ARMCHAIR DRAUGHTING TABLE

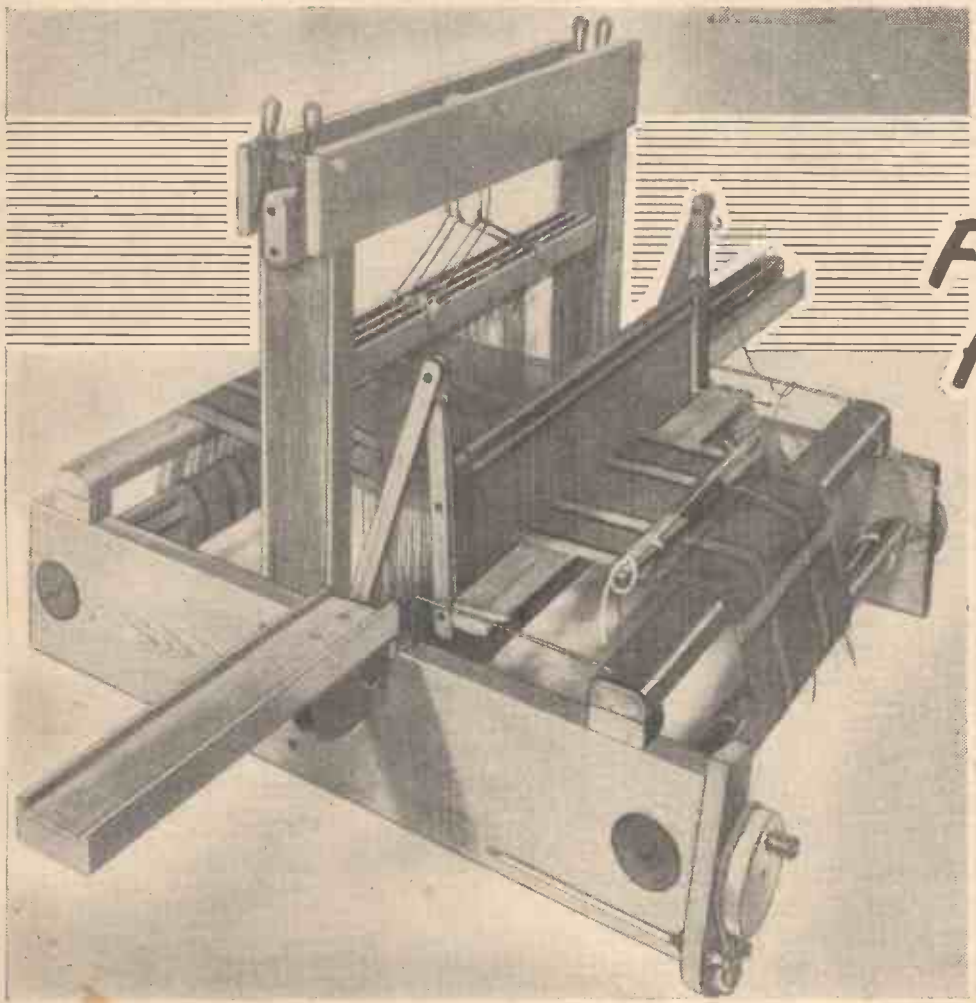
NEWNES

PRACTICAL MECHANICS

1/-

EDITOR : F. J. CAMM

SEPTEMBER, 1952



A 15" FOUR HEDDLE HAND LOOM

SEE PAGE 406

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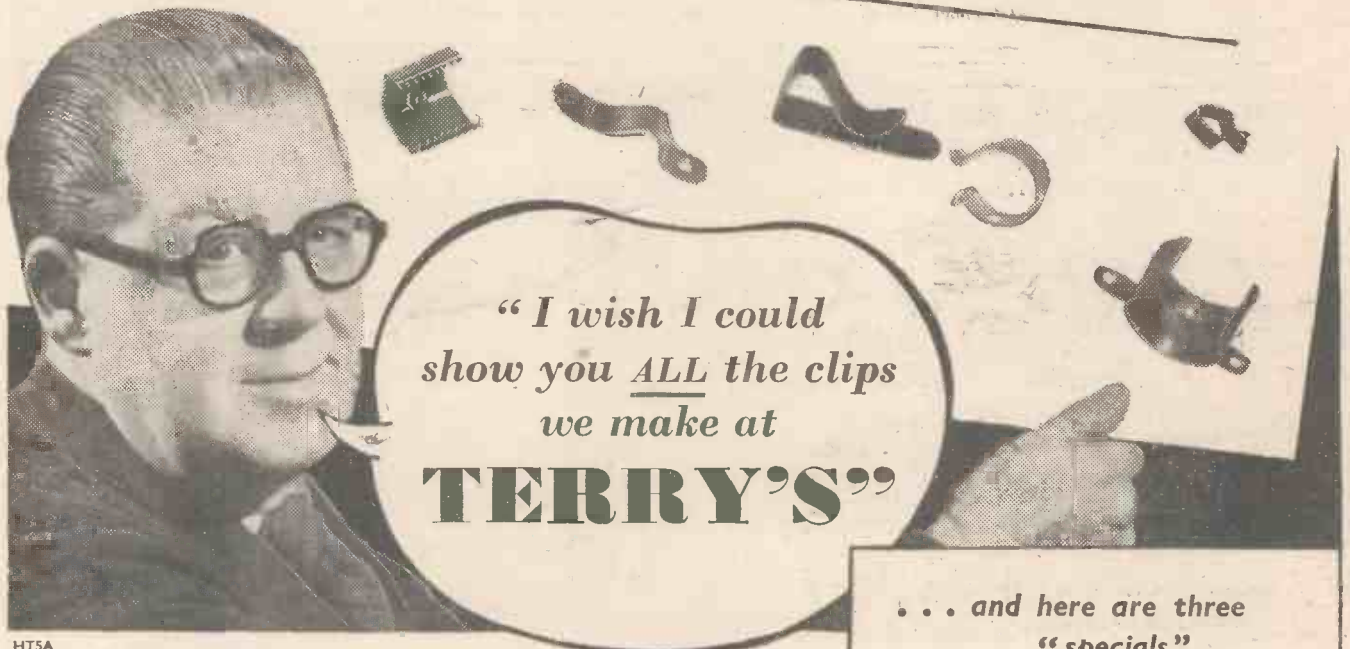

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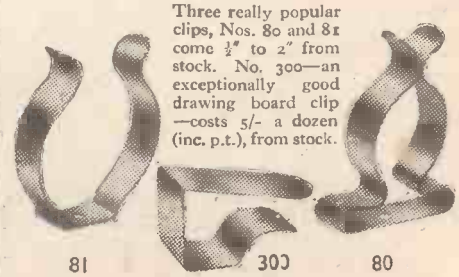

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SEPTEMBER, 1952
VOL. XIX
No. 225

PRACTICAL MECHANICS

EDITOR
F. J. CAMM

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

FAIR COMMENT — By The Editor

Next Month—Back to Our 3-Colour Covers!

Featuring the Construction of a Tape Recorder

IT is with great pleasure that we announce the return, commencing with next month's issue, to our pre-war style of three-colour covers. Pre-war readers will remember how attractively they displayed one of the main constructional features inside. They were printed on good quality paper and we are glad to be able to say that as from the next issue a similar paper will again be used.

In the early days of the war, when paper shortage was acute, our covers were one of our first casualties. It had always been our intention when the war was over to revert to our pre-war style, but as every reader knows, paper and production problems have continued until recent months.

We shall also be giving our readers more pages commencing with the October issue, thus enabling us to include more articles of the type with which this journal has been associated during the twenty years of its existence, and which have steadily increased its circulation. Readers of long standing will remember the type of article to which we refer—The Flying Flea, The Luton Minor, The Motor Boat, The Twenty Pound Car, The Master Battery Clock, a wide variety of models, to mention but a few.

We have endeavoured in the difficult years which have ensued since 1939 to maintain the very high standard we then set, and the great popularity of this journal encourages us to believe that we have succeeded.

Our Free Advice Service is world renowned, for this journal circulates all over the world, and we regularly receive queries from practically every country. That service is now to be amplified and extended. The wealth of illustrations which we use to illustrate the text does not need to be stressed, but we shall in future make even greater use of practical diagrams which can be readily understood by the non-technical reader.

We have always felt that where possible the three-dimensional cut-away perspective illustration is of far greater value than the usual elevations, plans and sections. We give both, of course. Each month, therefore, from now on, look for PRACTICAL MECHANICS in its new dress, featuring one of the leading constructional articles inside.

BUILDING A TAPE RECORDER

FOR a long time we have received a steady flow of queries dealing with tape recording and requests for an article describing a tape recorder. We are glad to be able to announce that the construction of one of these modern record and play-back devices has been designed in the PRACTICAL MECHANICS laboratory. It has satisfactorily passed its tests, and it will be featured on the cover as well as inside in next month's issue.

Tape has been selected as the recording medium because wire has proved to be troublesome and expensive. Tape recorders will record dictation, music, or radio programmes, and you may record an hour's entertainment from existing gramophone records, thus avoiding the trouble of needle change and the limitations of automatic record changers; and once the recording has been made and rewound (the time, of course, will depend on the length of recording; our tape recorder has a fast rewind) it may be immediately played back. The tape can have the recording quickly erased during the rewinding, and can be used over and over again, It will directly record radio programmes.

Apart from its use as an instrument for dictation and amusement it can be used to record conversations. If, for example, a speaker at a function finds that at the last minute he is unable to be present, he can dictate his speech, with a prefatory apology for his absence, and have his speech played back at the function. The device can, of course, be used at such functions for recording all of the speeches. It is useful, too, in enabling the speaker to listen to errors of speech or pronunciation, for it is possible to make erasures, to edit the recording and to "dub in." Many other uses will readily occur to the reader.

It is rarely that a spare copy of this journal is seen on a bookstall, and with the changes enumerated it is more than ever necessary to place an order with your newsagent for its regular delivery. Do not rely upon casual copies being available in the newsagents and bookstalls.

SUGGESTIONS WELCOMED

IN connection with this reversion to our pre-war style we shall, of course, welcome suggestions from readers for articles suitable to be featured on the cover. Such suggestions must take into account the fact that it must be possible to build the apparatus from readily available materials, and also that it must be within the capacity of the home workshop and the amateur. Mark your envelopes "Suggestions."

END OF VOLUME XIX

THIS issue completes Volume XIX, and an announcement concerning the index will be made as soon as it is ready.—F.J.C.

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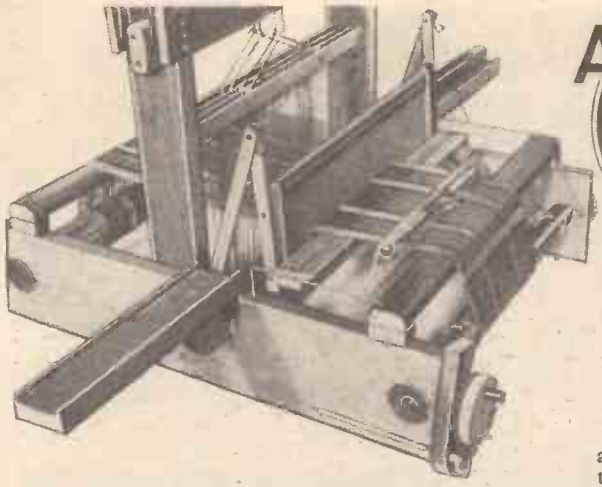


Side view of loom, showing reed and mounting in forward position—half-way towards beating down weft.

A 15" FOUR HEDDLE HAND LOOM

Constructional Details of an Inexpensive and Efficient Weaving Machine for Home Use

By G. G. CRAWSHAW

THIS loom is very simple to make and the quality of materials woven upon it cannot be improved by any more elaborate apparatus.

Being a four-heddle loom, a considerable variety of patterns is available as well as a choice of fabric textures—thus offering considerably more scope than a two-heddle loom, which can only produce "tabby" weaving: a plain woven cloth produced by merely lifting the odd and even warp threads alternately for each weft thread. With four heddles twill fabrics can be woven, which include the ordinary "tweed" materials in such patterns as Shepherd's Plaid, Dog Tooth checks and many others.

It is not, however, the purpose of this article to give any instructions in weaving, beyond pointing out that the art is very simple and easy to learn in spite of the apparent complexity of so many threads and wires. It is quite possible to produce excellent work at the first attempt.

Many books on the subject are easily obtainable, and may usually be found in the public libraries. I will not recommend any particular text book on the subject, but for general and extensive information over the whole field of hand loom weaving Luther Hooper's "Hand Loom Weaving" (Pitman, 15s.) is outstanding.

The loom described (Figs. 1 and 2) will weave up to 15in. wide, and is very robust and compact, but the design is suitable for any width up to the usual maximum of 32in. If a larger one is attempted, it must be remembered that the strain of weaving on it is tremendous, and that the rollers and heddle frames in particular must be made proportionately stronger or a breakdown may occur.

Remember that 20 threads per inch for 30in. at only four ounces shock, or strain, per thread at any time produces an aggregate pull of 150 lb. on the rollers!

Note that no great accuracy in construction is called for *except* the following:

1. The front and back rollers *must* be parallel to each other.

2. The rods upon which the heald wires are threaded must not protrude from the sides of the heddles and they must be mounted so that when the healds are hanging on the top rod they swing freely and do not jam on the lower rod. They must easily slide from side to side. A trace of lubricant on these rods is advisable and also prevents rust.

3. The mounting and setting of the reed requires reasonable care.

4. Take care that the heddle frames are as flat as possible. Warped frames can be a nuisance, as four of them have to be placed as close together as possible, permitting free movement up and down. Mind you do not split the corners when screwing them up—drill suitably fine holes first.

This loom was originally constructed without any plan or drawing, the *modus operandi* being to start from the middle and

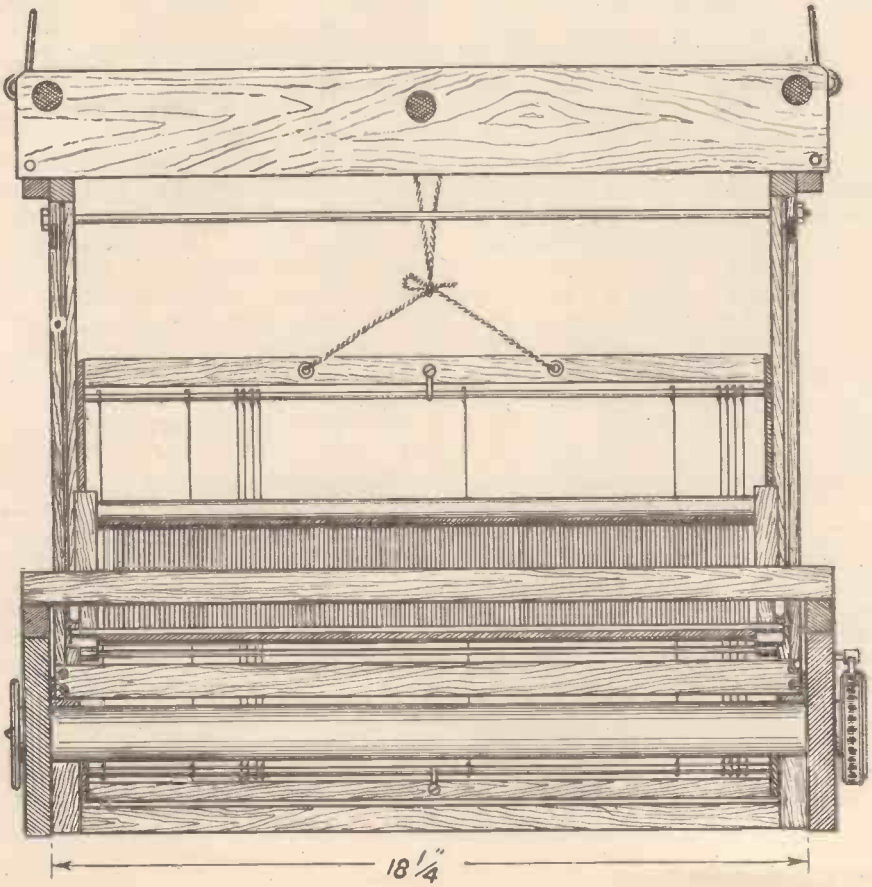


Fig. 1 (Left).—Front view of the loom.

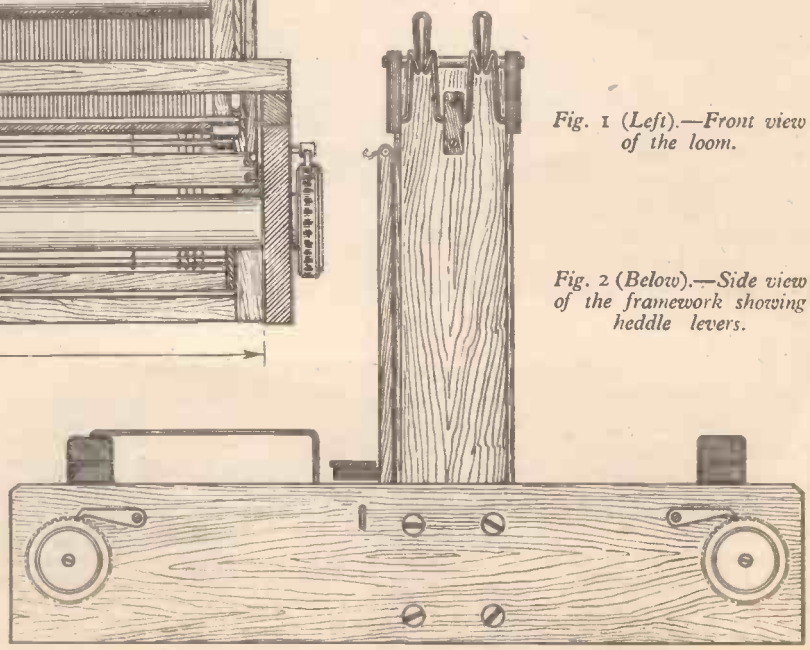


Fig. 2 (Below).—Side view of the framework showing heddle levers.

work outwards, each component dictating the measurement of the following one, commencing with the heddle frame opening width of 15½in. and height sufficient to accommodate the heald wires freely on their steel rods. This is mentioned as some constructors may prefer to follow this suggestion, and thus have little difficulty in using up any wood they may have to hand, and making any adjustments necessitated by dimensions which differ from those specified, as they proceed.

Heddles

For the four heddles cut eight pieces 11¾in. × ½in. × ⅜in. for the uprights and eight pieces 16½in. × 1in. × ⅜in. for the cross-pieces (Fig. 3). Cut a ⅜in. slot slightly under 1in. deep in each end of the uprights to take the cross-pieces, which are most likely to be slightly less than 1in. wide if purchased ready planed. Secure the joint with two small screws, one from each side, drilling small guide holes for them, and being most careful not to split the wood. Two holes should be drilled in the top cross-pieces 5in. from each end to take the lifting cord, and these can be neatly finished by means of large boot-eyelets—a non-essential refinement.

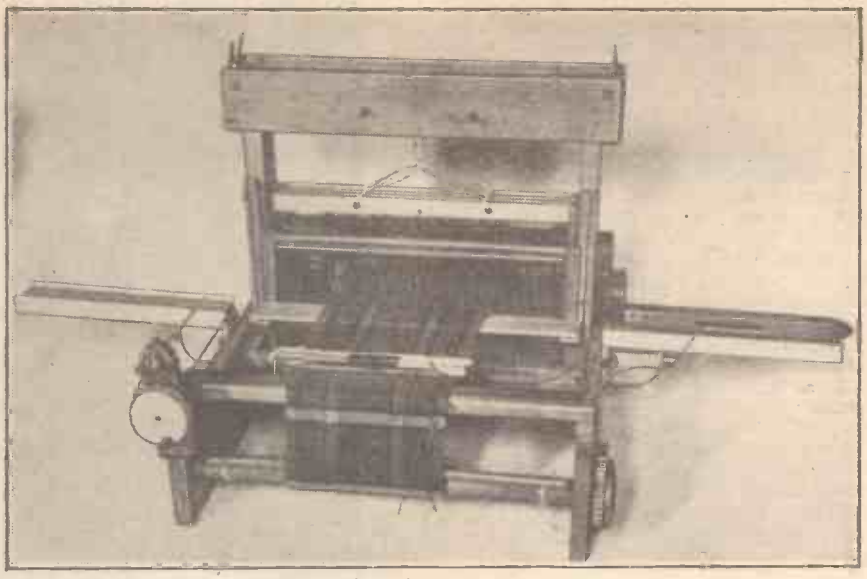
Eight steel rods 16⅜in. × ⅛in. are needed for mounting the healds. Holes for these rods which must ensure a push fit, should be drilled right through the side pieces about ½in. inside the top and bottom frame sides, with a distance of 9⅜in. between centres. This distance has proved satisfactory, but a latitude of 9 5/16in. plus or minus ⅛in. would not appear to be important.

Towards the lower edge of, and in the middle of, the top cross-piece insert a 6 BA or similar miniature nut and bolt and fix round this from front to back a loop of wire which will support the centre of the heald rod without distorting it.

Control Box

When the four heddles have been made they have to be mounted in the main control box, which also forms the main centre-piece of the loom. This is made as a separate unit which is secured in the loom by four screws each side. When these screws have been taken out it can be removed intact to facilitate storage or packing.

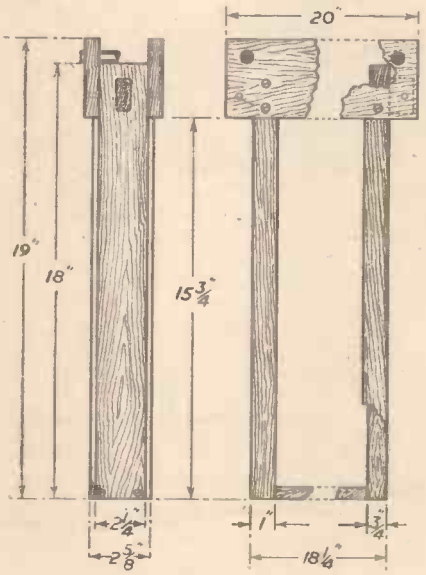
The object is to make a box frame in which the heddles can slide freely up and down, and which has vertical beadings front and back to retain them in position. Across the top is a form of bridge piece on which are mounted the four operating levers which raise and lower the heddles by means of cords passing over dowels at the centre and at each top corner. Wood required:



Front view of the completed loom.

Sides: two 18in. × 2½in. × ⅜in.
Beading: four 15⅜in. × ⅜in. × 1in.
Base: one 16⅜in. × 2½in. × ½in.
Bridge: two 20in. × 3½in. × ½in.
Dowels: three 3½in. × ½in.
Wood blocks: two 1⅛in. × ⅞in. × ⅞in.

The three dowels are placed as shown in Figs. 4 and 5. The two at the ends should be a tight fit, but the one in the middle should be a push fit, as it has to be removed to enable the heddles to be taken out when required.



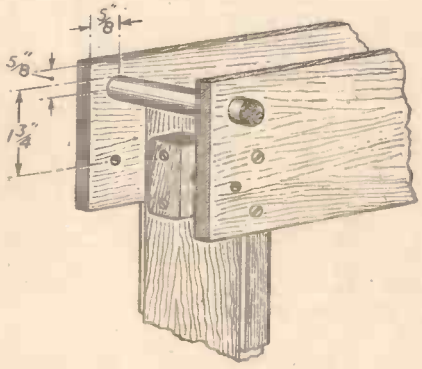


Fig. 5.—Details of the heddle box.

The operating levers are made from ⅛in. silver steel rod and the dimensions are shown in Fig. 6. The two loops should be made approximately 3in. apart in the centre of a 9½in. length of rod. This can best be done by placing the rod along the jaws of a vice as near the top edge as possible. The free end can then be pulled right round tightly

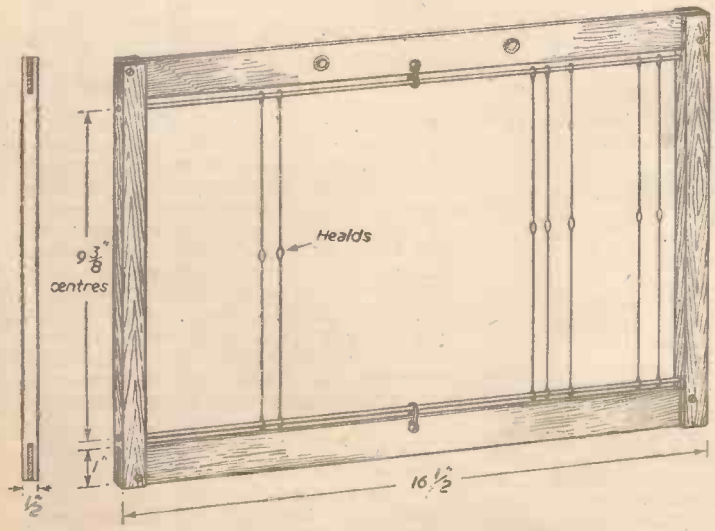


Fig. 3.—Front and end view of one of the heddles.

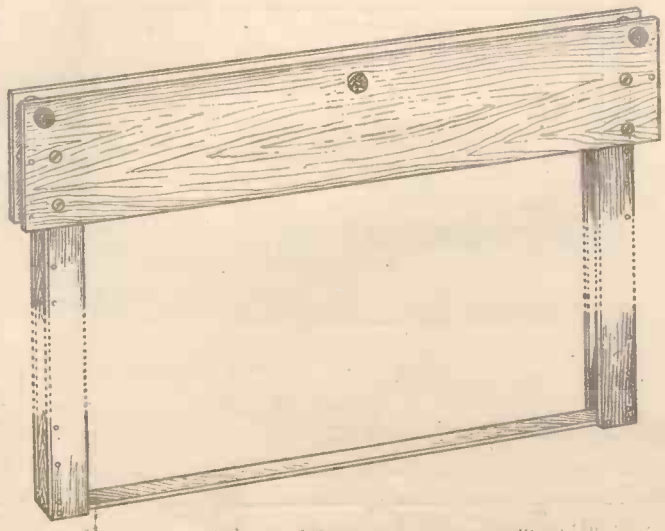
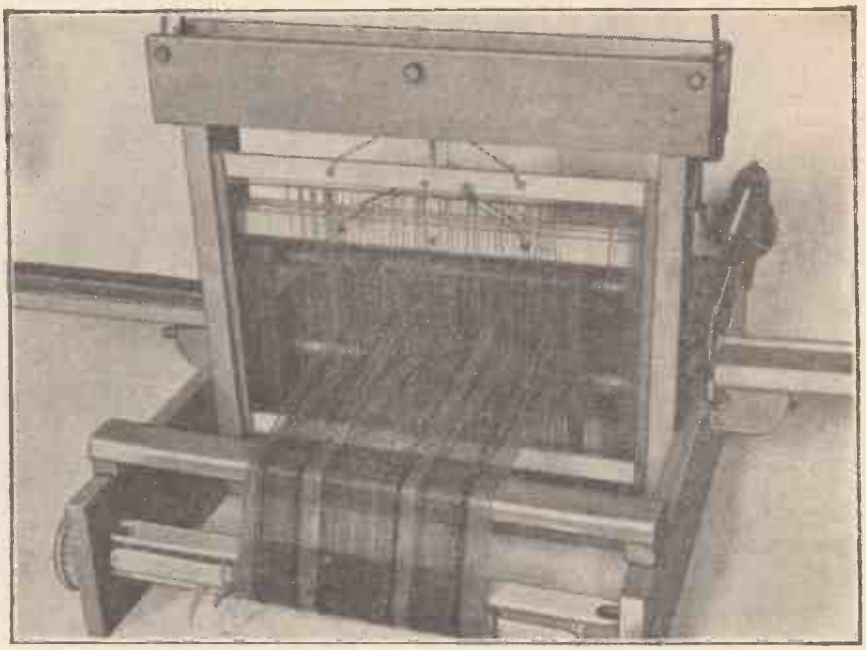


Fig. 4.—Perspective view of the heddle box.

through a 360 degree turn, thus forming a small loop. The other loop is made in a similar manner, but take care that it is formed on the same side as the first one. The rod should next be bent in the middle as tightly as possible in order to bring the two loops exactly together, but on the outside of the now folded rod, thus leaving a small projecting handle by means of which the heddle is lifted. Some care is needed here, as it is not easy to effect this bend so as to bring the loops together. Just 1⅛in. from the centre of each loop the ends of the rod should be sharply bent (*not curved*) at right angles, so that they point away from each other, the bent portion now being trimmed off to 5/16in. long. The illustration makes this quite clear, but the operations should be followed in the order given, as it would be difficult to get the necessary measurements correct any other way. (N.B.—It is essential that the bent ends 5/16in. long should be exactly opposite one another, or the operating lever will not be located squarely in position.)

