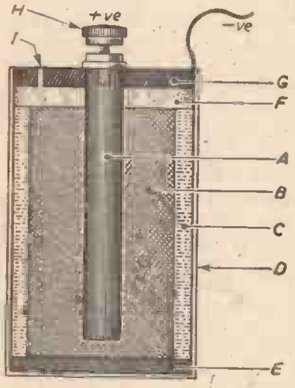


Fig. 4.—Construction of a typical dry battery.

A.—Carbon rod. +ve terminal of cell; B.—Depolarising paste. Usually a mixture of manganese dioxide, graphite and ammonium chloride; C.—Gel-like paste of ammonium chloride and starch. D.—Zinc case. —ve terminal of cell. E.—Insulating layer to prevent short circuit between depolarising paste and zinc case. F.—Layer of sawdust. G.—Bituminous seal. H.—Terminal. I.—Vent to allow gases from +ve pole to escape.

up into two parts known as ions, each of which carries an equal and opposite charge of electricity.

One type of these charged ions is capable of combining with an atom of the material of one of the plates and consequently, when that plate is placed in the electrolyte, such ions will move towards that plate and there react with atoms, forming an electrically neutral salt. The net result of this reaction is that the plate gradually acquires an electric charge equal to the charges given to it by the combining ions, and as this charge grows, the plate will ultimately repel further ions and the chemical reaction will cease. If, however, a conducting circuit be connected from this plate to the other plate of the battery, the charge will travel from the first plate round the external circuit and on to the other plate. This plate will then attract ions of the opposite charge and neutralise their charges, giving neutral atoms, which then combine together to form molecules.

Clearly, the process will continue only so long as there are both unreacted ions in the electrolyte and uncombined atoms of the plate material and theoretically the reaction will be arrested when there is no conducting circuit across the battery. In practice the latter condition is never quite realised, and the reaction slowly continues, thus running down the battery even when not in use.

The above description is somewhat over simplified and other effects, such as polarisation, tend prematurely to terminate the current flow, and a typical dry cell is not so simply constructed as this description would imply. The most widely used combination of materials in dry batteries is the zinc-ammonium chloride-carbon cell. The construction of a typical cell of this sort is shown in Fig. 4.

It will be appreciated that the underlying mechanism of the production of electricity from batteries is precisely the same, as that in the electric alternator, viz., a stream of electrons flowing round an external circuit, but in this case the energy is derived from chemical reactions which occur in the battery instead of from the fuel.

Accumulators of the lead-lead oxide or the nickel-iron type function in much the same way as the primary cell or dry battery, except that their components are selected, and they are constructed in such a manner that the changes produced on the plates during discharge can be reversed by passing a current through the cell. Thus the cell can be used repeatedly.

Direct Generation of Power from Atomic Energy

We have seen that electricity in motion can be regarded as a movement of electrons in conducting materials, and that these electrons move very slowly indeed. Therefore, a self-contained source of electric power would be one in which electrons are generated and induced to move slowly in a conductor.

Theoretically, the higher the velocity of the electrons the greater is the energy associated with them, and hence the more efficient producers of electricity they would be, provided that all this energy could be extracted as electricity.

Usually, the generation of high energy electrons is a process which requires considerable equipment and a large input of power; in fact, the power imput is generally many times the energy content of the electrons which are liberated. There is, however, one naturally occurring phenomenon, namely, radio-activity, in which electrons of high energy are spontaneously thrown out of disintegrating atoms. But here also, successful exploitation of this energy did not seem feasible, for naturally occurring radio-active materials are rare and expensive Furthermore, when these were investigated it was not possible to extract the energy of the electrons wholly as electricity, a large proportion of it appearing as heat, X-rays, light, etc.

With the advent of atomic piles and the growing surplus of man-made radio-active materials, representing a considerable fraction of the energy that has been wrested from fissionable materials, attention has been once more turned to the problem, and the recent demonstration in New York marks one of the first successful attempts to utilise this energy. During the demonstration, it was indicated that usable electric power was thus obtained a hundred times more efficiently than by any previously reported radio-active power generator.

For the demonstration the chairman of the R.C.A. used a small battery about half an inch long which comprised a radio-active metal and a semi-conducting material. The battery was joined to a telephone receiver and a telegraph key, and the message "Atoms for Peace" was tapped out. It was pointed out that the experiments had only just begun, and some degree of success was already apparent.

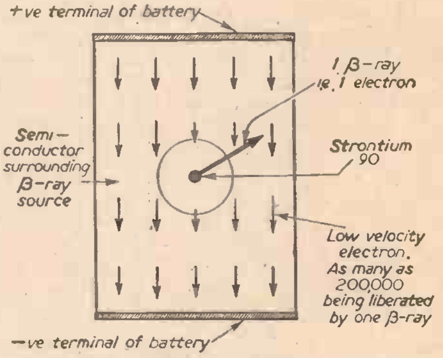


Fig. 5.—Schematic representation of a strontium 90 silicon battery.

Strontium 90

Presumably the success of the experiments is due to the ability of the semi-conducting material—in this case silicon—to capture the high velocity electrons (β-rays) given out by the radio-active metal, Strontium 90. These high energy electrons collide repeatedly with atoms of the semi-conducting material and release low velocity electrons at each collision. As many as 200,000 low velocity electrons can be released by one high velocity electron, and this suggests that some special molecular structure of the semi-conductor has been discovered in which this effect is most pronounced. No details of its actual composition are to hand, nor has it been disclosed how the low velocity electrons are made to move through the semi-conductor and around the external conducting circuit (Fig. 5).

Strontium 90 has been selected because it is a pure β-ray emitter and there are no harmful gamma radiations to be screened from the user. It can be made quite easily in the atomic pile, using what would otherwise be waste energy and because its half-life period is 25 years, a battery made with it would be only half run down in that time and could be revivified merely by replacing the radio-active component, which would then be returned to the atomic pile for reactivation. Because the rate at which the electrons are emitted by the radio-active material remains absolutely unchanged, the battery can never be damaged by short-circuiting.

Undoubtedly industry and private users will find increasing use for this new discovery, and there are great hopes of its commercial exploitation especially in America, where the Chairman of the Atomic Energy Commission has compared the recent demonstration to Faraday's experiments on rotating a copper disc between the poles of a magnet, which proved to be the forerunner of the dynamo.

Cinemascope for the Amateur

A Simple Method of Obtaining the Same Effect as True Cinemascope

By S. A. MONEY

DURING the last year or so the cinema producers have introduced several new methods of presentation in an attempt to draw the public into the cinemas. The first of these was the 3-D film, then came wide screens, and now we have the latest system which is called Cinemascope. This system is a further advance on the previous wide screen methods and gives a picture twice as wide as normal on a curved screen. The wider picture seems to be easier on the eyes, and curvature of the screen appears to increase the impression of depth in many scenes. Cinemascope has great possibilities and will probably be used, in much the same way as colour is to-day, to enhance spectacle in important productions.

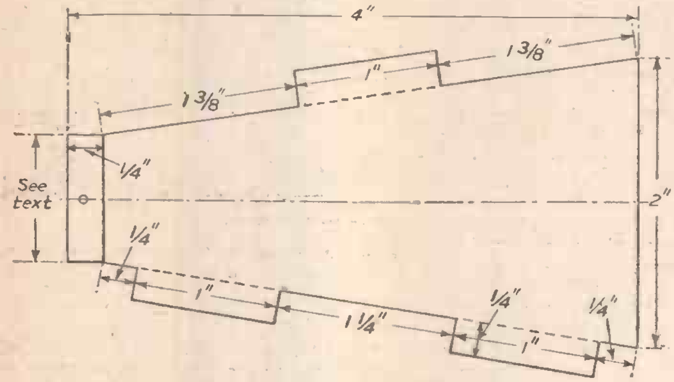


Fig. 1. (Left)—Dimensions of side plates.

In the Cinemascope process a special anamorphic lens, developed by Prof. Cretién in France, is used on the camera to compress the picture to half its normal width. When the film is projected, a second anamorphic lens is used on the projector and the picture is spread out to twice the width of the normal screen. The new picture, therefore, has an aspect ratio of 8 x 3 instead of the normal 4 x 3. On the professional Cinemascope films there are four magnetic sound tracks, two on each side of the picture, to give Stereophonic sound.

The amateur movie maker will begin to think that this new development must be beyond his modest resources. The special lens will obviously be expensive when it becomes available, so it seems that Cinemascope will be one of those refinements which only the large cine clubs can afford. Is this special lens really needed? For the true Cinemascope system it is an essential, but the same end result can be obtained without its aid. Bearing this in mind, we can devise a system which is both simple and inexpensive, thus making it suitable for amateur use.

Wide Screen Process

Let us consider the forerunner of Cinemascope, namely, the wide screen process. This uses the normal type of film which has been magnified until the picture fills a screen one-and-a-half times as wide as normal. The top and bottom of the picture are then masked off until the picture ratio is 6 x 3. This method was not completely satisfactory, since the films used were never intended for wide screen presentation. When the films are shown in this manner it is often necessary to adjust the picture-framing control during the titles in order to get all the words on the screen. It is not advisable to try to get a ratio of 8 x 3 by masking a normal film, since so much of the picture is lost that the result on the screen looks a little ridiculous. Obviously, we cannot quite attain our Cinemascope results by using this method as it stands, otherwise the professionals would never have gone to the trouble of producing a special lens for the job, but we only have to make one more step to achieve our goal.

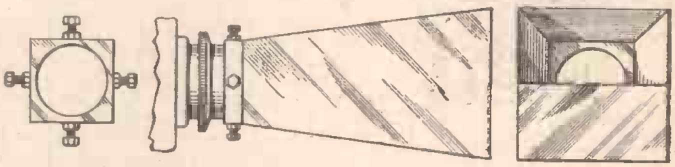


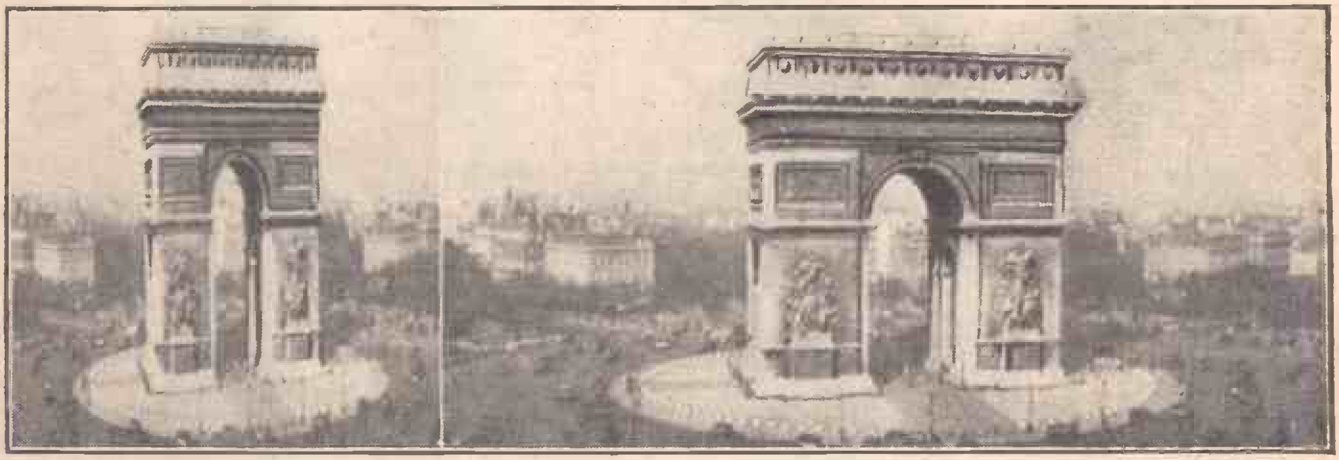
Fig. 2. (Right)—The completed lens hood formed of four of the plates in Fig. 1.

Since we shall be taking our own films as well as showing them, there is nothing to stop us modifying what is recorded on the film to suit our purpose. Now the obvious thing to do is to mask off the picture in the camera in the same way as we would on the projector. This would be satisfactory, of course, but is rather wasteful since we are only using about half the space on the film. Suppose we mask off the lower half of the picture. When the roll of film has been taken we still have a series of half frames which are unexposed. If the film is run through the camera again we can take a second series of shots on these unexposed half frames, thus obtaining twice the running time for the same length of film. There we have our alternative Cinemascope system complete with reduced running costs but, as we shall see later, there are one or two snags. Now we can get down to the practical details of the equipment required.

The Lens Hood

First let us consider the camera. The picture can be masked off by altering the aperture in the camera gate, but readers are strongly advised to leave this part of the camera well alone, otherwise irreparable damage may be caused. The best method is to make a lens hood and incorporate a masking plate into it. This hood can be easily removed if it is required to use the camera for normal filming. The hood to be described is made up of tinplate, which can easily be obtained from empty cocoa tins or some similar source.

Four pieces of tinplate are cut out to the shape shown in Fig. 1. The width at the narrow end should be ⅛in. greater than the outside diameter of the lens barrel. The lugs at the sides of each piece should be bent up and the four pieces fitted together to form a tapering tube. All of the lugs should be on the outside of the tube since this gives the strongest assembly. The four lugs at the narrow end of the tube should now be bent outwards slightly to form a short length of square tube. The four seams should now be soldered. A



Two photographs showing the effect of the amorphic lens used in the commercial Cinemascope process. On the left the picture is anamorphosed in width by the Hypergonar lens. On the right the same picture is projected through another Hypergonar which restores the objects to their proper proportions.

strip of tinplate ¼in. wide is then cut out and bent to form a ring of diameter such that it just fits inside the narrow end of the lens hood, into which position it should then be soldered. A ⅛in. hole is drilled through each side as shown in Fig. 2. Over each of these holes is fixed a 6 BA nut. This is best done by screwing the nut on to a bolt, pushing the bolt through the hole then soldering the nut to the tinplate. These four screws will then serve to clamp the lens hood to the lens barrel. The gaps between the ring and the outside tube of the hood should be filled in with plastic wood or some similar material in order to keep out any stray light. The whole thing should now be painted matt black. A piece of tinplate 2in. x 1in. is then soldered over the open end of the hood so that it masks off the lower half of the opening. This piece of metal should also be painted matt black.

The dimensions shown in Fig. 1 apply to 9.5 mm. and 16 mm. cameras fitted with the standard 20-25 mm. lenses. For 8 mm. cameras these dimensions should be halved. If a 15 mm. lens is used on a 9.5 mm. or 16 mm. camera, the size of the opening at the front end of the lens hood should be increased to 3in. x 3in. In all cases the width of the tube at the narrow end should be about ¼in. greater than the diameter of the lens barrel.

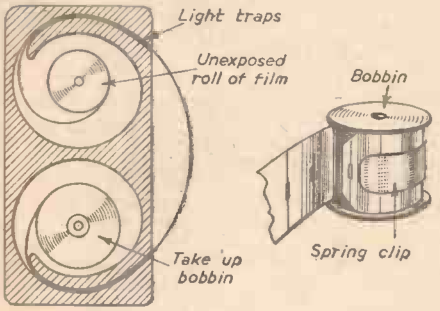


Fig. 3.—The 9.5 mm. charger.

The Viewfinder

Before we start shooting there is one further modification to be made. The viewfinder aperture must be masked off to match the new picture size. This can be done by masking the lower half of the front lens of the finder with a piece of card or black paper. A point to remember during shooting is that for most shots the camera must be about twice as far away from the subject as normal. The exposures required, however, will be the same as those normally used.

Reloading the Film

Having taken the first series of shots, we come to the problem of reloading the film for its second run through the camera. With 16 mm. film it is necessary to wind the film back on to the empty spool before reloading. The lens hood must then be rotated so that the upper half of the picture is masked-off during the second run. With 9.5 mm. film, the size used by the author, it is not necessary to rewind the film or alter the position of the lens hood. The film is simply removed from the lower chamber of the charger, replaced in the upper chamber and rethreaded through the charger. Thus on the second run we start at the end of the film and work back to the beginning.

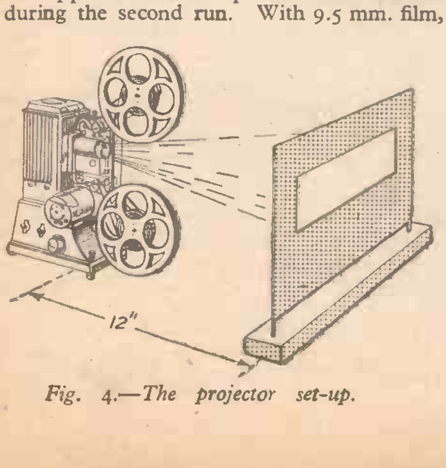


Fig. 4.—The projector set-up.

Readers who have not opened a charger before should remove the unused film from the charger and pack it away in a light-tight box. The charger may then be fully examined and a 30ft. length of processed film can be used for practice in reloading. It should be possible to reload the charger in complete darkness before any attempt is made to load up the unexposed film again. Details of the usual 9.5 mm. charger are shown in Fig. 3. The important point to watch is that the film is not askew on the bobbin otherwise it will pile up and cause jamming in the camera. After a little practice, loading a charger becomes extremely simple. 8 mm. double-run film lends itself admirably to this system since no rewinding or opening of chargers is required. First, both runs of the film are shot with the lower half of the picture masked off, then the film is run through again with the upper half of the picture masked off. It will be found that the film is rewound during its second and fourth runs through the camera. Single run 8 mm. film may be treated in the same way as 16 mm. film, though it will be found that rewinding 8 mm. film is a tricky operation. It must, of course, be stressed that *undeveloped film must be handled in complete darkness.*

The biggest snag arises when, after the film has been processed, we come to the editing stage. If we cut any scenes out of the first run of the film we shall have cut out an equal length from the second run of the film. Thus, the possibilities of editing after the film has been developed are very limited and most of the editing must, therefore, be carried out before shooting the film.

Projection

When the film is projected it is necessary to arrange that the picture is twice as wide as normal. This extra wide picture can be produced by either using a lens of half the usual focal length or moving the projector back to give twice the normal length of throw. If it is not possible to get the throw without making a hole in the wall and moving into the next room, the throw can be increased by using a mirror. The projector may be set up at the side of the screen and the picture thrown onto the mirror at the back of the room from which it will be reflected back to the screen. The angle of the mirror must be adjusted so that the picture is central on the screen. The screen may be made up by stretching a sheet of matt white cloth or paper over a wooden framework. The radius of curvature of the screen should be approximately the same as the distance from the projector to the screen.

Masking the Projector

In order to remove the half of the picture which is not required, a masking plate must be fitted up in front of the projector. This masking plate can be made from a sheet of metal or cardboard in which a hole of the appropriate size and shape is cut. The size of hole required can be found by setting up the mask about 12in. in front of the projector lens and marking the size of the picture thrown on to the mask.

With 9.5 mm. films the mask is left in the same place for all films, whereas, for the other gauges, it is necessary to move the mask up or down according to which half of the picture is being shown. Another point to be noted is that the 9.5 mm. films do not require any rewinding before the second run of the film is projected, whereas all other gauges need to be rewound.

The optimum viewing distance for Cinemascope films lies between one-and-a-half and two times the width of the projected picture and an effort should be made so that most of the audience sits within this area. If the picture is viewed from a greater distance, much of the effect of the Cinemascope picture is lost. In most home movie shows the effects of getting too close to the screen can be ignored since no one is likely to view the picture from closer than about three or four feet. The width of screen used will vary from about 4ft. to about 10ft. depending on the size of the room available. It may be possible to increase the effect of depth by increasing the curvature of the screen, though the amount of increase will be limited by distortion of the picture and defocusing at the edges of the screen. Since the size of the picture has been increased by a factor of four the screen brilliance will only be about a quarter of that normally obtained. In most cases this reduction of brilliance will not be unduly noticeable unless the projector has a low power lamp. It is not advisable to fit a more powerful lamp to the projector without obtaining expert advice, otherwise the machine will become greatly overheated.