In Fig. 5 it will be noticed that the bridge pieces extend nearly 1in. each end, and that



Rear view of the loom, showing one heddle frame raised.

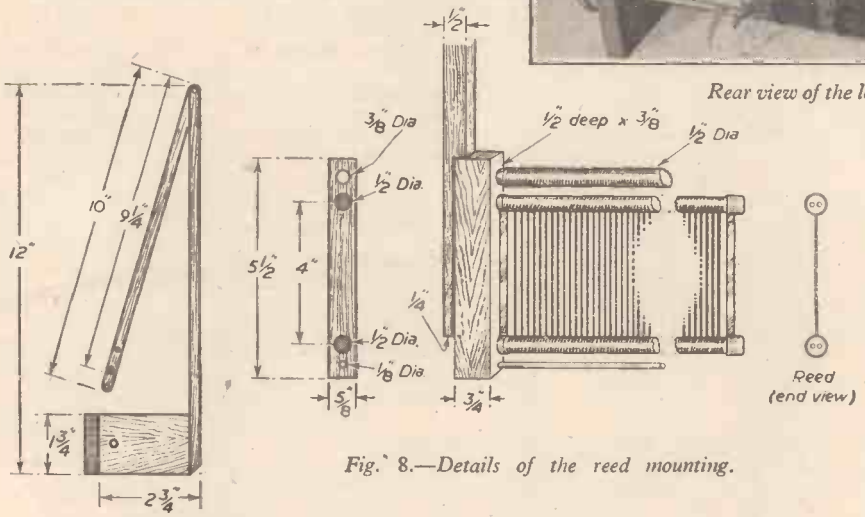


Fig. 8.—Details of the reed mounting.

a small block of wood has been fixed between these ends. It is in each of the two gaps thus formed that an operating lever is mounted by means of inserting the projections in holes drilled for them, as shown. It is an advantage to use a bench drill for making these holes, in which case the heddle box should be assembled first, and then the ⅛in. holes (oversize) may be drilled vertically through the three pieces of wood in one operation, provided a drill about 4½in. long is available.

operation. This mounting, believed to be original, is particularly satisfactory and a considerable improvement on many other types. (It may be noticed that the specification allows for the reed's vertical supports being some 2in. higher than shown in the photograph—an improved modification.)

When the reed, in its mounting, is in place on the loom, its lower inner edge should be about ½in. below the line of the heald eyes, with the heddle frames in their lowest position.

The reed is mounted in a frame which consists of two end pieces in which are drilled two holes ⅛in. diameter and ¼in. deep which act as sockets for the shoulders of the reed. The top ends of these pieces are joined by a ⅜in. dowell rod 16¼in. long which should be a firm fit in the holes drilled ¼in. deep to accommodate it (a ½in. rod may be trimmed to ⅜in. for half an inch at the ends). The end pieces should be pushed on tightly to secure the reed between them and the joints locked with a fine panel pin driven through them. This wooden rod has been used to obtain rigidity, but the lower ends of these pieces have been joined by a ⅛in. × 16¼in. steel rod secured by a 4 BA nut at each end—the ends being threaded for about ⅜in. It will be noticed that a ¼in. step has been cut to take the projecting end of the rod and its nut.

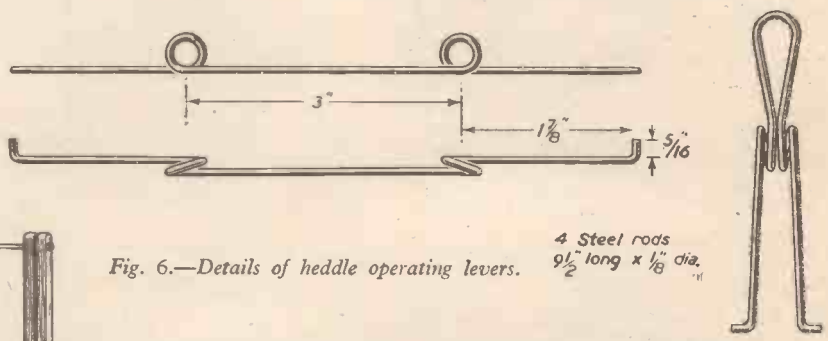


Fig. 6.—Details of heddle operating levers.

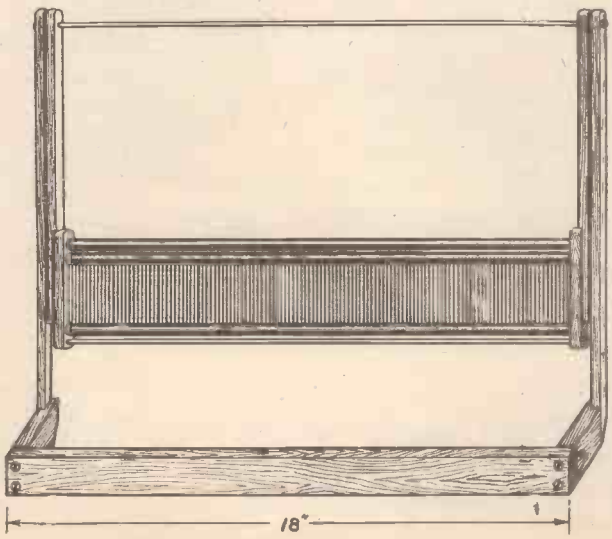


Fig. 7.—The reed and its mounting.

The Reed

The reed is purchased ready made ("Atlas" Handicrafts, Manchester; 15in. wide, 14 dents per inch, price 8s.). Its function is to slide along the warp threads like a comb each time a weft thread has been entered with a shuttle and pack it firmly against the edge of the fabric as the weaving proceeds, and the reed mounting is a contrivance which supports the reed and yet allows it complete freedom to move along the path required for its

The reed frame is next mounted on the two suspension arms, from which recesses a ¼in. deep have been cut to receive it. (See Figs. 7 and 8 for details and measurements.)

(*To be concluded next month*)

An Armchair Draughting Table

Constructional Details of a Useful Appliance for Student Draughtsmen and Artists

By D. V. PRIEST

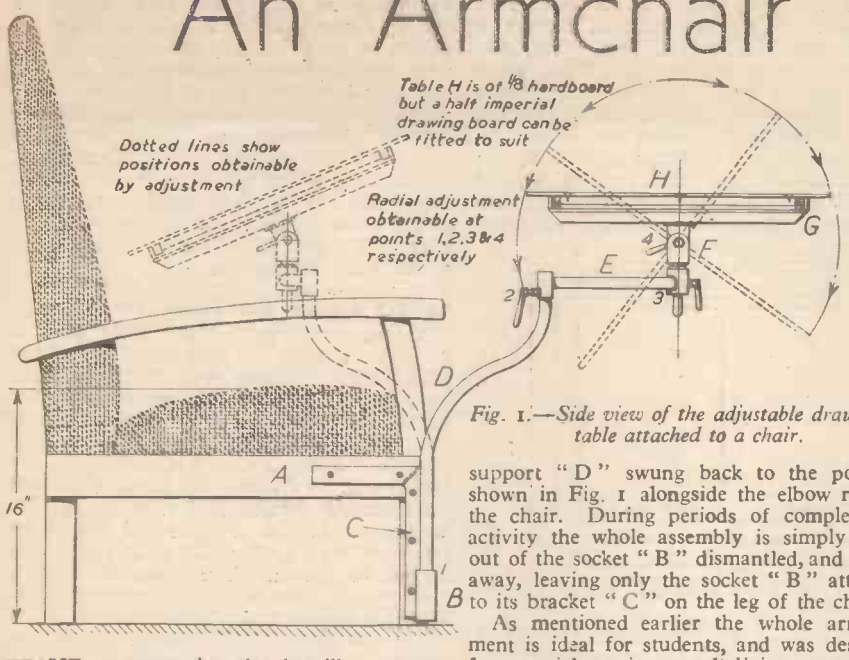


Fig. 1.—Side view of the adjustable draughting table attached to a chair.

THE accompanying sketches illustrate an arrangement well suited to the requirements of student draughtsmen, journalists, commercial artists and, indeed, any one whose business or hobbies, entail long periods of home study or sketching, calling for the use of books, drawing boards and draughting instruments.

In Fig. 1 a general view of the apparatus is shown in its assembled form, ready for use, the dotted lines indicating the various positions obtainable by simple adjustment at points 1, 2, 3 and 4 respectively. It will be seen that, by suitable manipulation, any desirable angle can be given to the plane of the table in two directions, while a variety of radial settings are afforded by adjusting the main support and the extension arm. The table may also be raised or revolved or both by utilising the set-screw numbered 3 on extension arm "E." Such a setting is indicated in Fig. 1, the arrows on the circle indicating radial adjustment through an arc of roughly 270 deg. in the one case and 360 deg. in the other, thus the table or drawing board may be tilted to any angle required by the user and swung through a full circle without altering the setting of the angle. The raising of the table must be done manually, of course, after the circular position of the table has been decided upon, then by lifting to the desired height and locking the set-screw numbered 3.

The main support "D" and extension arm "E" are adjusted at points 1 and 2 and afford the positions shown by the dotted lines in Fig. 1. The set-screw numbered 2 may be left slack until the most satisfactory setting of the table is found, whereupon it is tightened. Should the user wish to leave the chair, he simply pushes the table away from him, allowing it to swing on the support "D" in the socket "B." On returning to his seat the user pulls the table towards him knowing that no alteration has occurred in the original angular and radial setting during the two movements incurred by leaving and returning. When not in use for writing or drawing purposes, the arrangement can be adjusted for use as a chair-side table or again by adjustment to the full extent of the support "D" and arm "E" it can be made a useful card or afternoon tea table. During periods of very temporary idleness the table can be stowed away with the frame "G" and leg "F," and the remaining arm "E" and support "D" swung back to the position shown in Fig. 1 alongside the elbow rest of the chair. During periods of complete inactivity the whole assembly is simply lifted out of the socket "B" dismantled, and stored away, leaving only the socket "B" attached to its bracket "C" on the leg of the chair.

As mentioned earlier the whole arrangement is ideal for students, and was designed for especial use in a small living room.

Constructional Details

Any suitable chair can be used, since the apparatus can be fitted regardless of the constructional features of the chair itself. The only point of importance to note in connection with the chair is the measurement between the floor and the seat, since it is the governing factor in the overall height and location of the bends in the main support "D." It will be observed that the apparatus now being discussed is for a chair having its seat 16in. from the floor, as indicated in Fig. 1.

Referring again to Fig. 1, the component parts are lettered B, C, D, E, F, G and H, Figs. 2, 3, and 4 illustrate these parts in greater detail. The part "B" (Fig. 2) consists of a 3in. length of mild steel round bar of 1⅛in. diameter drilled ¾in. to within ¼in. of one end, thus forming a blanked socket. Part "C" is made up of two pieces of 1¼in. × ⅛in. flat strip. The longer piece is dimensioned to suit the length of the chair leg, in this case 10½in., and both strips are given a 45 deg. mitre to form an inverted "L" when welded together. The mitred ends should be chamfered to accommodate the weld. Finally, the socket "B" is welded to the long leg of the inverted "L" as shown. Since the strip is located on the periphery of the socket a good substantial joint is obtainable with a "run" on either side of the strip where it contacts the socket. It is most important that this be a strong connection because it has to support the whole weight of the other components plus the arms of the user. The bracket "C" is drilled and the holes countersunk to take the wood-screws with which it is fitted to the chair leg.

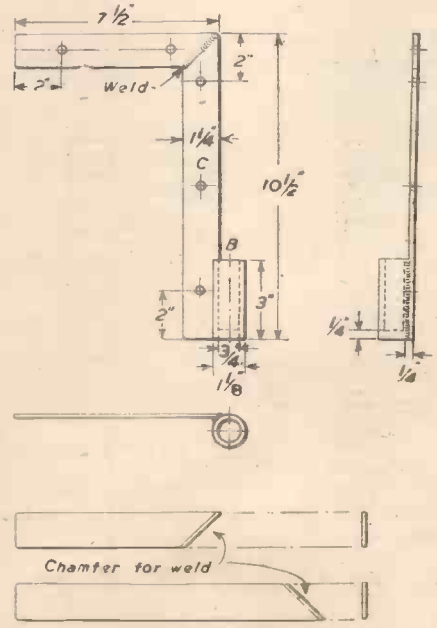


Fig. 2.—Details of chair-leg bracket and pocket.

Fitting the Bracket

The exact location of the completed unit "B" and "C" on the leg will, of course, depend on the shape and length of the leg, but it should be so fixed as to give strength to the leg as well as can be under the existing conditions. It is also important to ensure that the bore of the socket is vertical in relation to the floor. Before fixing all the wood screws it is advisable to tighten up on one, then, by inserting a length of straight ¾in. round bar in the socket and applying a fitter's try-square and spirit level to it, the true vertical can be ascertained by slight movement of the bracket on the single screw. Once this has been found, the remaining

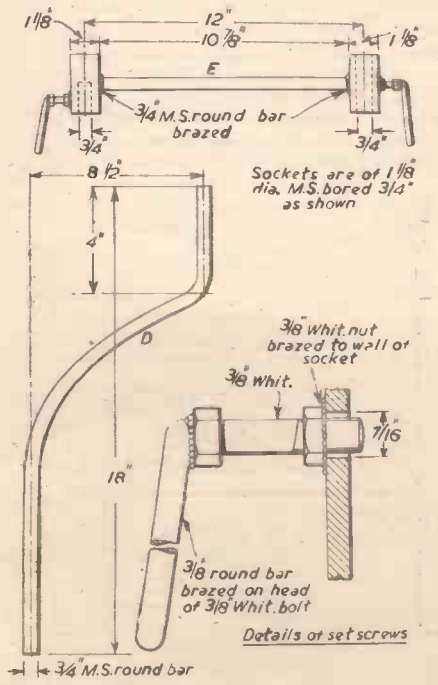


Fig. 3.—The main support and details of extension arm and fixings.

screws can be inserted and tightened up permanently. This is the only part requiring any degree of fine-limit work and proves its worth in the long run because any deviation from the vertical causes the support "D" to swing in that direction as soon as the table is placed upon it. The weld should be filed, at least on the inside of the bracket "C," to avoid any misalignment it may cause by pushing the bracket outwards from the wood. If the chair-leg has heavy taper this can be compensated for by inserting a wedge shaped strip of wood and placing the wood screws through both the bracket and the wedge.

The Support Arm

In Fig. 3 the main support arm "D" is shown and the extension arm and fittings "E." Dealing first with the support arm it is made of mild steel ¾in. round bar and the bends can be made with the material in its cold state. By first marking the position for the long slow bend and gripping this portion in a bench vice, a length of tube placed on the "free" end of the bar and used as a lever will give the desired result. Then, by reversing the bar so that the short 4in. portion is in the vice jaws, and by placing the tube on the part already bent, the final bend can be obtained. When finished the straight portions should be parallel and also in-line one with the other. It is preferable to do the bending without resorting to heat so as to avoid any loss by scaling or any burrs or hammer marks in the finished article.

Next part "E," the extension arm, can be considered. Referring once again to Fig. 3 it will be seen that ¾in. round bar is again employed for the arm. It is cut 10⅞in. long, but can be whatever length the user requires, of course. The ends to be brazed are given a chamfer in the orthodox manner. At one end there is to be a socket and at the other a sleeve. Both consist of 1⅛in. dia. round bar, the socket being equal in length to the sleeve, in this instance 2½in. The socket is drilled ¾in. to half its length, as shown by the hidden detail, and the sleeve is bored ⅜in. for the whole of its length.

The inset (Fig. 3) shows details of the set-screws. The walls of the socket and sleeve respectively are drilled 7/16in. at the point where the set-screw is to be placed. A ⅜in. Whit. nut is then brazed to the outside of the socket so that the threaded portion is directly over the 7/16in. hole. The set-screw itself is an ordinary ⅜in. Whit. black bolt of suitable length (1in. or 1½in.) having a short length, say 3½in. of ⅛in. round rod brazed to the head. Before positioning the rod it is advisable to insert a piece of the ⅜in. bar in the socket and then tighten the set-screw on to it in order to correctly locate the ⅛in. rod. Once the set-screw is tightened the ⅛in. rod can be brazed to the head and when the screw is loosened, by using the ⅝in. rod as a lever, the minimum number of turns of the screw will be needed. This also applies when tightening the set-screw, as only a fraction of a turn of the screw in the nut is needed to "nip" the bar and so secure adjustment. The same method applies for the set-screw in the sleeve except that the 7/16in. hole is drilled at the middle, i.e., 1½in. from either end of the sleeve. Alternatively, a ⅛in. Whit. tapping size hole may be used and the set-screw placed in it instead of brazing a nut to the outside. If a ⅛in. tapping size drill and ⅜in. taps are available their application will save brazing, but once the 7/16in. holes have been drilled, by the method described, the ⅛in. nuts, the ⅜in. rod and the brazing of the socket and sleeve to each end of the extension arm can be done in one session with the acetylene equipment. When brazing the socket and sleeve, it is important to align them truly and ensure that they are parallel. This is done by laying the three pieces to be brazed on a fairly flat surface and then packing the bar with thin strips of tin, or any flat scraps, until each chamfered end is in line with the diametrical axis of the socket and sleeve. Then by carefully measuring the distance between the socket and sleeve parallelism may be found and the brazing commenced. The brazing of the nuts can be done last as they need little work or positioning so long as the screw passes freely through the clearance hole. We now have completed three of our main components.

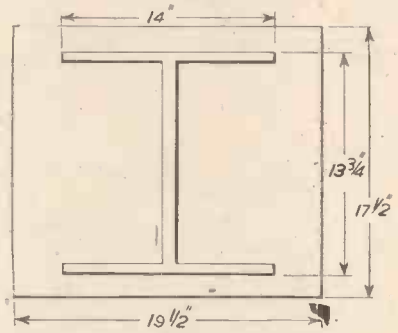


Fig. 5.—Underside of table.

Yoke Assembly and Table-frame

Fig. 4 shows parts "F" and "G" in detail, these being the yoke assembly and the table-frame. Dealing with the yoke first; we require a piece of ¾in. round bar 4¼in. long. To a distance of ¾in. from one end flats are filed in order to locate the side plates of the female section of the yoke. The flats should be parallel so that when finished the flattened portion is ¼in. thick by ¾in. long, as at A, Fig. 4. The two side plates are made from 3/16in. flat strip 1¾in. wide shaped as shown. The male, or tongue, piece of the yoke is of ¼in. flat strip 1¾in. wide. It will be seen that the overall length of the side plates is 2½in. whereas that of the tongue is 2¾in. The width of all three is the same however, and the pieces can thus be clamped "sandwich" fashion to the drill table and the ½in. hole drilled right through at one setting. A ½in. bolt placed through the holes will then serve to hold the pieces during the grinding or filing of the semi-circular portion thus ensuring uniform finish. On completion of the semi-circular portion the bolt is eased sufficiently to enable the ¼in. thick tongue to be swung into its "working" position; this leaves a ¼in. gap between the outer plates into which the flattened end of the 4¼in. long ¾in. round bar can be inserted. By retightening the bolt the whole unit is ready for brazing. The outer plates are brazed to the ¾in. bar; the ½in. nut is brazed to the plates; a 3½in. length of ⅜in. rod is brazed to the head of the ½in. bolt; a ¾in. washer is brazed to form a shoulder just under the plates, as shown in Fig. 4, and the component "F" is complete.

The table-frame "G" is made up of 1in. x 1in. x ⅛in. angle iron. Four pieces 14in. long are cut and mitred at the places shown. Two of the pieces are brazed back to back to the tongue of the yoke assembly. The set-up for the brazing process is simple. Place the two lengths of angle iron back to back on a flat surface. Then insert the ¼in. tongue piece between the pieces of angle iron in the position it is to be, i.e., the half-way mark. The ¾in. bar of the yoke assembly will now be upright but in the inverted position. This can be checked for "squareness" and the brazing proceed. Next, the remaining two lengths of angle iron are placed at the extremities of the first two. By finding the half-way line of our 14in. lengths and scribing a line 1⅛in. either side of it the position for brazing will be obtained. This done and the braze applied our table frame "G" is complete. It need hardly be stressed that before final brazing the two outer angles of the frame should be made parallel so that the table, or drawing board, will enter freely without binding as would be the case should the two pieces of angle iron be tapering towards each other if the setting-up is carelessly done.

The Table

Finally, Fig. 5 gives details of the table. This is hardboard material ¼in. thick obtainable at any building contractors yard.

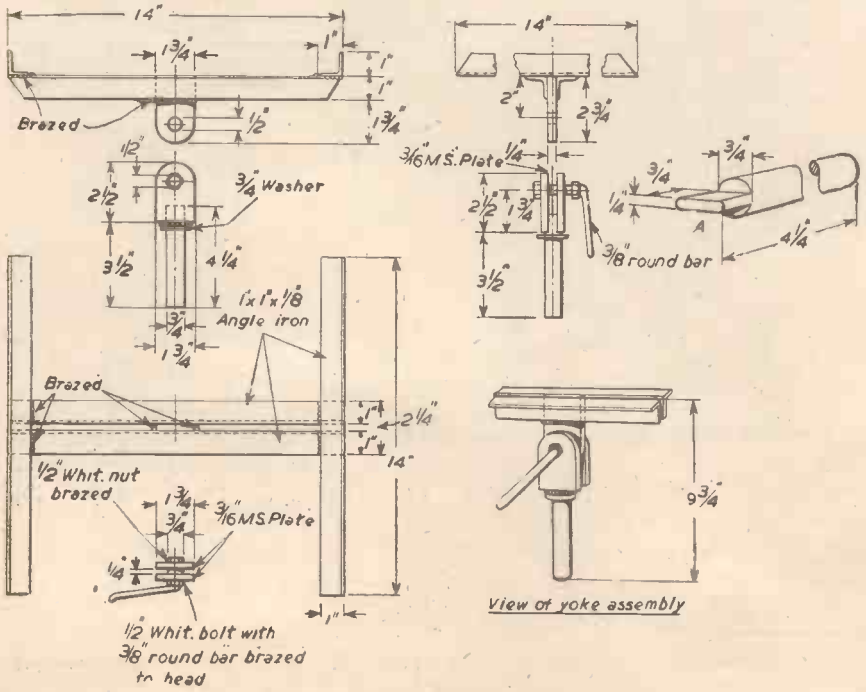


Fig. 4.—Details of the yoke assembly and table frame.

The locating frame on the under side is of slating-laths cut and placed to comfortably fit the angle iron frame "G." These strips of wood are secured to the hardboard by woodscrews. The table can be made any size desirable, and in this case it measures 19½in. x 17½in. and is found to be adequate for all purposes. Incidentally, the slating-laths should be so placed as to wedge themselves into the angle iron since if the fit is too free the table will tilt in use. A good firm fit safeguards against this while at the same time enabling the user to remove it when it is desired to place a drawing board in its stead. The usual students half-imperial drawing board can be economically rigged up to fit by placing catch buttons to the under side to fasten on to the ends of the angle iron frame of the apparatus.

The Materials

The necessary materials for the manufacture of the device can be collected from various amiable scrap dealers and the work entailed can be done with the constructor's own workshop equipment or, failing that, by the local garage. Furthermore, the materials specified for the apparatus described can be altered, as can also the dimensions; for example; the 1⅛in. dia. round bar could be replaced by 1in. dia. round bar, provided that ⅞in. instead of ¾in. bar was used for the parts "D" and "E," in which case ⅞in. dia. holes would be used in the sockets and sleeves. A slight loss in rigidity might be experienced, but the example serves to show what changes could be made to suit the materials available.

Finishing

To complete the finishing touches, a coat of Naylor's "Belco" undercoating applied to the parts makes a good base for a simple graining process. When the undercoat is dry it has a light grey colour. Then a coat of dark-oak floor stain is applied over the undercoating, using a fairly "raggy" brush, and the finished product has a pleasing grained appearance which blends with the woodwork of the chair. Since floor stain is not a preparation intended for use on metal parts it will take about 72 hours before it dries. Before placing the support arm in the socket "B" a thin smear of Vaseline applied to the inside of the socket will ensure its smooth action when in use. Since the bore of the socket is plugged at the bottom, there is no danger of the Vaseline thinning (due to heat from a fire for instance) and running on to the floor, but when the apparatus is dismantled it is advisable to clean the support arm of any surplus lubricant before storing away. No maintenance is necessary for the other swivel and adjustment points because they are only occasionally moved, and immediately relocked by means of the set-screws, their actual range of movement being too infrequent to call for any lubrication.

A NOVEL RATCHET

A Simple Device for Securing High or Low Reduction to Intermittent Motion

By A. C. USMAR

THE device is here seen applied to a clock; it is not limited in its purpose; the principle is, in fact, capable of much wider application. A reduction train of the principle is, in fact, capable of much wider application. A reductive train of 1,800 to 1 is illustrated, designed to transmit motion to the hands of an electric clock from a seconds pendulum.

Referring to the drawing two ratchet wheels are shown in the same shaft. Wheel B has 60 teeth cut in its periphery and is fixed to the shaft, which projects through the hour cannon to carry the minute hand. Wheel A is larger than B by twice the depth of the teeth, which are of the same number, plus a clearance of .010in. Diametrically opposite to each other, A has two of its teeth cut so deep as to have the same bottom diameter as the teeth of wheel B. Wheel A is closely mounted behind B, and is free to rotate on their common shaft. Both wheels are restricted to motion in one direction by backstops; that of A is very light, and is held in contact by gravity only. It is shown at D in the drawing. The backstop C of wheel B is pressed against the wheel by a small leaf spring which is sufficient to prevent A dragging B round by friction on the shaft.

The pendulum makes one complete swing from left to right and back to left in two seconds, and propels A through the pawl E engaging 30 teeth in each minute.

It should be noted that E is wide enough to embrace both rachet wheels at once.

Each complete oscillation of the pawl E is carried on A, clear of the teeth of B, until one of the two deep teeth in A is reached, when E is allowed to drop low enough to engage one tooth of B and to propel the wheel through one tooth space; in this case 6 deg. or one minute of time as indicated by the minute hand.