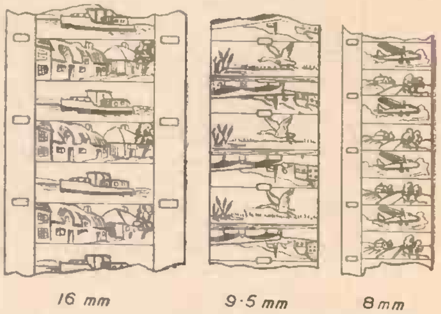


Fig. 5.—The results on the various sizes of film.

Camera Technique

In conclusion, a few pointers on the technique of Cinemascope production and its possibilities may prove helpful. When close-ups are being taken, it is advisable to make the background rather plain, so that the attention of the audience remains focused on the player. When two characters are seen in a medium shot, the dominant character should be nearer the camera. In scenic shots it is advisable to include a prominent object in the foreground, since this helps to increase the impression of depth in the scene. When an action sequence occurs during the first run of a roll of film, it should be arranged that a long slow sequence is recorded on the corresponding part of the second run of the film. If this is done any cutting which is carried out on the action sequence, will not produce too much effect on the slow sequence, since the removal of a few frames from a static shot usually passes unnoticed. For the really ambitious workers, a magnetic sound stripe can be coated on to each edge of the film at a moderate cost and two sound tracks can be recorded for Stereophonic sound effects.

A kitchen TIMER

A Battery Portable or Semi-portable Mains Instrument for Timing Jobs in the Kitchen

By J. D. MACDONALD

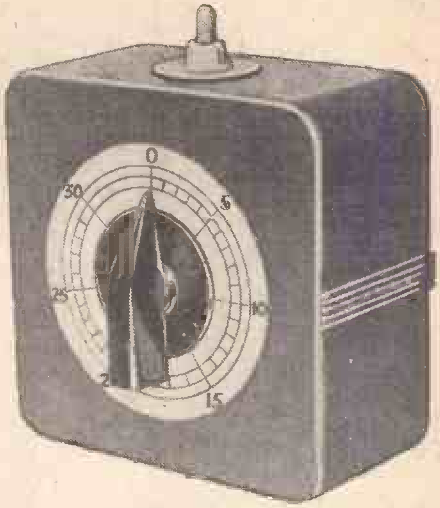


Fig. 4.—A completed battery portable timer. The case is a plastic food container, the paper dial being mounted on a metal disc to prevent undue strain on the thin plastic wall.

A TIMER is of great importance in the modern kitchen, especially if pressure cookers are used. The timer obviates the use of the ordinary clock and the necessity to note the time required, either mentally or on paper. The timer to be described gives a maximum time of approximately 30 minutes, which amply covers most kitchen timing jobs. If longer times are required the timer is reset after its maximum period has ended. This timer can either be a battery portable, or a semi-portable mains type, and can be made up by any home handyman in an evening. What is more important, there is no worry about the electrical side which is usually the main trouble in constructing such a timer.

On the market at the moment there are numbers of mechanical (clock types) and electrical timers, and they are usually expensive. The one in this article is a combination of both systems. A disadvantage of the clock type is that it rings only for a few seconds and if one is not in the kitchen then one is sometimes unaware that the timing period has ended. The electrical type is always " alive " and is, therefore, using power. This timer overcomes these two main difficulties.

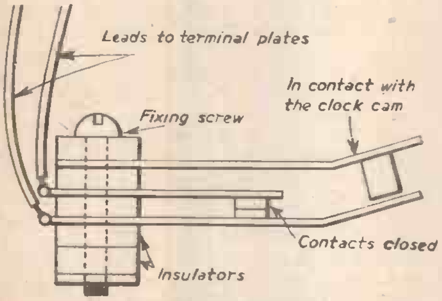


Fig. 1.—The switch contacts.

The Time Switch

The mechanical, or clock part, is the time switch incorporated in an ex-Government surplus oscillator, TS24/ARR2. This oscillator can now be obtained for a few shillings, and the removal of the time switch in no way interferes with the oscillator if you still wish to use it for its original purpose.

The time switch consists of a D.P.S.T. switch actuated by a cam on the clock mechanism. No doubt such a switch may be obtained separately from other sources if you do not desire to purchase the oscillator mentioned. The switch contacts are altered as shown in Fig. 1, so that when the time switch pointer is in the off position the contacts are closed instead of open. This is easily done as the contact strips are separated by small insulating blocks.

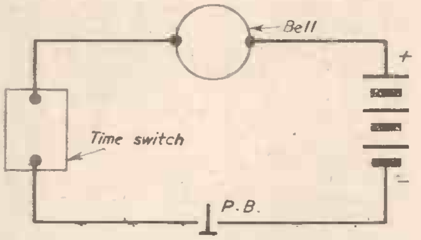


Fig. 2.—The battery timer layout.

The Battery Timer

The layout of this timer is as shown in Fig. 2. The bell is a small battery-activated type obtainable from a multiple chain store, where the push button mains type switch (P.B.) was also procured.

Operation

Turn the timing switch to the time required and then close the P.B. switch. Closing P.B. brings the bell into the circuit but the bell will not operate until the time switch returns to zero. The circuit will then be completed and the bell will continue to ring until P.B. is opened again.

To test whether the timer is functioning properly—this applies to both timers—the P.B. switch is closed first. The bell, if the timer is functioning properly, will continue to ring, until either P.B. is again opened, or the time switch is turned to a required time, thus breaking the circuit.

There is no need for a winding key on the time switch as it automatically winds itself up when it is set to any required time.

The Mains Timer

With a mains supply, the circuit is as shown in Fig. 3. What is required here is a bell transformer to activate the low voltage bell and a 2 to 6 volt half-wave rectifier.

If a low current mains-activated bell is obtainable, then the timing switch will be heavy enough. This will do away with the transformer and rectifier shown in Fig. 3.

Fig. 5 shows a mains type timer in an aluminium case. The bell was replaced by a buzzer whose sound was amplified due to the metal case. The noise has to be heard to be believed.

It can be seen from both timers that in each case power is only used when the bell is actually ringing.

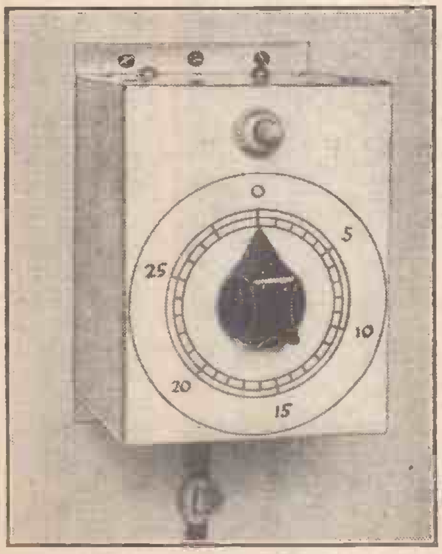


Fig. 5.—The mains type timer in an aluminium case.

The Case

The case is one of individual choice and can be made from either wood, plastic or metal. If made of metal, the mains timer should be earthed.

Fig. 4 shows a completed portable battery timer. Its physical dimensions are about the same as those of an ordinary alarm clock. The original scale was dispensed with and the scale substituted was larger and had the times marked in minutes. Calibration of the timer was easy. With the original scale to act as a guide, the new scale was checked by means of a watch.

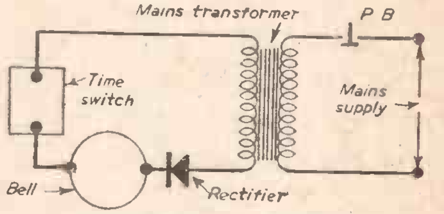


Fig. 3.—The mains timer circuit.

The battery is in an easily accessible compartment fitted in the back, in order to facilitate its removal when it becomes exhausted. To prevent the case sliding on any surface it can be mounted on four small rubber feet. The feet will also raise it slightly from any damp surface on which it may be placed. You can, of course, attach hooks to the case and hang it on any convenient wall space. This would be ideal with the mains type as it would keep the mains lead from fouling on any kitchen utensils.

Other Uses

The time switch can be of use in other ways, such as the switching on and off of electrical apparatus. If the switch is required to be used in conjunction with anything higher than a low consumption piece of apparatus, then it is advisable to incorporate a relay which has make and break contacts heavy enough to take the load concerned.

Makin

UNDOUBTEDLY the most useful of all lanterns, especially for public meetings, is the epidiascope. It supersedes the episcope, which projects only opaque objects (such as drawings, maps and photographs). Moreover, it is far more useful than the popular film-strip projector, which is restricted entirely to film-strips. The epidiascope does the work of both these types of lantern. In addition, the ordinary glass lantern slide (3¼in. × 3¼in.) may be used, and the 35 mm. mounted filmslide.

Other attachments may be employed for projecting tremendously enlarged pictures of microscopic objects, whether mounted on slides or in a micro glass tank. The epidiascope about to be described is quite easy to make, from materials readily obtainable. If the directions are followed carefully, the outcome will be a finished article that will give results almost as good as similar sized commercial models.

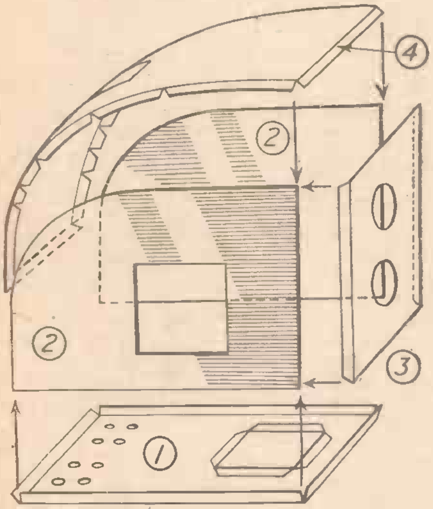
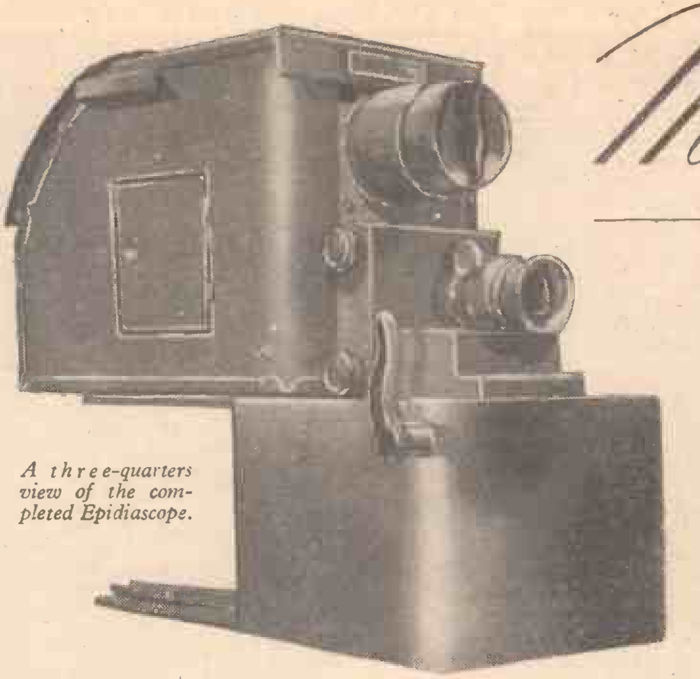


Fig. 1.—Part sectional view of the lantern-house. The number of each component part is given for easy reference, and relates to the numbered drawings.



A three-quarters view of the completed Epidiascope.

This home-made epidiascope will project photographs, drawings, maps, and diagrams (both plain and coloured) by means of its upper (episcope) lens. In addition, modern miniature slides (2in. × 2in.) may be used, together with standard microscopic slides (3in. × 1in.), and these employ the lower condenser and diascope lens. Specimens may also be placed on the revolving table for examination on the screen. Consequently, it may well be called an "all-purpose" lantern, and it will prove a valuable aid to the lecturer or teacher for demonstrative purposes; whilst it may also be used in the home for entertainment and pleasure. Another important consideration is that no expensive electrical resistance has to be purchased; you simply plug in to an ordinary household light socket.

An Economy Hint

If the handyman who resolves to make this epidiascope is as fortunate as the writer, he will be able to achieve his object for less than £4; this does not include the cost of the lamp. Someone gave me an old "magic lantern," which had been thrown out as scrap. The only serviceable things in it were the lens and condenser. I retained these and discarded the rest of the lantern.

Old lanterns are sometimes to be seen in second-hand shops, and can be bought cheaply. If the lens and condenser are obtained in this way, two of the most important items will be secured for the making of the epidiascope. However, before buying, make sure the lens is the ordinary type 6in. focus, and the condenser is the usual two 4in. plano-convex lenses in a metal mount.

The Chassis

Medium-gauge tinplate or, preferably, sheet-iron, is required for the lamphouse. Cut out the five pieces shown in Fig. 1. The measurements are given in the detailed drawings (Figs. 2 to 5).

The chassis measures 17in. × 10in. after the ½in. sides have been turned up to form right-angles (see Fig. 2). The eight holes are for ventilation. Cut out the square and bend the ½in. edge upwards and flatten. This will leave an opening (5in. × 5in.) for showing pictures, maps, etc.

The Sides

The two sides are cut from metal, 17in. × 12in., and each is curved at the corner as shown in Fig. 3. In one side an opening 4in. × 4in. is to be made. Bend the edges ½in. all round and flatten underneath, increasing the opening to 5in. × 5in. The size of the door ("A") which covers this is 6in. × 6in. when the ¼in. edges are flattened. To hang the door, bend the ¼in. of the right-hand side over a 7in. piece of stout wire, leaving ½in. protruding at each end. The wire may then be pushed into two small holes above and below the opening. (If preferred, two metal hinges may be used.)

The latch is an unbendable metal strip, 2in. × ½in. A rivet soldered on forms the knob, which is to be pushed through a ¾in. × ¼in. slot in the door. This latch should run easily in a piece of grooved tinplate, 1¾in. × 1¼in., which must be soldered to the inside of the door (see "A" and "B").

The Front

The front is 12in. × 10in. when the ½in. edges have been turned back at an angle of 45 deg. The top hole is to receive the episcope lens. A large reading-glass, 3½in. diameter, makes an ideal yet cheap lens for this purpose, providing it is bi-convex; the cost is about 7s. 6d. (A more expensive lens could be used, with better results.) Place the lens in a metal tube 6in. long. I found an aluminium hot-water bottle most suitable, after neatly cutting off the top and bottom. The interior of the tube should be given a coat of dead-black paint before the lens is inserted. Be careful to fix the lens securely by pressing the metal rim firmly but gently on the glass.

Now make a metal holder, into which the lens-tube has to slide for focusing. For this you will need a strip of metal, 13in. × 3in. Bend the strip around the lens-tube, and, before soldering the ends to form a circle, cut away ½in. from the edge, and leave four tags. Push these through the top hole, and solder them inside the lantern to the front section. In order to strengthen this part of the model, the lensholder was mounted on a metal base and then bolted on the front—see "A," Fig. 4. Make sure the lens-tube can be moved freely backwards and forwards in the lensholder for focusing. Care must also be taken to see that no streaks of light will show around. A cap for the lens can be made from a round tin lid lined with velvet.

The lower hole in the front section is for the condenser, which is rather heavy. Conse-

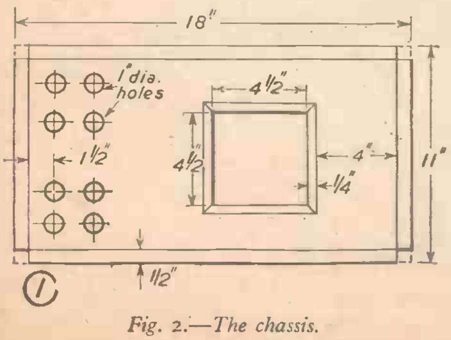


Fig. 2.—The chassis.

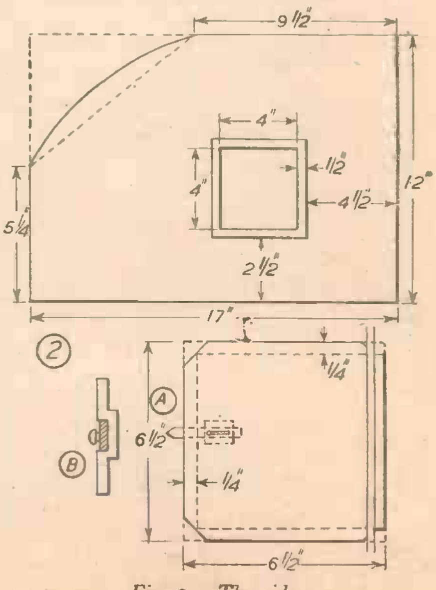


Fig. 3.—The sides.

g an EPIDIASCOPE

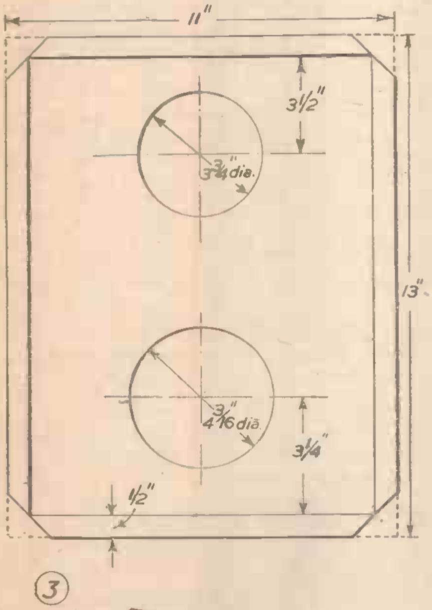
structional Details of an Easily-made Instrument

By FREDERICK GILLSON

quently, if it is to be held firmly in position, a rim of somewhat thicker metal is needed. A piece 14½in. × ¾in. will be sufficient. Form it into a circle, push it half-way through the large hole, and neatly solder to the front section. (Here again, it can be strengthened if mounted on a metal base before fixing to the front.) The condenser should be the usual plano-convex double lenses in a metal mount. The thick rim prevents the condenser falling into the lamphouse. Now fasten the sections together (chassis, sides and front), using 1in. bolts and nuts—or solder if you prefer.

The Top

For this the size of the metal is 25in. × 10in., allowing for the ½in. edges to be bent over at right angles. Snip out the V-shaped pieces from the edges, so that the metal can easily be curved. Remove the square "A," bend all the edges ½in. and flatten them underneath, leaving another opening for ventilation purposes, 5½in. × 5½in. Then bolt this top section to the two sides and front. Over the opening place a covering, 13½in. × 10in. The ½in. edges are flattened underneath as shown at "B," Fig. 5. This lid is fixed to the top section with two 2in. bolts and nuts.



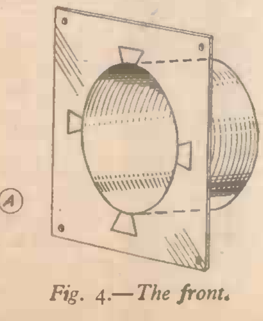


Fig. 4.—The front.

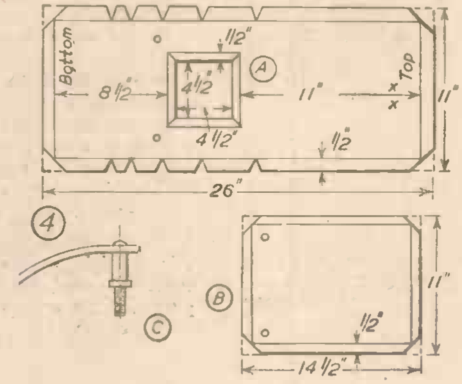


Fig. 5.—The top.

On each of these bolts place a 1in. length of ¼in. diameter brass tube (see "C"). This will enable the back part of the covering to be raised 1in. for ventilation. Moreover, it can easily be lifted for cooling the lamphouse quickly.

The Mirror

A mirror is needed to reflect pictures when the instrument is in use as an episcope. This is held in a frame cut from tin, 6½in. × 5½in. (See "A," Fig. 6.) Allow ¼in. each side to be turned over on to the mirror. Insert a piece of thick wire, length 3in., around which the hinge "B" is attached. Cut this hinge from metal, 3¾in. × 2½in. Turn over three of the sides ¼in. and flatten. On the fourth side (see "B"), turn the ½in. around the wire to form the hinge. Then bend as indicated in "C" (viz.: 45 deg.). At the opposite side of the mirror-frame insert another piece of wire, 1in. long. Attach to this 8in. of very thin wire.

Now put the mirror in position inside the lamphouse, as shown in Fig. 7. To do this make two small holes in the top section, ¾in. from the front, in the places indicated by "x" in drawing (4) Fig. 5. The mirror has to face the lens. Two holes have also to be made in the hinge attached to the mirror (see "B" Fig. 6). By means of two small bolts and nuts, inserted through these holes, the hinge is fixed to the top section, and consequently the mirror can easily be removed for cleaning.

Make another small hole in the centre of the top section 6in. from the front, and through it push the 8in. length of wire. Gently pull until the angle of the mirror is about 45 deg. Place a 2in. bolt through the hole, and fasten the wire to it with a winged nut. When the lamp is working, screw up or down until the best position is secured for the reflected picture. No further adjustment will then be necessary, for this will be the permanent position of the mirror.

The lamphouse is now ready for painting. First remove the mirror, and then give the whole of the interior two coats of flat white paint. The metal that holds the mirror should also be painted, and when dry screwed in position again.

The Lampstand

A glance at Fig. 8 will reveal how simple the lampstand is to make. An iron rod, ¼in. diameter, and 7in. long, is fixed to a heavy, metal base, 5½in. × 3½in. Over the rod place a slider, made from a strip of thick metal, 3¾in. × 1in. A screw at the back regulates the height of the lamp.

The arm is of stout wire, length 8in. One end is bent around a porcelain holder, and the other end is to be soldered to the metal slider. (N.B.: The holder must be the screw type, as the ordinary household kind cannot be used with the required lamp.) You will

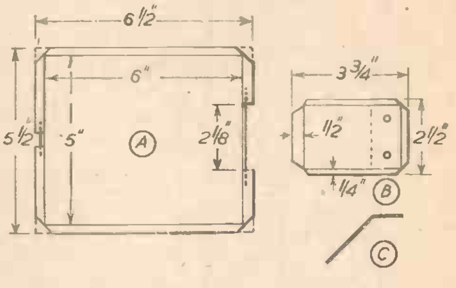


Fig. 6.—The mirror.

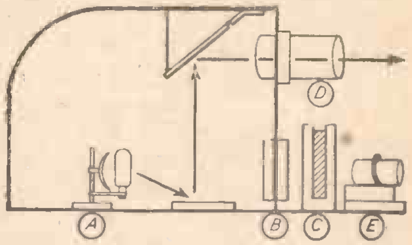


Fig. 7.—The schematic layout of the epidiascope and attachments, showing position of lamp (A), condenser (B), slide grip (C), slide carrier (D), and lens unit (E). The arrows indicate the way the picture-postcard or object is reflected by the mirror through the lens.

need a 500 watt projector lamp, the cost of which will be about £1 5s. An ideal reflector can be obtained from a cycle lamp. Solder it to another metal slider, and regulate it with a screw.

About 2ft. of flex (asbestos covered) will be needed for the interior of the lamphouse, and Fig. 8 clearly indicates how it is to be connected to the lampholder, adaptor and switch. Bolt the switch to the back of the lantern, and leave the adaptor hanging over the edge of the ventilation opening in the top section. Another length of ordinary flex is required to link up with the power point.

Later, after the various attachments to be described next month have been tried out, determine, by moving the lighted lamp backwards and forwards, which is the best position for it. Then screw the lampstand to the chassis. My lamp is placed centrally 5in. from the back.

(*To be continued*)

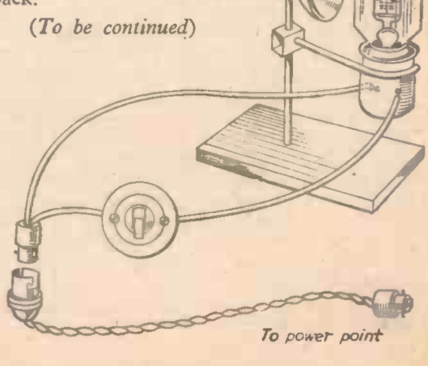


Fig. 8.—The lampstand.

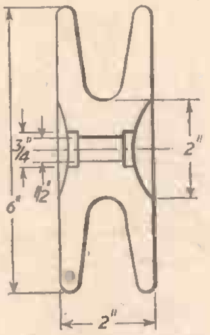
A Sea Fishing Reel

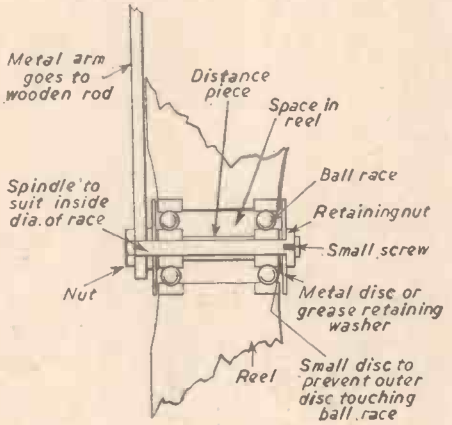
This article was received in reply to a query from Mr. F. Hutchinson (Co. Durham) which we published under Information Sought in the April issue.

An Angling Accessory Which Can be Turned Up On the Lathe

By C. Emms

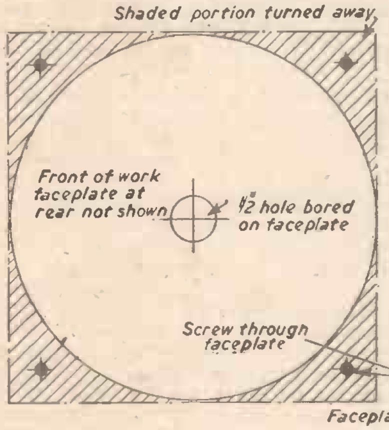
THE most important parts of the reel are the ball races and these should be purchased first, and the measurements given adapted to suit them. Fig. 1 gives a side view of the reel. The final measurements will be slightly smaller than those shown, as turning and trueing up will require a small amount of wood and the piece of wood from which the reel is to be made is this size to start with. Fig. 2 gives a more detailed view (not to scale). The space in the reel can be packed with grease during assembly and the distance piece is to allow the retaining nut to be tightened without straining the ball races (otherwise they will not run freely) and the exact length must be found by experiment. The small screw shown prevents the retaining nut from becoming loose.

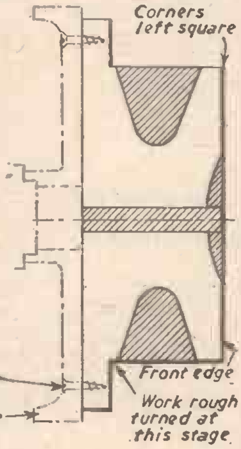




Figs. 1. and 2 (left).—Two side views of the reel, the second giving a more detailed view of the ball bearing arrangement.

Fig. 3 shows the workpiece marked out and position of screws used for holding it on the faceplate. Fig. 4 shows the faceplate and work side view (again not to scale). The shaded portion is turned away and the reel begins to take shape. At this stage and in Fig. 5, it is only rough-turned as sufficient wood must be left to finish off. After Fig. 4 has been completed, remove work from faceplate, then take another piece of wood and fix to faceplate. Turn this up true on the face and then turn a recess, so the front edge of the reel (see Fig. 4) will just press in. This should just be a tight fit so that the reel will hold in place while the original corners (where the first screws went) are turned away. The other recess is also now turned.





Figs. 3 and 4 (left).—Fig. 3 shows the workpiece marked out and Fig. 4 is a side view of the faceplate and work.

Fig. 6 shows the final turning and trueing operation. Between the lathe centres turn a piece of hardwood, tapering very slightly towards the tailstock. This will allow the partly turned reel to be pushed along this mandrel until it is tight enough to enable the final turning of the reel to be completed.

To turn out the recesses for the ball races, a specially shaped tool is required; this is shown in Fig. 6. An old square file, tapering to about 3/16in., is best to make the turning tool from. The end can be bent when hot quite easily. One recess should be turned out and the reel then reversed on the wooden mandrel and the other recess can then be turned. While mounted on this mandrel the final turning work can be completed and finally the reel polished, if that is the finish required.

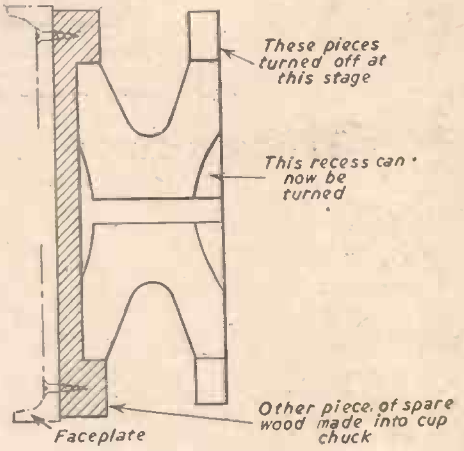
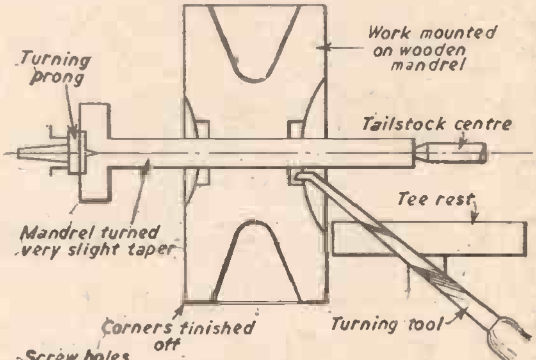
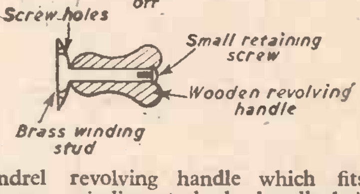


Fig. 5 (right).—The work reversed and pressed into a cup chuck.

Fig. 7 shows the small winding handle (two required for balance) and the drawing is self explanatory.

As will be seen it consists of a wooden revolving handle which fits over a brass winding stud, the handle being retained in position by means of a small screw.





Figs. 6 and 7 (right).—The final turning and trueing operation and the small winding handle.

Rhodium Plating

RHODIUM, like the other metals of the platinum group, has great stability and resistance to corrosion, and a high melting point. It is, in fact, more resistant to chemical attack even than platinum, and at normal and moderately elevated temperatures it is completely free from oxidation and tarnish. It is also very much harder and more resistant to wear than platinum, somewhat whiter in colour and has a higher reflectivity.

The preparation of rhodium in fabricated forms presents considerable difficulty and it is as an electrodeposit that it is most useful. Such deposits are used for parts of scientific instruments and radio apparatus to give permanent protection against atmospheric and marine corrosion, for certain types of electrical contacts and for reflecting surfaces such as instrument mirrors, cinema projectors and infra-red reflectors.

In the purely decorative field it is used to give a lasting and attractive finish for jewellery and silverware.

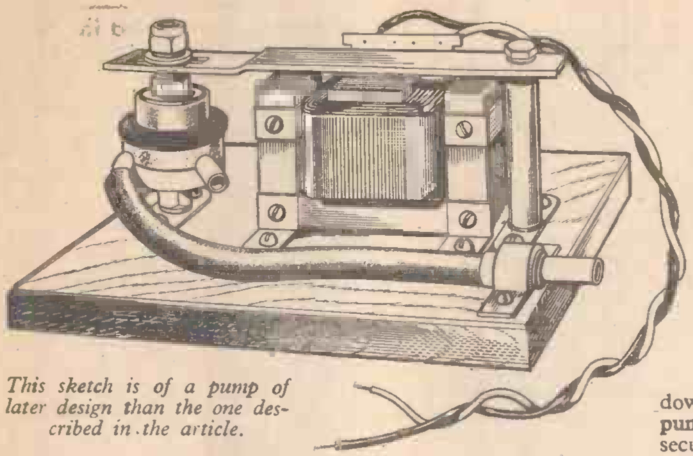
Rhodium Deposit

Rhodium can be directly deposited on to silver, copper, nickel, brass, nickel silver, phosphor-bronze, beryllium-copper and similar copper alloys, but not on to tin, lead, zinc, cadmium, aluminium, iron or steel. Where one of these latter metals is present a preliminary deposit must be applied, preferably of silver. In many cases, particularly for reflecting surfaces, it is desirable to apply this silver deposit in order to obtain the excellent polish which silver will take. Since no polishing is required after deposition, the rhodium surface has the degree of polish given to the underlying material.

An Aquarium Aerator Pump

A Diaphragm-Type Pump for the Artificial Aeration of Aquaria

By R. KELSEY



This sketch is of a pump of later design than the one described in the article.

THE body is made from the tinplate lid of a screw-topped jar. Two elongated holes and two drilled holes are made in the bottom (Fig. 2) over which are mounted the two valves (inlet and outlet) on the inside of the body (Fig. 3). The valves are fixed inside the body by soldering over each elongated hole one half of each valve. On the underside of the outlet valve the outlet tube is soldered, as shown in Figs. 6 and 7. The valves are made from the brass housings of organ reeds from which the reeds have been removed. These are placed in pairs, and one of the reed rivet holes is drilled out to take a bolt to clamp down the valves to the pump body and for securing the pump to the mounting bracket. The clacks of the valves are cut from cycle inner tube; they are cut to the shape of the brass housing and a tongue is cut in them to act as the valve (Fig. 4). The clacks are placed on the halves of the bodies of the valves, which are mounted inside the pump body, then the top halves are placed on and the bolts are passed through from the inside, a nut being screwed on to secure them to the pump body, as shown in Fig. 7.

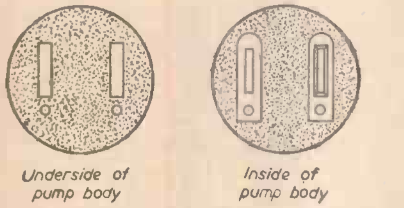


Fig. 2 (left) and Fig. 3 (right).—Two views of the pump body and valves.

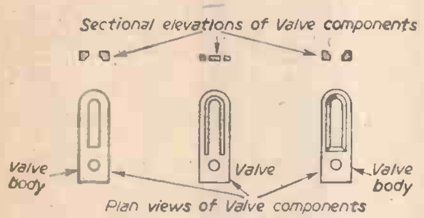
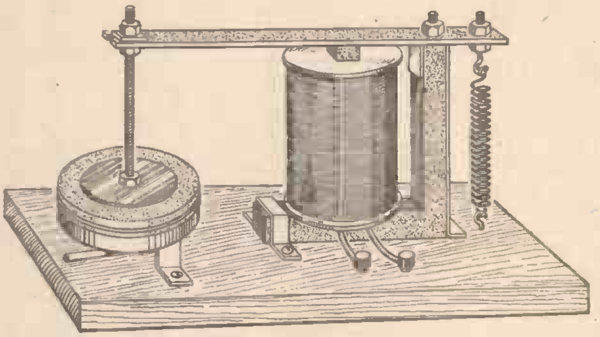


Fig. 4.—Details of the valves in plan and section.

Fig. 5.—The inlet and outlet valves assembled in the pump body.



A perspective view of the completed pump.

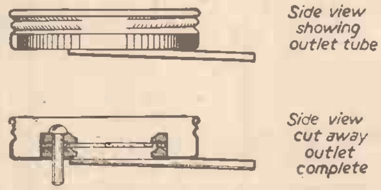


Fig. 6.—Side view of pump body. Fig. 7.—Cut away view showing valve in section.

The diaphragm and stem consists of an ⅛in. fully threaded rod, two nuts, two strong tin discs and a piece of inner tube cut large enough to lap well over the sides of the pump body to enable it to be bound to the body with wire. Two discs are made, one for the top of the diaphragm which is the larger but able to work freely in the pump body, the other disc, which is for the underside of the diaphragm, being cut ½in. less in diameter. Through the centre of both discs and the diaphragm is a hole for the stem to go through (Fig. 8).

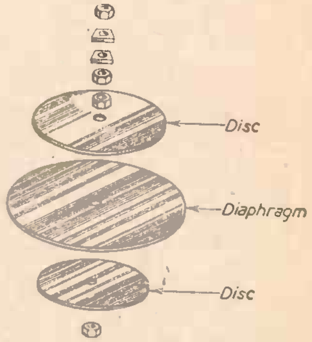


Fig. 8.—The diaphragm stem assembly.

The trembler (Fig. 9) is made from a piece of soft iron ½in. wide and ⅛in. thick. One end is forked with its two prongs ⅛in. in width. Next, 3/16in. from the other end is drilled a ⅛in. hole, and 1in. further towards the centre is drilled another ⅛in. hole.

The Magnet

The magnet is made from the mains coil of an A.C. eliminator. The laminations were originally made to form a square, but I cut them to form a U; this, with the coil wound on and connected to the A.C. mains supply, makes a perfect vibrator, when the trembler bridges the open ends of the core. If the core is of the ⊔⊔ type it will be found to be more efficient, the coil then being on the centre pole, as shown in the sketch of the finished pump, shown at the top of this page.

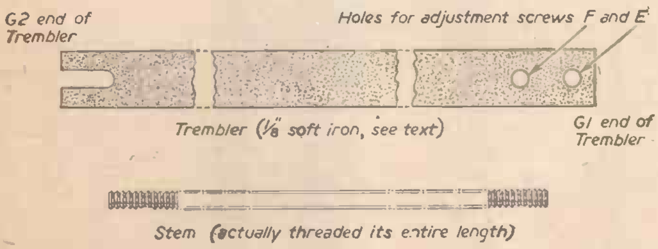


Fig. 9 (above).—Details of the trembler and a view of the diaphragm stem.

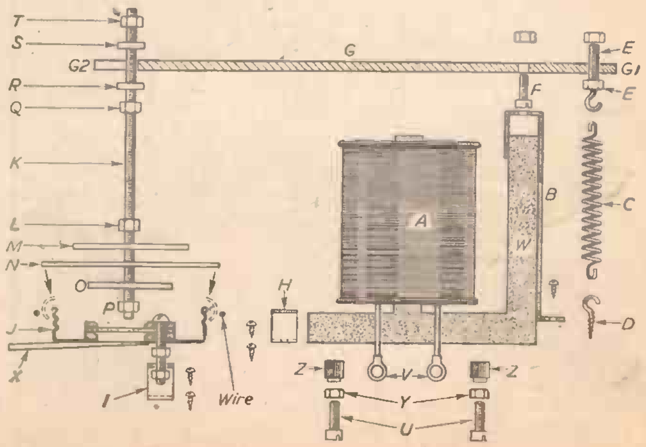


Fig. 10 (right).—Lettered assembly details of the whole pump.