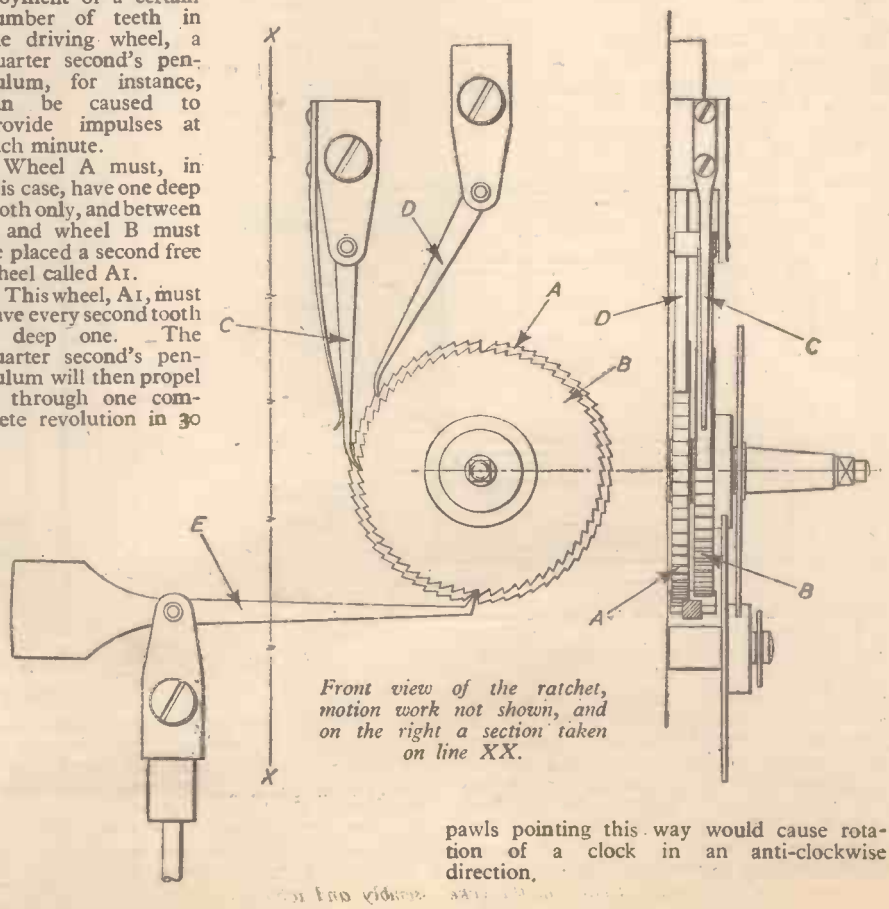
For the succeeding 29 swings which occupy 58 secs., the pawl is again held clear of B when the second deep tooth is encountered and the minute hand is advanced once more; the advance taking place in slightly less than the time the pendulum takes to pass from right to left. It will be seen that the friction of the backstop C is negligible, since it has to be overcome only once each minute, while the free wheel A advances almost without resistance.

From this, high number reduction will be readily seen; three wheels in tandem each of a hundred teeth with one deep tooth on each of the two free wheels will give a reduction of a million to one, but the reverse case may not be so obvious.

Using the clock mechanism as an example where design considerations force the employment of a certain number of teeth in the driving wheel, a quarter second's pendulum, for instance, can be caused to provide impulses at each minute.

Wheel A must, in this case, have one deep tooth only, and between it and wheel B must be placed a second free wheel called A1.

This wheel, A1, must have every second tooth a deep one. The quarter second's pendulum will then propel A through one complete revolution in 30 seconds, and without the intermediate wheel A, would propel B and the minute hand through one revolution in 30 minutes.



Front view of the ratchet, motion work not shown, and on the right a section taken on line XX.

Alternate Pulses

By interposing A, alternate pulses of the pawl are carried in the shallow teeth clear of B, the deep teeth permitting engagement of B only on every second revolution of A. This secures the desired ratio which rotates the minute hand correctly once each hour at intervals of one minute.

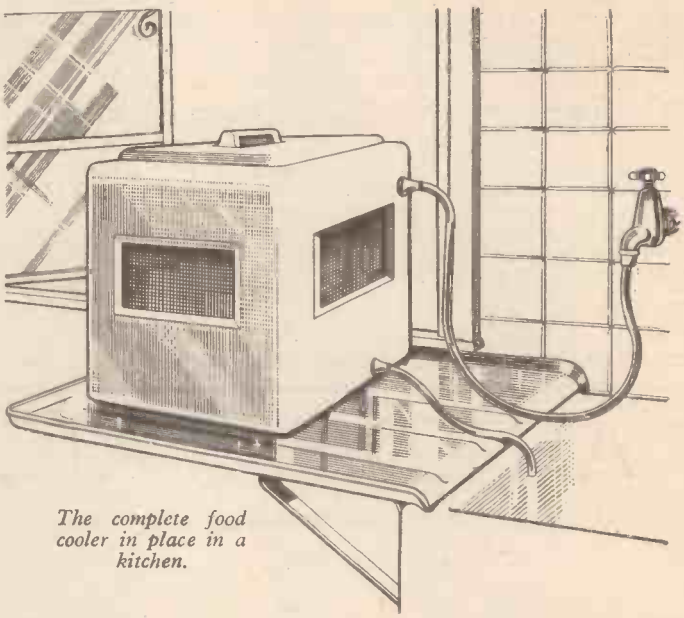
From these two examples it will be seen that the device is capable of considerable variation. It is necessary only that all ratchet wheels have the same number of teeth, and that the pawl be wide enough to bridge them all.

Note that for purposes of maximum portrayal of the backstops the drawing is in the nature of a negative since teeth and pawls pointing this way would cause rotation of a clock in an anti-clockwise direction.

OUR £200 COMPETITION

A WATER-OPERATED FOOD COOLER

Mr. A. R. Eades' Entry Which Won First Prize in Section 1 of Our Competition



The complete food cooler in place in a kitchen.

THIS food cooler is cheap, simple, easily made with readily available materials, and requires only a supply of cold water to operate it.

Two main sectional views of the complete cooler are given in Figs. 1 and 2.

The inner container (1) round which the cooler is built consists of an ordinary tin container from the grocers. The size of the tin upon which all the other dimensions are proportioned is 9in. square by 9in. deep and allowances should be made accordingly for any other size of tin. The lid may be discarded and any dents in the sides or bottom should be flattened out. The tin should be tested for watertightness and any leaky joints soldered up. The outside surfaces and underneath should be given two coats of aluminium or other rust-resisting paint; the inside may be left bright if in good condition or given a coat of light coloured enamel if there is any sign of rust.

Next, a bottom lining tank (2) is cut out from thin tinplate or sheet copper to the dimensions given in Fig. 3 and after drilling a hole for the overflow pipe the edges should be bent up at right angles on the broken lines and the corner joints soldered.

Do not sweat in the short outlet pipe yet but plug the hole and test for watertightness.

Water Spray Grid

The third item is the water spray grid which may be made from any soft and preferably non-rusting pipe ½in. bore by 3ft. 9in. long before bending. Prepare a brass plug ½in. dia. by ½in. long which is a drive in fit in one end and solder round the joint. Bend the pipe to the dimensions given in Fig. 4, round a former either by heating the parts where the bend is to be or by previously filling the pipe with clean, dry sand and ramming a wooden plug in the open end. After the pipe has been bent to shape and has cooled or the sand been shaken out, nine holes 3/32in. dia. should be drilled in each side equidistant from the centre lines and pointing inwards and slightly downwards.

Four clips (4) should be made as in Fig. 4 from pieces of thin tinplate or copper, 3in. long by ½in. wide before bending, and having a 5/32in. dia. hole drilled for a round head wood screw ½in. long.

Outer Casing

The outer casing (5) is made from ½in. thick wood and the internal dimensions are 2in. wider on each side than the inner container and 2in. greater in overall inside depth. This outer casing could be made from a wooden box obtained from the same grocer as the tin.

The four sides should have cut out holes made in each, 9in. x 6in. as shown in Fig. 6, ready for screening with perforated metal held in with ⅜in. edge beading. Alternatively, if suitable perforated metal cannot be obtained, each side may be drilled with 24 ¾in. dia. holes at 1½in. centres in the area occupied by the 9in. x 6in. panel. The bottom of the box should be drilled with a central ¾in. dia. hole in case the bottom lining tank should accidentally leak or overflow during use. A ⅜in. dia. hole should also be drilled for the entry pipe and another for the outlet.

Prepare, but do not fix, 8 corner pieces (6), Fig. 7, which locate the inner container and also support the water grid pipe.

The 2in. x ½in. strips forming the top edge of the box and a 10in. square central opening should not be nailed on until after fitting the bottom tank and water grid.

The inside of the box and the corner locating pieces may now be given a coat of paint. Two lifting handles should be fitted to the outside of the box if the cooler is not going to occupy a permanent positon.

The lid (7) is simply a piece of wood 12in. square with the underside lined with a piece of insulating board 9¾in. square by ¼in. thick and a lifting handle fitted on top (Fig. 8).

Evaporator Panels

The four evaporator panels, 10½in. x 9¼in. (Fig. 9), are cut from any ¼in. thick flat fibrous board, such as asbestos, which will not disintegrate after prolonged wetting. To these are nailed or glued four cork or hardwood blocks (9) on which to stand the inner container. The blocks should be painted if made of wood but *not* the panels.

Alternatively, the evaporator panels can be made from stiff canvas of the same size as given, stitched at the corners to fit round the

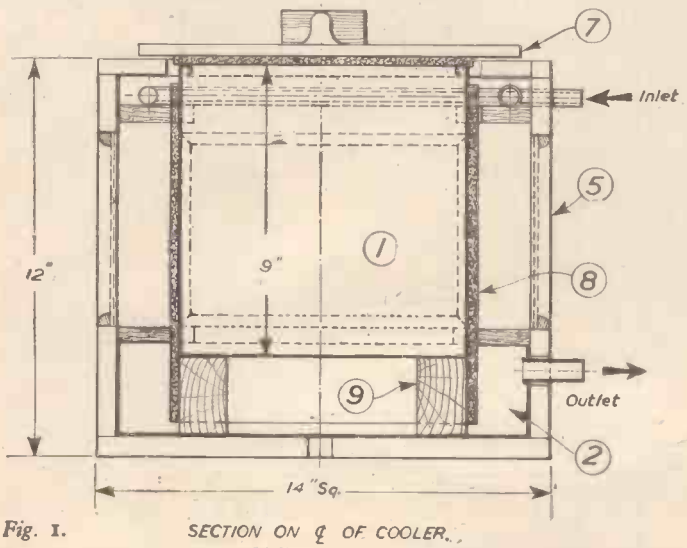


Fig. 1. SECTION ON ℄ OF COOLER.

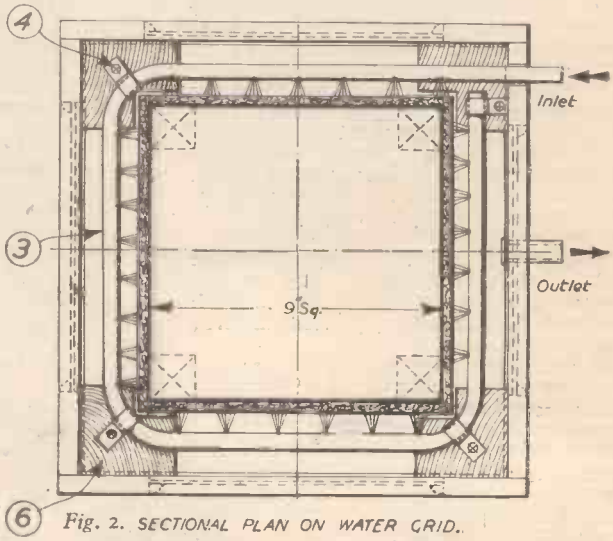


Fig. 2. SECTIONAL PLAN ON WATER GRID.

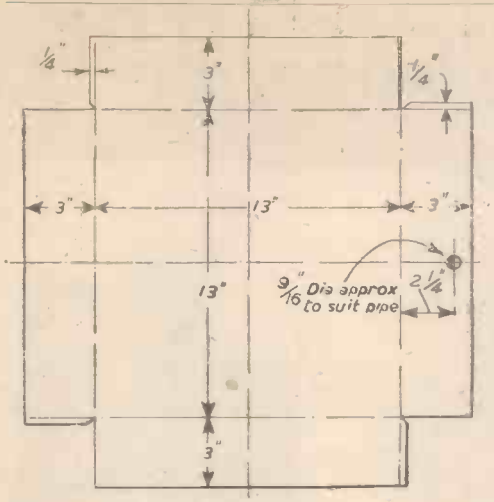
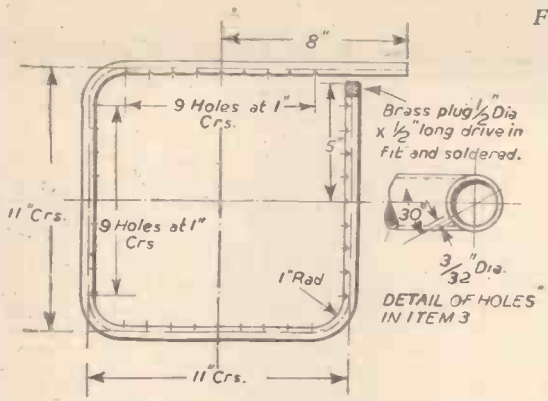


Fig. 3. ITEM. 2 BOTTOM LINING TANK. 1 OFF. SHEET TIN OR COPPER. BEND AT RIGHT ANGLES ON BROKEN LINES AND SOLDER ALL JOINTS



ITEM. 3 WATER SPRAY GRID. 1 OFF 1/2" DIA. BORE COPPER-BRASS OR MS TUBE 45 INCHES LONG BEFORE BENDING

Fig. 5.

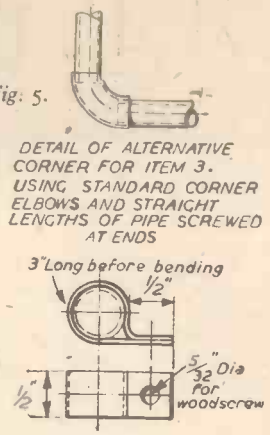


Fig. 4. ITEM 4 CLIP FOR ITEM 3 4 OFF TINPLATE OR COPPER STRIP

tin container (1). The only difference this makes to the other items is that the corner pieces to be cut out from parts (6) should be ⅜in. instead of ⅞in. as indicated in Fig. 7; also the spacer blocks (9) should be reduced from 2⅜in. long to 2⅛in. long and fastened to the corners of a piece of board 9in. square by ¼in. thick to form a stand for the inner container (1).

Assembly

The four evaporator panels or canvas covering should now be fitted round the inner container and should lie snug and flat; if not, bind with one or two turns of thin copper wire at top and bottom.

Now fit the bottom lining tank inside the wooden outer casing and fit and solder a 2in. length of ½in. bore pipe for the outlet. This operation is made easier by leaving out the perforated metal panels from the outer case. Test the joint for water-tightness. Fit the four bottom locating corner pieces (6) at each corner of the box on top of the lining tank and directly under the bottom edge of the 9in. x 6in. cut-out panels. Fix the perforated metal, if used, and the ⅜in. beading.

Nail in the four top corner locating pieces and fit the water pipe grid centrally on these, securing with the four corner clips (4) screwed to the corner pieces. Now nail the 2in. x ½in. strips round the top of the box. Give the outside and top a coat or two of paint to match the kitchen or pantry walls. When dry drop in the inner food container with its evaporator panels and stand fitted. The top of the tin should now be about ⅛in. below the top edge of the outer box and the evaporator panels about ½in. below the top of the tin. Put on the lid and the food cooler is now complete.

Location

The ideal site is on a bracket outside a north facing kitchen window with the lid of the cooler on a level with the window-sill, but it is essential that no direct sunshine should fall on the box for any length of time. A length of ½in. bore rubber hose is connected to the inlet from the kitchen tap and another from the outlet to the nearest drain. It is only necessary to turn on the tap sufficiently for the water from the jets to reach the sides of the evaporator panels.

A convenient indoor site is on the draining board at the side of the sink when quite short lengths of hose will suffice for the inlet and outlet.

If this position is not always available, as on washdays or during decoration work, etc., the bottom tank should be allowed to fill with water nearly to the outlet-pipe level and the cooler stood on a stone floor preferably in a breeze.

After a few hours in operation the food in the inner container is not only brought down to the temperature of the cold water flowing down the outsides, but is still further cooled from the evaporation of the water on the panels by the air flowing through the box; so that it will be seen that by using cold tap water and placing the cooler in the strongest available current of air, optimum conditions are obtained for a food cooler of this type.

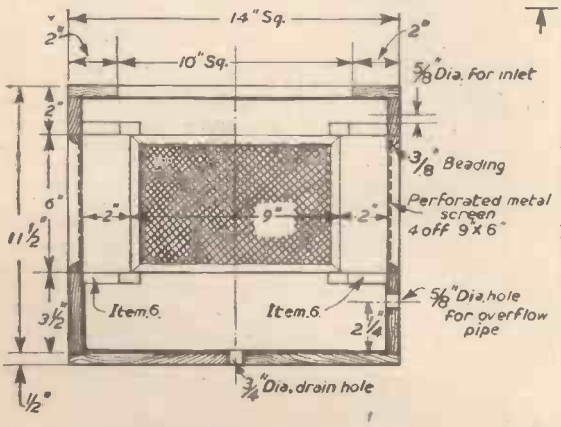


Fig. 6. ITEM. 5. OUTER CASING. 1 OFF ½" THICK TIMBER

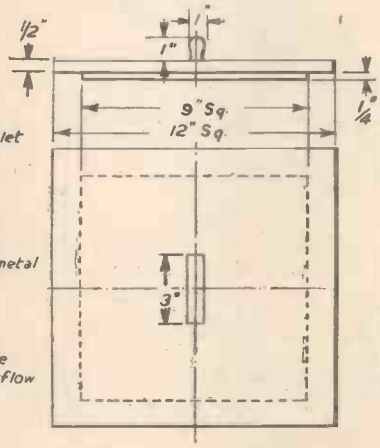


Fig. 8. ITEM. 7 LID. 1 OFF. MAT'L ½" TIMBER AND ¼" HARDBOARD

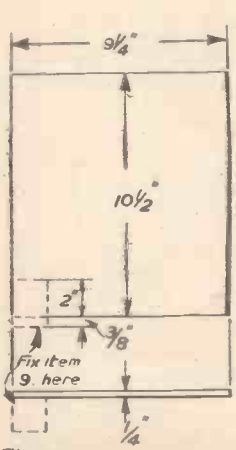


Fig. 9. ITEM. 8 EVAPORATOR. 4 OFF ASBESTOS FIBRE BOARD (OR OTHER FIBROUS MAT'L)

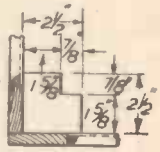


Fig. 7. ITEM. 6. CORNER LOCATING PIECES. 8 OFF ½" THICK TIMBER

ITEM. 9 CORK OR TIMBER SPACER 4 OFF

A Wind-charger Propeller

Constructional Details of an All-metal Self-regulating Propeller for a Wind-charging Unit

By R. E. THOMAS

(*Concluded from page 383, August issue*)

THE other end of the short fulcrum lever is a forked end screwed on and locknutted under the back end of the fork, so that by screwing on or off the leverage can be altered slightly. The fork ends connect up to the heads of the link rods (Fig. 10) and a small pin goes through the two to keep them joined.

The link rods (Fig. 13) are set at right angles to the fulcrum levers, horizontally on the front plate. The heads of these rods are tongued to fit in the fork ends, and are also shouldered at the back to take the inside diameter of the control springs. There is a special shaped sliding guide which also has a shoulder for the spring, but is rounded at the back to fit into a countersunk hole made for it in the outrigger bearing (Fig. 13). When working, the link rod slides backwards and forwards freely through the shaped spring retaining guide and also through the slightly elongated hole in the outrigger bearing. The shoulders on the head of the link rod and the guide keep the control spring central along the rod. The spring also keeps the rounded back of the guide pressed into the countersunk hole in the outrigger bearing, and this serves as a ball-pivot joint and guide for the link rod to slide through as well as pivot on.

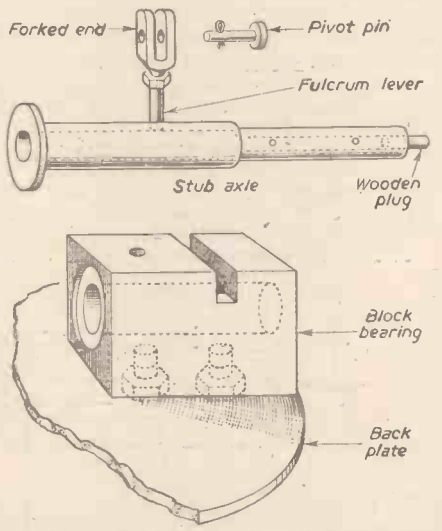
Control Springs

With regard to the controlling compression springs, the ones used in the unit shown in Figs. 1 and 2 were 3in. long by ½in. outside diameter, but it must be left to the constructor to choose the spring strengths to suit his requirements. As a guide, the ones used on the converted hand-driven generator already mentioned are weak enough to allow you to grip the propeller blade by the tip, end on, and be able to twist it fairly easily with the finger and thumb. These springs, of course, govern the amount of turn or twist on each separate blade against the wind pressure beyond a certain velocity, after which they automatically open or feather end on. This is, in effect, a type of constant-speed propeller, and it should be possible, with a little experimental work, to keep a steady balanced speed and steady output from the dynamo. Fig. 14 shows the general plan of the parts when assembled.

The following dimensions of the various components used in the construction of the four-bladed propeller described and illustrated are given as a guide.

The finished propeller, from the tip of one blade across to the tip of the opposite one, is 6ft. span. Each shell blade is 2ft. 6in. by 4¾in. at the root to 2¾in. at tip (approx.).

The main wind-shaft (Fig. 12a) is 8½in. long by ¾in. diameter, reduced to take one-half of a small flexible coupling, and threaded ½in. B.S.F. This shaft is mounted on two ¾in. bore ball races. The housing for the ball bearings is 2½in. long by 2¼in. outside diameter, with a spacing tube slipped over the shaft between the two ball races. The bearing housing is bored out to take the outside diameter of the ball races and is shouldered at both ends to take the width of the bearing plus a ¼in. thick end cover plate, to keep the grease in and any rain out. The spacing tube will be the same width as the shoulder in the housing, which has an ordinary grease cup screwed in the side. The housing is clamped between two $\frac{3}{16}$in. plates by four $\frac{5}{16}$in. Whitworth threaded tie rods at each corner. The bearing housing and plates are fitted to the chassis of whatever design wind-charger is used by four small angle-iron lugs riveted to the upright $\frac{3}{16}$in. plates. The other end of the main wind-shaft is also reduced and threaded ⅝in. diameter Whitworth for a distance of ¾in., then the diameter increases to ⅞in. for 1½in. along up to a shoulder 2in. diameter by $\frac{3}{16}$in. wide; this shoulder has three ⅜in. diameter Whitworth bolts screwed in the front side, equally spaced round, with the heads cut off to leave ¼in. long driving dogs or pegs. When making up the wind-shaft assembly, remember to leave enough shaft clearance beyond the housing, so that when the propeller is fitted it will not foul or strike it when in the open or feathered position.



Figs. 10 and 11.—Details of stub axle and bearing block.

Driving Plate

The driving plate (Fig. 12b), is 3in. diameter by $\frac{3}{16}$in. thick and has a boss or tube brazed in at the centre. The boss is 1⅜in. diameter by 1½in. long by ¾in. bore. The flange has three ⅜in. holes drilled in it at the back to register with the driving dogs or pegs, which are on the 2in. shoulder of the main wind-shaft. The driving plate is pushed on the wind-shaft, from the front, right back to the 2in. shoulder, engaging the holes with the driving pegs, after which a large washer, 1⅜in. diameter by ⅛in. thick by ⅜in. hole is put on next and a ⅜in. nut is run on and the whole assembly is locked back to the 2in. shoulder. The driving plate of the wind-charger shown in the photographs was made from the sheared-off wheel end flange of a Bedford lorry back axle, which was turned down to size.

Back Plate

The back plate, next to be described, can be brazed directly on to a boss, thus doing away with the driving plate idea. The writer had to adopt this method owing to the lack of suitable materials.

Front view of the completed propeller driving a wind-charging unit.

The driving plate is bolted to the back of the block bearing, at the same time passing through the holes drilled in the back plate, thus bolting the assembly together. If a single plate is used as previously outlined, the fixing bolts will only need to be screwed into the back of the block bearing (see Fig. 11). In the job shown in the drawing, the three items are bolted together with ⅜in. B.S.F. short hex./headed metal screws. There are two for each block bearing. It will be noticed in Fig. 12b that the hex./headed metal screw nearest to the main shaft passes through both plates and is screwed to the block bearing, which is drilled and tapped ⅜in. B.S.F. to take it, and also the metal screw set above it, which goes through the back plate only, and helps to keep the block bearing firm and square.

Block Bearings

The block bearings (Fig. 11) are made from 1⅜in. square, mild steel bar. They are 1⅜in. square by 1⅛in. long by ¾in. bore, and are counter-bored at one end (nearest to the driving plate boss) to 1⅛in. inside diameter by ⅛in. deep, to take the head of the stub axles. These bearings have a $\frac{5}{16}$in. wide slot cut across the front face, about ⅜in. deep, at ⅞in. centres from the end of the bearing (the opposite end to the one recessed). These slots, which are for the fulcrum levers to move in, side-to-side, will have to be filed deep enough to allow the levers which are screwed to the stub axles to have sufficient movement to enable the axle to make a full quarter turn so that the blades can feather or turn almost edge on to the wind. In this position the blade is almost parallel with the main wind-shaft. The bearings are, as before mentioned, drilled and tapped ⅜in. B.S.F. at the back, while at the front, just below the slot, in the centre is a hole tapped and threaded ¼in. Whitworth, for fixing on the front plate. When bolting up the block bearing, etc., take care that the hex./headed metal screws do not go to far into the bearings, otherwise they will lock and pinch on to the stub axles and prevent them from turning.

Stub Axles

The stub axles, Fig. 10, are 5in. long by ¾in. diameter, and should make a good but free fit in the block bearings. They are reduced at one end for a distance of 2½in. to take the inside diameter of the ¾in. conduit tube which forms the hollow root axles. They should be a good tap-on fit to each other. The other end of the stub axle has a round head or shoulder, 1⅛in. diameter by ⅛in. wide, to fit the recessed end of the block bearing.

They are also drilled out $\frac{5}{16}$in. along the length and a small wooden plug is tapped in at the blade end. Also, a small hole is drilled in at the side, half-way up the bearing surface (this side hole is for the remote oiling system if used). The next operation is to place the stub axle in its bearing and on it mark off the centre of the slot in the block bearing face. Make sure that the axle head is flush with the bottom of the bearing in the recessed hole. Having marked the centre of the slot, the axle is taken out of the bearing, centre-popped on the marked line, drilled and tapped with a $\frac{5}{16}$in. diameter Whitworth thread to take the small fulcrum levers (see Fig. 10). To make the fulcrum levers, cut off four pieces of m./s. rod 1$\frac{3}{8}$in. long by $\frac{5}{16}$in. diameter and thread these both ends; one end is screwed in to the stub axle after it is put back in its respective bearing. They are now left until the front plate is ready to fix on, before screwing on the forked ends and their lock-

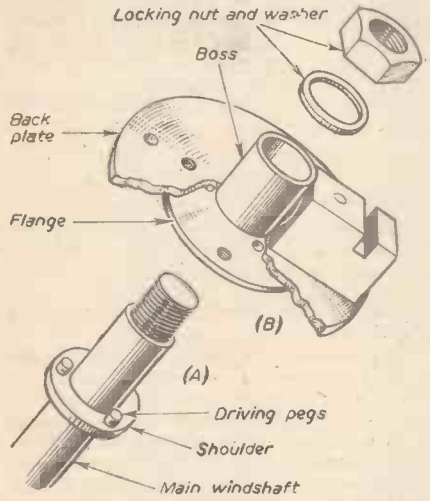


Fig. 12.—Details of windshaft and back plate.

nuts. The forked ends are made from short lengths of $\frac{3}{8}$in. square mild steel bar or brass, and are $\frac{7}{8}$in. long, overall, with a small shoulder on one end for the lock-nut to go against, while the other end has a slot cut $\frac{1}{4}$in. wide by $\frac{3}{4}$in. deep. There is also a $\frac{1}{4}$in. diameter hole drilled off centre towards the fork ends, for a small pivot and fixing pin to go through. The pin has a plain head and is drilled at the other end for a split pin (see Fig. 10). The forks are drilled and tapped at the shoulder end, up the centre with a $\frac{5}{16}$in. Whitworth thread, for screwing on to the short levers. It may be necessary, when fitting the tongue of the link rods, to round the bottom of the fork end slots on one side to allow the levers to come right back on one side of the bearing slot, when at rest, as the bottom of the tongue may restrict the full movement one way. There will also be required four thin lock-nuts for the fulcrum levers when set in the right positions.