Assembly

First of all choose a suitable baseboard; a piece of $\frac{3}{8}$in. plywood is about the most satisfactory. The magnet (A) is screwed on so that the end of the trembler G1 carrying the spring is $\frac{1}{4}$in. clear of the end of the board. The adjustment screw F is put through top hole in bracket B, the bracket is then put over the top of the back leg of core W and screwed down to the base at the other end. The other end of the core is anchored with bracket H. The pump body J is fixed to bracket I by means of two nuts screwed on to the extending ends of the valve bolts.

The diaphragm is assembled by screwing nut L on the stem K for $\frac{1}{2}$in., the largest tin disc M next, then diaphragm N and disc O, after which nut P is screwed on the end of the stem. Nut L is now screwed down to tighten the diaphragm between the discs to allow no air leak. The diaphragm is now fixed to the body by pressing the diaphragm around the top and ensuring that disc M has an even clearance all round. Whilst this is held firmly the edges are lapped over the edge of the body and bound firmly to the side by strong wire. Nut Q is now screwed well down the stem and rubber block R is slid down to it. Trembler G is placed on screw F and nut screwed on, the trembler must lie central across the centre pole of the magnet.

Place the pump on the base so the stem is $\frac{1}{4}$in. clear of the bottom of the slot at the G2 end of the trembler; the outlet X tube should be pointing away from the magnet A.

The pump is now screwed down firmly. Spring hook E is attached to the trembler, spring C hung on it and hook D screwed directly below the loose end of spring. Drill two holes through base for terminals U, put these through, screw on nuts Y, then tags V and nuts Z. A length of flex is attached to the terminals for plugging in to the mains supply. A length of rubber tubing is attached to the outlet tube X and taken to the aquarium or other apparatus to be aerated. The power can now be switched on, and great care must be taken not to touch terminals while power is on.

Adjustments

These are made at the nuts on E and F and the stem nuts T and Q until satisfactory operation is obtained.

Additional nuts may be made to T and Q to lock them against vibration. This pump has been tested in a butt of water 3ft. deep and it worked satisfactorily.

Making a Perspectograph

An Easily-made Instrument for Copying Drawings and Other Objects

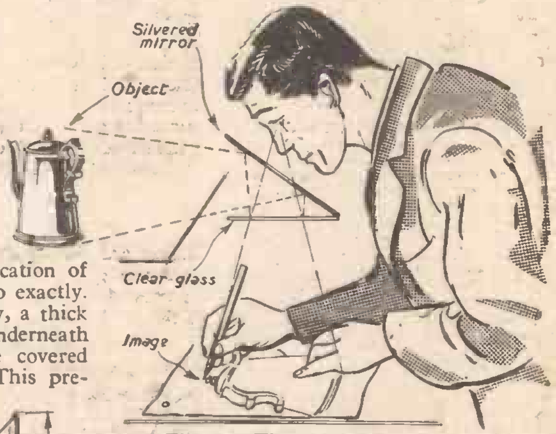


Fig. 1.—The perspectograph in use.

A PERSPECTOGRAPH is a simple optical device which can be of great assistance to an artist in copying drawings, etc. It can also be used for preparing illustrations from the actual articles, in which case correct perspective, frequently a difficulty for an amateur artist, can be readily obtained.

Principle of Operation

The principle on which the apparatus works will be apparent from the illustration (Fig. 1). The "copy" is arranged in an upright position on an easel, opposite to the mirror. On looking through the small hole in the mirror the eye sees an image of the object reflected by the plain glass and the mirror, and this image appears to be flat on the table directly beneath the eye-hole, as shown in the illustration. A piece of paper may, therefore, be placed in position where the image appears and an accurate drawing can be made by following the shapes with a pen or pencil. As the eye can see through the plain glass at the same time as it sees the reflected image, the pencil and the image are both visible together, and the details can be followed by the pencil point quite easily.

For amateur construction wood is probably the most convenient material.

Construction

Fig. 2 shows the framework complete. The dimensions are given as some indication of the size, and need not be adhered to exactly. To make the apparatus stand firmly, a thick piece of lead should be screwed underneath the base and the lead should be covered with baize fixed with adhesive. This prevents the lead from marking papers, etc., on which it may stand.

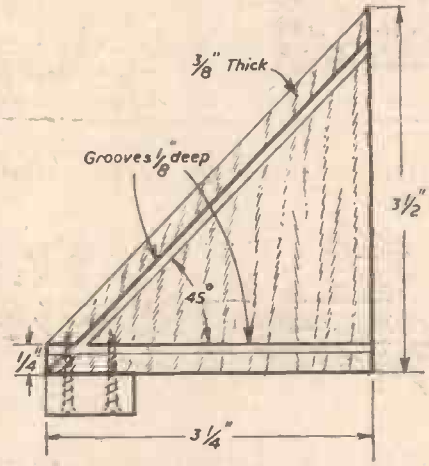


Fig. 3.—One of the triangular-shaped pieces for holding the mirror and glass.

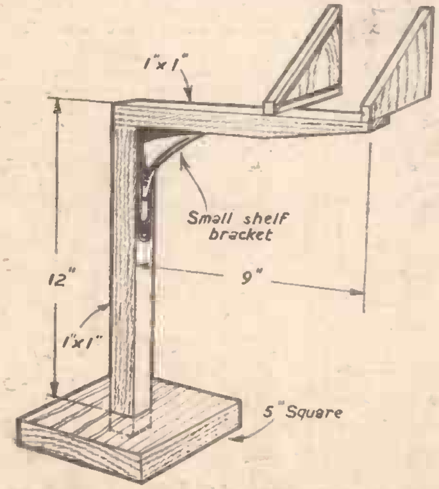


Fig. 2.—The completed framework.

The triangular pieces which hold the glass and mirror are shown separately in Fig. 3. These, of course, should be made as a pair, i.e., one right hand and one left hand. Screw the end piece on to the horizontal support first, then space the second triangle far enough away so that it holds the glass comfortably in the horizontal grooves. Fix it in this position, and put a small screw or tack at the end of the grooves to stop the glass from sliding out.

The size of the plain glass should be 3in. by 3in. and the mirror 3in. by $3\frac{3}{4}$in.

The mirror should then be slid into the slanting groove, with the back uppermost, until it rests on the plain glass, then fix it with a screw or tack as before.

Next scrape a small hole on the back of the mirror so as to leave a spot of clear glass about 9/16in. diameter. This forms the "eye-hole." It should be approximately central.

A simple easel will be required to hold the drawing which is to be copied, and a suggestion for making it is shown in Fig. 4. The clips are flat pieces of wood held in place by rubber bands.

Illumination

The illumination of the original drawing and the copy will both need some attention to obtain the best results. If there is too much light on the drawing and not enough on the copy, it will be difficult, or impossible, to see the pencil and vice versa; if there is too much light on the copy and not enough on the original drawing, the image will be too faint, or perhaps not visible at all. All that is necessary is to adjust the position of the light source until a satisfactory result is obtained.

The size of the new drawing can be made large or small as required, by placing the original drawing nearer to or farther from the mirror. The farther away the drawing is placed, the smaller will be the copy.

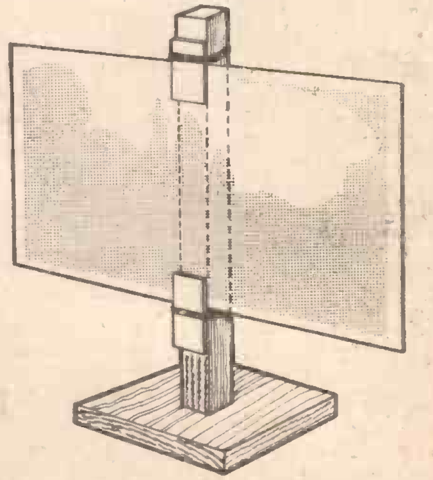


Fig. 4.—Easel for holding drawing to be copied.

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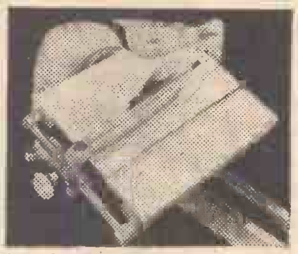
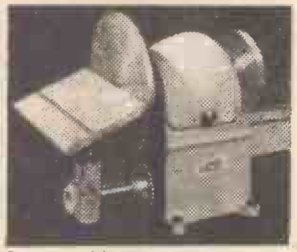


(*Above*) CIRCULAR SAW ATTACHMENT
(*Below*) SANDING ATTACHMENT



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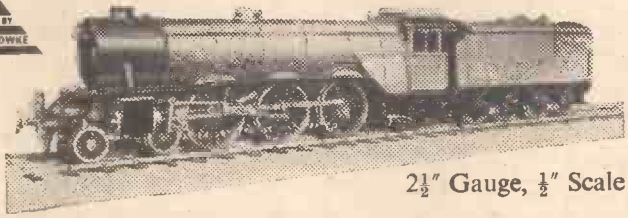

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LIGHTING SWITCH CIRCUITS

Some Suggested Circuits for Additional Household Lighting

By F. G. RAYER

ADDITIONS to existing lighting circuits can quite frequently be made with advantage, or become necessary when photographic dark-rooms, workshops, or other work rooms are arranged. Such additions to an existing electrical installation can be made without any particular difficulty, and with perfect safety, if the regulations which apply are kept in mind, and the correct method of wiring is known. On the other hand, incorrect and haphazard installation of additional lights or switches may cause danger to the user. A number of fatalities arise annually from equipment hooked-up in an unsafe manner, and the number of severe (but non-fatal) shocks experienced must be quite large. Such risks should at all costs be avoided.

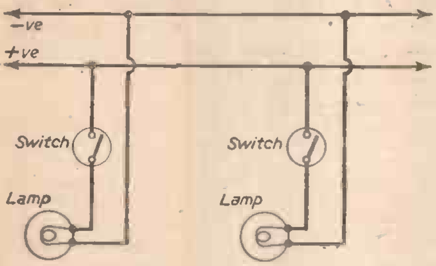

Fig. 1.—Showing correct position for switches in +ve line.

It is not necessary to set out in detail the additions which may be made, since these depend upon individual circumstances. A few may be noted, however. First, two-way switching can be employed with advantage in many circumstances where one-way switching has previously been employed. Such cases arise when a room has two doors, and when it is desired to switch a bedroom lamp from both door and bed positions. Again, it is sometimes an added convenience to use an intermediate switch with an existing two-way switching circuit. Such a circuit is usually employed for stair lights. If there is a bathroom or bedroom at an intermediate position, three switches, all controlling the same lamp or lamps, may be used. This is also of advantage in some other situations, such as in long passages with a door at a central position.

Secondly, there are additions to existing lighting—desk and bench lamps, reading lamps, cupboard and passage fitments, etc. All these can usually be added without any particular difficulty. In other cases an outdoor light in a high, waterproof fitting secured to the house wall is of definite advantage.

Correct Switch Position

It is often not realised that a lighting switch must be included in the correct lead, not in either, as convenience or chance may suggest. With standard A.C. mains one lead is at high potential to earth—this is the "Line" or +ve conductor. The other lead is at low potential to earth—this is the "Neutral," "Earthed" or −ve conductor. Switches must always be included in the "Line" conductor, as shown in Fig. 1. When the switch is "Off" the lamp fitment will then be safe to handle. Were the switch in the other conductor, the lamp fitment would be at high potential to Earth when the switch is in the "Off" position. In such circumstances a shock can arise when changing a lamp, if the insulation is poor or if the contacts are touched.

It is worth noting that the usual voltage of 200 to 250 volts is the Root Mean Square value, and that with A.C. supplies the peak value is 1.414 this figure. Whether such a voltage is fatal or not depends upon the person's health, the contact resistance, conductivity of flooring, and similar factors. Switches must therefore be in the +ve conductor for maximum safety.

Practical Installation

To avoid awkward joints, etc., "looping-in" is frequently used, and has much to recommend it. With such a method of wiring, twin conductors can usually be used throughout, and all joints are at switches, ceiling roses, or lamp-holders.

The circuit in Fig. 1 is shown in "looped-in" form in Fig. 2. The ceiling roses have three terminal plates, thereby permitting a twin cable to descend to the switch. This is tidy, convenient in obtaining an easy wiring run, and avoids any need for jointing.

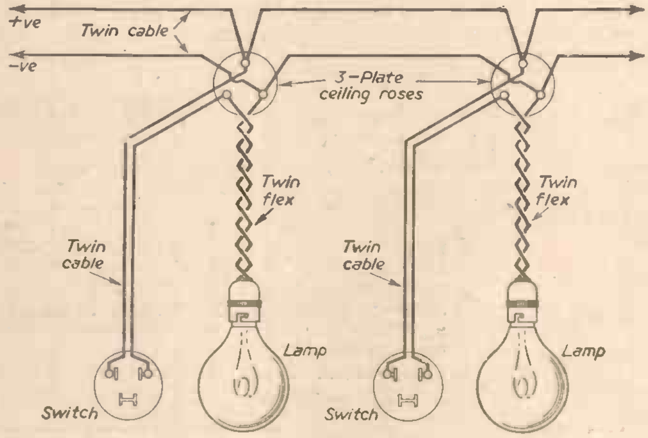

Fig. 2.—Looped in connections for circuit in Fig. 1.

Twin flexes of convenient length terminate in holders for the bulbs.

This method can be used with advantage in almost all wiring. If joints in wiring runs are required, they should not be covered with insulating tape, but should be contained within a junction box. Such boxes are usually of insulating material, with a removable cover, and have two or four terminals.

"Looping-in" may take place at the switches, when more convenient, or at the lamp-holders themselves when these are of the batten type. Any theoretical circuit (e.g., such as in Fig. 1) may usually be redrawn in practical form without difficulty. The red-covered conductor should be retained for the +ve connection throughout all wiring.

Two-way Switching

One circuit for this is illustrated in Fig. 3. It is used for stair lights, lights in corridors, and all situations where it is convenient to switch a common lamp from two positions. When modifying a bedroom light circuit so that the lamp may be controlled from the bed, a pendant switch of the type shown is usually most convenient at the bed position. The three-core flex should pass up into a three-plate ceiling rose, from which a three-core conductor of solid type can be taken to the other part of the circuit.

When modifying an existing installation, the method shown in Fig. 4 (which gives the same results) is sometimes more convenient in practice. In Fig. 3 one conductor from the lower switch needs to go to the +ve line and a junction box may be necessary for this connecting point. But in Fig. 4 the three conductors from the lower switch may terminate at the second switch—usually that already situated by the bedroom door. As a result, there is no need to remove or alter any of the existing wiring.

Fig. 4 also shows connections for an actual two-way switch, contacts being lettered to agree with the circuit. In the modification under consideration the existing on-off switch by the door would be removed and replaced by such a two-way switch, connections being made accordingly.

Other uses for two-way switching will doubtless come to mind, according to individual circumstances.

With Intermediate Switch

The circuit in Fig. 5 may be regarded as that in Fig. 3, with the addition of an intermediate switch. This switch is merely inserted in the twin conductors which pass between the "B" contacts (Fig. 4) of the two two-way switches. With this type of switching the lamp may be switched on or off at any of the three positions, quite without regard to the switch previously used to switch it off or on, as the case may be.

In Fig. 5 a second lamp has also been added, and this is often convenient with long or bent stairways, etc. It is shown looped-in to the existing lamp and can, of course, be used with any other one- or two-way switching circuit. If a stairway is illuminated by a single lamp at the top, it is often of advantage to provide such an additional light at the bottom for adequate illumination when a person is descending.

Special Circuits

It is frequently possible to arrive at some circuit which is of particular advantage in

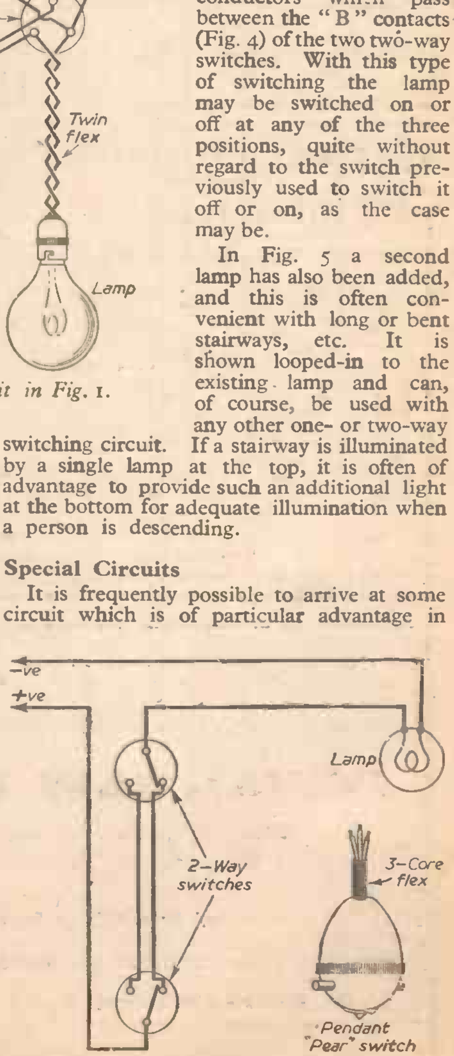

Fig. 3.—Two-way switching.

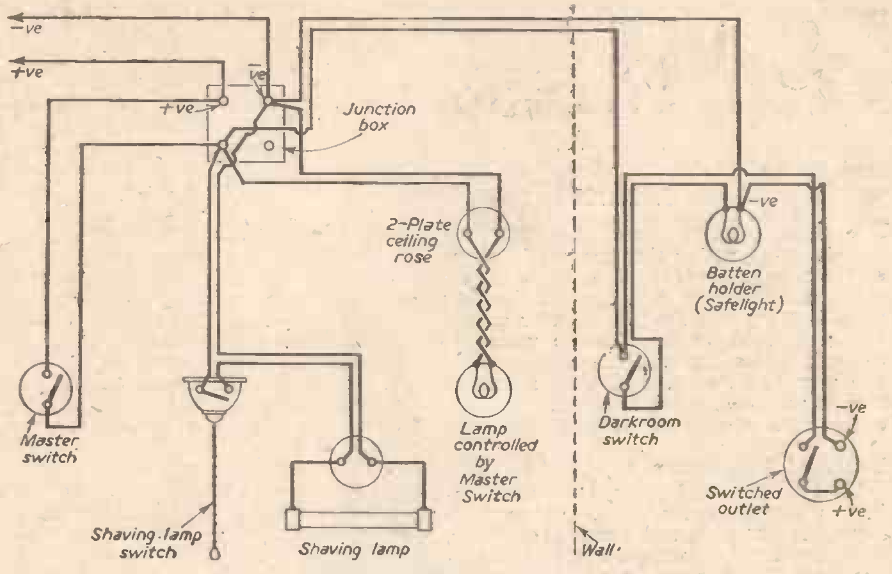

Fig. 6.—Circuit with master control switch.

individual circumstances. The circuit in Fig. 6 is an example of this, and was used for a photographic dark-room built in a large bathroom and for a tubular shaving lamp. Originally the switch marked "Master Switch" controlled the one bathroom lamp only, but the additions were made in such a way that when this switch is "off" the shaving lamp

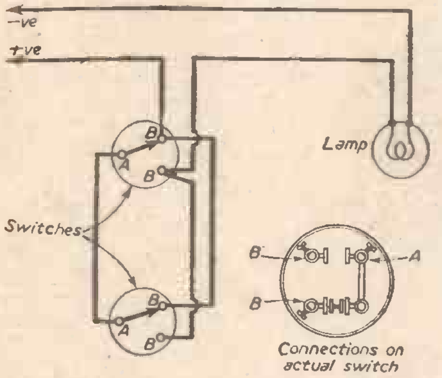

Fig. 4.—An alternative two-way switching circuit.

is also off, and so is any equipment in the dark-room. This provides a positive safeguard against the dark-room equipment or safelight being left on unnoticed, or against a person leaving the room without having switched the shaving lamp off, if it were used. In addition, by the bathroom light having to be on, there is an indication that the dark-room is occupied.