Link Rods

The link rods (Fig. 13), can either be made from the solid bar or in two pieces, similar to the forked ends, with the head threaded and screwed on to the rod which has a $\frac{5}{16}$in. Whitworth thread one end only. The rods are roughly 3$\frac{3}{4}$in. long by $\frac{5}{16}$in. diameter, with a head $\frac{5}{8}$in. diameter by $\frac{3}{4}$in. long, shaped to a tongue $\frac{3}{4}$in. long by $\frac{1}{4}$in. wide and $\frac{5}{8}$in. deep. At the back of the head is a shoulder for the inside diameter of the control spring. There is also a $\frac{1}{4}$in. diameter hole drilled across the tongued end to correspond with the cross-hole in the fork end, so that when the $\frac{1}{4}$in. diameter pin is passed through the two, they are fixed in their working position. Do not make the tongue and fork too tight in their hinging movement.

The shouldered and rounded back pivot-cum-spring guide (see Fig. 13a) is $\frac{5}{8}$in. diameter, with a shoulder to fit the control spring, and has a $\frac{5}{16}$in. diameter centre hole, a free sliding fit to the link rod spindle. The other side of this guide is rounded to fit a countersunk $\frac{5}{16}$in. hole in the outrigger bearing.

The outrigger bearings (Figs. 13a and b) are made from mild steel bent up at right-angles, or angle iron cut to $\frac{3}{4}$in. wide; the upright side is 2in. long from the base and 1$\frac{7}{8}$in. from this there is drilled a $\frac{5}{16}$in. clearance hole, which is countersunk on the inside ($\frac{3}{8}$in. drill will do) for the spring guide and pivot. The $\frac{5}{16}$in. hole is slightly elongated to allow a free sliding and pivoting movement of the rod. The other limb of the angle or base has two $\frac{5}{16}$in. holes drilled and tapped in it for the two countersunk-headed metal screws which fasten them to the edge of the front plate on the underside.

Front Plate

The front plate (shown in Fig. 14) is 5in. diameter by $\frac{1}{8}$in. thick, with a centre hole 1$\frac{3}{8}$in. diameter to fit tightly over the end of the driving plate boss. This plate has four slots cut, 1$\frac{3}{4}$in. long by $\frac{5}{16}$in. wide, to correspond with the slots in the block bearings; there are also four $\frac{1}{4}$in. clearance holes drilled and countersunk for fixing the plate to the block bearings which already have the $\frac{1}{4}$in. Whitworth threaded holes just below the slots for the $\frac{1}{4}$in. Whitworth c/s metal screws. The outrigger bearing holes are drilled $\frac{5}{16}$in. clearance and countersunk for fixing the bearings in the position required.

Final Assembling

The whole unit can now be assembled. The front plate is screwed on to the front of the block bearings with a $\frac{1}{4}$in. Whitworth c/s metal screw to each block bearing which already have a $\frac{1}{4}$in. Whitworth threaded hole just below the bearing slots to take them. The forked ends are now screwed on with their locknuts to their short levers. Next, the outrigger bearings are fitted in their right positions on back of the plate. Then the link rods with their control springs and pivot guides slipped on are then pushed back and outwards through the holes made for them in the outrigger bearings, and finally they are let back and fitted to the forked ends and the small $\frac{1}{4}$in. pivot pin pushed through. When the right amount of leverage is found, the split-pins are fitted, and also the locknuts tightened to the shouldered back of the forked ends.

When the mechanism is assembled, the whole thing is placed on a level or flat floor, after pushing the root axles over the stub axles right home. Now twist each blade to set at an angle of 20 deg. to 25 deg., using the front plate as a baseline; this is when all levers, etc., are back at rest or in the normal running position. The blades can now be cross-bolted with two $\frac{3}{16}$in. or $\frac{5}{32}$in. diameter high-tensile aircraft bolts and nuts.

All things being made equal, the mechanism should not need much balancing, if at all, but it is just as well to check this over by temporarily fixing the whole unit to an upright post with a large coach screw the same size as the wind-shaft being used. If balanced, the blades should remain in any position it is placed, or if it is spun round it should not keep stopping at one spot.

It will be noticed in the photograph (Fig. 2) that when the forked ends of the fulcrum levers are at rest, or in the running position, they only just clear the springs of the next blade, etc., behind them at right-angles. This somewhat cramped grouping was necessary owing to the whole of the front being confined to the limit set by the car headlamp case used for the nose cap, which was 5$\frac{1}{2}$in. inside diameter.

Dynamo Details

There are at present on the market all kinds of ex-Government surplus electrical equipment, and it should be fairly easy for the reader to build a wind-driven charger and charging board. The unit shown in Fig. 1 was made from scrap, and odd bits and pieces supplied by friends. The dynamo is an ex-Government hand-driven one, 6-12 volts at 5 amps. The original cranking handle was removed and one-half of the small flexible coupling used takes its place. This dynamo is an enclosed-gear type and requires a fair amount of turning, but the four-bladed propeller described drives it quite well, even in a moderate wind.

There is a certain amount of lathe work involved in making the propeller shown in the various illustrations, but most of the work is done by hand. The writer did 85 per cent. of the drilling with the aid of an ordinary $\frac{1}{4}$in. breast drill, plus a lot of hacksawing and filing. The sheet metal work usually started on the shed floor and finished up in a small bench vice; also, a large pair of garden shears were used to cut out the sheet metal, while a piece of 3in. by 2in. wood served as a beater's mallet! The reader can modify the design to suit the tools and material available.

Fig. 1 is a side view of the wind-charger, with the side cover removed to show the layout of the wind-shaft. The dynamo is flexible-coupled to the wind-shaft which is on two ball bearings in the housing, which is clamped between two upright plates. The back of the propeller boss is shown and also the nosecap.

Nose Cap

The nose cap is made from an old car headlamp casing, and the four projecting "horns" are tubes, with the outer ends blanked off and soldered over the holes drilled in the cap. This is to protect the ends of the link rods from the weather when they move outward beyond the diameter of the cap, which is also made a good fit on the back driving plate and round each propeller blade's axle. The cap is clipped on by a simple swivel bolt and wing nut on one side; the other side is a tongue and slot fixing, very

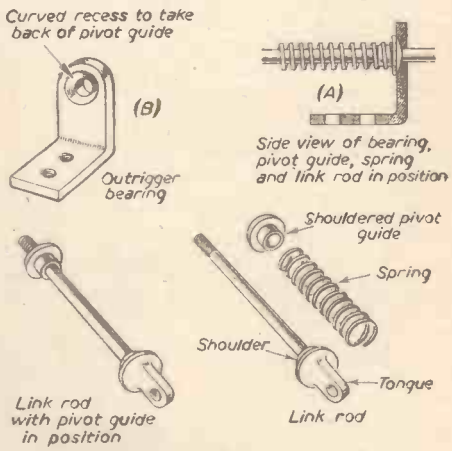


Fig. 13.—Link rods and guides.

much after the style in which the glass front of a car lamp is secured. If a car headlamp is not available, a large tin could be used, with the lid fastened to the back plate, and the main part being made to fit round the blade axles and clipped with a neat fastening arrangement. In Fig. 1 can be seen the air scoops fitted, the rear long one goes up on to the side of the commutator and brush case; on the opposite side to it an outlet slot is cut. The short scoop is under the main casing of the dynamo, and these scoops help to keep the dynamo cool. There can be seen, lower down, the two brass slip rings which are

fastened, but insulated, to the hollow turntable spindle. From these slip-rings are two heavy insulated wires that pass in and up the hollow spindle to the negative and positive terminals of the dynamo. There are two hard flat copper springs which make a constant contact on the slip-rings, no matter which way the whole charger swings round to face the wind. The flat copper wiper brushes are fastened to an ebonite block, which is also fastened to the turntable bearing and pole clamping framework. From the ebonite block and brush terminals are two heavy insulated cables (7.044) which go down the mast to the charging board, fitted with an ampmeter and cut-out, then to the one or two six-volt batteries. The tail rope or cable passes over a small pulley above the hole through the hollow turntable spindle and is guided down past the slip-ring leads with a small tube set in and to one side, inside the spindle.

Fig. 2 is a front view of the propeller boss with the nose cap removed, showing the general arrangement of the control springs, levers, etc., which govern the turning or twisting movement of each separate blade. It will be noted that the blade on the left-hand side of the photo is being held in the open or "feathered" position; this clearly shows the action when the excessive wind pressure forces the blade back. The projecting pipe also shown, coming out from the centre, is a remote oiling system for use when the cap is on the boss. It is a small ⅛in. diameter pipe with a grease nipple screwed on the outer end, while the other end is screwed into the partly hollow wind-shaft, after the ⅝in. Whitworth clamping nut is on. The wind-shaft is drilled part of the way along its length, as far as the block bearing, and there are four small holes drilled in sideways through the main shaft and the driving plate boss, opposite the centre of each stub-axle head, which are in the block bearing. The stub-axles are drilled for lightness along their length and plugged at the blade end with a wooden plug. They also have a small hole drilled in the side about half way up the bearing surface, the idea being that when the oil from a grease gun is pumped through the end grease nipple along the extension tube and the hollow wind-shaft, it then escapes through the side holes in both shaft and driving plate boss, and then centrifugal force flings the oil out and up the hollow stub-axles through the small outlet hole on to the bearing surface. This remote oiling system is not vital, as all the moving parts can be oiled with an oilcan when the nose cap is removed. Whichever method is used, it is just as well to smear the whole front and inside the cap with grease, as this will help to keep out the rain and prevent rust setting in.

Figs. 3 and 4 are two views of the finished wind charger before it was erected on its 34ft. mast. It will be seen that it is fitted with a sliding adjustable side vane, another form of governing, but this is not really required as the propeller is governed, but the side arm is needed to take the outside pulley for the tail rope or cable if a spring-tensioned hinged main tail is used. With this principle, the rope or cable is fastened to the tail vane and passes out to a small pulley on the side arm, then in at right-angles to another small pulley set over the hollow turntable spindle, and continuing down the spindle to the bottom of the mast, so that when it is pulled it swings the tail round at right-angles to the charger, which causes the wind to turn the whole unit out of the face of the wind. It is released to allow the spring on the side of the tail, etc., to pull the tail vane out parallel to the charger again and so back into the position facing the wind to start generating.

Items of Interest

Britain's Newest Aeroplane

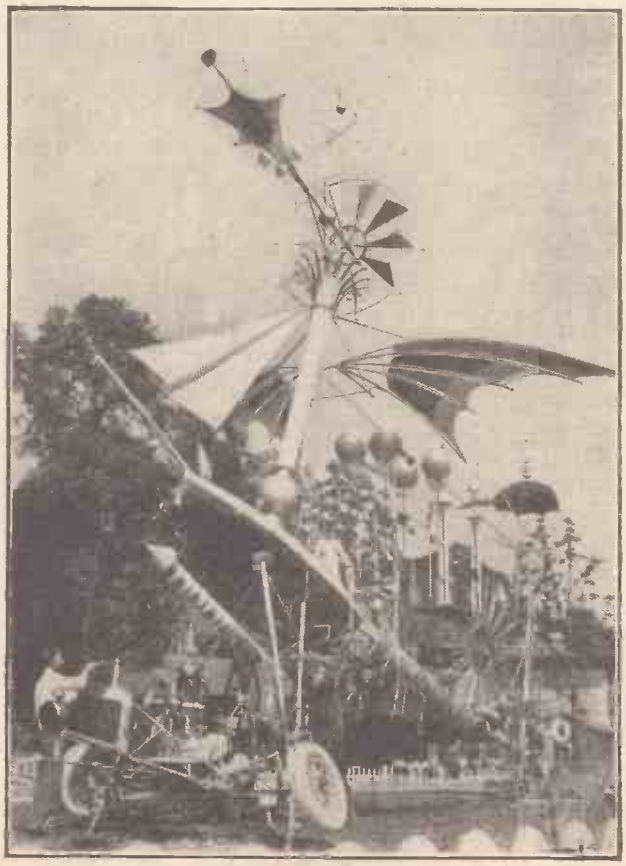
THE prototype aircraft of a new entrant into the specialised field of aircraft construction is now being exhibited in the Battersea Festival Pleasure Gardens. This is the Shell By-plane X-100. Chief designer of the project was Emett, of Punch fame, and the aircraft contains many features of interest to mechanically minded enthusiasts.

A departure from the traditional is the pilot's nacelle which is planked in antique teak and ends in a graceful tail which keeps the delicate butterfly wing rudder the necessary 25ft. distant from the incandescent boiler. A long funnel supports the main wings and a large diameter rotor extracts power from the four winds and conveys it elsewhere. Amidships are the Urge Crankless Combination Beam engines which provide, at the turn of a tap, propulsion for sea or air.

Perhaps the most interesting feature is the Mainflight Jet Engine on the front axle. This works on almost unknown principles, embracing a centrifugal anti-static energiser, in which rotary condensers, passing between electro-magnets, charge pith balls with alternative negative and positive currents, so that they become confused, and run violently up and down the static rods, thus building up a potentially powerful potential in the semi-automatic fully-syphonic closed circuit of especially lightened heavy water, aided by the three-stage blower and heat exchanger.

Giant Planing Machine

SPECIALLY built for John G. Kincaid's works, at Greenock, a 220-ton push-button planing machine was recently delivered to them in 25 parts, a lorry for each part. The £40,000 machine, 60ft. long and 25ft. high is the largest and most modern of its kind in Britain. Its makers are Noble and Lund, of Felling, near Newcastle.



The Shell By-Plane X-100, with its designer, Mr. Emett. (Photo by courtesy of Shell-Mex and B.P. Ltd.).

180-ton Hangar Doors

IT is reported that London Airport is to have what are claimed to be the largest aeroplane hangar doors ever made.

Head, Wrightson Aluminium, Ltd., Thornaby engineering firm who are to make the doors, said recently that the Ministry of Civil Aviation ordered that the doors must be 300ft. long and 45ft. high. Use of a special aluminium alloy will keep the weight down to about 180 tons, and the doors will be designed to open and shut at the touch of an electric button.

A Nut and Bolt Hint

THERE are certain structures or pieces of mechanism where it becomes necessary from time to time to remove nuts and bolts for the replacement of a worn part. As examples, one might cite wearing strips to resist abrasion, special plates to resist burning by hot material, etc. Many cases could be thought of in connection with various industries. In such cases, how many engineers and mechanics have not experienced a feeling of irritation and frustration on finding that the bolts and nuts have rusted together, or in some instances have become burnt by heat so that it is practically impossible to unscrew them, and the sawing through of the bolt becomes the only solution to the problem?

The writer, in common with many others, has often experienced this annoyance, and, as a consequence, has experimented in various ways in an attempt to find a solution. It has been found to be a good plan to use iron bolts with brass nuts. (This usually applies to the smaller sizes, say up to ¼in. or 5/16in.)

Since there are two metals, it is impossible to have a continuous "growth" of rust in the threads between nut and bolt, and the combination will remain easy to undo even after prolonged use under adverse conditions. If, even in such cases, persistent binding prevails, try the gentle application of heat from a blow lamp or gas jet. This, applied more particularly to the nut, will cause the latter to expand and become loose, owing to the higher co-efficient of expansion of brass as compared with iron.—A. R. M.

ELECTRICALLY-OPERATED MECHANISMS

Their Application for Various Purposes

By "ENGINEER"

IN this article I propose to give details and results of experiments, inventions and their application in connection with electrically driven and mechanically operated movements extending over many years of model making, chiefly for exhibition and general publicity. Not all of the schemes devised by me can be dealt with; they would occupy far too much space and call for too many complicated drawings; for instance: there was a human figure, half life size, which was made to appear as if walking and which, besides its feet, moved its hands and arms, unrolled a scroll, moved its head and eyes and, shown in a West End of London window of a big stores, had to be removed because of the large crowds which collected on the footpath outside. Then there was a large model of an electrically-driven colliery winding engine, a working model of a dragline excavator, performing all the operations of the prototype and embodying three separate motors all made to synchronise; there was an oil-well boring plant, a large heavy model of an 8-cylinder diesel engine, and many other items too numerous to mention.

From the list of such working models I have selected, for illustration here, those which operated upon principles which may be applied, if required, to things other than models; things which call for interrupted motions and for alternately reversible movements or light changes. I commence with the switch gear, designed for operating the reciprocating cages in a model of a colliery winding shaft.

It was required that the up-and-down travel of the cages should be automatic, but that there should be an interval of rest between the movements. There was, besides the cages and their guides, the usual pithead gear and reversible winding drum, all as in full-size mining practice.

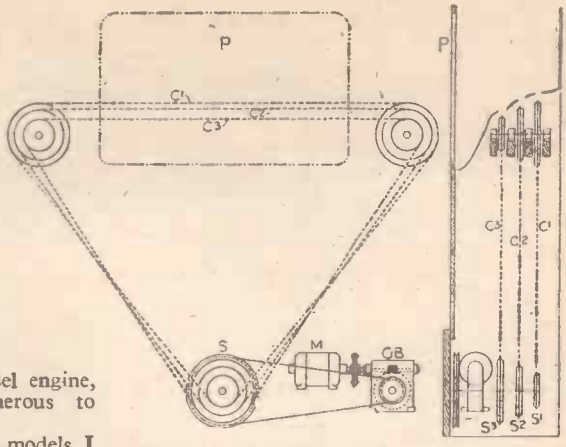


Fig. 4.—Moving model display gear.

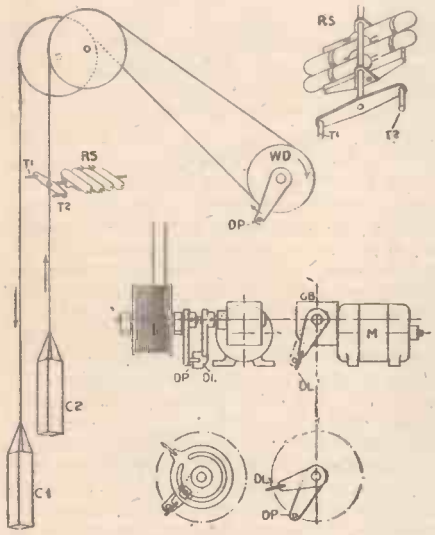


Fig. 1.—Colliery winding gear.

Referring to Fig. 1 the motor, M, geared down through the gearbox, GB, and revolving the drum, WD, was controlled by mercury switches, RS, four of them, secured to a pivoted cradle on the shaft of which was a double armed lever. In this lever were pins, T1 and T2.

In the drawing on the left of Fig. 1, cage C2 is ascending and C1 descending. When C2 reaches the top of its travel it will knock up pin T2 and reverse the motor. Fig. 2 is a pair of wiring diagrams showing the changes in the current flows when the mercury switches are tilted from one side to the other. As will be seen, reversing is shown through the field winding, but it may be done either through the field or through the armature.

At the top right-hand side of Fig. 1 is a small sketch of the switch cradle. Here it may be noted that the contact ends of the switches are all arranged to come as near to the pivoted shaft as possible; this is done in order to reduce to the minimum the movement and resistance to bending of the eight flexible connections. The great advantage of mercury switches—mercury making contacts in air-exhausted glass tubes—over any other kind of switch is, first, that there is no arcing and, second, that a mere featherweight touch is sufficient to tilt them; this delicacy of movement should therefore not be defeated by resistance from stiff electrical wiring.

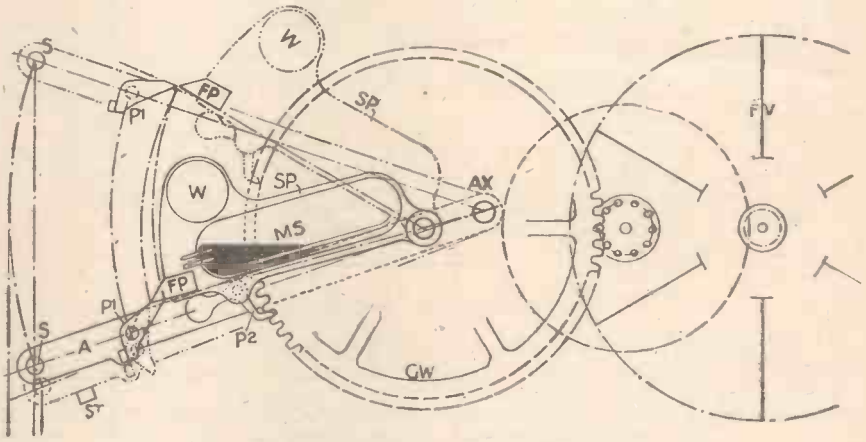


Fig. 3.—A time interval switch gear.

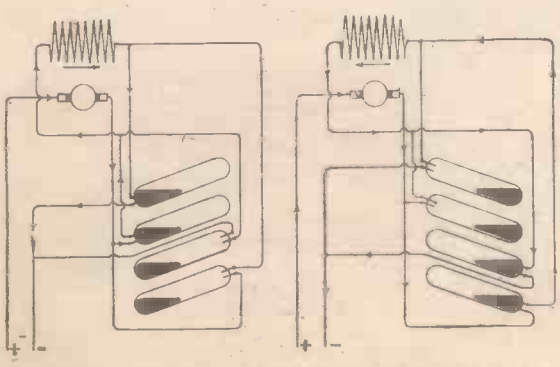


Fig. 2.—Motor reversing by mercury switches.

Time Interval Gear

I have referred to a time interval between the travels of the cages. In one design this interval was provided for by compelling the driving arm and its leaf, DL, on the geared shaft of the motor, to make very nearly one revolution before it caught up the arm and pin, DP, on the drum shaft, after reversal of the motor. In order that this time interval may be reduced, if required, the position of DL was made variable by means of a plate, slotted as shown at the lower right-hand of Fig. 1. By this means the interval could be altered from the duration of one revolution to no interval at all.

For giving an interval longer than the duration of one revolution it becomes necessary to switch off the motor entirely and, without interfering with the reversing switches in any way, a small piece of mechanism is introduced carrying one single mercury switch, or, if it be thought advisable to break both sides of the circuit, a pair of such switches. The apparatus is drawn in Fig. 3, where GW is a gear wheel driving through other gears and pinions—such as may be taken from an old alarum clock fan vanes, FV. Carried loosely upon the shaft of the large gear wheel is a plate SP to which the switch, MS, is

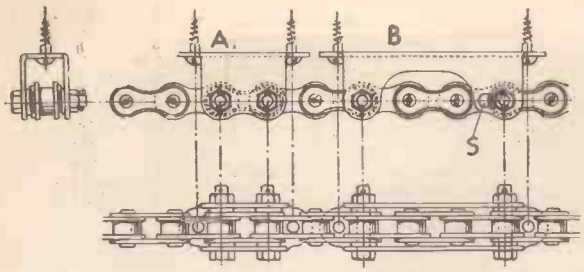


Fig. 5.—A portion of moving model display gear.

attached. W is a small weight. Pivoted at the bottom of the plate, SP, is a counter-weighted pawl, P2, which engages by gravity with the teeth of GW. On the periphery of SP is a fixed pawl, FP, and this is engaged by another pivoted pawl, P1. This P1 is carried by a long arm, A, which is pivoted at AX, eccentrically to the centre of GW.

The outer end of A is provided with a striker pin, S, which is long enough to be caught by either of the two cages and carried up to the position shown by the chain-dotted lines. In moving upwards the arm, by means of P1 and FP, lifts the switchplate and cuts off the current. When it reaches the top of its movement, P1, on arm A, releases FP by reason of the eccentric centres and the plate SP is then carried by P2 which has, in the up movement, slipped over the teeth in the gear wheel and re-engaged itself in a fresh position. Gravity now comes into play and begins to set in motion the train of gears and the fly vanes, FV. The arm A will remain up, but the disengagement of pawls P1 and FP will allow the switch to slowly fall until the mercury flows to the opposite end of its glass cylinder and closes the circuit. A stop, not shown, will be required for SP to limit its descent and stops are provided on the arm for P1 and, externally, ST for the arm itself. The arm A is lowered directly current is switched on by the falling away of the cage which lifted it.

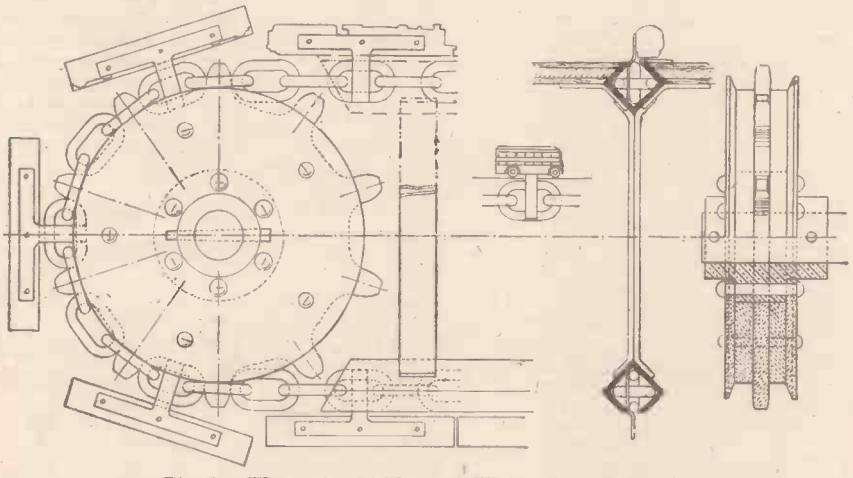


Fig. 6.—The mechanism for travelling small-scale models.

Travelling Object

The next mechanical arrangement was used to display a series of models of ships, all sailing or steaming from left to right across a proscenium opening. The sea was painted on curved surfaces and there were slots in these, or between these, along which the vessels passed in front of a painted back scene of sky. There is, of course, no reason why the scheme should not be used for any other kind of moving object: The history of locomotive development, the history of the Atlantic crossing, transport through the ages, development of the motor vehicle, and the history of dress or costume, i.e., the human figure, are all suitable subjects.

Figs. 4 and 5 show that ordinary bicycle chain and sprocket wheels enter largely into the scheme. When there is a great number of objects to be shown—as there was in the case of the ships to which I have referred—they cannot all be accommodated on one chain and, moreover, the moving picture is improved in perspective if the nearer objects move faster than the more distant ones; for these reasons two, three or more chains may be provided, each driven by a sprocket wheel having a different number of teeth. The fastest moving objects will be those nearest to the proscenium, P, and will be carried on chain C3; the slowest will be the most distant, at the back, on C1. All three of the driving sprockets, S, shown in the front and sectional views in Fig. 4, that is to say, sprocket wheels S1, S2 and S3, are keyed on one shaft and all run at the same revolution speed, but the upper sprockets on each side run each on its own independent short shaft.

The rate of travel depends upon the subject of the display, and in the case of the ships they moved very slowly. The motor, M, drove through a big-reduction gearbox, GB, and a belt over differential Vee pulleys as well.

Fig. 5 shows the method of making the attachments to the chains. For short, or comparatively short, objects up to about four or five inches in length, only single links in the chain may be embraced by the clips, as at A, but for greater lengths longer clips may be advisable. With these latter, B, the bolt at one end of the clip must pass through slotted holes, S, in the clip, in order that the chain may flex in passing around the sprocket wheels.