In other cases similar circuits may be used. An example is the installation of a light in a toolshed or garage, where the circuit may be made from the house in exactly the same way, thereby assuring that the garage or shed light is not left on unobserved. In such cases the circuit is best connected to the switched circuit of the room or passage through which a person would normally go to reach the shed or garage.

Installation Precautions

All wiring runs should be of proper five-amp. conductor, secured by wiring clips. Flex secured with insulated staples should *not* in any circumstances be employed. If the insulation eventually perishes or is fractured, moisture may reach the conductor, making the surface of the insulation, or damp wall surfaces, etc., alive.

With bathrooms, no switch should be within reach of a person using the bath or touching water taps. It is for this reason that a ceiling switch, operated by an insulated pull cord, is shown for the shaving light in Fig. 6. In some cases (according to size of room, etc.) such a switch would already be used for the main bathroom light. Fitments in a bathroom should be of the all-insulated type, and no provision for portable appliances is permissible. In Fig. 6, the dark-room, though reached by passing through the bathroom, is wholly separate—this is why a socket outlet is permissible, and a cord switch is not required.

Draw A Circuit

When making additions to existing domestic wiring it is of great advantage to examine the existing wiring carefully and draw a circuit of the section required. It will then become apparent where other circuits may be joined in, where cables may run, and whether any junction boxes will be required. The main house switch should be set in the "off" position before making alterations. If separate main switches for power outlets and lighting are used, great care should be taken to assure the correct switch is opened.

Earthing Necessary

Fitments with metal parts, such as for outdoor lights, should have the metalwork securely earthed. This can be done by using a separate stranded copper earth wire, or by using a cable with earth conductor. The earth wire is returned to the house mains-circuit earth point, e.g., that to which the earth pin of three-pin power outlets is wired. The

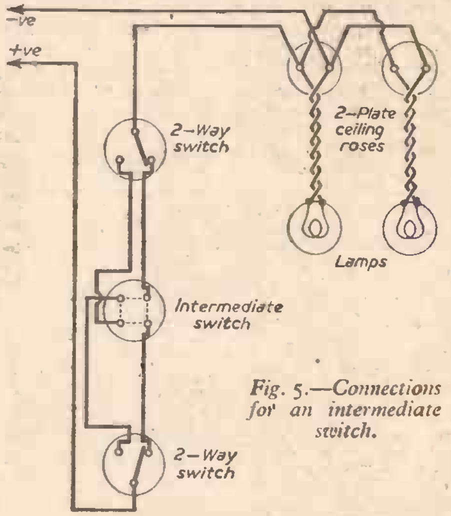

Fig. 5.—Connections for an intermediate switch.

metal parts of such fitments cannot then become alive as any breakdown in internal insulation would cause the lighting circuit fuse to blow.

Finally, lighting circuits should not normally be looped-in to existing power circuits, since the latter will be of 13, 15 or more amps rating. Quite apart from other considerations, such fuses would not provide proper protection for a five-amp lighting circuit.

With D.C. mains the line at positive polarity is not necessarily that which is at high potential above earth. Whether or not this is so must, therefore, be ascertained in advance.

Colouring Metals

MOST common metals can be given a dead-black surface coloration very readily by chemical means. For instrument work, such a coloration is very useful and often indeed a necessity. The black colour, unlike many of the painted-on lacquers, does not flake off or chip away. Brass and copper articles can be blackened by immersion for a few minutes in the following liquid:

Copper nitrate	1oz.
Water	3oz.

A small quantity of silver nitrate dissolved in the above solution is said to improve the black coloration produced upon the metal, but its employment is by no means essential.

Copper (but not brass) articles may be made to acquire a slightly shiny black surface by immersion in the following solution:

Ammonium sulphite (liver of sulphur)	1 part
Water	4 parts

Brass articles take upon themselves a steely-grey colour in this solution.

By immersing iron articles in a solution of photographers' "hypo" they are given a blue-black colour, particularly if a little lead acetate or nitrate is dissolved in the hypo. Silver immersed in sodium-sulphide solution turns almost black, while a black colour on zinc can be obtained by immersing it in a solution of antimony chloride.

A pleasant grey colour is produced on iron by boiling it for half an hour in a weak solution of iron phosphate. This process is akin to that of "coslettisation," a thin film of iron phosphate and oxide being formed on the surface of the metal.

In order to colour brass or copper a variety of shades ending in black, the metals should be immersed in a very dilute solution of ammonium or sodium sulphide. Brass, for instance, placed in an extremely dilute solution of either of these sulphides will acquire a golden appearance, whilst copper, in the same solution, will be reddened. By making these sulphide colouring solutions stronger or by allowing a longer time for them to act upon the metal, the mechanic will find that he can get almost any yellow, red, brown or black colour he desires on these metals.

Steel articles can be "blued" simply by passing them through a flame. Better still, they may be blued by boiling them for a short time in a strong solution of hypo containing a little lead nitrate.

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

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EARLY CLOSING DAY THURSDAY.

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

METAL RECTIFIERS, suitable for 6/12/24 volts at 10 amps charging with the correct transformer, complete, 97/6 each.

6 or 12 VOLT RECTIFIERS at 4 amps output, complete with suitable transformer, 200/230 volts input, 45/- each, post 1/6.

12/24 VOLT RECTIFIERS, at 4 amps, with suitable Mains Transformer, 200/230 volts input, 55/- each.

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

MAINS TRANSFORMERS (NEW), suitable for spot welding, input 200/250 volts, in steps of 10 volts, output suitably tapped for a combination of either 2/4/6/8/10 or 12 volts 50/70 amps, 95/- each, carr. 7/6.

MAINS TRANSFORMERS, 200/250 volts input, output a combination of 6, 12, 18, 24, 30 and 36 volts at 6 amps, 45/- each, post 1/6.

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

MAINS TRANSFORMERS (NEW), 200/250 volts input in steps of 10 volts, output 0, 6, 12, 24 volts 6 amps, 42/6 each, post 1/6. Another, as above but 10-12 amps, 55/- each, post 1/6; another as above but 25/30 amps, 75/- each, carriage 3/6; another, input as above, output 0/18/30/36 volts 6 amps, 47/6 each, post 1/6.

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

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

Ex-W.D. U.S.A. HAND GENERATORS, less winding handle, output 425 volts at 110 m/a., at 6.3 v., 2½ amps, complete with smoothing, 30/- each, carriage 2/6.

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

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

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

Ex-W.D. ROTARY CONVERTORS, 24 v. D.C. input, 50 v. 50 cycles, 1 phase output at 250 watts, complete with transformer for stepping up from 50 v. to 230 v., £9.10.0 each. Ditto 450 watts, £12.10.0 each. Carriage forward.

HEAVY DUTY BATTERY CHARGERS 200/250 volts A.C. input 36 volts, 36 amps D.C. output, £25 each, c/fwd.

400 WATT DIMMER RESISTANCES, Large Stud type, 30/- each, post 3/6 each.

Ex-RADAR TRANSFORMERS, 230 volts input, output 4 or 5 kV at 30 m/a., 6.3 v. 2 a., 2 v. 2 a., 4 v. 1 a., immersed in oil, capable of a larger output than stated, £3/15/- each, carriage 5/-.

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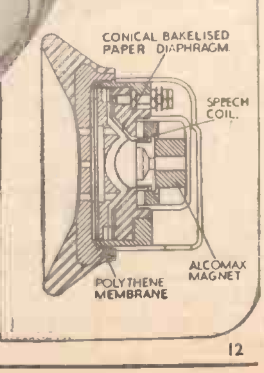

S.G. Brown Ltd.

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Telephone: Watford 7241.

12

SPECIAL OFFERS

ELECTRO MAGNETIC COUNTERS.—Post Office type, counting up to 9,999, operating from 1½ volts D.C. Coil resistance 3 ohms, overall size 4¼ x 1¼ x 1¼in., perfect condition. 12/6 each, post 1/-.

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

VENTAXIA EXTRACTION FANS.—230/250 volt 50 cycles. Bakelite cased. Silent running. 90/-, post 2/6.

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

TELEPHONES.—For intercommunication between 2 or more positions. These "call and reply" wall sets are a complete unit, with bell, mike and receiver in neat wood case, and only need a length of twin bell wire between them. Brand new, suitable for office or home. Robust construction and efficient. £5 per pair.

MICRO-TELEPHONES.—Standard P.O. hand type with transmitter and flex. 15/-, post 1/6.

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

VOLTMETERS.—0/300 volt A.C. 50 cycles. 2½in. flush moving coil, rectifier type. 30/-, post 1/-.

RESISTANCES.—Sliding type, 25 amps 0.4 ohms or stand, complete with insulated knob, size 9 x 4 x 6in. 12/6, post 2/-.

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

GEARED MAINS MOTORS.—Universal Series Type for 230 volt A.C./D.C. 100 r.p.m., torque 7 lbs./ins. Klaxon No. EK3UB1-W3, complete with control box to enable speed to be varied. 115/- complete.

VOLTMETERS for A.C. Mains 50 cy. reading 0 to 300 volt with clear 5in. dial only 60/-; worth double.

ROTARY CONVERTORS.—From 24 volt D.C. to 230 volt A.C. 100 watts. 92/6 each; also available with 12 volt input, 102/6 each, carriage 10/-.

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

AUTO CABLE for car wiring and all electrical purposes, waterproof. Single, 20/-; 3 core, 40/-; 5 core, 53/-; all per 100 yards.

VACUUM PUMPS or Rotary Blowers.—Ex. R.A.F. Brand new. 7 cu. ft. per min. 10 lbs. per sq. inch at 1,200 r.p.m. Ideal for a brazing torch, etc. Size 6in. x 4in. x 4in. 2 x ¼in. shaft. 22/6 each, post 2/-.

BUZZERS.—3 to 8 volts. In mahogany case. Superior quality. 5/6 each, post 9d.

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

AMMETER.—2¼in. Flush 0/25 amps. Moving Iron. D.C. 7/6, post 1/-.

MOVING COIL METER with 1 M/A movement, 2½in. flush, rectifier type, scaled 0/100 volts A.C. Resistance 100k. ohms. A very useful basic meter, 30/- post free.

MASTS, TELESCOPIC.—Extending to 12ft. in 7 sections, 12/6, post 1/6.

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

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

INSPECTION LAMP.—Complete with Battery Case. Fits on forehead. Leaves both hands free. 7/6, post 1/-.

ACFIL PUMPS.—These pumps enable you to fill all accumulators on the bench with the carboy at floor level. Brand new, only 30/-, post 2/-.

EXTENSION SPEAKERS. P.M. 5 in. In wood case 9in. × 7½in. × 4in., 17/6, post 2/-.

THERMOSTAT SWITCH.—Bimetal type in sealed glass tube, 2½in. x 1½in. 30 deg. Cent. Ideal for Aquariums, Wax and Oil Baths, Gluepots, etc. Will control 1 amp. at 240 v., 5/- each, post 6d.

THERMOSTAT.—Satchwell 12in. stem., 0/250 v. A.C./D.C. 15 amps. A.C., .1 amp. D.C. 10 to 90 deg. Cent., 35/-, post 1/6.

"ELF" CIRCUIT BREAKER, avoids blowing mains fuses if circuit is overloaded. Reset in an instant. Very useful on test bench. Size 3in. round, 9/6, post 1/-.

LOW VOLTAGE CIRCUIT TESTER.—A self-contained unit for making a complete and rapid check of the generator-battery circuit of a vehicle. Battery voltage, regulator and cut-out settings and generator performance can all be easily determined. American made. Complete with instruction book. £5/10/-, post 2/-.

SWITCHES.—A row of 5 in a flush mounting bakelite moulding 5¼in. x 1¼in. x 2in. Ideal for model railways, etc., 5/6, post 9d.

BALL RACES.—No. EE2, ¼in. x ¼in., 3/-, 30/- doz., post free.

THRUST RACES.—13/16in. x ¼in., 1/6, 15/- doz. Post free.

RECTIFIER UNIT.—Input 230 volts A.C. Output 12-0-12 volts 1 ampere D.C., 50/-, packing and carriage 5/-.

Lists available, 6d.

WILCO ELECTRONICS

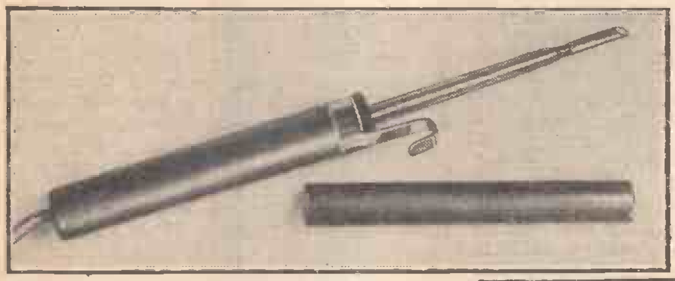
DEPT. P.M.,

204, LOWER ADDISCOMBE ROAD, CROYDON.

Trade Notes

The "Litesold" Miniature Soldering Iron

THIS miniature instrument is primarily designed for light soldering work, but will carry out any normal soldering work on



The "Litesold" miniature soldering iron.

radio and television receivers. The range of sizes comprises instruments with 1/8in., 3/16in., 1/4in. and 3/8in. diameter bits, and they are supplied to work off a large number of A.C. and D.C. voltage ranges. Economy claims are that only the bit has to be replaced when worn down and there is a big electricity saving. The fully insulated element is flash tested to frame during manufacture at 1,000 volts A.C. Models in all four sizes are available in either fixed or replaceable bit types. The smallest, the 1/8in. bit size, is supplied with a cover, as shown in the photograph.

The price of the 1/8in. replaceable bit instrument is £1 1s. 6d., and the 3/8in. size costs £1 8s. 6d., the fixed range being a few shillings cheaper. The sole manufacturers are Light Soldering Developments, Ltd., 30-32, Devonshire Road, Forest Hill, London, S.E.23.

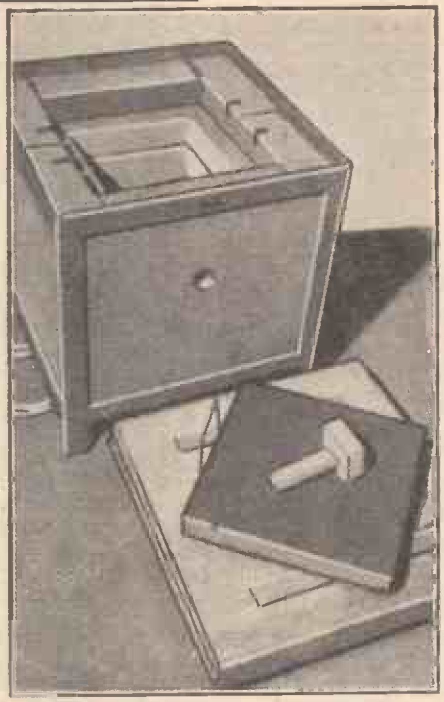
E.D. Diesels

MESSRS. BASSETT-LOWKE, LTD., 112, High Holborn, London, the well-known firm of model makers, are supplying a range of diesels and driving accessories, particularly recommended for model power boats or aircraft (free flight or line controlled). They range from the "Bee," a 1 cc. 2 1/4in. high motor, with a weight of 2 3/4oz., and with r.p.m. of 7,000 plus, to the 5 1/2oz. 3.46 cc. "Hunter," which develops 10,000 r.p.m. and is ideal for control line and stunt-flying. They range in price from £2 14s. 9d. to £3 18s. 6d. Among the accessories supplied are propellers (air and water), marine unit flywheels, shafts and stern tubes, driving dogs, etc., and all are available either to personal shoppers or by post.

Micromodels

THESE three-dimensional volumetric models are printed on cardboard, and then cut out to form miniature replicas of interesting mechanical, architectural, industrial and maritime subjects. The makers state very firmly that these are not toys, but authentic models for craftsmen and finished specimens, they claim, often change hands at prices running into guineas. An illustrated list of 100 models will be sent on the receipt of a stamped, addressed envelope by the makers, Micromodels, Ltd., 3, Racquet Court, Fleet Street, London, E.C.4.

A sample micromodel.



The "Standard" top-opening pottery kiln.

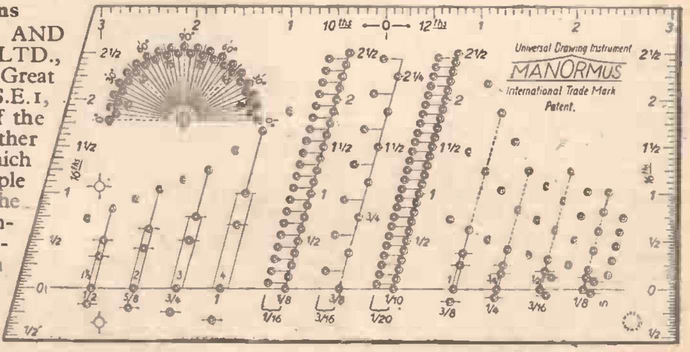
Electric Pottery Kilns

MESSRS. MILLS AND HUBBALL, LTD., 10, Silvester Street, Great Dover Street, London, S.E.1, have sent us details of the electric kilns and other pottery materials which they supply. An example of their products is the "Standard" top-opening kiln (see photograph) which has a firing chamber, 9in. × 9in. × 9in., lined with Moler Super H.T. insulating refractory 1 1/2in. thick. This is surrounded by 3in. thick Moler "Economite" slab, and the kiln is contained in a welded steel frame with 3in. legs. The chamber is sealed with a Stourbridge tile and a 3in. thick Moler "Economite" slab lid; both kiln and lid are panelled. There are three elements, the firing time for pots being from three to five hours. The external dimensions are 19in. × 19in. × 23in. high, it weighs 1 1/4cwt., the total loading is 3 kW., 200-250v. A.C./D.C., and the maximum working temperature is 1,050 deg. C. This model is also made in front-opening form and other kilns are available with different firing chamber sizes. Some are intended for enamelling and have a maximum temperature of 900 deg. C. The price of the smallest of these, the "Junior" Enamelling Kiln, is £12. The kiln illustrated costs £22. A long list of accessories and pottery materials is available, including replacement elements, clays, pyrometers, tools, brushes and kiln furniture. Details are available from the makers.

"Manormus" Drawing Instrument

THE "Manormus" self-spacing sliding ruler is one of the many and varied instruments supplied by the firm of W. G. Pinner and Co., 1, York Road, Birmingham, 16. The general outline may be seen from the illustration; it contains 216 precisely spaced holes, precision drilled for a 5H pencil; its top edge is a 6in. ruler; the sides are 3in. rulers; it contains a protractor of 180 deg. by 5 deg. and is a set-square of 90 deg., 90 deg., 75 deg., and 105 deg. It is used for distance ruling in pre-determined distances of 1/20in., and all its 50 multiples up to 2 1/2in. and 1/16in. and 40 multiples up to 2 1/2in. It is useful for vertical or oblique ruling and as a shading ruler and a diagram ruler; using a drawing-pin as a pivot it can be used for drawing circles, and one of its chief uses is in shadow lining for lettering. The price of this instrument is 16s.

Also from W. G. Pinner we have received details of "Drawink," a new waterproof reproduction ink, claimed to be completely non-clogging and equally successful for writing, sketching, draughting and stencil work. Full lists of the many and varied shadings supplied by this firm may be had on enquiry from them.



The "Manormus" drawing instrument.