Omnibuses and Trains

In a large model of Bournemouth which my firm made for the Corporation of that famous watering place, and which was exhibited on Waterloo Station for some time, there were some hundreds of motor-buses travelling along the roads as well as trains on the Southern Railway. All of these were to an extremely small scale and were supported and caused to move in the manner shown in Fig. 6. Each vehicle was made with an extension of tinplate carried downwards and soldered to the links of an endless chain. The buses were die-cast with the tin strip cast in, but the trains were of wood.

There was, at first, difficulty with the stretching of the chains and eventually, having tried different manufactured kinds, we made the chains ourselves from mild steel wire. This trouble of stretching was created by the fact that one length of omnibus run was over 9ft. between the sprocket wheels, and not only curved horizontally following the directions of the roads, but up and down as well in accordance with ground contours. To guide the chains around curves and undulations they were enclosed in square brass tubes set diagonally and slotted at one corner for the passage of the vehicle supports, all as explained by the cross-section seen in Fig. 6.

The sprockets, one at each end, were at first driven by a motor and gearbox at one end only, the one at the opposite end merely serving as a jockey pulley, but on the 9ft. run (over 18ft. of chain) there was excessive friction in spite of lubrication and, although it is considered bad practice to couple two separate motors to do one job, I had two motors selected which synchronised for speed and put one of these at each end; thus both sprocket wheels were driving and the load at each wheel reduced to less than one-half. The sprocket wheels were built up, each of five steel plates, riveted together, with a hub of gunmetal. The centre plate, on the edge of which the teeth were formed, was case-hardened on the periphery. The wheels of the locomotives, the trains and the buses did not revolve.

Colour Light Changing

The automatic changing over of lighting to provide differently coloured illumination

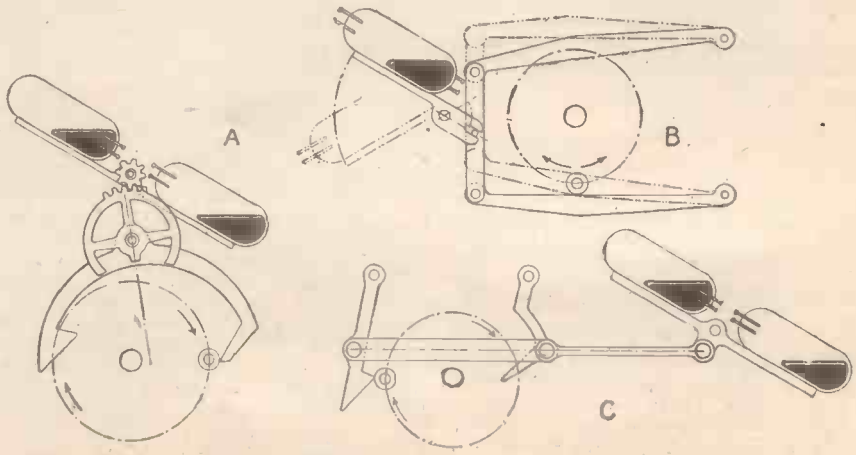


Fig. 7.—Apparatus for change-over switches.

in, or on, models and for advertising schemes is a thing I have often been called upon to arrange and, in Fig. 7, I show three of the mechanisms devised to trip mercury switches for the purpose.

Although, as I have already said, on these switches there is no arc at the moment of making or breaking a circuit, the more rapid the movement of the switch the better. For this reason the scheme A is the best, with C almost as rapid, whilst B gives the slowest movement to the two switches, which are here mounted side by side. In B also the weight of the switches has to be carefully balanced by that of the arms and their connecting link, though this is not a difficult matter to arrange, since the switches could be mounted in adjustable positions. In all three mechanisms small geared motors are used to revolve the tripping pin ; which pin should be provided with a roller. Obviously, in A and C the pin can turn in one direction only, whilst in B it does not matter in which way the pin revolves.

The Sea

All the mechanisms which I have dealt with up to this point, although designed for and applied to models, might be used for other purposes, chiefly those connected with advertising, but the last two which I propose to illustrate cannot, so far as I can see, be of any use other than that for which they were designed, namely, as models of the sea with waves in motion. I show them because they are interesting and chiefly because some ship lovers may like to mount their model vessels upon the surface, or perhaps I should say *in* a surface, which does give the impression of waves and a sea in motion. The effect is very considerably enhanced if the whole is set behind a proscenium, properly lighted, and treated as a diorama.

The first of these mechanisms is made to move a fabric sea surface with a long, rolling, deep sea wave or swell: the size of each wave and the distance between their crests being determined by the area and scale of the model and the heaviness of the sea which is supposed to be running. The drawing, Fig. 8, represents the space between two crests of heavy waves ; which space I have divided into eight parts. Any number of parts may be chosen, according to the size of the model, but they should not be too widely separated for any given wavelength. The positions of the spaces are determined by shafts running across the model underneath the "sea," and in these shafts there are double-webbed cranks, as shown at the right-hand end of the drawing.

The cranks are set at such angles in relation to each other, that when crank No. 1 is on top centre crank No. 2 will be at 45 deg., crank No. 3 at 90 deg., and so on, until we get crank No. 5 at the bottom and crank No. 9 on top, as No. 1. Each shaft has, either at one end, or preferably in the middle of its length, a simple plate sprocket wheel, as A, B, C, etc., and on the shaft of a gearbox driven by a motor another and little larger sprocket wheel. The whole is then encircled and all the sprockets coupled, to rotate together, by a cycle chain.

Now it will be seen that if the motion is started with crank No. 1 at the top, all cranks set at correct angles and rotation is in the direction shown by the arrows, one-eighth of a revolution will bring crank No. 2 to the top, then crank No. 3, then 4 and 5, and so on, each crank behind the top one dropping down as those in front come up, until each in succession passes from the crest of a wave to the valleys between them, so producing the rolling effect of deep-sea swells.

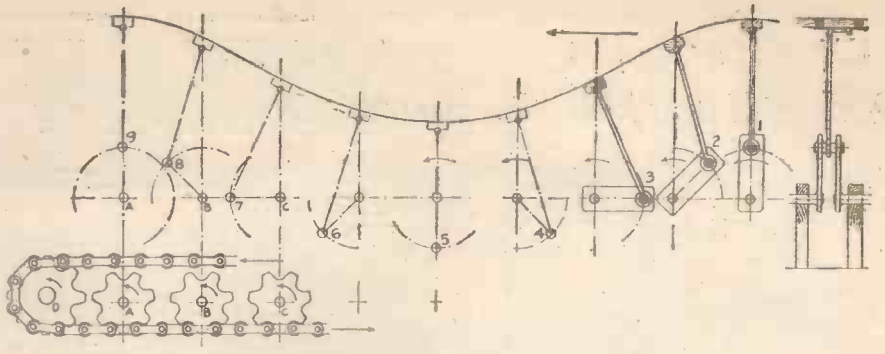


Fig. 8.—Mechanism for reproducing the effect of a heavy sea.

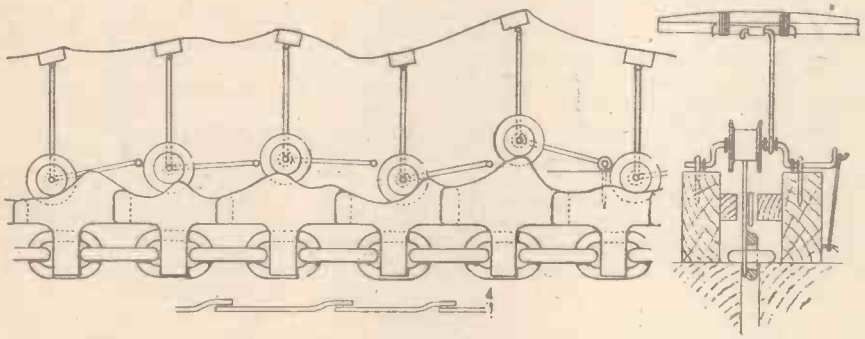


Fig. 9.—Mechanism for reproducing the effect of small waves.

It will be understood that I have drawn the chain and sprocket wheels below the shafts and cranks merely to avoid confusion, and that sprocket A is on shaft A, B on B and C on C ; also that there will be sprockets on every shaft.

A Diorama of the Sea

If the sea is intended to be modelled in perspective, as of course it should be in a diorama, then the wave length represented by Fig. 8 may very well be at the extreme front of the model. Assume that crank No. 9 is the front and that the swell is rolling towards the spectator, then the next lot of cranks to the right, beyond No. 1, can have not only diminishing lengths of throw but can be closer together, fewer in number and can go on reducing in throw, in spacing and in number the farther they become from the front. By this means, especially by the use of judicious painting, for atmospheric effect, true perspective will be arrived at.

For the fabric for the sea surface: silk is best, to which the little wooden strips, shown in Fig. 8, are glued. In the foreground the silk is treated with transparent blue-green oil paint and finished with either varnish or wax.

For Smaller Waves

Fig. 9 shows the mechanism for another seascape model ; but here the waves were smaller: they did not roll but represented a sea that might only seem "choppy" in a small boat. In this scheme the same kind of chain is used as in the case of the buses and trains, and soldered to every vertical link is a plate cut to a profile which will join up in outline to the next plate in advance of and behind it ; thus is produced a continuous, moving straight cam, resting upon which are little boxwood flanged rollers running upon pivoted wire radius arms and having wire connecting rods leading up to similar wooden strips glued under the sea fabric, as in the first scheme. The roller arms each have a return cranked wire, as shown in the cross-section, having a light rubber band, or a spring, hooked over the end ; this in order to ensure that the roller is kept down to the cam. The chain carrying the cam plates will, of course, be driven, like the buses, by a motor and sprocket wheels, and the straight part of it beween the sprockets, where the cams carry the rollers, will slide upon black-leaded hardwood runners, as shown in the cross-section.

A MODEL STEAM LAUNCH

A Modern Stream-lined Design Powered by a Single-cylinder Oscillating Engine

By J. E. J.

(*Concluded from page 372, August issue*)

The Power Unit

THE unit described here was constructed from improvised material; putting it in a more explanatory sense it was prefabricated. Although a plan was drawn up showing basic requirements, certain allowances were made in view of the improvisation. Take, for example, one component, the flywheel. Without a lathe, turning one up to the actual measurements was out of the question: therefore, something of suitable character was found and "doctored" to specification instead. This was the case throughout the unit's whole construction. It is surprising what a "junk box" will produce when called upon.

The Mounting

This was cut and filed to shape from a piece of 20-gauge sheet iron (see Fig. 11), with a separate piece fitted at the rear to support the rear bearing. It will be noticed that it is so constructed to lie at a cant. This is for lining up with the propeller shaft. The main shaft bearings consist of brass bushes soldered into holes drilled for the purpose. The main shaft is a short length of silver steel, $\frac{1}{8}$in. dia. The flywheel was improvised from a brass disc. As this was originally somewhat oversize it had to be brought to the required measurements. First, a $\frac{1}{8}$in. dia. hole was drilled through the centre. Into this was soldered, temporarily, a short length of brass rod. Then, using the handbrace clamped in the vice as an impromptu lathe, the disc was inserted into the chuck and the surplus metal removed with a file. The next operation was fitting the crank. First, the location was found with the dividers, then a $\frac{1}{8}$in. dia. hole was drilled; into this was inserted and soldered a short length of $\frac{1}{8}$in. dia. steel rod to serve as the crank. Finally, the main shaft was inserted into the centre hole from which first had been removed the existing brass rod. Then the complete unit was polished up.

The Cylinder

This was made of $\frac{3}{8}$in. dia. bore 20-gauge brass tubing. The head, filed from a piece of brass, was inserted as a press fit into one end of the tube and soldered (see Fig. 12). The cylinder block was cut from a piece of brass and filed down to the exact dimensions. Into one side was filed a half-moon recess to serve as a seating for the cylinder. Into the centre of the block a No. 33 dia. hole was drilled and then tapped 4 B.A. This was for the pivot, which was formed of 5/32in. dia. brass rod tapped correspondingly at both ends 4 B.A.

Fitting the cylinder to the block. With a scraper the half-moon groove on the block was cleaned until the cylinder seated dead square with no "rocking." Then the seating was tinned with solder as likewise the cylinder, and the two units were assembled and sweated. The steam port, 1/16in. dia., was drilled until it penetrated through just under the inside of the head, and finally the face of the block was rendered dead true, and void of high spots, by rubbing on a piece of plate glass to which had been added some carborundum dust and oil. Incidentally, both the cylinder and mounting blocks have to undergo this highly important procedure in view of

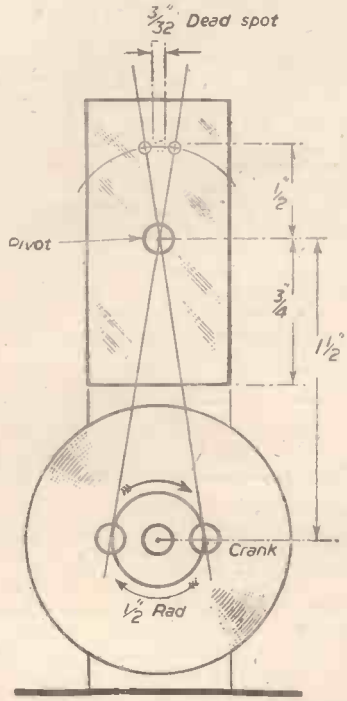


Fig. 13 (Above).—Method of locating the steam and exhaust ports. Fig. 12. (Right)—Component parts and side view of the completed engine.

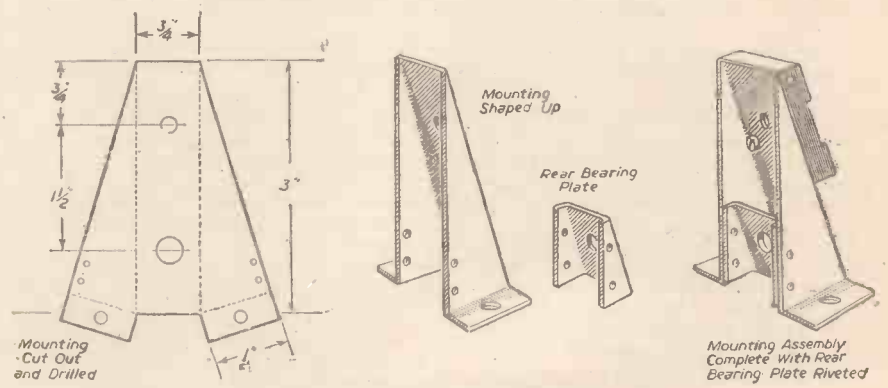
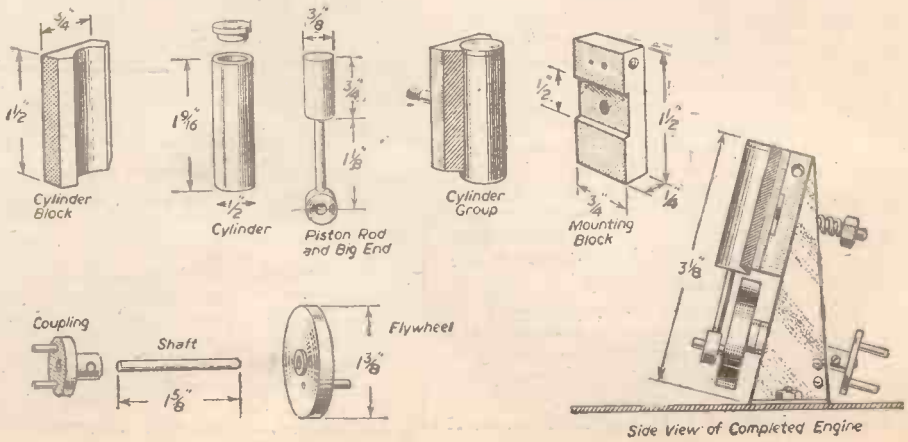


Fig. 11.—Details of cylinder mounting.



their having to be *absolutely steam tight.* (The blocks and the ports are two details that require very *exacting treatment.* If a block is filed slightly out of shape, or a port drilled a fraction off its centre, it is better to dispense with them entirely and re-make.)

The mounting block was filed up from brass, and is screwed on the mounting. The pivot hole coincides with that of the cylinder block ; in fact, to obtain uniformity, both were squared together, and a 1/16in. dia. pilot hole drilled right through both.

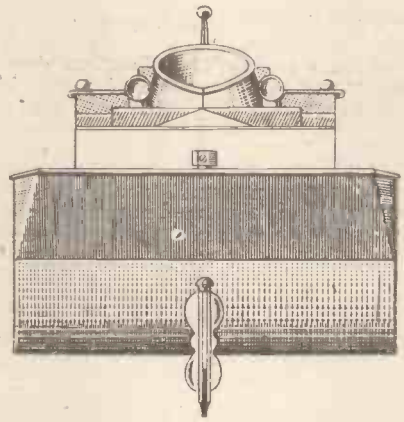
Drilling the Steam and Exhaust Ports

This is, of course, a careful operation. The positions can be worked out, but the safest way to obtain the locations is by the "impression method." First assemble the flywheel to the mounting, and the cylinder to the mounting face block, without the pivot spring. Insert piston, and connect big end to crank. Place a little "blue" over the steam port of cylinder, rotate to extreme right angles and press cylinder block home against mounting block. Gently withdraw cylinder, rotate to opposite side, right angles, and repeat process. Two circular impressions will be found on the mounting face. Pinpoint the centres of these with the scriber, then drill 1/32in. pilot holes through each. Open out the holes to the required size, taking care that the "dead spot," i.e., the distance between the inside edges of the holes, is not *less* than the extreme diameter of the steam port on cylinder face (Fig 13). When the cylinder is vertical, this "dead spot" ensures that no steam is permitted to enter the cylinder. Another point to remember is that the exhaust port should be slightly larger than the steam port, as the quicker the exodus of the exhaust steam, the better the performance of the engine as a whole.

The holes of the steam and exhaust pipes are drilled through the sides of the block ; steam, right, exhaust, left, facing forward. That means that the motion is anti-clockwise. The size of the holes are of such diameter that just permits the insertion of the respective pipes as a tight fit, after which these are fixed with solder. The steam is $\frac{1}{8}$in. dia. copper and the exhaust 3/16in. dia. copper. The steam pipe is connected direct to the boiler dome, whilst the exhaust is carried away via the funnel as shown in Fig. 14.

The Piston, Piston Rod and Big-end

Fitting a piston to the cylinder was one of the first operations carried out. A piece



Rear view of the completed model launch.

of $\frac{3}{8}$in. dia. mild steel was procured and lapped into the cylinder tubing with emery cloth and oil until it slid backward and forwards smoothly. Then a piece was cut off to the requisite length, drilled on the centre and fitted with a piston rod made from $\frac{1}{8}$in., dia. steel rod. On to this was soldered a "big-end" improvised from a brass collar (see Fig. 12). The final detail on the engine is the universal coupling. This was improvised from another small brass disc, having two holes drilled, into which were inserted two brass pegs, for engaging the propeller coupling, Fig 12.

The Boiler

The design of the boiler is similar in every respect to the "pot" type, that is to say, it consists only of a copper cylinder sealed at both ends. There are no internal or external water tubes. In fact, it bears a strong resemblance to the kind usually seen on sale in toyshop windows.

The best material for boiler construction is, of course, solid drawn copper tube. If no tube is available, the next best thing is to "roll-up" from sheet, and in fact, for simpler types of boilers it is ideal because of the lightness. Copper tube, unless turned down, is inclined to be on the heavy side ; also the thicker the gauge of the metal, the longer it takes for the water to be brought to the boil, which, of course, lessens the running time of the craft.

The boiler for this unit was rolled up from a sheet of 22 gauge copper, the join being lapped over and silver soldered, see Fig. 14. To serve as a former, a length of iron piping was clamped in the vice, the sheet being wrapped around it. The end plates were cut from a piece of slightly heavier gauge copper, and more tightly inset to a depth of $\frac{1}{8}$in. Right through the centre runs a $\frac{1}{8}$in. dia. brass stay, tapped 5 B.A. at either end to receive lock nuts which screw firmly down on to the end plates. The protruding ends of the stay also support the boiler in its casing. The filling cap and the dome were cut from an old brass rifle oil bottle, and are set in their positions in drilled holes on top of the boiler. There is no safety valve, as the engine, with the cylinder being spring pivoted, serves in this capacity, the face blocks being blown apart when the steam pressure becomes excessive. As there is no regulator, there is no danger of the steam being accidently shut off and forgotten.

Soldering

The melting point of silver solder is much

(*Continued on page* 430)

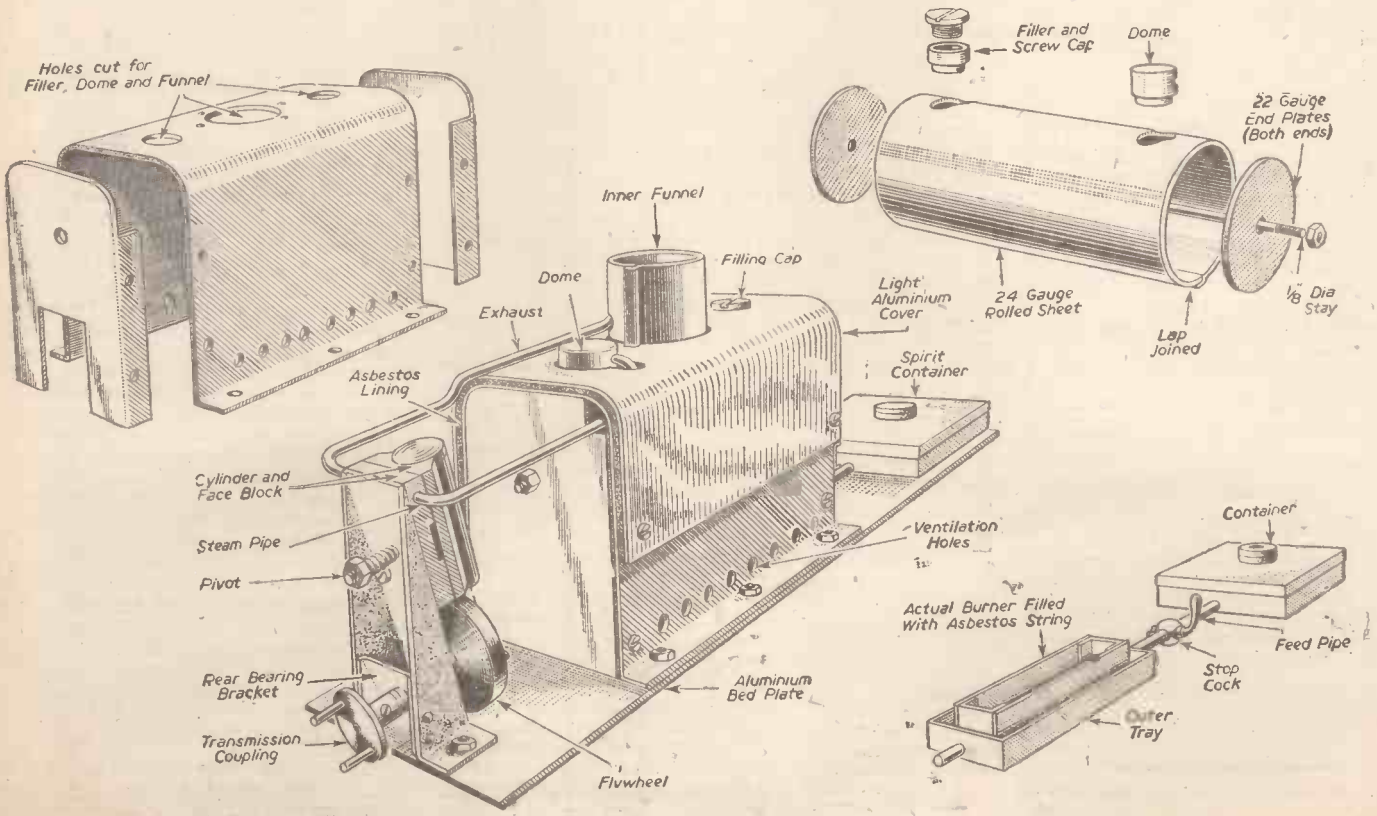


Fig. 14.—Perspective view of the complete power unit, and details of boiler, casing and burner.

Telescope Queries Answered

Dealing With Focal Lengths of Lenses, and a Terrestrial Eyepiece for the Simple Telescope Described in the June and July Issues of "Practical Mechanics"

By E. W. TWINING

SINCE the publication, in the June issue, of the first part of the telescope article, I have received letters from readers regarding the optical equipment of eyepieces for the instrument. Some require to know how to make a terrestrial eyepiece for viewing objects on the earth, the right way up; others say that the lenses they have received from the suppliers are not of the same focus as specified. Details of the eyepiece are given in the August issue.

I propose first to deal with the matter of the focal lengths of the two eyepiece lenses supplied by Messrs. Broadhurst, Clarkson & Co., Ltd. Only one reader has said that these are not as specified; he stated that the focus of the field lens is 1¼in., and of the eye lens ¾in., whereas the stipulated foci were 2in. and .66in. respectively.

Measuring Lens Focus

The accompanying Fig. 1 shows how the focus is measured, i.e., by projecting the light of the sun, or of the moon, with maximum sharpness of the image on to a piece of white cardboard, alongside of a rule. This is what the querist did. Now by the formula $\frac{fF \times fE \times 2}{fF+fE} = \text{Eq f}$. Where f is focus, F the field lens, E the eye lens and Eq. f the equivalent focus, I found that the quotient, with his lenses, is exactly the same as with the specified lenses, viz., 1in., so the magnifying power on the 40in. O.G. will be the same, but the distance apart at which the two lenses will be mounted is different. For separation the rule is $\frac{fF+fE}{2} = S$, S being separation, measuring from flat side to flat side.

As specified $\frac{2''+.66''}{2} = 1.33\text{in.}$, but $\frac{1.5+.75}{2} = 1.125\text{in.}$ So it behoves each reader on receipt of his lenses to check up on their foci and mount them accordingly. Stated in words, the separation should be: one-half the sum of their focal lengths.

I would warn the reader in testing the focus of a lens to use the image of an object at an almost infinite distance away. Only the sun or the moon are bright enough and fulfil these conditions. It would give a false result if the images of the houses on the opposite side of the road were projected on to the card, for in such case the focus would appear to be longer than it actually is.

In Fig. 2 are longitudinal sections showing construction of two eyepieces A and B, both having the same equivalent focus of 1in. A is as specified and B is as reported by the reader to whom I have referred. Another correspondent states that the diameter of the field lens is 13/16in., not ¾in. This difference is not material; it only means that an extra ring of card will be needed in the tube to bring the diameter down to that required by the lens, or else to use a brass draw tube of a little smaller outside diameter than 1in.; it does not matter which is done. In both of the diagrams the lenses are held in position by bands of Bristol board secured with seccotine, and the whole stuck in the tube with the same adhesive. Midway between the lenses a stop, C, must be inserted having a truly cut, circular hole in its centre.

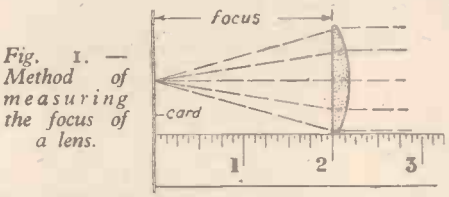


Fig. 1. — Method of measuring the focus of a lens.