Wolf Electric Tools

AT the recent British Industries Fair, the above firm displayed, in addition to their firmly established electric tools and equipment, some newcomers to their range. Amongst these there was a recently introduced 3in. Portable Electric Belt Sander (Type BS3), a machine of abundant power for continuous operation, offering advantages in speed, accuracy, perfect finish and dependability.

Portable electric saws were featured in two models—Types RS7 and RS10. The first is a powerful saw of medium capacity of 2-5/16in., and a bevel cutting capacity of 2in. The RS10 is an ideal general purpose saw for heavy duty ripping and cross-cutting, with a cutting depth of 3 3/8in. or 2 3/4in. for bevel cuts. It can also be used with outstanding success on material such as corrugated asbestos, steel sheets, brick, stone and marble, and suitable abrasive discs are also available for cutting metal tubes and sheets up to 1/4in. thick.

The Wolf Combined Mortiser and Drill (Type CM4) with a capacity of up to 1/2in. in

(Continued on page 409)

LETTERS TO THE EDITOR

The Editor does not necessarily agree with the views of his correspondents.

Flying Saucers

SIR,—I have been interested in "Flying Saucers" right from the very first reports and have eagerly awaited each new development with interest, always keeping my eyes skinned, hoping to see something unusual in the skies.

About three months ago a friend and I were observing through my 6in. reflector, which stands in my garden. The time was 5.45 p.m. approximately about mid-December. We were looking at Jupiter and various stars in Orion. My friend happened to look towards the west and said, "What is that over there by the hill, is it another planet?"

Just above the low hill nearby was a bright star, about the brightness of Saturn when at its closest. So I turned the telescope in that direction to look at it before it set below the hill. Before I could pick it up in the finder it had moved behind some poles a distance away. I thought it was moving rather quickly for a setting heavenly body. When it reappeared it seemed to be moving more parallel to the earth than at the angle one would have expected. The trouble was it was very difficult to get it in the telescope due to the magnification (about 100x) so we worked one at the finder and one at the eyepiece.

When we did get a glimpse of it, we were amazed to see instead of one object it appeared as a close group or formation of bright lights, anything from 6 to 12 in number which reminded me of the Pleiades or seven sisters. We took turns at the eyepiece, but could not keep it in the field of the telescope for any length of time to examine it.

For the naked eye it was moving very slowly, but appeared to move rather quicker than when we first saw it, when, for all intents and purposes, it appeared stationary. So we followed it until it disappeared behind the houses to the north.

While it crossed from south to north there was no noise, its movement was very slow, far slower than an aeroplane, and more like a drifting object, so it took five or more minutes to move between the hill and the houses. It did not look like the navigation lights of a plane, but rather like a bright star among the other stars.

A few minutes later I walked to the end of the road, and there to the north it was still going far over the sheds of Parkeston Quay, and was much fainter. I watched it till it was out of sight. What it was I do not know, so maybe someone can suggest an explanation as it somewhat resembled the formations of lights photographed in your recent review of Adamski's book.—D. HARVEY (Parkeston).

SIR,—I have just read PRACTICAL MECHANICS for March, 1954. This is the first time I have read your journal, and I was very impressed by its high standard. However, I feel that some of the remarks published on "Flying Saucers" cannot go unchallenged.

Mr. W. Kohl imagines that saucers may be experimental craft still on the secret list of some country. From what countries do they originate? The most obvious ones are U.S.A., U.S.S.R., and Great Britain. Let us examine the possibilities of them coming from these. First, the U.S.A.: does Mr. Kohl know that a Captain Mantell of the U.S.A.F., was sent up in a fighter to investigate a saucer and in so doing met his death? Does Mr. Kohl know also that on several occasions saucers have flown near to American aircraft? Surely if these objects belong to the U.S.A. then fighter pilots would not be sent to investigate them nor would the objects be permitted to fly close to civil aircraft.

As for U.S.S.R. and G.B. it is very doubtful whether either country could have been experimenting with secret aircraft for any length of time. (The same applies to the U.S.A.). Do not let us forget that saucers have been reported over a considerable period of time. The saucers have not appeared since 1947 only. For example, one was recorded as passing over Byland Abbey, Yorks, in 1290! If saucers are secret craft then the powers must have been experimenting a very long time!

Several readers said that Adamski's saucer resembled an electric light shade, or humming tops, bath plugs, etc. Here I should like to quote Mr. Waveney Girvan, Editor-in-Chief, T. Werner Lawrie, Ltd. (the publishers of Adamski and Leslie's book):—

"I have myself noticed a likeness to the lid of an electric kettle and to my bath plug, which is at the moment unrelated to its chain. All of this seems to prove that circular and dome shaped objects resemble each other in general appearance—a conclusion so obvious as to be unremarkable. . . ."

The above quotation is taken from a letter by Mr. Girvan to the "Observer," Oct. 18th, 1953.

Your statement, sir, that books on "Flying Saucers" have made people over incredulous about space travel seems hard to understand. I have found that most people having read about saucers become interested in space flight and often become enthusiasts. After all, going by your statement one would suppose that science fiction magazines would make people incredulous, too, whereas I find just the opposite happening.—P. F. SHARP (Knutsford).

Electronic Tortoise

SIR,—With reference to "Information Sought" on an Electronic Tortoise (page 320, April issue), by Mr. G. Bryson, of Enfield, constructional details of "Timothy," a robot electronic turtle, were given in the American publication "Radio and Television News," for April, 1953. It is normally available in this country, but if Mr. Bryson wishes, I should be pleased to lend him my copy.—L. H. BROWN (Abingdon).

SIR,—Mr. G. Bryson, of Enfield, will find the circuit diagrams and sufficient constructional information in a book entitled "The Living Brain," by W. Grey Walter (Duckworth) for his electronic tortoise.

The account appears as a rather short appendix to the above volume, but the book is worth reading as it provides a justification for the evolution of M. Speculatrin—L. S. JOHNSON (Glos).

Fishing Reel

SIR,—As a maker of various types of reels, and a sea angler of forty years' standing, I should like to inform Mr. Hutchinson ("Information Sought," April) that in my opinion ball bearing reels are not as good as cone type bearings. I have made several of the cone type, plain bush type, and ball bearing type. The latter is affected by the salt water; although they are made totally enclosed, it still penetrates into the race. If Mr. Hutchinson wishes to get in touch with me, I am quite prepared to give him sizes, balance, etc.—R. A. MOON (Yorks).

Pottery Kilns

SIR,—In the April issue of PRACTICAL MECHANICS we have noted a query (page 320) concerning Pottery Kiln Design. We are designers and manufacturers of small electric kilns and have a prototype gas kiln under construction, and we should like to point out that your reader cannot hope to attain or maintain temperatures of 1,000-1,200 degrees Centigrade with his design and your suggested modifications.

In addition to the inner refractory lining, a high temperature kiln needs also to be well insulated so that the heat can be conserved. The insulation of an ordinary gas stove may be satisfactory for domestic requirements (300-400 degrees Fahrenheit), but is quite useless for the temperatures required here. Apart from the considerable heat losses which are bound to occur round the door, the losses due to poor insulation would be enormous, and would effectively prevent the desired temperature ever being reached. Incidentally, the method suggested for retaining the firebrick lining of the door is quite impracticable.

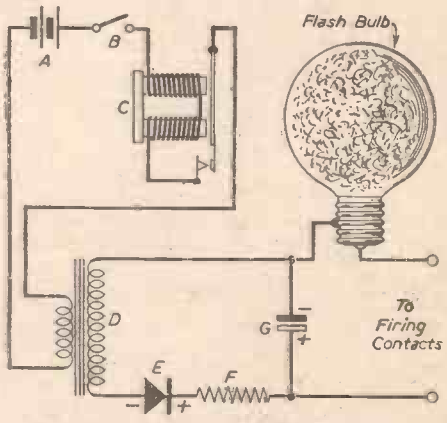
We do not know the nature of the brazing lamps mentioned, but consider that for a gas kiln of this size a flow of 120 ft./hour would be necessary. Adequate provision for secondary air inlet, and flue on top of the kiln, would have to be made.—MILLS AND HUBBALL, LTD., Potters Merchants (S.E.1).

[NOTE.—*This firm's products are mentioned editorially in "Trade Notes" on page 405.*]

Flash Photography

SIR,—The following details of a capacitor flash apparatus I built may be of interest to amateur photographers like myself, especially those very remote from centres where batteries other than for torches cannot be readily purchased, and to those who take flash pictures only once in a while.

The main circuit is the same as that described by Mr. F. G. Rayer in the November issue of



Mr. N. D. Ottman's flash bulb circuit.

PRACTICAL MECHANICS, the only difference being in the method of providing the power to charge the capacitor. Instead of expensive deaf-aid batteries which soon run down, even when out of use, two 1.5 volt unit cells of any size torch batteries can be used (I take two

READERS' SALES AND WANTS

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

FOR SALE

TYLER SPIRAL HACKSAW BLADES are "all-ways" sharp; cut intricate shapes in steel, wood, plastics; 12 Blades and Adaptors to fit Standard Hacksaw 5/6 from your local dealer, or 6/-, post free, from Spiral-Saws Limited, Trading Estate, Slough.

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

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

WRINGER ROLLERS to order, wood or rubber; s.a.e. for details; 1 week. Wringer Hospital, Sandygate, Burnley, Lancs. Est. 40 years.

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

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WATCH REPAIRERS, Hobbyists, etc. Send stamp for free lists of watches, movements, materials, tools, lathes, etc. Loader Bros., 36, Milestone Road, Carterton, Oxford.

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MUSICAL MECHANISMS. Swiss made, for fitting in cigarette boxes, etc., 22/6 each. Send s.a.e. for complete list of handicraft materials. Metwood Accessories, 65, Church Street, Wolverton, Bucks.

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

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CAN YOU SOLDER? That's all you need to make a really good radio from guaranteed Osmor Components. Send 5d. (stamps) to-day for free circuits and lists. Dept. P.M.C.2, Osmor Radio Products Ltd., 418, Brighton Road, South Croydon, Surrey. Croydon 5148/9.)

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BUILD YOUR OWN REFRIGERATOR, all components available at reasonable prices. Frigidaire flowing cold units, £5; small units, Kelvinator, etc., £4; ¼ h.p. heavy duty Motors, £3; Chrome Cabinet fittings, new, £1; money back guarantee; s.a.e. for list and schematic diagram. Wheelhouse, 1, The Grove, Isleworth, Middx. (Phone: Hounslow 7558.)

BOOKLETS, "How to use ex-Gov. Lenses and Prisms," Nos. 1 and 2, price 2/6 ea.; ex-Gov. Optical lists free for s.a.e. H. English, Rayleigh Road, Hutton, Brentwood, Essex.

"FORTUNES IN FORMULAS," 900 pages, 10,000 formulæ, processes, etc., 25/-; American Magazines covering every interest. Stamp for lists. Herga Ltd. (Dept. P.), Hastings.

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PERIODICALS BOUND, moderate charges. Send 1/- for samples. Sharpe, 38, Worcester Rd., Wold Rd., Hull.

out of my torch light whenever I use the flash attachment).

A—Two 1.5 volt unit torch light cells.

B—Low voltage ingition type switch.

C—Vibrator (small low voltage buzzer to work on three volts).

D—1 to 10 ratio transformer (loudspeaker output type).

E—Half wave metal rectifier (minimum 30 volts 5 milliamps).

F—10,000-15,000 ohm fixed resistance (¼ watt will do).

G—25 volt 50 mfd. electrolytic condenser.

The switch is put in the "on" position at least 5 to 10 seconds before the flash lamp is to be fired, this gives the necessary time for the condenser to be charged.—N. D. OTTMAN (British Guiana).

Interplanetary Space Travel

SIR,—*Re* W. J. Low's letter in the March issue of PRACTICAL MECHANICS, I feel it needs someone to extricate him from the mire of misunderstanding into which he has fallen.

His analogy comparing heat radiation to the flow of electricity is totally fallacious and misleading for the following reasons :—

(i) What is a good conductor of electricity is *not* necessarily a good conductor of heat (and vice versa), since the flow of electricity is concerned with the passage of electrons and the flow of heat is concerned with the *vibration* of *molecules* being transferred from one to the other—thus it is merely coincidence that, for example, copper is a good conductor of heat and electricity. An example proving that the conduction of heat and electricity is not correlative is the case of carbon—it is common knowledge that carbon is a fairly good conductor of electricity (note its use as an electrode in the arc lamp and the Leclanché cell) and it is also common knowledge that it is a bad conductor of heat: using the arc lamp as an example again, the tips of the carbon electrodes become white hot, but the rest of the electrode remains relatively cool.

(ii) Neither heat nor electricity use the *vacuum* as a medium—heat radiation depends upon the ether as its vehicle, since it is a part of the electro-magnetic spectrum, and the flow of current in a discharge tube depends upon the traces of ionized gas left in the tube—thus if we could completely evacuate the tube we should have no discharge.

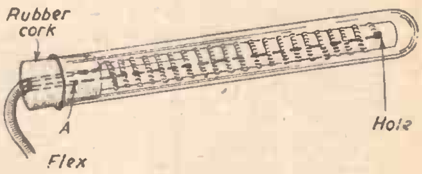
If, as Mr. Low maintains, the vacuum were the medium, the energy from the sun could never reach us, let alone the light from galaxies millions of light-years away, since the infinitesimal amount of hydrogen-gas in interstellar space would be insufficient to carry an electric current.

(iii) Mr. Low's argument breaks down once again, because an electric current depends upon a *difference of potential*, whereas wave-motion does not. Therefore heat radiations will travel along a medium irrespective of any "difference of energy," to coin a phrase.—R. W. R. ROUND (Sussex).

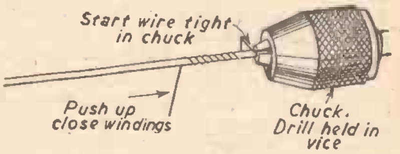
Immersion Heater

SIR,—In reply to Mr. A. P. Conway-Wallace (Farnham) who wishes to construct an immersion heater, the following details should be of assistance.

Take a hollow fire bar and break or cut off 6in. to 7in. To wind the element for 300 watts, 230 volts, use Nickrome wire, .004in. diameter, 127.0 ohms per yard. Wind element as per diagram on a thick wire (16 gauge) in a spiral, using a hand drill. When the spiral is complete it should be removed from the 16 gauge wire which has been used as a former and wound spiral fashion round the fireclay former. The end of the fire bar is



The completed immersion heater.



Winding the element.

inserted into a rubber bung and the other end of the element taken through a hole in the firebar, through the centre of the bar and joined to the other end of the mains lead. The rubber bung is then cemented into a glass tube and the heater is then complete.—P. HICKSON (Prestwich).

Club Reports

The Model Railway Club

THE annual Model Railway Exhibition, run by members of the above club took place at the Central Hall, Westminster, in April. Craftsmanship was up to its usual high standard and this year a section was devoted entirely to models made by members under the age of 18. In addition to the scenic modelling and displays of trackwork, signalling and station buildings, there was a garden layout with a continuous line round an artificial garden, and with a large through station. Models of London and Provincial trams were shown and the steam locomotive on the passenger-carrying track worked as hard as ever.

Sidmouth Model Society

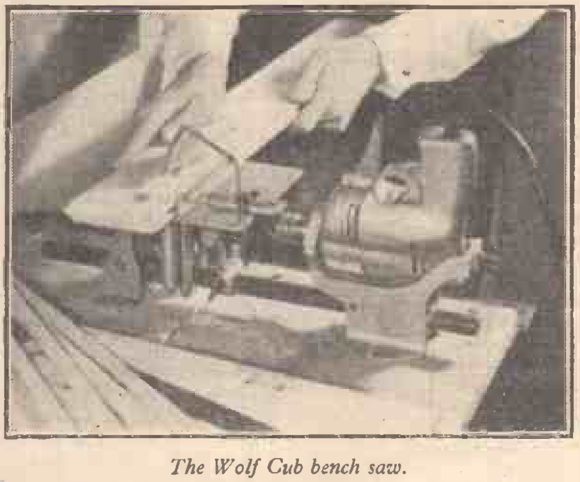
A NEW society has been formed at Sidmouth in the name shown on the heading above. Meetings are held fortnightly on Wednesday evenings at the High Street Garage, Sidmouth, and a most successful meeting was held on March 3rd when a demonstration of a 5in. Hall Class locomotive was given by a Tiverton member, and some passenger carrying was demonstrated. At the next meeting on March 17th there was a film show on R.A.F. aircraft. The hon sec. is J. E. Sleight, Myrtle House, High Street, Sidmouth.

West Hants Aeromodellers' Association

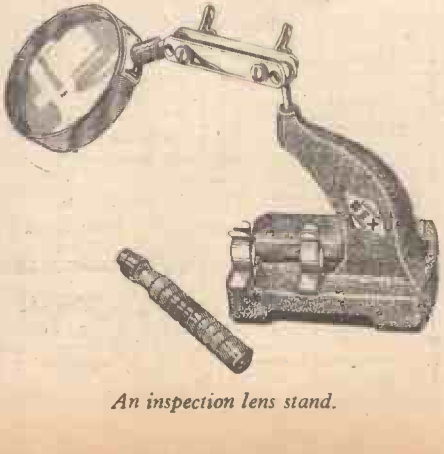
THE above association is holding the West Hants Radio Controlled Glider Trophy Contest on Sunday, July 4th, commencing at 12 noon, at Larkhill, Nr. Amesbury, Wilts. The contest is open to all. Entries and enquiries should be addressed to H. E. Wheatley, 5, Alum Chine Road, Westbourne, Bournemouth or D. Naylor, Flat 2, 29, Cavendish Road, Bournemouth.

TRADE NOTES

(*Continued from page 405*)



The Wolf Cub bench saw.



An inspection lens stand.

hardwood, provides the answer to mortising problems for the smaller woodworking firms. Its multi-purpose character allows for it to be converted into a bench drill press or ⅜in. portable heavy duty drill.

The range of drills from ¼in. up to 1¼in. capacity, screwdrivers, sanders, blower, 6in. and 8in. bench and pedestal grinders, portable grinders, flexible shaft grinders and a die-grinder kit, hammer and wall-plugging kit, together with machines of especial interest for the servicing of motor transport vehicles, and the full range of Wolf electric solderguns and soldering irons, completed the display.

For the home handyman this B.I.F. saw the debut of a fretsaw attachment, which adds yet another accessory to the well-known "Cub" range. Built around the powerful "Cub" drill, it also provides a bench saw, lathe, drill press, sander polisher and bench-grinder, etc.

An Inspection Lens Stand

BI-METALS (BRITINOL) LTD., St. Mary's Works, Bridge Road, Edmonton, N.9, have recently introduced a lens inspection stand as illustrated which is produced in a range of sizes. These models consist of a stand with a 2½in. lens to a stand with a 5in. lens. The Dual Purpose Model shown is fully adjustable and can be converted to a hand magnifier in five seconds. To make this change the lens mount is unscrewed from the plate mount and screwed into the handle which is clipped on to the base of the stand.

QUERIES and ENQUIRIES

A stamped, addressed envelope, a sixpenny, crossed postal order, and the query coupon from the current issue, which appears on the inside of back cover, must be enclosed with every letter containing a query. Every query and drawing which is sent must bear the name and address of the reader. Send your queries to the Editor, PRACTICAL MECHANICS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

Casting Materials

COULD you suggest a formula for the making of a stone-hard material to simulate stone and/or alabaster? I have been using various cement mixtures for rough casting but need a very fine mixture for the casting of statuary and ornamental work from Vinyl moulds. —Sean O'Casey (Ireland).