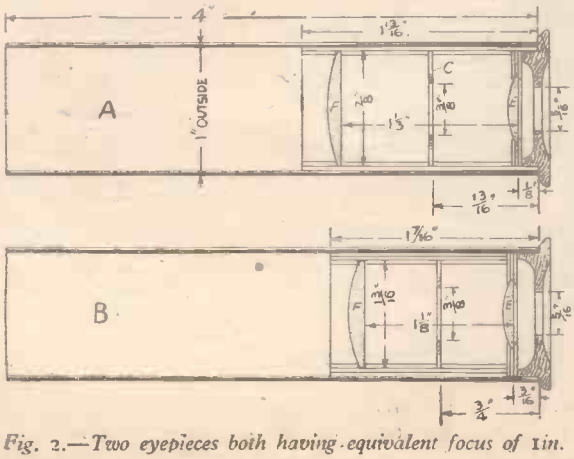


Fig. 2.—Two eyepieces both having equivalent focus of 1in.

Terrestrial Eyepiece

The next matter is that of the terrestrial eyepiece. To convert the ordinary astronomical eyepiece into one for viewing objects the right way up, two additional lenses will be required and the system will become as in Fig. 3. From this it will be realised that a very much longer draw tube will be needed and will probably have to be as much as 9in. or 10in. in length. I suggest that the two erecting lenses, C and D, shall be duplicates of the field lens F, having the same diameter and both of the same foci. They will each be mounted in separate cells of Bristol board (as shown), which cells should be a good firm sliding fit in the tube. As I do not know what the foci of these lenses will be, I cannot state the best positions in which to place them nor their distances from the field lens F. It is for this reason that I suggest they be made to slide so that their best positional adjustment can be got by actual tests. When the clearest definition with the telescope is obtained, the places occupied by the two cells should be measured and marked inside of the tube and either stuck to the tube with seccotine or spacing bands of card inserted to retain them in place. I think the bands will be best, in which case only a ring at the end furthest from the eye need be actually cemented inside of the tube.

Erecting Lenses

I want the reader to realise that the addition of erecting lenses will increase the magnifying power very greatly, and I am by no means sure that the simple, non-achromatic object glass will stand such a power, so for terrestrial observation the results may be disappointing. This telescope was designed for astronomical work of an elementary kind and with a Huygenian eyepiece only; that is why the stands shown in the June and July issues all have tops giving equatorial motion. At the same time, I must say that if the reader wants to use the instrument for seeing distant landscape, then the experiment is worth trying considering the small extra expenditure of money and time involved.

Tripod Stand

But if the reader decides to risk it and make a terrestrial eyepiece, he had better either use a ready-made camera tripod or make a three-legged stand of the camera type. In either case, making a head which will enable the telescope to swivel in both horizontal and vertical planes; in other words, in altitude and azimuth like a theodolite.

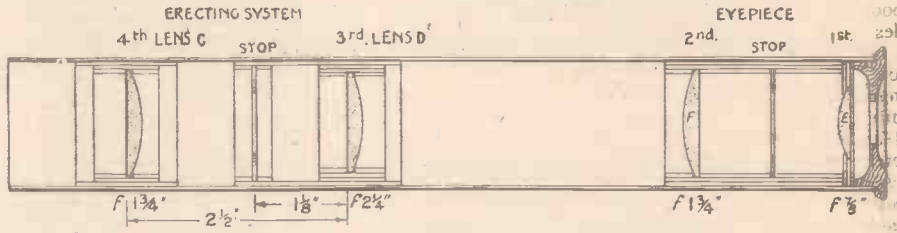


Fig. 3.—The arrangement of lenses in a terrestrial eyepiece.

Finally, I have been notified by Messrs. Broadhurst, Clarkson & Co., Ltd., that the foci of the two lenses which they are supplying to readers for the astronomical eyepiece are: first lens (the eye lens E), ⅞in. focus by ½in. diameter; second lens (the field lens F), 1¾in. focus by ¾in. diameter. They have also given for the terrestrial eyepiece the following: First and second lenses: as for the astro eyepiece which will be mounted in accordance with the formulæ I have given above. For the erecting system: third lens, 2¼in. focus by ¾in. diameter; and fourth lens, 1¾in. focus by ¾in. diameter. Lenses two and four will therefore be similar. They state that the figures given are approximate and this applies, presumably, to both diameters and foci, so I still recommend the reader to check up on the foci and mount accordingly. For the information of the reader who proposes to make a terrestrial eyepiece I should mention that the two erecting lenses are quoted by Broadhurst, Clarkson & Co. at 8s. 6d. each.

The figures for the erecting lenses I have added to Fig. 3, and the separation between the second lens (F) and the third lens had still better be arrived at by trial.

Wood Bending Methods

How to Make Simple Bends in Wood in the Home Workshop

By N. CLIFFORD

IF the limitations of the material are borne in mind and a correct technique is adopted, many timber species can be successfully bent, and having been shaped will retain that shape indefinitely apart from the minor "movement" that is common to all timber.

The process of bending results in compression of the wood fibres on one face of the bend with a tensile force on the other face, and the extent to which a timber can undergo such stresses without rupture depends on its anatomical structure, which varies according to species. A timber such as ash, for instance, can be bent to quite a small radius whereas in solid form other timbers may break if bent to anything but a comparatively large radius. Ash, beech, birch, elm, horse-chestnut, oak and false acacia (or robinia) are examples of home-grown woods that bend exceedingly well, and the North American varieties of these woods are also excellent for the purpose. African walnut, danta, greenheart, true mahogany and eng are samples of commonly imported timbers whose bending properties are good.

Before it can be bent, all wood must undergo a softening process, and this is best done in a steaming chest, the wood being kept under treatment for a period of one hour for every inch thickness of the plank. For normal amateur use the steaming chest can be a simple homemade affair of the type illustrated in Fig. 1.

The Steaming Chest

The actual box (of 7in. by 1in. or similar wood) is made to a convenient length, the sides being butted together with brass screws; all meeting edges and the inside of the box should be red-leaded prior to assembly. A hinged lid is fitted at one end of the box while the other is permanently closed in, both lid and end being bored to take a ¾in. diameter pipe.

An oil drum, stood on a tripod or a couple of bricks, will serve as the boiler, heating being by means of a gas-ring beneath. Armoured hose or copper pipe is fitted between a hole at the top of the drum and the closed end of the box, while the lid carries a 4in. long escape pipe of the same material. The wood being steamed rests on fillets inside the chamber (which stands on a table of convenient height), the steam passing from the boiler through the chamber, around the wood, and out by way of the escape pipe.

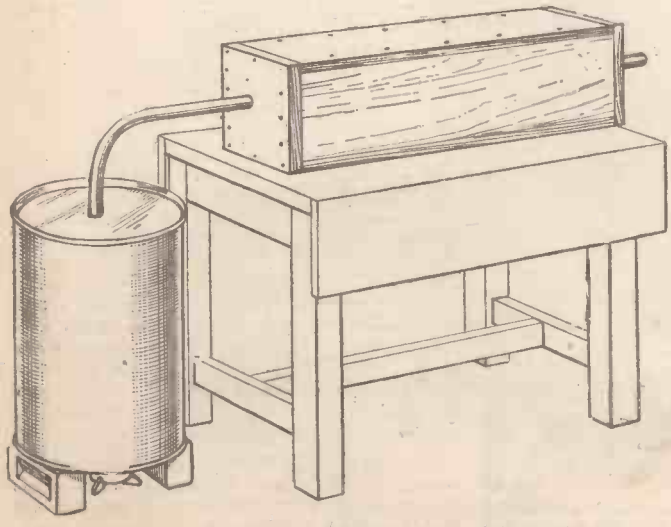


Fig. 1.—Home-made steaming chamber set up ready for use.

The subsequent treatment of the wood depends chiefly on the degree of curvature required. For comparatively large radii the wood is forced down between stout blocks fixed to the bench-top in the manner shown in Fig. 2, and with this manner of working it is customary to insert wedges between the back block and bending strip at one end, as shown in the plan view. Alternatively, the steamed wood can be fitted between a male and female former, the whole being clamped together until the bend has set (Fig. 3).

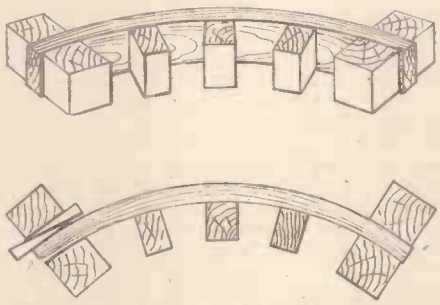


Fig. 2.—Wood strip being bent between formers fastened to bench-top.

The Supporting Strap

For making bends to a small radius or for use on a timber that is not a particularly good bending species, a "supporting strap" must be used, and this can be homemade.

The strap is a piece of mild steel of about 14 S.W.G. and of a suitable length for the job in hand; the width of the material must be at least equal to the thickness of the timber being bent, and preferably should slightly exceed that dimension. A simple type of wooden handle is fastened at each end, with a stout stop on its inside edge (Fig. 4).

For use with this strap, a former round which the wood can be bent is fastened to the bench, and it is normal practice to have a fixed block and wedges at the centre point of this. The steamed timber is laid into place with a strap on its outside face, the centre wedges are tightened, and the wedges are placed between the end of the steamed timber and the stop on each handle. Bending is then done by pulling the handles round so that the wood takes the shape of the form (Fig. 5). If possible, the handles are clamped to keep the timber in position, but if this cannot be done a lath is nailed temporarily across the arms of the bend.

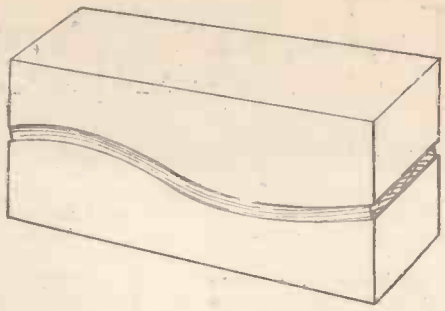


Fig. 3.—Bending strip fitted between male and female formers (clamps not shown).

For bends more closely approaching the circular a slight alteration in technique is necessary. Here one handle is omitted from the strap so that this end can be wedged against the former, and the strap is carried right round the former to complete the bend. Commercially manufactured items such as hoops, etc., are bent on special machines.

The bending of more elaborate curves may call for special equipment. An S-bend, for example, needs supporting on both the inside and outside faces, and two straps are necessary, with two sets of fixed blocks and wedges, one on each side of the centre point. Such bends as these, and also bends in different planes, are normally beyond the scope of the small workshop.

After bending, the timber is left to set in its new form. In commercial practice the bends are often removed to a heated setting-room, but equally satisfactory results can be achieved by leaving the steamed wood under pressure between the strap and the former. A period of twelve hours is usually sufficient to set a bend, but in all cases it will be found that there is a very slight tendency for the wood to straighten, though the effect is usually negligible.

Bending Laminated Timber

In an article of this length it is impossible to more than touch on the question of the bending of laminated timber.

Quite complicated bending may be achieved if the wood to be treated is made up of thin laminae. These laminae must be glued together to gain the required thickness, the compound strip being treated precisely as if it were solid timber. The loss of length in each lamination, due to bending, may be very noticeable, and the end of the wood may assume the shape shown in Fig. 6.

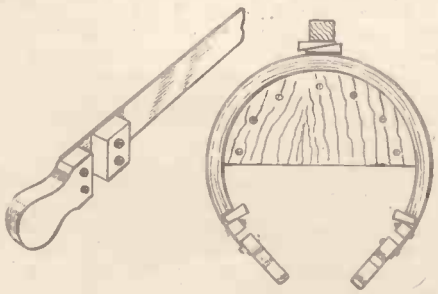


Fig. 4.—One end of strap, showing "stop."
Fig. 5.—Use of strap to bend wood round "former."

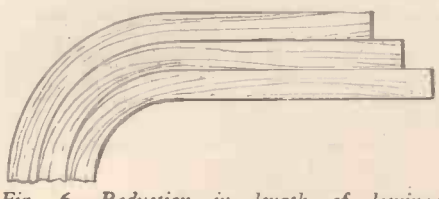


Fig. 6.—Reduction in length of laminae caused by bending.

YOUR INVENTION!

Hints and Tips for Prospective Inventors

By Professor A. M. LOW
President Inst. of Patentees

I OFTEN hear someone say "I've got an idea for something that would sell in thousands." The number of people who begin to invent something is probably greater than the number who hope to write a novel. I have found one of the best conversational openings with a stranger at dinner is to say, "And how's the invention?" because everyone has either invented something, is inventing or is thinking of inventing it!

The war has shown how extremely inventive is the ordinary man and woman in Britain. A thousand inventions and ideas a month poured into the Ministries and the factory organisations. Many hundreds of them were adopted. A very much greater number proved impracticable for one reason or another. And my experience in talking and writing to hundreds of "amateur" inventors suggests that the majority are doomed to disappointment and may, indeed, lose a great deal of money rather than make the fortune that is popularly supposed to come the way of the successful inventor.

Ingenuity versus Utility

The reason why their inventions are doomed to disappointment are numerous, but they fall generally under a number of heads. The commonest is that they have ingenuity rather than utility. It is not sufficient for an invention to be ingenious, it must be useful in the broad sense that it accomplishes something more cheaply, quickly or easily than before. But it is always the ingenuity of their inventions that fascinates amateur inventors rather than the utility.

I remember having a new mouse-trap demonstrated to me that was certainly the most ingenious I had ever seen. The details are forgotten, but at least six forms of sudden death awaited the mouse, and as many lures were ready to get him within range. The proud inventor asked me what I thought, and I had to tell him, "It is very ingenious, but don't patent it, because a cat would be cheaper." Not only did the very complicated mechanism cost a great deal to make—setting the trap would have taken, perhaps, five or ten minutes.

The Time Factor

The time factor, incidentally, is one frequently overlooked by amateurs in their favourite field of invention—labour-saving. It is little use saving "labour" if you waste time. I remember a washing-up machine that was certainly labour saving in the sense that all you had to do was place the dirty crockery in certain positions. But I estimated that it would take ten minutes to do this—almost as long as the ordinary housewife would have taken to wash them by soap and water methods costing one-tenth as much.

Another mistake is to invent some new way of doing something which is already done very well. I remember a lady who invented a new burglar alarm, and was so pleased with it she spent considerable sums on patents and models. The alarm consisted essentially of wires so placed that when a door or window was entered a gramophone was automatically switched on to play a record of dogs barking! When I asked her "Wouldn't it be easier to keep a watchdog with the added advantage that he could bite as well as bark?" she was definitely hurt, and nothing I could say would persuade her that her invention was not epoch-making. It is fairly obvious that the usual alarm bell ringing inside or outside the house or in the nearest police station would be a great deal cheaper and at least equally as effective.

Most of the thirty thousand patents taken out each year in England are mechanical, and it is important that inventors should keep to the class of work of which they have some knowledge. It needs long experience to improve some vital detail of, say, a motor-car, but any ordinary user might think of a useful accessory to make repairs easier.

Simple Ideas

Remember that simple things for cooking, the house, knitting and woodwork are all among the most profitable fields of patents, and everyone is an expert in something! Another important point is that when an article is very widely used any improvement must be tremendous if it is to make worth while the changing of all the tools and stocks which exist. To improve a lampholder would be a very difficult task from the commercial point of view because so many millions are in use.

All this may sound very discouraging, but in fact it is not so. Every year, people who may be called "amateurs," produce first-class ideas that in some way increase the wealth, health or comfort of their fellow citizens. To know what to avoid and to be able to examine your invention objectively is to avoid much disappointment and probable loss of money.

People sometimes ask me, "What should I invent?" It is rather like asking for an idea for a short story or a novel! In my experience at least fifty per cent. of the art of invention is seeing something that is needed. Satisfying that need, to the man or woman of imagination and moderate mechanical ability, is rarely difficult once the need has been perceived. The man who made a fortune out of crinkling hairpins, to prevent them falling out, had virtually solved his problems once he noticed that hairpins fell out, caused women inconvenience, and could be made to stay in quite simply.

I can, however, give readers one or two hints. Notice that inventions are not completely "new" things, but a combination of two or more old ideas. The most obvious example is the fountain pen—neither pen nor ink was original, the "invention" consisted of bringing them conveniently together. So it is with every invention. The inventor carries someone else's ideas farther, combining perhaps the principles of two others in ingenious fashion.

Timing

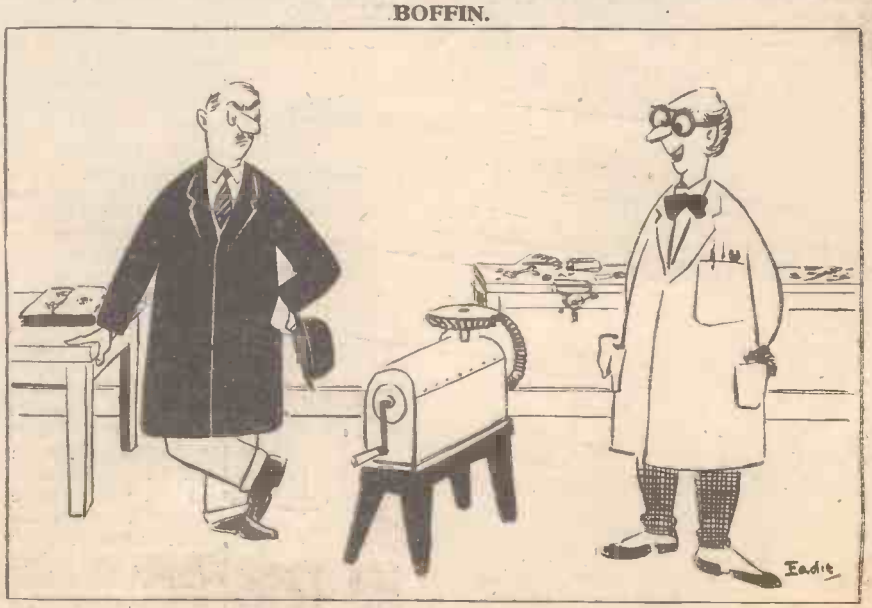
Timing is important with inventions. You can be too soon both technically and psychologically. I demonstrated television before the 1914-18 war and the wireless-controlled 'plane during that war. Both were too many years before their time. If you have what you believe to be a really first-class idea at the moment, I advise you to keep it. While present economic conditions last, it is obvious that manufacturers will be more concerned in turning out quantities of what they are equipped to produce, rather than looking for new goods. When controls of labour and materials are lifted, and trade becomes competitive, it will be another matter. For certain things you must also catch the customer's "mood." The best example I can think of is the game of Monopoly which swept America like wildfire during the economic blizzard years. Deliberately or accidentally, it exactly provided the entertainment needed at that time.

Very little has been done to help inventors, yet they are really important to any country for they pave the way to new industry. In England we have the Institute of Patentees which is an organisation entirely devoted to helping inventors. The institute organises exhibitions, gives report upon inventions, free legal advice as to agreements or royalties, and generally helps its members to find the right manufacturer for their ideas. Patentees who find their ideas being pirated can go to the Institute for advice.

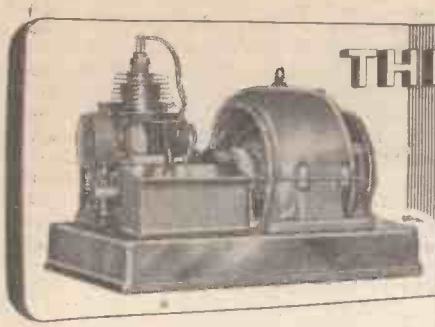
Originality

Above all, remember that it is the amateur who has excelled in the art of invention. It was not official bureaux which were responsible for the steam engines, spinning machines, the telegraph, radio or X-rays. Originality is a country's most vital asset. It cannot be regimented by hidebound committee men.

BOFFIN.



"As soon as I find out what it does, I shall take out a patent."



THE WORLD OF MODELS

By "MOTILUS"

Model Hydro-electric Power Stations : Model Railway Exhibition at Scarborough

IT is interesting to learn of the different ways in which model railway owners strive to bring realism into their hobby. Most of us can be charmed by the visual appeal of a model layout that is sufficiently well built to give us an impression that we are looking at "the real thing" in miniature. Yet some enthusiasts go even further and when we visit them they present us with a complete timetable to which they can run their model passenger and goods trains.

Such a one is Mr. V. C. Martin of Eastchurch, Kent. In a room with walls lined with railway pictures and posters he has built up an extensive gauge 0, electrically controlled model railway. This comprises some thousand feet of track, including sidings, 74 coaches and vans for passenger rolling stock, and 100 wagons, etc., for goods rolling stock. Mr. Martin calls it The Midland and South East Railway and his timetable is drawn up for 110 trains to run in a day's service of 12 hours. Altogether, his locomotives cover about two miles in a week.

For scenic effects, Mr. Martin relies mostly on accessories and lineside buildings, without resort to painted backgrounds. His Warden Central Station is well equipped with a locomotive shed, platform buildings, bookstall, seats, timetable board and posters, not forgetting, of course, station staff, passengers and luggage!

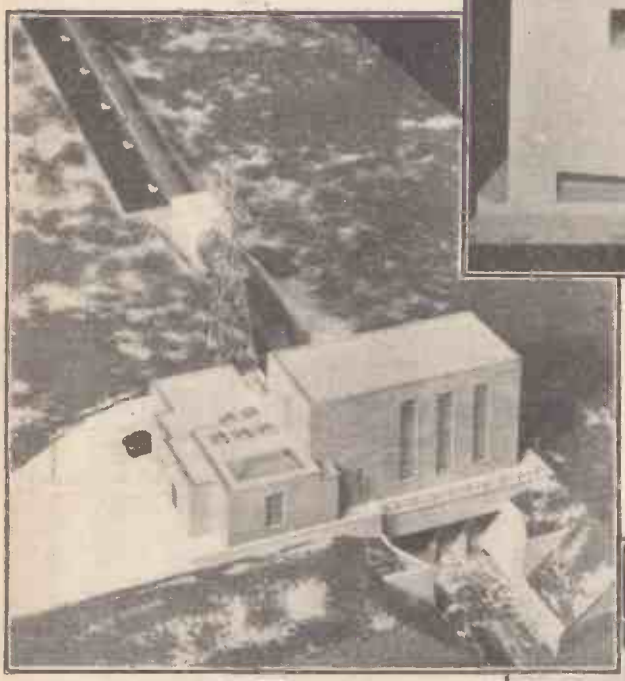


Fig. 1 (Above).—Part of the model pipeline for the Loch Sloy hydro-electric scheme in the Highlands.

Fig. 3 (Right).—A section of the Elliott Model Railway Exhibition at "Railwayland," Scarborough, showing some of the interesting track features of the layout.

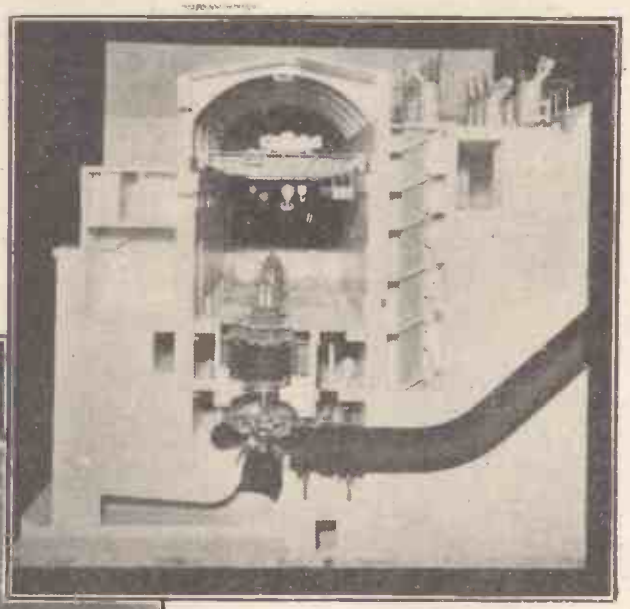


Fig. 2.—Model of the power station for the Fenosa-Los Peares hydro-electric scheme in Spain.

Model Hydro-electric Power Stations

Hydro-electric power schemes have been the focus of much attention among post-war events in Scotland. The results of schemes already operating in the Highlands are proving the wisdom of the decision to use Scotland's water power for production of electricity for Scottish industries and homes.

Messrs. Mechans, Ltd., of Glasgow, who supplied the pipeline for the Loch Sloy hydro-electric scheme (which is already in operation), had a model made last year which they exhibited on their stand at the Engineering and Marine Exhibition in London. The model (Fig. 1) shows Messrs. Mechans' pipeline for the Loch Sloy scheme, the power house and tail race; a simple model, demonstrating the immense sweep of pipeline with essential clarity.

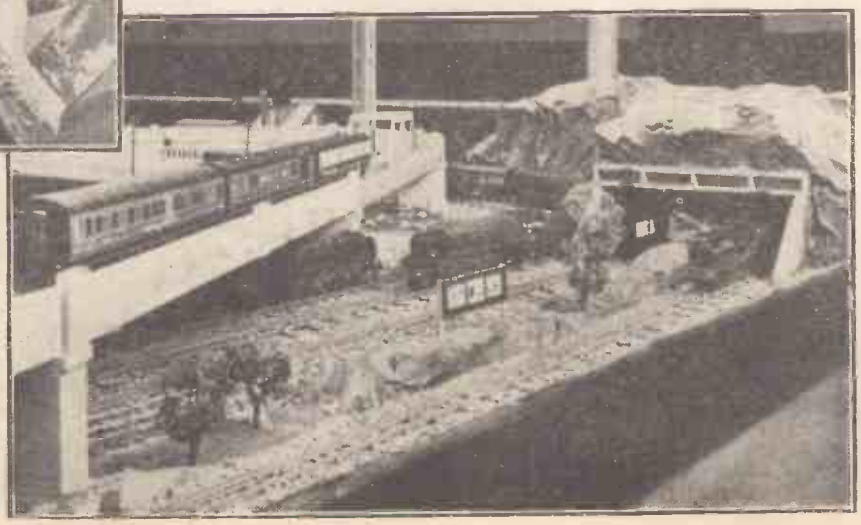
Another interesting model that was built last year in connection with a hydro-electric scheme was of the Fenosa-Los Peares Power Station in Spain. The model, built to a scale of 1/50th full size, was to the order of the British Thomson Houston Co., Ltd., Rugby. It shows the turbines, one of which is in section, the alternator, also in section, and the water inlet and outlet. In the illustration, Fig. 2, the transformers can be seen at the right-hand side.

Both these hydro-electric scheme models were built in Northampton by Messrs. Bassett-Lowke, Ltd.

Model Railway Exhibition

I hear that the new Elliott Model Railway Exhibition (now being run in addition to the one at Blackpool) has been drawing numerous visitors to "Railwayland" at Scarborough. "Railwayland" lies in the centre of Scarborough, in Huntriss Row, and the building is devoted entirely to railway matter, both real and model.

Mr. Elliott's new gauge 0, exhibition railway (Fig. 3) has fifteen locomotive models, including such well-known ones as the London Midland Region "Royal Scot," "Duchess of Montrose," and the Eastern Region "Flying Scotsman." Some of them are steam operated, and these, to my mind, have an extra appeal that is lacking in electrically operated models. However, even some of the electric models are most realistic, as real smoke puffs from their funnels from a specially fitted smoke device.

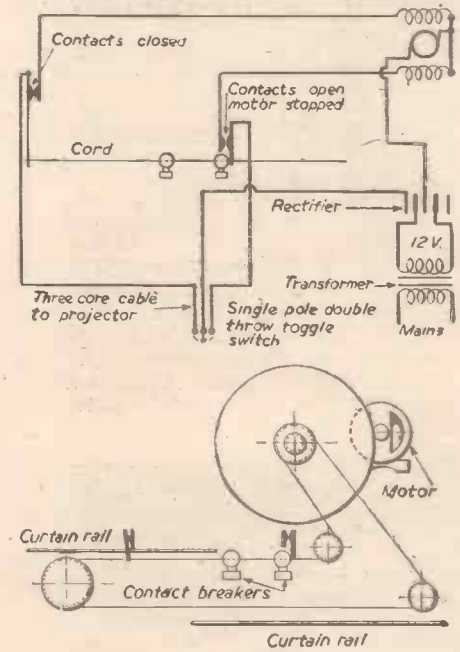


Electrically-operated Ciné Screen Curtains

SIR,—With reference to Mr. Bagley's enquiry perhaps my own arrangement will be of interest to him.

The first requirement, of course, is a suitable reversible electric motor, and I was fortunate in this respect in picking up a 24-volt D.C. ex-Government motor from a radar scanner. This motor had the pole windings brought out, so I use one pole for opening and the other for closing. I find there is ample power on 12/14 volts at a reduced speed (24 volts being rather fast and noisy). I run the motor through a transformer and rectifier—transformer is of the bell type but of heavier construction, and was used for operating air-raid alarms during the war—rectifier ½ amp. 14 volts, which can be purchased cheaply at any radio shop. It will still be necessary to reduce the speed, in my case this was done by gearing, using the ½in. dia. gear-wheel already on the motor spindle, and a 10in. dia. fibre gear-wheel (ex-radar scanner). On the latter I fixed a turned brass vee-pulley (I made two grooves, 2½in. and 1½in. dia., as I was not sure of the speed required).

Control of the motor is from the projector



Wiring diagram and details of Mr. E. Lawson's suggestion for operating ciné screen curtains.

position by means of 3-core flexible cable, using 3-pin connectors to a single-pole double-throw toggle switch. The cord operating the curtains is picture cord which I find satisfactory. On the cord I have two wooden stops, which are wooden balls threaded on, each with a set-screw to stop them shifting and at the same time allowing their positions to be adjusted. These balls come up against micro-switches at each end of the run—these switches are about 7s. 6d. each, but difficult to obtain at present. Home-made alternatives were used at first, but I found that when the motor stopped the tension in the cord sometimes allowed the switches to close again, momentarily starting and stopping the motor which was annoying as the clicking of the switch rapidly opening and closing could be heard above the music. A good deal of trial is necessary to get good results in spite of the apparent simplicity of the scheme. In my own case I use the same driving cord to operate a sliding resistance which dims the lights on opening the curtains.

For a 6ft. screen the curtain rails should extend about 8ft. so that the curtains will clear the screen. Use two rails (950 type) so that the curtains will overlap. In my case I have the curtains attached to the cord on the under side of the board supporting the rails and the contact breakers mounted on the top of the board. This means more pulleys than are shown in the rough sketch, but it is worth it in the long run as adjustments can be easily made. If a sliding resistance is used it is essential, as it is difficult to obtain a sliding resistance of the correct length. To overcome this another short cord is attached to the driving cord and adjusted so that the lights start dimming when the curtains are half open, and I have arranged the windings so that the slider has a few inches to spare at either end—one end right off the windings which ensures the lights are right off and the other end a metal contact continuing the windings in the full-on position. On 12 volts or so the system is perfectly safe—except, of course, the sliding resistance for dimming the lights, which is on the mains voltage. The original contact breakers were spring strips similar to those used in telephone jacks—a light spring only is required, otherwise it tends to pull the cord back again and so make contact.

A stop is required to prevent the momentum of the motor opening the contacts too far and so damaging the light springs. Micro-switches make a much better permanent job.

It is advisable to use light material for the curtains and fix small lead weights along the bottom to make them hang nicely.

My own proscenium is made up with Dexion aluminium alloy angles and the top portion can be lowered into the base which is on wheels to enable the whole thing to be moved easily into another room. The framework is covered with beaver board and painted. The whole is automatic, which is a great help as so much has to be done at once. When the switch is pressed the curtains open, lights dim and nothing has to be switched off. When the film is ending, all that is required is to press the switch and the curtains close and the lights come on. —E. LAWSON (East Boldon).

SIR,—As I have fitted up an arrangement of motor-operated screens for a church hall stage, incorporating reversing and limit switches, I venture to send the following description and sketches in case they may be of interest.

The curtains in this case are much larger than 6ft., and are double, each curtain being about 11ft. square, with a movement of 9ft. from the centre. Also, the whole apparatus has to be portable to allow the stage platform to be cleared for other uses, and this renders the arrangement, especially the wiring, more complicated than a permanent one would be.

The curtains are hung on ordinary rails and runners, moved by a cord running

(*Continued on page 429*)

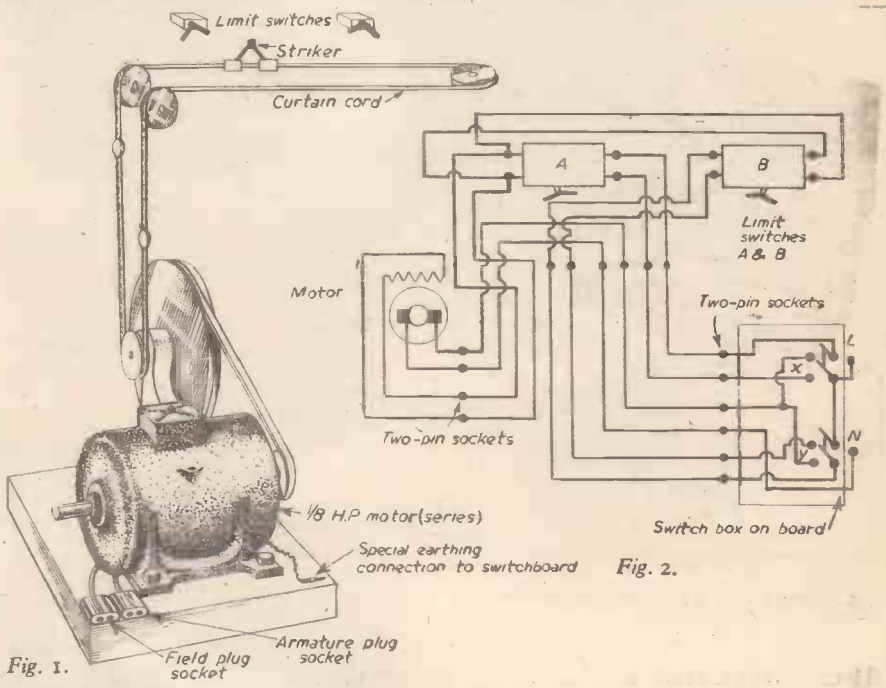


Fig. 1.

Fig. 2.

General arrangement and wiring diagram of Mr. A. T. Jones's system for operating ciné screen curtains.

LETTERS FROM READERS—

(*Continued from page 426*)

parallel to them and hanging down over guide pulleys at one end, as is usual for window blinds. The ends of the cord are joined and looped over a small pulley driven by belt gearing from a ⅛ h.p. series motor. (Fig. 1.) This allows the curtains to be operated by hand if necessary. The motor and gearing are fixed on a wooden base laid on the platform and held down against the pull of the cord by its own weight plus a piece of lead. Occasionally, owing to stretch in the cord, it slips; this is overcome by wrapping adhesive tape round the pulley and shortening the cord if necessary.

The field and armature connections to the motor were separated and brought out to 5-amp. 2-pin sockets on the base board. For starting, stopping and reversing two double-pole double-throw switches were put into a box, fastened to the general stage lighting switchboard and wired to three 2-pin sockets as shown in Fig. 2. Another pair of similar switches were fastened to the upper curtain supporting frame in such a way that their levers were inwards towards the centre of stage when closed. They were opened by a striker attached to the operating cord, which pushed them to the open position as the curtain approached the end of its run. L-shaped extensions were fitted to the switch levers to allow for over-running due to weight of curtains, etc. The striker, moving to the end of its run, engages an arm of the L and moves it over, thus opening the switch and cutting off current *in that direction*. Thus after running about a foot farther, movement stops. The limit switch at the other end is closed, so if the motor is reversed it starts and moves the curtain the other way. The striker first engages the rest switch and puts it on again, but owing to the reversing arrangement there is then no current flow in its wiring, and nothing happens; the striker then goes on and opens the distant switch, thus stopping the motor at that end of its run.

The two switches in the switch box are connected by a bridge lever in such a way that while they can be both off, they cannot both be on, and are wired as shown so that one gives movement to open the curtains and the other to close them. In case of accident, 1-amp. cartridge fuses are fitted in the motor wiring. The wiring plugs are connected by wooden holders so that they cannot be inserted wrongly in their sockets.

This arrangement is very complicated as regards wiring (especially as I used 15-amp. cable to avoid any possibility of heating due to stalling of the motor), but opening or closing can be obtained in any position except within the over-running distance when movement can only be obtained in the opposite direction.

A simpler arrangement, using one single-way switch and two two-way switches connected together and operated by the striker can be used, but has the disadvantage that reversing only takes place at the end of travel.—A. T. JONES (Glasgow).

Westminster Door Chimes

SIR,—I wish to submit various modifications I have made to the chimes, details for the making of which are reprinted in the May issue of PRACTICAL MECHANICS.

1. I have shortened the striker rods so that the hammer hits the gong very near the top, and have made the actual striking heads completely of hardwood. I have found this eliminates the bounce experienced with long rods and heavy brass strikers, and also by hitting the gongs at the top, a much more mellow note is obtained.

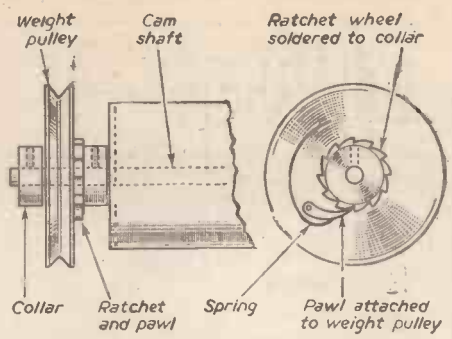


Fig. 1.—Modifications to weight pulley.

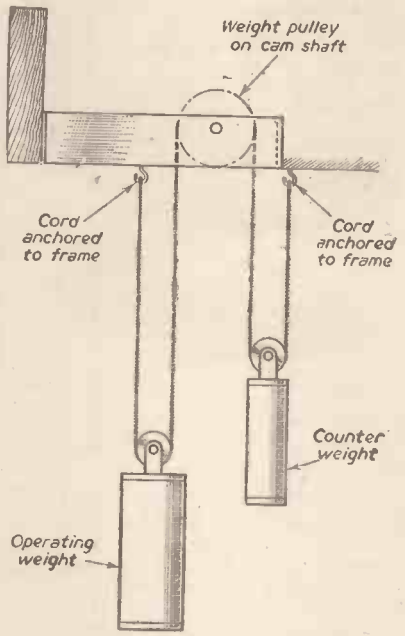


Fig. 2.—Rearrangement of drive.

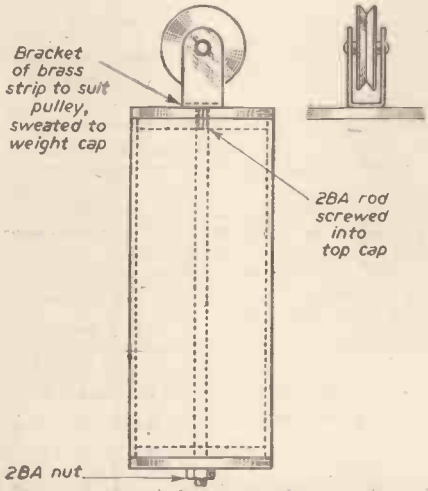


Fig. 3.—Modifications to weights to suit new drive.

2. I have fitted a pawl and ratchet drive to the driving pulley, and this I find greatly improves the rewinding operation.

The pawl and ratchet I obtained from an old clock, the former being fixed to the driving pulley, and the ratchet wheel was fixed to a collar by sweating. The collar is then set-screwed to the camshaft, while the pulley can rotate freely during the rewinding operation, and the pawl engages with the ratchet wheel for driving. The accompanying sketch, Fig. 1, shows the general arrangement.

3. The length of time the chimes will operate at one setting of the weights has been doubled by using the arrangement shown in Fig. 2, but it will be found that a little heavier weight is needed for driving, due to the extra friction to be overcome. This, however, is very slight.

Fig. 3 shows details of the weight construction.

I thought other readers may be interested in these modifications and would like to apply them to their units.—A. J. SLATTER (Worcester).

Cricket Club Score Box

SIR,—I am connected with a village cricket club anxious to build a modern type of score box.

The present arrangement is the old type of number plates hung on nails.

Would it be possible to obtain information on some modern type, easy to construct?—H. E. WRIGHT (Stannington).

[*Readers' suggestions are invited.*—ED.]

"Leaded" Windows

SIR,—Perhaps your readers would be interested in the following description of an alternative method of leading plain windows which I tried and found successful.

Instead of marking each window pane and applying the strips one at a time, as is usually done, I drew my design (elongated diamond pattern) on stout brown paper, the exact size of the pane, laid the paper on a protected table top, placed the lead strips along the pencilled lines and soldered all joins and inter-sections, using resin-cored solder.

Oval lead strip was used in preference to flat, a small tool to smooth the lead on the window being filed to coincide with the curvature of the lead.

When soldering is completed, the whole job is turned over, using an adapted hanger (care is needed here owing to "flimsiness" of the job). Cement is then applied and allowed to become tacky, after which the hanger is used again to carry the lead-work out to the window for direct application thereto. A little care is called for in applying the lead, but if the smaller windows are tackled first a little skill is easily acquired.

Using the plastic tool, press the lead stripping to the glass, working downwards, quickly at first (to prevent peeling off), then more thoroughly.

Clean up the job by using turps or similar solvent and polish up, using plenty of newspapers. The minimum of time is thus spent outside the window and a definite realism is achieved.—R. WORDEN (Blackpool).

Laying Glazed Tiles

SIR,—In the "Letters from Readers" page in the July issue of PRACTICAL MECHANICS I was particularly interested in "Laying Glazed Tiles," by S. Wealthy, Liverpool. I have used this method for several years, but I should like to warn readers of one snag—that is, before painting the back of the tiles first give a coat of painter's knotting (shellac varnish), or they will find the oil in the paint will penetrate through, showing the recessed pattern on the back of the tile. I am referring to the *white* glazed tile.—F. SMITH (Spondon).

The Problem of the Steam Car

SIR,—I suppose there are quite a lot of people who think, like Mr. H. V. Kelly, that the reason why the steam car went out of production was because it was uneconomic and inefficient.

This view is absolutely wrong. The petrol car came because of progress. And progress does not mean that one thing is better or

(*Continued on page 430*)

Trade Notes

Johnsons' House Journal

MESSRS. JOHNSONS OF HENDON, LTD., Hendon Way, London, N.W.4, have just issued No. 4 of their bright little brochure "The Hendon Way," which is an occasional bulletin published in the interests of the photographic industry. Mainly intended for photographic dealers, it is also of special interest to amateur photographers as it contains particulars of popular cameras and the latest accessories offered by Johnsons, including fine grain developer in two-part containers; developing tanks; tripods; the Perkeo I and the Bessa I cameras; colour filters and hoods, and a complete printing outfit packed in a stout box. Particulars are also given of the popular Johnson Photo Tint Outfit.

Collaro's Fan Heater

MESSRS. COLLARO, LTD., have produced a compact, completely portable Fan Heater that provides the answer to low-cost air conditioning.

Only 16in. high, and with an overall bowl diameter of 12in., it quickly creates a warm, comforting atmosphere that reaches every corner of a room. At the touch of a switch it provides a cool, refreshing stream of air, which is prevented from being a draught by shutters—controlled by a simple knob—which effectively regulates the direction of the air current. The shutters also provide protection from the heater and fan blades—making it absolutely safe.

The Collaro Fan Heater which is designed for A.C. mains, 200-250 v. at 50-60 cycles.

Collaro have designed their Fan Heater for all A.C. mains from 200-250 volts at 50/60 cycles. The electricity consumption of the heater is approximately 1,500 watts, while that of the fan alone is negligible.

Available in either cream or eau de nil, the Collaro Fan Heater, at £9 18s. 0d., including tax, is inexpensive enough to appeal to most people with modern ideas on health in the home.

Weldafume Unit

THE "Tornado" Weldafume Unit improves working conditions and gives better, faster welding, because of improved vision, cleaner and cooler air conditions in the vicinity of the operator.

This new exhauster removes the heat, fumes and dust of welding operations from the vicinity and greatly improves local conditions generally. A booklet published by Keith Blackman Ltd., Mill Mead Road, Tottenham, London, N.17, demonstrates the exhauster in use in some of its possible applications. Its flexible metallic hose enables the unit to be placed in the position most convenient for the welder and for the type of work being carried out, and also facilitates the removal of fumes, smoke, etc., from out-of-the-way and otherwise inaccessible positions.

The special asbestos base, fireproof cloth filter incorporated in the unit to arrest light slag and flux dust, contains over 1,000 sq. in. of filtering surface, thus ensuring a very low air velocity and high efficiency.

This unit is compact and portable, and running costs are low.

MODEL STEAM LAUNCH

(*Continued from page 421*)

higher than that of soft solder, the heat being such that either a gas flame or blow-lamp would be necessary to effect the fusing of the metal. The beginner, therefore, would be well advised to stick to soft soldering, which, if properly carried out, is quite satisfactory. A soft soldered boiler can stand a very high pressure and, as long as there is some water left in it, will last indefinitely. The only occasion when it would be likely to "give," would be in the case of super-heating. Super-heated steam tends to make soft solder "putty like," particularly the kind generally used on electrical fittings, etc., which has a lower melting point than tin-man's solder.

The Boiler Casing

To get the best out of a boiler, it should be completely enclosed in a strong casing, preferably sheet iron. The casing for this boiler was made of 22 gauge sheet iron, and covers the whole boiler, including the end plates. In turn, it is also half covered with a layer of asbestos, held in place with an aluminium cowl (see Fig. 14). The chimney was rolled up from a piece of the same sheet iron, lap-joined, and riveted to the top of the casing with four holes drilled through flanges. Ventilation is obtained by drilling a series of ¼in. dia. holes low down on either side of the casing.

The bottom of the case is flanged and drilled to enable it to be bolted down to the bed plates, Fig. 14.

The Burner Unit

The burner is a "wick" type, but instead of the wick protruding through small vents, it consists of short lengths of asbestos string laying in a tray through which runs a perforated tube, which in turn is connected up to a methylated spirit container, situated outside the casing. Around the burner another shallow tray is fitted. This is to catch any accidental overflow of spirit, which occasionally might happen, if the boat is negotiating a "spot of rough weather." Both the burner and the tray are made of 22 gauge brass sheet. The tube is ⅛in. dia. brass. Whilst the container was improvised from a suitably sized "lozenge" tin. The complete unit is held in position under the boiler by two "L" shaped clips, bolted to the bed plate. This latter item is of 20 gauge aluminium, cut and filed to the necessary shape.

As the engine, boiler and burner are all contained on the bed plate, the complete power unit can be inserted, or lifted out as one from the boat, a very handy innovation for preparation and cleaning purposes, and particularly for the carrying out of any minor adjustments at the portside.

BOOK RECEIVED

Modern Motorcycle Maintenance. By Bernal Osborne. Published by Temple Press, Ltd. 252 pages. Price 6s. net.

THE second edition of this popular book has been enlarged and improved so that the contents continue to be in keeping with the title. Written by a well known member of *Motor Cycling's* staff, the book explains in a practical manner all that the motor cyclist wants to know about keeping his machine in top-notch condition. The book is profusely illustrated with clear cut line drawings, and the appendix contains several pages of specifications of well known makes of motor-cycles.

LETTERS FROM READERS

(*Continued from page 429*)

more economic than another, it simply means that someone has got something to sell.

In those early days had there been some fuel companies who advertised "Use Johnson's coal and coke for your car. More miles per cwt." "Bloomers Breeze is best. Your car will love it." But, alas, there was nothing like that. If there had been a very different story might have been told.

You were absolutely right in your original comments. There is no doubt that the steam car was pushed out by the oil companies, and that strange attitude to anything new—it must be best because it's a new kind of thing.

I wonder if anyone now remembers that whispering campaign, "I wouldn't like to sit on top of a boiler. What happens if it bursts?"

Personally, I never heard of a Stanley car boiler bursting. But I know how foolish it is to try and convince people that the steam car was good. To most of the oldsters that have driven both there is no comparison in sweet running. But there is a comparison that can be made to-day. I have no doubt that Mr. Kelly has been on a trolley bus. Well now, which does he really think is the nicest. That or the petrol bus?

Here are a few technical facts. The petrol engine has one power stroke in four. Steam has four power strokes in four. In a petrol engine for two of the strokes the piston is a pump, and the other stroke is compression which is a terrible waster of power. Valves have to be lifted against the springs and magnetos driven, so if we say that a half of the power is wasted, we are treating it very lightly. In the steam engine there are no losses in induction and exhaust or compression so one cylinder is as good as four in I.C.

If diesel is as good as generally thought, why haven't we got a diesel car. Petrol injection was going to sweep all before it, but it hasn't.

I have been informed by a friend in the boiler business that up to 2,000lb. per sq. in. is now possible, but 200 is high for petrol.

Another great point in favour of steam is its simplicity. No gears, no clutch, are surely worth something!—C. V. THOMPSON (West Kensington).

QUERIES and ENQUIRIES

A stamped, addressed envelope, three penny stamps, and the query coupon from the current issue, which appears on page 95 (THE CYCLIST), must be enclosed with every letter containing a query. Every query and drawing which is sent must bear the name and address of the reader. Send your queries to the Editor, PRACTICAL MECHANICS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

Lavender Water Making

PLEASE tell me if there is a simple method of extracting the essential oil from lavender flowers. It would have to be simple enough to be done in an ordinary kitchen, and only in small quantities. I grow my own lavender.—H. Smart (Selkirk)

LAVENDER flowers contain a very minute proportion of the odiferous oil, hence it takes a very large bulk of the flowers to produce a small quantity and it is for this reason that small scale-attempts to extract the oil are, usually, not very satisfactory. However, if you wish to try, here is the method :

Place the flower heads in a glass or copper chemical retort, cover them with water and slowly distil the contents of the retort until about one half the quantity of the water has collected in the receiver. This water will smell strongly of lavender and can be used as ordinary lavender water. It will be turbid in appearance and will consist of minute droplets of the essential oil of lavender dispersed through a relatively large volume of water. If the lavender water is allowed to stand for a time, the oil droplets will rise to the surface, and will tend to coalesce together, forming a single large drop of the oil.

Asbestos Slates

CAN you give me any information as to how to make roofing slates from asbestos and cement—known as "Asbestos Slates."

The commercial product is about ¼in. thick and I think the slates, which are usually 24in. by 14in., are cut from sheets in the factories. If you know of any formula for making these slates, I should be very pleased to have particulars.—A. F. Doyle (Nenagh).

THE cement and ground asbestos are mixed together in the requisite proportions, which latter may vary considerably from equal parts of both constituents to one part cement and three parts asbestos. The asbestos used is not normally of one constant grade of fineness or particle size. You must have mixed together 3 or 4 particle sizes of asbestos powder so that a compact interlocking mass of materials is obtained.

Sometimes, too, a quantity of red oxide is dispersed throughout the mass to act as a colouring agent. Green chromium oxide and other pigments can also be used for a similar purpose, but, mostly they are all rather expensive and tend to make the cost of the tile prohibitive.

The mass is slaked with water to the consistency of mortar. It is then run on wooden boards through rollers which give it the required thickness. Finally it is left out to dry and to harden. The sheets are then cut up into strips and from these the final tiles or slates are cut. All this cutting is done by means of carborundum wheels revolving at high speed under a cold water drip to act as a lubricant. The minute details of the process vary a good deal and depend on established practice together with the precise composition of the slates or tiles. These are matters for which no recommendation can be given, and which will have to be worked by a method of trial and experiment.

You may be able to obtain a suitable and informative book on the subject from any one of the following technical book sellers, but our lists do not reveal any title which would be of much use to you.

Messrs. W. & G. Foyle, Ltd., Charing Cross Road, London, W.C.2. Messrs. Wm. Heffer & Sons, Ltd., 3 and 4, Pety Cury, Cambridge. Messrs. Wm. Bryce, Ltd., 54, Lothian Street, Edinburgh. Messrs. H. K. Lewis & Co., Ltd., 136, Gower Street, London, W.C.1.

Adhesive for Envelopes

I WISH to make a glue which becomes adhesive when moistened, as, for example, that which is used on envelopes and labels. Can you please tell me whether it is possible to make such a preparation fairly easily ?—F. Smith (Peterborough).

THE following is a good formula for an effective envelope and label adhesive paste which is brushed on the paper, allowed to dry and which then becomes strongly adhesive after wetting or moistening in the ordinary way :—

(a) White Dextrine	..	40 grams.
Water	.. ..	50 c.cs.
(b) Borax	.. ..	1 gram.
Glycerine	.. ..	1 c.c.
Water	.. ..	5 c.cs.

Dissolve the dextrine in the nearly boiling water. Make up solution (b) in warm water and then stir it into solution (a). It will usually be necessary to add a few drops of Lysol or other preservative to prevent the adhesive from growing mould, but not sufficient preservative should be added to impart a bad taste to the liquid or paste. The adhesive thus prepared takes the form of a gummy liquid which is spread over the paper with a soft brush and then left to dry.

Oxidised Finish to Aluminium

I DESIRE to produce an oxidised finish on aluminium or duralumin, whichever I can procure.

My plan is to renew the brass bosses of door knobs with a small square of metal, and to colour them to match light oak graining. Could you please give me details of the process ?—G. D. McKenzie (Chatham).

THE only really satisfactory method of blackening or colouring aluminium or its alloys is to anodically oxidise the metal first, and then to dye the oxidised surface to the colour and shade required. The process is a difficult and an exacting one, although, in principle, it is simple enough. There are several anodising processes available, but the Bengough-Stuart is as good as any. This consists in immersing the well cleaned and degreased aluminium or aluminium alloy in a solution of three parts of chromic acid in 97 parts of water at a temperature of about 40 deg. C. The work must be suspended in the solution by means of an aluminium wire. It is made the anode. A carbon block will provide a suitable cathode. The arrangement is put into circuit with a voltage of 60-80. A resistance should be provided so that the voltage may be varied as the anodisation proceeds. The process is begun with a voltage of, say, 10, but it will be found that the voltage slowly increases up to about 40. The 40 volts pressure is maintained for about three quarters of an hour, after which the voltage is increased to 50 and retained at that figure for another ten minutes or so. Finally, the work is withdrawn, well rinsed, and dried. It will be found to have acquired a dull, flat surface of aluminium oxide, which latter is perfectly adherent and well protective. It is this oxide surface which is capable of being coloured by the ordinary process of dyeing. To this end, dissolve about 4 parts of dye in 96 parts of water and immerse the oxidised aluminium or aluminium alloy in the dye bath so made. Gradually heat the dye liquor to near boiling point during one hour and retain it at that temperature for at least another half-hour. The aluminium oxide will absorb the dye permanently. After the dyeing, the work is well rinsed in warm water and allowed to dry out. A final rubbing down of the work with a smooth cloth charged with lanoline completes the operation.

You would, we think, be better advised to eschew the use of aluminium or of an aluminium alloy for your work and to substitute it with brass or copper, either of which could be easily blackened or browned by short immersion in a bath containing one part of sodium sulphide dissolved in 99 parts of water. Sodium sulphide is a photographic chemical and can be obtained quite readily from photographic dealers.

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.

Purifying Lanoline : Collapsible Tubes

I HAVE about 1lb. of ex-W.D. lanoline, used, I think, for rust-proofing purposes. Could you please tell me how I may purify it for use for toilet purposes ?

Also, could you please tell me where I may purchase a small quantity (say two dozen) of empty tubes similar to tooth-paste tubes but larger (i.e., shaving cream size) ? Is any special equipment required to fill these tubes ?—H. Littlefair (Hessle).