FOR the aggregate of your material use either powdered stone or ground silica, or a mixture of the two, which mixture can be toned or coloured with yellow ochre, red oxide or other mineral colours. Ground silica can be obtained from any laboratory supply firm or from Messrs. Colin Stewart, Ltd., Wharton Lodge Works, Winsford, Cheshire.

To make artificial stone, the above aggregate is mixed 50 : 50 with Portland cement and then slaked with water to mortar consistency.

If you want to make a very fine product, almost like unglazed porcelain, the above aggregate should be made into a paste with hydrolysed ethyl silicate and then left to stand for a few days in order to harden. The ethyl silicate is rather expensive, but it can be obtained ready for use from Silicaseal, Ltd., West Gate Hill Grange, Newcastle-on-Tyne, 4. The hydrolysed ethyl silicate will not keep. It must be used within about a month of receipt.

Another method would be to mix the above aggregate containing silica flour (ground silica) with equal parts of calcined magnesite and to slake it to mortar consistency with a solution by dissolving 40 parts of magnesium chloride in 60 parts of water. This will dry out to a very hard mass within 30 hours and will give very sharp castings because the mixture expands very slightly on setting. For very fine work the hydrolysed ethyl silicate method is the best.

Ready-mixed materials for this type of work are available from the Karlena Art Stone Co., Ltd., Karlena House, 270/272, Oxford Road, Manchester, 13.

Chemical Soot Dissolvers

IS a chemical soot destroyer likely to damage the chimney structure of my house?

The actual fire is one of the new convector types and, therefore, has a cast-iron back, sides and top; the chimney is of the usual parged brick construction. —G. R. Mahy (Notts).

THE general effectiveness of the innumerable so-called chemical chimney-sweeps, soot dissolvers and so forth is a very debatable point. It is obvious that these substances, as they often claim, cannot possibly dissolve soot (carbon), since carbon is totally insoluble in any known liquid (with the exception of molten iron, in which it is slightly soluble). Most of these cleaners consist of potassium nitrate or saltpetre, with or without a small sulphur admixture. When placed on a hot fire, they give off a very rapid stream of hot gases. This rapid stream dislodges the loose particles of soot adhering to the chimney sides and carries them upwards. That is all it does, or can do. It cannot in any way burn away hard masses of soot clinging to the chimney sides for, to do that, the soot material would have to be raised to red heat—an obviously dangerous procedure. In our opinion, therefore, all such "chemical cleaners" are of little use.

Such articles do damage by causing local overheating of brickwork and thus by setting-up cracking or spalling, with consequent destruction of the chimney or flue sides. The hot oxygenated gases arising from them are also liable to oxidise iron surfaces and thus to deteriorate them. Since your chimney fireplace has apparently a good deal of metalwork in its construction, this point should be borne in mind.

Badminton Lines on Dance Floor

OUR badminton club plays in a public hall which is also used for a weekly dance. We have been painting the lines with an ordinary flat white paint but find that the action of the dancers' feet and the greasy nature of the dance polish used combine to scour and dirty the lines so that practically all trace is removed.

Please give your opinion and also the name of a suitable paint.—I. J. Burness (Angus).

IT is quite clear that even the very best of paints cannot hope to withstand the continual attrition of dancing feet. The friction between the feet and the floor rapidly wears away the particles of paint and its pigment, so that sooner or later (and, often enough, sooner) little trace is left of the paint on the floor.

The only way to get over this difficulty is to use a powerful stain on the wood so that the wood itself is coloured without leaving a surface coating on it. Fortunately, this result is easy to attain. Obtain from your local pharmacist or colour-merchant a quantity of a spirit-soluble black dye. There are many varieties of these black dyes, but almost any of them will suit your purpose. Dissolve the dye in warm methylated spirit so as to make a very strong dye solution.

Thoroughly degrease and clean-up the floor. Mark out the required lines and, if possible, scrape the floor between so that you get a perfectly clean surface. Now, with a narrow brush, apply the dye solution (hot, if possible, because it penetrates better) to the wood surface between the lines: and after it has dried out, repeat the application. This method will leave nothing on the floor surface, but it will stain the wood black, so much so that before the blackness departs, the wood itself will have to be worn away.

The floor may be waxed over in the normal way.

If you have the time to make an extra good job of things, stir a little lampblack into some warm *raw* linseed oil and apply this over the stained woodwork. It may take a week to dry out, but it will intensify the blackness produced by the spirit staining.

Readers are asked to note that we have discontinued our electrical query service. Replies that appear in these pages from time to time are old ones and are published as being of general interest. Will readers requiring information on other subjects please be as brief as possible with their enquiries.

Sump Oil Heating System

I WISH to use engine sump oil as a fuel for heating purposes. The drawing on page 412 indicates the general idea wherein oil from the header tank passes, under the control of a valve "X," to an inclined "heating" tube.

If this tube is heated strongly the oil in it is vapourised, and by virtue of the pressure exerted by the head of oil, is forced through the burners, where combustion takes place.

The initial heating of the tube would be accomplished in the same manner as that used when igniting an ordinary blowlamp, and afterwards carried on by the heat from the flames at the burners themselves.

Would the introduction of air into the system as shown in the illustration produce a blue flame as seen at an ordinary gas ring? If not, can you suggest a method which will give a smokeless flame? Would a non-return valve be required in the oil supply line? Can you suggest any improvements or modifications which it would be helpful to incorporate? Is there a reasonably simple method of removing the impurities present in engine sump oil? How many cubic feet of vapour would be given off by vapourising 1 cu. in. of oil when the resulting gas is at a pressure of, say, 1lb. per sq. in. above atmospheric? How many calories would be produced by burning this gas, the flame being smokeless and combustion complete?

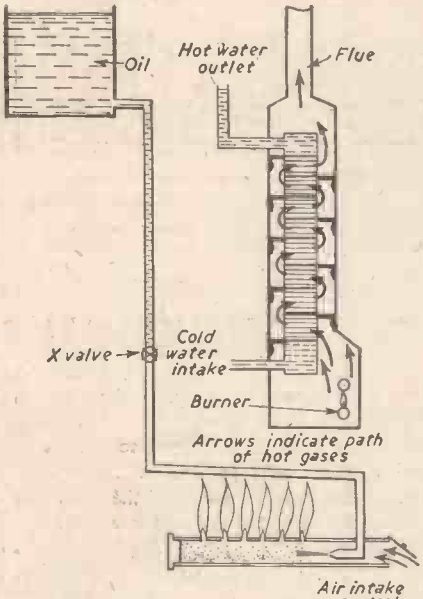
The diagram on page 412 also shows an idea I have for using the hot gases generated at the burners to heat the water of the system.

A car radiator, with only top and

(*Continued on page 412*)

(*Continued from page 410*)

bottom tanks remaining after stripping all "trimmings," has its sides enclosed by steel plates, upon which are fitted lengths of angle iron, which act as baffles and make the hot gases pass from side to side whilst on their journey towards the flue.



Mr. Martin's sump oil heating system.

End plates prevent any escape of gases via the ends of the baffles.

What can be put into the water of the heating system to prevent rust? Taking the subject in general, are there any facts or figures available which might prove to be useful?—S. E. Martin (Middlesbrough).

THE scheme, as shown in your sketch, would be workable, and it would not be necessary to provide a non-return valve so long as the tap at X is a finely-controlled one. You would have to be prepared for a good deal of experiment in determining the precise aperture of the vapour jet. It would be best to adapt an ordinary heavy blowlamp jet for this use and then to progressively enlarge the hole if necessary. You might find it necessary to drill additional holes in the horizontal conduit on which the burners are placed, but how many of these holes would be necessary we cannot say. The whole principle is that you should provide an amply adequate supply of air to combust the oil vapour completely so as to provide a dependable blue flame vapour mixture.

Impurities from the oil would best and most simply be removed by allowing the oil to percolate through an 18in. column of a mixture of fairly coarse sand and charcoal grains (not powder). Such a filtering column could best be set up in a short length of drainpipe, suitably plugged at the lower end and provided with a pipe and cock entering at the low end of the column. The oil filtration would be slow, but it could be allowed to drain into a tank set below it. The filtered oil should then be allowed to percolate through a 6in. column of glass-wool or coarse asbestos fibre, after which it should be passed through one or two folds of very fine fabric. It is of the utmost importance to ensure that the oil fuel is free from fine suspended particles, otherwise you will have almost endless trouble with choked-up jets.

The amount of vapour derived from a given amount of oil depends entirely on the composition of the oil. So, also, does the calorific value of the oil. This latter figure would need to be determined experimentally by laboratory methods, using, for the purpose, a "bomb calorimeter," for details of which refer to any textbook on fuel. The calorific value of the oil is bound up with the combined carbon content of the oil. Hence, a hydrocarbon oil would show, normally, a higher calorific value than a vegetable oil, as, for instance, rape or olive oil, which contain combined oxygen. This is assuming, as you mention, that in all cases complete combustion of the oil is attained.

Your idea for a water-heating system is quite feasible. Its efficiency will be governed by the rate at which the water is circulated by the temperature of the hot gases. There is nothing which you can add to the water of any heating system to prevent the slow rusting of iron and steel. You must, however, take every care to prevent the water from becoming acid in any way, since even the slight acidification of water enormously increases its rusting power. About 1 per cent. of sodium metaphosphate added to the water might tend to slow down any rust attack which may be present, but we cannot guarantee this.

Concerning the general "facts and figures" which you require, this is so large and so wide a query that we cannot possibly hope to deal with it to your satisfaction. We can only advise you to pay a visit to a technical library, and there to consult the numerous volumes on fuel and combustion. In general, your scheme is fundamentally sound, and, in practice, should be quite feasible, although, of course, we cannot predetermine exactly how efficient it is likely to be, since so much will depend on matters of detail.

Anti-rust formula

I RECENTLY purchased a bottle of green coloured rust destroyer and inhibitor. A rusted article is first brushed with a wire brush to remove excess rust and scales. The metal is then painted with a thin layer of the liquid and allowed to dry. A skin forms over the area painted and all the rust present is converted to a black colour. Without any further treatment the article is then painted in the normal way.

It states that the liquid contains phosphoric acid which converts the rust into a phosphate.

I should be very grateful if you could provide me with the formula.—N. G. Bouchier (Bridgwater).

THE anti-rusting liquid described by you can be imitated according to the following simple formula :—

Ortho-phosphoric acid ...	8 parts (by vol.)
Water	2 parts (by vol.)

The above liquid can be dyed any colour with a water-soluble dyestuff, such as brilliant green or methylene blue, but the colour in the preparation you describe will have been incorporated solely for the sake of appearance and it will have no practical effect whatever.

The metal component should be immersed in the liquid for as long as conveniently possible. It must not be rinsed subsequently, but left to dry when taken out of the acid solution. The phosphate coat is formed during the drying of the article.

The most durable results are obtained by removing the rust first and by immersing the scratch-brushed component in the liquid. It is better, also, to use the liquid hot than cold. The liquid does not convert the existing rust into iron phosphate. It acts on the metallic iron itself, not on the rust. The final black colour of the phosphatised article is improved if it is finally rubbed over with a little mineral oil, such as light lubricating oil.

Information Sought

Readers are invited to supply the required information to answer the following queries.

Mr. E. Williams, of Leicester, writes : "I have a duplicating job on hand, but the sizes of stencil papers on the market are not large enough for my purpose. I must therefore make my own. I have arranged for supplies of the right kind of long-fibred, unsized paper, and intend to spray these with wax dissolved in a solvent.

Could you please let me know the proper wax and solvent ? Is it possible to have a suitable coating that will permit the use of gravure ink (i.e. spirit ink, with Xylol or solvent) for squeegeeing through the stencil without affecting the wax ? "

Mr. S. Scotts writes : "Can you tell me how to make a flame gun for dealing with weeds in the garden ? "

A reader asks : "Can you help me by explaining how the 3D effect on the stage, as produced in the 'Harry Lester's Comedians Show,' is obtained ? In this, a white screen is put up on the stage, with lights behind (I believe a white, green and red light), and in the form of shadowgraphs objects appear to come right out from the screen, right up to your very eyes. The audience looks through spectacles of red and green celluloid."

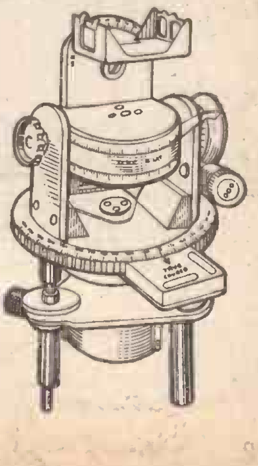
Mr. J. Cavalie, of London, N.16, asks : "Please tell me how to construct a watermark detector for stamps, working off a 6-volt transformer power unit."

From R. Campbell comes the following : "I have a motor-boat, powered by a Scripps V8 engine, which I find, with the cost of petrol at present, very expensive to operate. I should like to convert the engine to T.V.O. with a vaporiser. Could you please tell me how this vaporiser works and how to build it ? "

H. T. Hinkins writes : "I wish to build a small sectional coldroom, height 69in., width 39in., length 48in. Can you supply me with details of construction, the best method of joining the sections together, and the making and fixing of the door ? I plan to construct the various sections in 3in. by 2in. good quality deal and to screw on to this ¼in. thick asbestos sheeting, leaving a 3in. cavity to be filled with fibreglass. The joints I propose filling in with bitumen and covering with battens. If cement would not be a suitable material for the floor, it could be made as the wall sections, but with ⅜in. thick asbestos in place of ¼in. thick.

Could you advise me as to the best type and size of refrigerating unit ? "

Mr. J. Valmos writes as follows : "I have purchased what I presume to be an ex-R.A.F. Astro Compass. I would very much like to know how it could be adapted to form part of a surveying level—which is too expensive for my pocket. Do you have any suggestions, please ? I am thinking of a 'Tavistock' level, for example. There is no telescope as part of the Astro compass."



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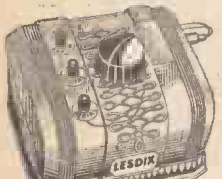

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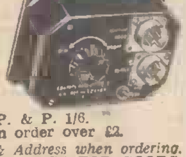

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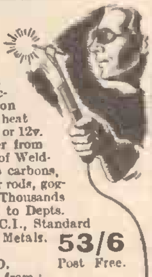

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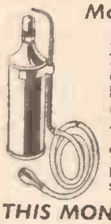

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THE Cyclist

Editor : F. J. CAMM

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COMMENTS OF THE MONTH By F. J. C.

The Report on Massed-start Cycle Racing

THE report of the Committee on Road Safety dealing with massed-start racing on the highway has now been published. The important parts of the report are the conclusions. Everyone is aware of the facts which led up to this inquiry and, therefore, no good purpose is served in repeating them.

The committee say they have received little evidence that massed-start cycle racing has caused many serious accidents or large-scale traffic congestion ; but there is evidence that traffic regulations have been ignored, that road safety and proper standards of road conduct are sacrificed to speed and racing tactics, and that normal traffic has been slowed down or forced to give way. On this evidence the committee reaches the conclusion that the public highway is not a suitable place for massed-start cycle racing, particularly as it is an activity which is still in its infancy in this country ; and if this form of racing, and particularly its commercial exploitation, is allowed to develop without restriction, the danger to other road-users will increase in scale and seriousness.

They go on to say that the presence of a comparatively large body of cyclists racing against each other on the public roads at speeds between 20 and 30 miles an hour must create a hazard, particularly in built-up areas, and this can only be avoided at the expense of other road-users who are subjected to inconvenience and delay.

Commercially - sponsored races involve publicity attracting a large number of vehicles and spectators at certain points. The fact that very few accidents have taken place is largely due to effective control by the police. Therefore it is concluded that if the sport is allowed unrestricted development and the same measure of effective control is maintained, an intolerable and unjustified burden would be placed on police forces. They doubt whether the public would accept temporary exclusion of all other road traffic from the course while the race is in progress. From all these considerations they state that massed-start cycle racing is a potential source of sufficient danger to the public to warrant more positive action on the part of the Government. They think that the opposition to this form of racing is so serious that a case can be made for complete prohibition, and if this is not at present contemplated they think the sport should be strictly regulated and that at the end of two years the problem should be considered again. If the sport is then, in spite of the recommended restrictions, causing substantial danger and inconvenience, steps should be taken to prohibit it.

They reject out of hand the suggestion put forward by the cycling organisations they they should themselves exercise control on a domestic basis. The committee is unfavourably impressed by the fact that the organisations have chosen not to comment in detail on their proposals for control, but argue that in the light of their agreement and the organisation which they have set up they are able to control this form of racing themselves. This they label as disingenuous.

The committee therefore recommends that for a period of two years the sport of massed-start cycle racing, including team time trials, should be allowed to continue on the following conditions :

1. That the three bodies interested should immediately set up a control council to administer an agreement on the lines of the one negotiated but not yet ratified.

2. That the number of events in any one year should be limited to one circuit of Britain or similar circuit and an agreed number of local races, the maximum number to be settled immediately by the Ministry of Transport and Civil Aviation, the Home Office and the Scottish Home Department.

3. With the exception of the circuit of Britain, massed start events should be begun and completed before 9 a.m.

4. Circuits forming part of courses should be not less than 15 miles in length.

5. Courses should be planned so that major road junctions and right-hand turns are avoided.

6. There should be no racing through built-up areas.

7. The start and finish of each race should take place off the highway.

8. Courses and arrangements, including neutralisation, should be agreed with the police in advance, one month's notice at least given of any race.

Bearing on this subject is a statement from the Manufacturers' Union that it has set up a Road Racing Committee which will be responsible for all matters relating to racing on the public roads. They state that cycle road racing is considered to be of great value in the interests not only of cycle sport but of sales promotion, and that it is particularly valuable for overseas propaganda. They also consider that there is no evidence whatsoever to support the allegations that have been made that such racing is dangerous, and the committee will strongly oppose any steps taken unduly to restrict this sport. They also are considering the possibility of agreement on the number of events to be officially supported.

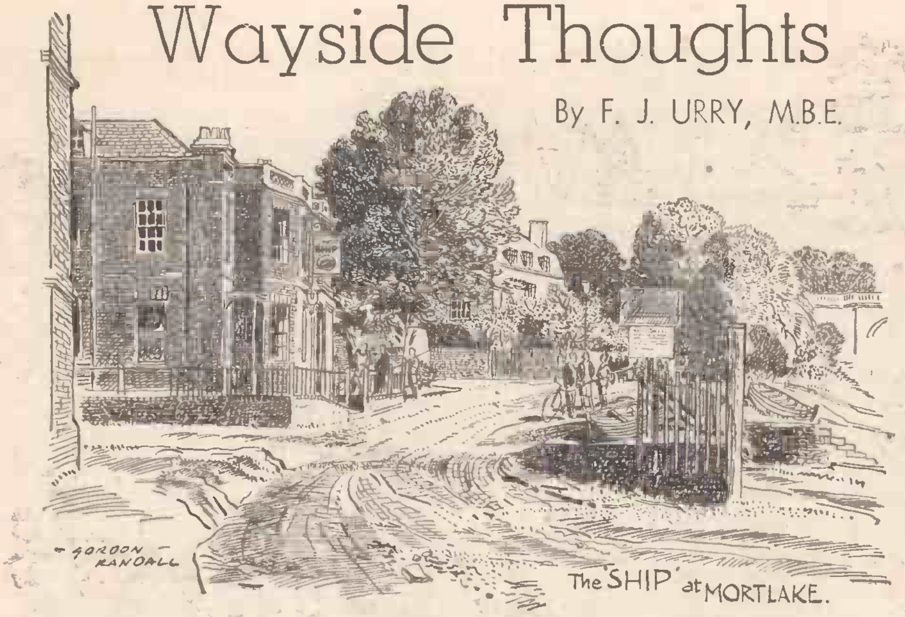
The whole of this controversy started with the N.C.U., which in the early days of the war made covert approaches to the Ministry of Transport in order to get the sport banned. This came to our notice and we thereupon prepared a memorandum on the subject which was presented by two members of the League and ourselves to the Minister. The N.C.U. used every means to oppose and obstruct the new sport and failed. Finally, it turned a complete somersault and declared itself in favour of it. None of its gloomy forebodings as to what would happen after the war, if massed-start continued, have come to pass. Their judgment on this, as on almost every other major issue which has occurred during the past 60 years, has been proved unsound. The N.C.U. goes in fear of the police. It trembled at the withers in the '90s, when it banned all forms of road racing and record making and breaking.

Thus for the second period in its history it has thrown a spanner into the works, and at a time when its fortunes, like those of the C.T.C., are decidedly in the descendant. *The time has come when cycling clubs should consider whether they should not themselves ban the N.C.U.* It has been the stormy petrel in the sport from its very commencement. It has been the apostle of lost causes, and created hatred and spite towards other road users. It has brought up a certain section of cyclists to believe that they must always be "fighting for cyclists' rights," and has constituted itself as a militant body. It has been consistently wrong in its opinions.

Church Cobham, the picturesque old mill on the River Mole.

Wayside Thoughts

By F. J. URRY, M.B.E.



A picturesque corner of the Mortlake waterfront. The old inn is known to thousands of waterfolk past and present and to many others on Boat Race day.

The Old Days

SOME time ago I sat at home entertaining an old riding friend, and, as is usual on such occasions, talked of the "old days" and the good times we had along the roads when they were but lonely tracks. Were the old days better from a purely cycling viewpoint? We came to a negative conclusion, not because we are fonder of the crowd, but for the reason that our native secondaries to-day are at least as good as the main roads we mostly used for our journeying in the early part of this century. Our secondaries are really delightful to use for people who are not in a hurry; they roll and twist a little more, wriggle into and out of valleys and skirt the real countryside.

It is wise to make the most of our opportunities because of the spread of suburbia which is obliterating so much of the real country near the industrial areas, while aerodromes are biting big chunks out of the downlands and the beautiful sweeps we once knew and loved for their solitude and calm loveliness are now noisy with multitudes. There is nothing we can do about it except pick new areas for our roaming, and that in itself is a good thing, for even cyclists are too apt to go the old ways instead of using a map more intelligently as a means of personal discovery.

In our talk on the "old days," we deplored the disappearance of the good old country inn; so few are left to-day that breathe the atmosphere of country life, the tang of the heath and the vowels of the area. How curious it is that townspeople appear to want the country inn to be so closely related to their own local!

These Compensations

WE had a good session and challenged each other to see how far we could go back along the run of the years until we reached the early 1890s when first we met and roamed together in the high days of our teenage. Scattered along the road we dug up some glorious recollections, little incidents from the golden moments of life small enough to point the way and carry about for ever, and large enough in their comforts to bring out and lean against in times of weariness and depression. Yes, I'd rather be an old cyclist and remember with joy, than a rich and urgent man with nothing but a money background. If you who read remain a cyclist, taking the best of life in the run of its simplicities, then I can promise you these things in the volume of your recollections, things that will fit so snugly into the happiness of later days and keep you saddle-minded in the years to come. We two grey-headed old yarners will continue to add to our experiences, for now neither of us will give up cycling so long as we can sit in the comfort of personally active locomotion.

So many people deride cycling to-day because it is not the fashion to be self-contained, not the thing to sail your own vehicle along the highways of Britain and work the marvellous engine God gave you; but they are wrong and ignorant, and cover that ignorance by pretending to know all about the pastime. I never go motoring for a couple of days at a stretch without wishing for my bicycle to steer me into the little roads and over the hills; I never ride to work on a lovely morning without the desire to turn round and go the other way, south and west to meet the spring, through the blooming woodlands and their bird choir and over the rolling roads until I see the glint of the ocean and smell its briny tang.

Stormy Times

CYCLING is not all gay laughter and easy running; if it were, then its value would be less in the matter of comparison. That week-end when the bad weather came I rode my usual route to work and bowed very low in front of that bitter wind. The hard-driven rain hit me, and my face felt as if it might crack open so tightly was the skin stretched; I don't think I've ever been colder. Having arrived I fumbled a full minute for the key to open my door because my fingers were so numbed, despite sheepskin gloves, and all over I felt brittle; but I got there. In a matter of ten minutes I had returned to normal and felt the usual glow of satisfaction which comes of testing the elements. The ride home that evening, however, was full of compensation; I just floated there almost as if I had been etherialised.

That Sunday the sunshine made me go adventuring, but oh! it was a bitter brittle wind into which I pounded for seven miles to the shelter of a wood, by which a little pool, usually so calm and placid, was carved into short sharp waves, the tops of which flew off like shavings from a mighty plane. Here I rested and talked for an hour, with the usual hot stimulant for lubrication, to an old countryman, who seemed quite unconcerned at the gale. Then once more I floated home, and all the bitterness seemed to have gone out of the breeze; but I should not have cared to butt into that wind for many miles, for apart from its force, its sharp stinging tried to drill holes through me. One got an inkling of the meaning of an arctic blizzard, but it was only an inkling; enough, however, for me to find a fireside a very comfortable exchange.

This Is Why!

A FRIEND of mine wants to know why I don't have a "fliffer" attached to my bicycle to increase my speed and allow me to free-wheel most of the way. I wonder if people ever think that some of us ride bicycles because we like the exercise, the ever fresh exhilaration of being our own power-plants? If I were pushed along by a tiny toddler of an engine, cycling for me would be finished; I should join the car brigade and the luxury parade, and I suppose grow fat and supremely idle as a traveller. I am not trying to be critical of the powered bicycle or even of the motor-car, I am just explaining my own attitude to cycling. I ride daily because I like to, it is convenient and cheap and has the great value of keeping me as fit and supple as I can expect to be; and I ride at week-ends and holiday times for the sheer joy of the pastime and all it connotes. I should not fancy taking a "fliffer," say, over the Devon and Cornwall moors into the little downside villages dropped in their depths, and out of which some kind of road wriggles to the skyline. For that is what you and I find when we go touring; it is what we want to find, what we look for, and I hope that the coming generation will never tire of this kind of adventure, or weary of its change from our usual run of life.

On Touring

I THINK that touring is the phase of cycling that needs stressing; it has been allowed to fall into the doldrums of late years. Coach tours, motor tours, ship tours, even 'plane tours are now the rage, and all of them cabined and confined in the real sense of those terms, and they are expensive, too. But cycle touring is the cheapest form of wandering holiday I know, and the most attractive, because it is slow enough to make observation a genuine part of the joy, and fast enough to change counties and area fairly easily. It is a carefree way of seeing and absorbing things, minus ritual or distance or time, just your own mood converted into easy comfortable progress. To cycle, taking a few maps, a little money and a decent bicycle—with the good companion if possible—is the nearest thing to stepping from the everyday world into a paradise of freedom.

With catering easier, we are at last returning to something like the pre-war times and to-day there are places along the road to welcome the wanderer. Personally, I am only looking for plain food, a little comfort and cleanliness, and that condition is almost with us once more. Yes, cycle cruising ought to be more popular than ever, especially among the folk who take some trifle of pride in bodily health—and they are not all youngsters. But the pastime appears to have allowed the idle travellers to get ahead of them in this matter notwithstanding the fact that the costs are not comparable. Perhaps too much stress has been put on foreign holidays and the glamour of the word captures the fancy of folk who know next to nothing of their own land, as lovely a country as any in the world.

Around the Wheelworld

By ICARUS

Hooligans of the Past

I CAME across a passage in "The Age of Elegance," by A. Briant, a book published in the early part of the last century, which seems to indicate that road users then did not greatly differ in manners from some of the hooligans of to-day—the "cads on casters" some of whom turn up annually at the Albert Hall, with the express intention of wrecking the show. They are mostly from the North. Here is the quotation: "Their motto was to be ripe for any spree, by which they generally meant any frolic that involved others in trouble. It was the result partly of too much food and drink and, with the growing upper class substitution of snobbery for religion, of too little sense of responsibility... Lord Barrymore, driving home from a midnight revel in his high-flyer phaeton, cracked half the windows—'fanning the daylights' he called it—on either side of Colnbrook High Street with his whip!" It is a great pity that cycling clubs do not take steps to discipline their members when out on a club run. In the early years of this century the uniformed club captain with his bugle was very much in control of the following members and there was expulsion from the club as a penalty for any member whose conduct was prejudicial to the club's good name.

The International Racing Imbroglio

THE B.L.R.C. recently issued the following statements:

"The recent statement issued by the N.C.U. to the effect that their decision on International Racing causes little hindrance to rider or organisation wishing to take part in international sport is strongly disputed by the B.L.R.C., and the following example is quoted to prove the fallacy of the N.C.U. claim. On February 4th, the N.C.U. received an invitation for a team of independent riders (all road racing for independents under the terms of the Tripartite Agreement is the responsibility of the B.L.R.C.) to contest the 'Tour d'Alsace Lorraine.' On March 17th, the B.L.R.C. hearing that the N.C.U. had this invitation asked for it to be forwarded to them. On April 7th, three weeks after the B.L.R.C. had made its request and almost 10 weeks after the invitation had first been received by the N.C.U., it was sent to the B.L.R.C. with a request for the B.L.R.C. to make the necessary arrangements, selections, etc., and that the N.C.U. should be notified of these arrangements in order that they could be confirmed with the promoters. If the B.L.R.C. were to agree to accept such lax methods the international programme of road races which has been built up by the League over the years would very soon be destroyed.

"Since it was ratified the B.L.R.C. has kept rigidly to the terms of the agreement. On the other hand the N.C.U. is attempting to put to its own advantage the temporary U.C.I. recognition accorded it by the B.L.R.C. and R.T.T.C. under clause 6a of the agreement.

"As an equal partner with the B.L.R.C. and R.T.T.C., the N.C.U. should have submitted its proposals on international licences to the March 13th meeting of the joint committee, but instead of doing this, it withheld them for its own meeting a week later, thereby attempting to override the authority of the joint committee and the terms of the Tripartite Agreement.

"In the meantime in order that the interests of the B.L.R.C. and International Road Sport shall be safeguarded, the following resolution was unanimously adopted by the National Executive Committee of the B.L.R.C. at its meeting on April 4th: The B.L.R.C., who, under the terms of the Tripartite Agreement, control all professional and independent road racing in Great Britain, together with the greater part of amateur events, cannot admit the right of any other body to authorise B.L.R.C. riders to compete abroad.

"Accordingly until such time as clause 6c of the Tripartite Agreement is implemented, B.L.R.C. licence holders will only be permitted to race abroad with licence and written authority of the B.L.R.C.

"Any rider disregarding this directive will automatically forfeit his B.L.R.C. licence.—P. T. STALLARD (International Racing Secretary, Delegate to the Joint Committee)."

The National Committee on Cycling

MEMBERS of the National Committee on Cycling are meeting members of the standing joint committee of the R.A.C., A.A., and R.A.S.C. to consider problems needing joint consideration or action. The suggestion that such a meeting should be held was one of the recommendations of the Llewellin Committee on Road Safety.

The present officers of the National Committee on Cycling have been re-appointed for the present year: president, Sir Harold Bowden; chairman, Major Watling; vice-chairman, G. O. Stancer; secretary, Robert Williamson. Mr. H. M. Palin, director of the Manufacturers Union, is joining the National Committee as another of the three representatives to whom the Union is entitled.

Sportsman of the Year

A BIG gathering of celebrities saw Gordon Pirie receive the "Sportsman of the Year" trophy and replica at the Savoy Hotel on Monday, April 12th; this presentation followed the national ballot organised annually by *Sporting Record*, in which Pirie topped the poll for 1953.

The "Sportswoman of the Year" trophy was presented to Pat Smythe, Britain's famous show jumper, who polled the highest number of votes of any sportswoman.

The Marquess of Donegall, Vice-President of The Roadfarers' Club, and President of the B.L.R.C.

Tunbridge Wells
The Pantiles
A quaint and unique little throughfare . . . .

The presentations were made by Lord Aberdare.

Sunday Racing Abandoned at Manchester

THERE was a rigid rule in the early days of the sport against holding race meetings on Sunday. Heated debates on the subject appeared in the cycling journals of the period, but Sunday racing to-day is generally accepted by clubs. Racing on the roads we now know is not illegal and neither is Sunday racing. It was with some surprise, therefore, that I learned that a Manchester local track league cancelled a Sunday event which included an attack by Reg. Harris on his British quarter and half mile flying start records and 14 other events. A whispering campaign suggested that a common informer might appear, everyone apparently being oblivious of the fact that the common informer racket was abolished some time ago. Then fear was entertained that that meddlesome and mischievous body, which seems to interfere with everyone who partakes of simple pleasures on Sunday, the Lord's Day Observance Society, might object. The N.C.U. did not express any decided views on the matter, although a local official was in favour of the race continuing. Counsel's opinion was to be sought.

R.R.A. Triennial Dinner

THIS year, the R.R.A. is 66 years old and the occasion was suitably celebrated at its recent triennial dinner. In nearly the whole of these 66 years it has been run on a shoe string, and from the corner of the kitchen table of someone who could be persuaded to take over the secretaryship. Until Sydney Vanheems took over the secretaryship the "Office" records had got into a mess—a surprising state of affairs for an association which claims to be national. I have serious doubts about the authenticity of some of the earlier R.R.A. records. I am informed that on one occasion a watch was used by the timekeeper which had not a current Kew A certificate. If an organisation could not organise its own office it seems fairly obvious that the records which it was supposed to homologate must be equally run on careless lines. Sydney Vanheems spent a long time organising the records and putting them in apple pie order and setting a model for following secretaries to follow. The succeeding secretary, Leonard Ellis, and those who have succeeded him have followed in the Vanheems footsteps. But is it not time that the R.R.A. had a fixed address and appeared in the telephone book?

CYCLORAMA

By H. W. ELEY

East Budleigh
S. Devon

A pretty village that has changed very little over the centuries. The 13th cent church of All Saints contains the noted Raleigh pews.

A Word from Westmorland

IN my post-bag recently was a friendly letter from a keen cyclist in far-away Westmorland. He wrote to me from the charming old-world town of Kirkby Lonsdale, on the River Lune, that northern river which flows and foams over a rocky bed, and over which there is an ancient bridge on which a column is inscribed "Feare God, Honer the King, 1673." My correspondent tells me that the Norman church here is probably the most interesting in Westmorland, and that some six miles north of Kirkby there is a Roman milestone. I enjoyed reading this good letter from Westmorland, with its references to the Lakes, to the poets associated with the county, and with its graphic descriptions of hills and dales, and old castle ruins. There was a word too about the county town of Appleby, with its ancient castle built by Anne, Dowager Countess of Pembroke, in 1651.

Month of Roses

JUNE, traditionally, is the month of roses, and to my mind there is no finer sight than a bed of English roses, especially if the blooms are of the old-fashioned sweetly scented varieties. I find that most of the modern blooms are lacking in aroma, fine though their colours and shapes may be. Here, in this somewhat bleak Derbyshire climate, I find it a little difficult to grow roses, and I am afraid that my gardening activities are now concentrated on the "vegetable patch"—and my enthusiasms are for potatoes, and carrots, and beans and peas! But, some fine morning in June, when I ride out to some neighbouring hamlet, I pluck a rose, and put it in my button-hole. It is a badge of "flaming June," even on a day when the sun hides its smile, and the air is as keen as in March. It is good, on a June morning, to ride out to Long Waynfleet, or Nether Cawsley, and—with enough miles behind one—to call in at the "Beehive" or "The Waggon and Horses" and find refreshment and peace in the low-ceilinged room of the inn.

Bikes of the Past

FOR many years it has been a habit of mine to keep cycle catalogues, copies of cycling journals, and many odd notes about touring and the care of the machine. The other day, rummaging among some old papers, I came across one or two cycle catalogues which brought back memories of machines which have long since disappeared from the market. Who now remembers the "Centaur"? Or the "Royal Ruby"? The latter was quite a popular bike—made, I fancy, in Manchester, and certainly the "Centaur" was a good "selling line." There was a booklet about the "Monopole," quite a famous Coventry product, but now all have gone, although there must be many old riders who knew them, and rode them down the rolling roads of Britain! They conjured up these ghosts of the past, but really I wondered why ever I had kept the lists and catalogues. If one is a hoarder of old papers, it is amazing how much "junk" accumulates over the years!

"Great Oaks from Tiny Acorns Grow"

IN some recent Dunlop advertisements, one reads of the 93,000 people employed by the organisation throughout the world—and the impressive figure set me thinking of the small beginnings of Dunlop, and musing upon the days when John Boyd Dunlop made his first experiments in connection with the pneumatic tyre. After all, the enormous ramifications of the present giant Dunlop organisation all started from the cycle tyre—from the small original factories where the tyre was made. The expansion of the company is one of the outstanding romances of industry, and to men who have served the great organisation its present leadership is a source of pride.

Romantic Robin Hood

ANOTHER letter in my post-bag recently came from a cyclist living in Nottinghamshire, and he wrote me just after purchasing a new "Robin Hood" bicycle. The romantic name of this machine caused him to make a tour of the Dukeries area, and to renew acquaintance with Sherwood Forest, with all its memories of Robin Hood, and Friar Tuck, and Maid Marian. His letter brought back happy memories to me, for this forest area, with its great trees, its sylvan glades, and its associations with the famous outlaw, has for long been a favourite district of mine, and I can recall many a ride across Clumber Park, from Apley Head Gate, along the famous tree avenue, to Carburton. I remember turning eastward from Cuckney, continuing nearly into Budby, and then taking the road across Thoresby Park, where one gets a splendid view of the Dukeries, and can muse upon the days when ducal seats were perhaps more magnificent than they are to-day, and when the heavy hand of taxation had not reduced fortunes to pittances, or whittled down the splendour of ducal seats and families. An appropriate ride—on a "Robin Hood" cycle—through the leafy glades where Robin Hood played his rôle of the gallant outlaw, and staked his claims to legendary fame.

The Fisherman's Patron Saint

SOME business took me recently to Stafford, and as I entered this interesting old county town I recalled that Izaak Walton was born there, in the year 1593. Now, Izaak is surely the patron saint of all fishermen, and Staffordshire may claim him as one of her illustrious sons. As I wandered round the town, I remembered that Izaak was wont to visit his friend Charles Cotton, at Beresford Hall, to fish and smoke, and muse upon life in general. The River Dove is sacred for all time to Izaak Walton and Charles Cotton, but readers of these notes may say that surely the Dove is in Derbyshire. Actually, the fast-flowing river's valley, for quite a considerable distance, forms the boundary between Staffordshire and Derbyshire, and much of the rich beauty of famous Dovedale is in Staffordshire. Fishing is a sport which links up well with cycling, and I have often tied my rods to my cycle, and ridden out to lakes and streams, there to emulate the great Izaak, and find peace and serenity beside the water's edge.

Oil and Tyres

I SAW, in a shed the other day, a bike with its front tyre standing in a pool of oil and I pointed out to the young owner that oil did not improve tyres, and that he would be shortening the life of his cover if he continued to stand his machine in the oily pool. It is really quite surprising how many riders treat tyres carelessly, use them grossly under-inflated, fail to pick out flints and stones from the treads, stand them in patches of oil, and, when all the ill-treatment brings its inevitable shortening of life, these careless riders are usually vehement in their blame of the tyre manufacturer for "faulty workmanship"! I know that all our tyre makers issue plenty of informative literature on the subject of tyre-care, but the trouble is that so much of it is wasted!

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