LANOLIN is a species of wool fat, being, in its pure form, the cholesterin fat of sheep's wool. Officially, it is known as *adeps lanæ*. There are two distinct varieties, the hydrated wool fat and the anhydrous wool fat. You do not say which variety your sample comprises but we are assuming that it is the hydrated wool fat which was originally given the registered trade-mark of "Lanoline" in the United Kingdom. This is fairly readily purified. Place it in a large saucer or basin and heat the latter over a pan of boiling water. The lanolin will separate into an upper oily and a lower aqueous layer. A quantity of charcoal fragments should be stirred into the mass, the stirring being continued for about 10 minutes. Afterwards, the mass should be squeezed through one or two layers of fine muslin or similar fabric into a clean vessel and allowed to re-solidify. If it is not sufficiently white, the product can be re-treated in a similar manner, but it should be remembered that lanolin, particularly the anhydrous variety, is inherently a yellowish material which no amount of purification will render perfectly white.

Collapsible tubes in either tin or lead may be procured in varying sizes from any of the following firms : Messrs. H. G. Sanders & Son, Ltd., Gordon Road, Southall. The John Dale Mfg. Co., Ltd., Brunswick Park Road, New Southgate, London, N.11. Messrs. Langbeck & Co., Ltd., 5, New London Street, London, E.C.3. Messrs. Brooks Peel & Co., Ltd., Gordon Road, Southall.

For dealing with small quantities of the tubes no special equipment is required to fill them, but you will require a pair of "closing pliers" to seal them. These, which may be obtained from the tube makers, are akin to broad-nosed pliers which serve to compress together neatly the open ends of each tube and thereby to seal them off. For dealing with large quantities of tubes this sealing process is, of course, mechanically done.

Sensitive Fluorescent Screen

I WISH to make a very sensitive (i.e., sensitive to gamma rays from radium), fluorescent screen, and have already ordered one gramme of barium-platinocyanide.

I am advised to coat a sheet of thin cardboard with either rather thick gum-water, or preferably with a solution of celluloid dissolved in amyl acetate ; then to dust the salt evenly over the surface out of a sieve of very fine muslin.

Can you inform me if these instructions, which are from an old source, are satisfactory or could be improved upon ?

I require to make only a very small, say 2in. x 2in. screen.—L. F. Hunter (Rugby).

WE do not think that ordinary gum-water will have sufficient adhesive power to hold down a film of the heavy barium-platinocyanide. Nor is celluloid very soluble in amyl acetate alone. It is much more soluble in a mixture of approximately equal parts of amyl acetate and acetone and such a medium would do quite well for your purpose.

Another excellent medium for the same purpose is a solution of polyvinyl acetate in warm methylated spirit—say about 20 parts of the polyvinyl acetate in 80 parts of the methylated spirit. Polyvinyl acetate resin is an inert synthetic resin more or less transparent in character which is obtainable fairly cheaply from Shawinigan, Ltd., Marlow House, Lloyd's Avenue, London, E.C.3. It is sold under the name of "Gelva Resin." The grade which you will require is No.7. The advantage of this resin medium is that it can readily be dissolved away in warm methylated spirit or alcohol.

An alternative resin solution which could be used for the same purpose is "Vinalak," which is a solution of polybutyl methacrylate in toluene or xylene. This is supplied ready made by Vinyl Products, Ltd., Butter Hill, Carshalton, Surrey, and, being transparent, would be quite suitable for your purpose. The slower-drying solution in xylene would, we think, suit you best.

Your projected scheme of dusting the barium salt

out of a fine sieve on to the resin surface applied to the fabric is not a particularly good one, being rather wasteful. A better way, we think, would be for you to grind the sieved salt into the resin solution and then to apply this to the fabric evenly by means of an artist's soft paint brush. By this means you would be able to get a fairly even layer of the fluorescent salt, and one of almost any required thickness.

Making a Plaster Cornice

I AM desirous of making a plaster cornice of simple shape in my lounge.

Will you please inform me how to set about making one including :

1. The making of a simple tool.

2. The type of plaster to use.

3. The preparation of the corners of the room to take the cornice.

Do you think the construction is within the capabilities of an average handyman ?—N. J. Wilson (Stockport).

THE forming of a plaster cornice of simple section to an ordinary room should not be beyond the capabilities of a good handyman, assuming that the room in question is one of ordinary type and dimensions. The plaster used for the purpose is the ordinary plasterers' "white" plaster. This should be "hung" on a few nails driven into the wall so that an adequate mass of plaster is suspended from the wall. It is difficult to make a tool for the purpose, even presuming that a cornice of the simplest section is being attempted, for this type of work necessitates a steel "plasterers' float" the curvature of which must be the reverse of that desired on the cornice. The plaster should be made with water to the consistency of mortar, and, in this connection, it is well to remember that admixture of about 5 to 10 per cent. zinc oxide with the white plaster considerably improves the bulking powers of the mixture, and is to be recommended, since it makes for a smoother and denser plaster.

You can obtain plaster and zinc oxide for this purpose from Messrs. James Beard, Ltd., 16, Great Ancoats Street, Manchester, whilst various plasterers' floats will be obtainable from Messrs. Baxendale & Co., Ltd., Millar Street, Manchester, 4, or from other large dealers in articles of hardware and toolcraft.

As regards the preparation of the corners of the room, these should be made up "solid" with the plaster. Suspending nails are then driven into the wall at these points, covered with most plaster and the surface at these areas carefully rounded with the steel float.

If you can get a little practice you will quickly pick up the technique which is much more difficult to describe in words than it is to perform in actual deed.

Remember, that if a dead white cornice is not required it can be tinted buff or cream by admixture of about 2 or 5 per cent. of yellow ochre with the plaster material before the latter is made up with water.

Re-covering Top of Car

I WISH to re-cover the leather top of my car, a 12 h.p. saloon, 1940 model, and should be glad if you will kindly answer the following queries :

1. What is the best method for removing the metal sheet beneath the leather ?

2. Will it be necessary to fit a new metal sheet, or can the present metal sheet be removed undamaged ?

3. Will it be necessary to use a special mastic for fixing the sheet ?

4. What is the procedure in refixing the leather and sheet, and what precautions are necessary ? —A. E. Lomas (Southport).

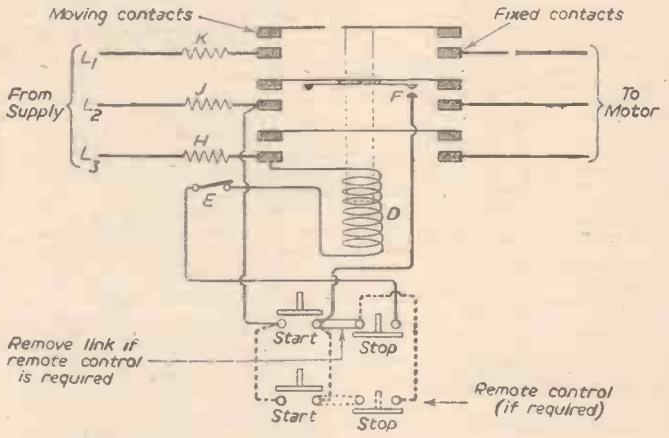
THE leather top covering the roof of your car will have to be slowly detached from the metal sheet which forms its basis. This can be done readily enough by carefully pulling the leather away from the sheet just as if you were detaching a piece of paper which had been pasted down to a flat surface. You may find it necessary in some areas to damp the leather by means of a wet cloth previously applied, and it may also be necessary for you to insert between the leather and the basis sheet a thin spatula blade which can be run up between the two, thereby causing a separation. Assuming that the metal sheet is in reasonably good condition and not holed or otherwise injured or deformed in any way, it will not be necessary for you to fit a new metal sheet. After the removal of the leather covering all traces of adhesive will have to be scraped away and the surface of the sheet must be roughened with the aid of coarse sandpaper. The only special "adhesive" which you will require to fasten a new sheet of leather down to the old metal sheet will be an ordinary good quality glue, say about 20 parts of glue dissolved in 80 parts of water. This should be applied liberally to the sheet and sparingly to the leather. The assembly thus contrived should be put under pressure whilst the glue dries and hardens. This, you will find, is the most difficult task of the whole process. The leather sheet, will, of course, have to be cut to size previously and it is best to lay it down on the metal surface methodically, beginning at one end and squeezing it down to the opposite end by means of a photographic squeegee or, in default of the latter, a carefuly-contrived cloth pad. It is of the utmost importance not to entrap any air bubbles which would not only be unsightly but would also cause areas of faulty adhesion.

After initial contact has been made between the leather and the metal sheet, the resulting compact should be put under firm pressure between boards for about 24 hours to allow time for the glue adhesive to dry and harden. Finally, the upper surface of the leather sheet should be given a good rubbing down with castor oil or with a solution of ammonium stearite in white spirit in order to waterproof it. This waterproofing treatment should be renewed three or four times a year.

Push-button Starter Circuit

WILL you please inform me as to how I should connect up a 3-phase motor for operating by stop-start buttons ? Also what actually happens when these buttons are put into operation ?—K. Copping (Watford).

WE presume that your motor is a simple 3-phase squirrel-cage induction motor, having three stator terminals, and is to be started by a direct-on-line switch. For a small motor having a rating of up to 4.5 amps. you could use a simple starter which merely consists of a 3-pole switch which it closes mechanically by pressure on the "start" push button, the switch then being latched in by a trip bar which is lifted mechanically by the "stop" push button when pressed. The Memota "Startet" starter is of this type, and contains three bi-metal over-current trip elements through which the motor current flows. Excess current due to overload or electrical fault causes the bi-metal



Circuit diagram of a coil-operated push-button motor starter.

strips to bend and lift the trip bar so that the contacts open under spring pressure.

For a larger motor you could use a coil-operated direct-on-line starter, such as the auto Memota starter. The connections are shown in the accompanying diagram, together with the alternative connections required if remote "start" and "stop" push buttons are also to be employed. The start button contacts connect the operating coil D to the supply lines L1 and L2. The coil then attracts its armature and closes the main contacts to supply the motor, the retaining contacts F then short circuiting the start button so that the coil D remains energised when the start button is released. The bi-metal over-current trip elements are shown at K J H; excess current through these elements then causes the bi-metal strips to bend and open the trip contacts E to de-energise the coil D so that the starter opens.

Both types of starter are supplied by the Midland Electrical Co. Ltd., of Reddings Lane, Tyseley, Birmingham.

Ink for Rubber Stamps

THE endorsing inks in common use with rubber stamps are black, red and brown. How can I obtain any other colour or shade, e.g., grey or pale blue ? Also is printers' ink suitable for rubber stamps ?—P. B. Jackson (Durham).

AN ordinary type of printers' ink is not usually suitable for rubber stamp work unless one is prepared to be satisfied with a fairly slow rate of drying. For ordinary work with rubber stamps any colour can be used except perhaps grey, and this is difficult to obtain satisfactorily since it usually appears merely as a half-white/half-black, there being no adequate grey dyestuff. Stamp pads for rubber-stamp work are best coloured by means of spirit-soluble dyestuffs, such dyes being dissolved in mixtures of methylated spirit and water. These dyes are usually obtainable from any colour merchant and paint dealer, but they may also be obtained from chemical laboratory suppliers, such as Messrs. Vicsons Ltd., 148, Pinner Road, Harrow, Middx. There are quite a number available in pale-blue shades.

In order to make a stamp pad it will be necessary for you to cover over a layer of new cottonwool with some linen material and then to impregnate the material thus obtained with a liquid of the following compositions :

Spirit-soluble dye	1 gram.
Hot water	10 c.cs.
Gum arabic	1 gram.
Glycerine	25 c.cs.
Methylated spirit	10 c.cs.

Dissolve the gum arabic in the hot water. Add the glycerine. Dissolve the dye in the methylated spirit, add the dye solution to the solution of gum arabic in the hot water and glycerine. Then pour the resulting liquid over the stamp pad prepared for it. Allow about 12 hours to elapse for the liquid thoroughly to impregnate the pad.

By varying the colour of the dye, you can thus obtain a stamp pad ink of any colour.

Pumping Water From a Well

I WISH to pump water by hand from a well, and should be glad of your advice. The distances to be covered are 40 yds. with a rise of some 40ft. I have a pump which is of the double-acting type, 9in. diameter by 3in. and 1¼in. inlet and outlet.

I understand that water cannot be lifted more than 30ft. ; is this so ? I would like to have the pump at the top of the hill if possible.

What diameter piping do you recommend for this condition ? Are there any objections to using rubber pipe as this is much easier to handle than steel or copper ?

Must I use a "clack" or non-return valve on the suction side and make provision for priming on the delivery side of the pump ?—M. Senior (Sheffield).

WE presume that you propose to use a pump of the "common" or suction type for dealing with your well water. In theory, a pump of this nature will only raise water to a maximum height of 34ft. but in practice (usually, owing to deficiencies in the pump), it will not raise water higher than about 28ft. Hence, a common or suction pump whether double or single acting would be quite unsuitable for lifting water for 40ft. at one stroke. You would have to use two such pumps in series. The first giving an initial lift to the water and the second raising the water from a tank, container or reservoir for the remainder of the required distance. The size and diameters of the pump tubing or piping would be immaterial; so, also, would the diameters of the orifices and the nature of the tubing or piping would likewise be immaterial, which means that you could use a rubber pipe quite as well as one of metal. If, however, you used a mechanically - operated pressure or force pump to raise the water in one stage, metallic tubing would be preferable on account of its greater rigidity and strength, for it is well understandable that rubber tubing will only withstand a very restricted pressure.

It would, of course, be necessary to use a non-return valve on any type of suction pump and also to make some type of provision for priming the pump shaft. To erect and maintain a 40ft. pump would, we imagine, be a rather formidable task for you unless you have had special experience and we suggest that you get, in this connection, in touch with a firm of experts who will supply and advise on the most suitable equipment for the task. Such a firm is that of Messrs. John Thom, Ltd., Canal Works, Patricroft, Manchester.

Carpet-cleaning Liquid

CAN you supply me with formulæ for the preparation of a dry or shampoo-type cleaner for an Indian carpet and tapestry upholstered furniture ? Only a small quantity of this cleaner is required for domestic use.—W. P. Campbell (Edinburgh).

THE following formula is for an excellent carpet and upholstery cleaning liquid soap and shampoo. It is quite easy to make and the materials can be obtained from most firms of laboratory chemical suppliers, such as Messrs. Vicsons Ltd., 148, Pinner Road, Harrow, Middx. :

Oleic acid	28	parts (by weight)
Butyl cellosolve	5	" "
Ethylene dichloride	13	" "
Triethanolamine	16	" "
Isopropyl alcohol	14	" "
Water	125	" "

Mix the oleic acid, ethylene dichloride and butyl cellosolve. Dissolve the triethanolamine in the water and add the oleic acid mixture to this solution. Stir the mixture well (preferably with a mechanical stirrer) and then add the isopropyl alcohol, continuing the stirring until a clear solution is obtained. This will readily emulsify in water. It can be used on either carpets or upholstery at full strength or diluted with water. It is best applied to the fabric with a hard bristled brush, such as an ordinary nail-brush, being well rubbed in and then eventually wiped away with a wet rag. This cleaning agent will readily remove dirt, grease and oil, but it will not injure or fade the fabric.

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Editor: F. J. CAMM
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Comments of the Month

By F. J. C.

Final Stages of the Ten-Years-old Dispute

IT gives us pleasure to record that the British League of Racing Cyclists, the National Cyclists' Union and the Road Time Trials Council are jointly and, we believe, sincerely making strenuous efforts to end the impasse which has existed between them on the question of racing on the road ever since the League commenced activities ten years ago. Representatives of the three bodies recently met the Minister of Transport, the Right Hon. Alan Lennox-Boyd, who discussed with them the position arising from the recent decision of the National Cyclists' Union to permit its members to engage in massed start cycle racing on public highways.

It was agreed that this change emphasised the importance of organisers of events of this character ensuring, by means of strict road discipline and adequate control throughout the routes of any such race, that the minimum of interference was caused to other road users. At the meeting the desirability of maintaining a reasonable limit on the number of races organised and the number of competitors in any particular race was accepted by the cycling organisations. The Ministry of Transport circulated a note to the Press on these lines.

Does this mean that the Ministry of Transport is changing its attitude regarding its threatened legislation to ban racing on the roads, a threat it has made on a number of occasions? We hope so. One of the handicaps from which the B.L.R.C. has suffered from its inception is that no bicycle manufacturer has been permitted to support by means of advertising either the League's journal or the programmes of its events, and it has had to finance all of its somewhat heavy expenses from its own very limited resources. It is astonishing that it has been able in spite of this to advance the cause it was formed to espouse on so little money.

We understand, however, that the manufacturers have agreed that for the remainder of this year they will be permitted to support massed start racing no matter by whom promoted, and at the end of the year the position will be reviewed again. We hope that manufacturers will favourably consider the claims of the B.L.R.C. for their support, for they are the pioneers of the movement in this country and have demonstrated that a new form of racing was wanted by a large body of sporting cyclists. In our view nothing but good can come of this recognition by all concerned that massed start is not the unclean thing it has been represented to be. It will put fresh life into the sport and pastime, and it will enable cycling to take its place in the newspapers on equal terms with football, golf, tennis and all other forms of outdoor sport.

It will give a terrific fillip to the cycling movement as a whole and will undoubtedly help to sell more bicycles in this country. Sales of bicycles are not so brisk as they were, and the promotion of these spectacular races will bring cycle racing out into the daylight and lift it from the hole-and-corner obscurity where it has lain perdu for half a century, and will cause fresh young blood to pulse through the whole of the movement. Publicity hitherto has been considered an unclean thing, something which no amateur should seek, and quite naturally there is an enormous body of public opinion which does not know the existence of the sporting cycling movement. The position to-day would be vastly different had wiser counsels prevailed many years ago. Had time trials, for example, been permitted to be advertised in the Press by means of advance publicity it is possible that time trial races would still be the only form of cycling sport on the roads to-day. Those who have been the giants in the field of cycle racing, the Triton among the minnows, have had to hide their light beneath a bushel and have received only a modest amount of publicity in the technical press, and little, if any, in the national press. The rules governing the sport have forbidden prior publicity. Time trials are held under such secret conditions that the times and the courses of the races have to be identified by the participants according to cabalistic signs. Little wonder that the exceptional cycle racer sooner or later deserts the ranks of the amateurs and turns professional. When an athlete knows that the world is looking on he is spurred on to even greater efforts and achievements.

The change of front between the three bodies does not mean that the R.T.T.C. will cease to operate and control time trials, but it is obvious that there will be secessions from its ranks by all those who, now confronted with the choice of two forms of racing, will prefer massed start.

This propounds the problem: will the R.T.T.C. itself promote massed start races in the future? If it finds a decline in the course of a few years in the form of races it has controlled with merit for so many years, will it change its rules so that time trials can be run under conditions of publicity which apply to its rival? Will there be a condominium of the three bodies at some distant date? These are intriguing questions which are bound to be eagerly discussed in the ensuing months.

It seems reasonably hopeful now that peace will descend on the cycling world and that the acrimony of the past will be forgotten. Let us hope so, and let nothing be said or written to strike a discordant note during the lucubrations which are now going on.

Motor Assisted Bicycles are Auto-cycles

LAST month we dealt with the case of a youth who was riding a motorised bicycle without the owner's consent and was charged with riding without a third party insurance and a driving licence. It was held that as he had not switched on the engine he did not require these and the summonses were dismissed.

A similar case, however, has reversed this decision. A youth charged with similar offences made the same pleading and the magistrate held that he was in the same position as a motor-cyclist travelling free-wheel and he was fined for the offence. It is true that this second case was held in Northern Ireland. The legal position here now needs to be clarified although it seems that the verdict in the second case is the correct one.

Rear Warnings

RECENTLY a Member of Parliament asked the Minister of Transport when regulations requiring bicycles to be fitted with red reflectors and white mudguards were to be restored. The Parliamentary Secretary replied that the requirements had not yet been brought into force because manufacturers have not been in a position to meet the demand without detriment to their export and other essential commitments. Presumably the rearmament programme and the shortage of raw materials is the main cause of the delay. Certain it is that the present period of immunity from the requirements of the Act will not last in perpetuity.

Cycle Racing Gossip

A Monthly Summary

By W. J. MILLS

"Newark Mill
Surrey"

By the little bridge over the River Wey. A favourite spot of the fisherman cyclist

OLYMPIC inquests will be followed this month (September) by world's championship inquests; not that the National Cyclists' Union will do much about it. All over the country, at club meetings and on club runs, cyclists will be asking such pertinent questions as: "Why were our riders beaten by men they had beaten many times back home?" The obvious answer is in the form of another question: "Where was the N.C.U. team manager?"

Just as the resignation of Bill Bailey, on the eve of the 1948 Games, badly bent the morale of the British team, so, too, did the resignation of Syd Cozens on the eve of the 1952 Games.

The rights and wrongs of it are still not fully known. On the surface, Cozens resigned because the N.C.U. would not pay out four pounds for a special insurance policy to cover the risk of flying to Helsinki and back. Both the N.C.U. and Cozens himself could easily afford four pounds . . . so?

This left our Olympic track team without a leader. George Fleming, the road team manager, did his best, but it was asking too much of any one man to handle such widely divergent interests as road and track.

Until the N.C.U. face up to the fact that the prime essential of international competition is a combination of good enough riders and a better than average team manager, we will never get far. Reg. Harris, for example, only rose to world championship heights after he had thrown off the N.C.U. shackles and decided to go his own way.

* * *

GEORGE FLEMING, though, is perhaps our hope for the future. He coaxed our team through the Route de France fourteen days' race, he handled our Olympic road team, and he has proved that he can command the confidence of the riders. With his past record as a road rider he knows the game inside out. What does he lack? George is only too ready to admit it. "To handle teams abroad," he told me, "you've got to fight for them against the foreign officials, and that means at least one other language besides English."

In order to qualify as British team manager next year, George, at his own expense, is studying French intensively this winter, so that he can more adequately stand up for our teams next year. Remember, by the way, that the British team manager's job is purely honorary.

* * *

THE Tour of Great Britain, the sixteen days' road race now in progress (August 22nd onwards) is certainly well on its way towards full international status.

Boycotted by the trade last year (in so far as the big cycle makers were banned by their union from entering teams), this year's race has received the full blessing of the cycle makers' union, and as a result, B.S.A. cycles were quick to get in with a full team, consisting of no less than four national (N.C.U.) road racing champions . . . Bob Maitland, Pete Proctor, Tiny Thomas and Alf Newman. With Sun Cycles fielding a team headed by Ian Greenfield, and Viking and Wearwell Cycles also represented, the Tour of Great Britain begins to take on the aspect of a trade war.

But, all the while the race is run under British League of Racing Cyclists' rules, the Continental cycle makers cannot enter their best men, who, by virtue of interlocking agreements, can only ride in England in N.C.U. approved races.

Cycle makers in this country have at last realised that racing successes in Europe sell bicycles all over the world. French makers have known this for the last fifty years, and spend the largest part of their advertising allocations on sponsoring professional road teams (not track teams . . . for some reason, track wins don't sell bikes).

If only the B.L.R.C. and the N.C.U. can get together this winter and put on a joint programme next year, we'll have the great champions, such as Fausto Coppi, of Italy, winner of this year's Tour de France, competing in similar events in this country.

* * *

THE road time trial season in England is fast drawing to a close. The main title, "Best All Round Champion," will almost certainly have been decided after the national championship at 12 hours (held at the end of August). Ken Joy, of Medway Wheelers (but now resident in Preston, Lancs, where he represents one of our largest cycle companies), established a clear lead in this contest quite early in the season and, at the moment of writing, is hardly likely to be dislodged.

The title is awarded for the rider with the best aggregate average speed in m.p.h. over 50 and 100 miles and 12 hours. Joy won in 1949, with 22.808 m.p.h., again in 1950, with 23.330 m.p.h., again in 1951 with 23.414 m.p.h.

In 1952 Joy smashed the 100 miles record, his own 12 hours record, and this, plus a fast 50 miles time, gives him an all-round average speed of 23.829 m.p.h. Before the season is out, it may even be that he can push this up to 24.000 m.p.h.!

What events in September can affect the B.A.R. championship? There's the National 12 hours championship, results of which will be known by September 1; the Birchfield 100 miles, the Manchester Wheelers 12 hours and the Middlesex R.C. 12 hours.

I rather expect that Ken Joy will concentrate on improving his 50 miles time—he can hardly better the others—and so we can expect him all-out for the record in the Regent (Southampton) 50, and the Brentwood 50—the latter being the very last trial in the season which can affect the B.A.R. results.

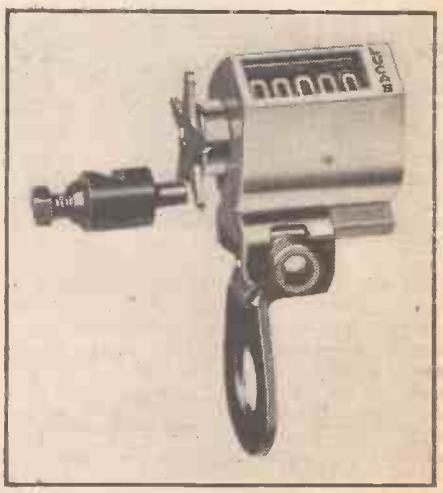
* * *

MAIN international cycling event this month is the Grand Prix of Nations, a time trial held near Paris, and over approximately 88 miles. Now, we have always maintained that time trialling is a purely British speciality, even though the facts prove that every time a British rider competes abroad in a major time trial he is beaten.

As this Grand Prix of Nations is purely a professional race, we cannot expect Ken Joy to be riding, but is there any British professional with a chance worth entering? Last year, Stan Saunders and Basil Reeves, newly fledged pros., competed, but hardly with success.

This year we have a much stronger professional school in this country, and several riders, notably Dave Bedwell, have shown an interest in the "G.P." Although Bedwell is best known as a massed start rider, he has proved, at Herne Hill track this year, that he can adapt himself to any form of racing—and I think that he has the mentality to make an entry in the Grand Prix of Nations well worth while.

True, he will be up against such riders as Fausto Coppi, of Italy, and Ferdy Kubler, of Switzerland—but that won't worry Bedwell, who has even been known to challenge Reg. Harris in a short distance sprint race.



The new Lucas cyclometer for 27in. wheels. Externally, of course, it does not differ from the 26in. or 28in. sizes, and the price of 7/- is also the same.

AROUND THE WHEELWORLD

By ICARUS

Death of E. Coles-Webb

IT is with more than ordinary regret that I record the passing of my old friend E. Coles-Webb, whom I had known since 1939, when I met him at a Bath Road Club annual dinner. He was known to everyone as "Coley." Born in 1866 at Bath, he died at the age of 86 on July 23rd.

He had had a most interesting career and had performed with distinction on the path as well as on the road. He was also a well known runner, and during his sporting career he won a large number of trophies, medals and prizes. He was contemporary, of course, with the late C. A. Smith, both of whom were members of the Bath Road Club. He was riding bicycles in the 80's long before the introduction of the pneumatic tyre, when the battle was on between Harry J. Lawson's safety bicycle and the Ordinary. He rode on both, and because of his having ridden an Ordinary before the time specified under the rules of the Fellowship of Old Time Cyclists, he was elected a member of that distinguished but ever dwindling band. In 1900 he broke the London to Bath and back tandem record with E. P. Clarke as partner, the time being 12h. 25m. 55s.

His wife and he were a famous tandem couple, and the periodicals of the day seldom appeared without a reference to them. They were reputed to be very fast riders indeed, particularly on the Portsmouth Road, where they were frequently in trouble with the police for "furious riding."

The Portsmouth Road was popular among cyclists in those days. Famous men in the cycling world foregathered every week-end at The Angel at Thames Ditton, or The Anchor Hotel at Ripley, where a sort of unrehearsed exhibition of the latest cycles and accessories was staged every week.

Coley deserted cycling for a number of years for motoring, but returned to the fold a few years before the war, rejoining his old club, the B.R.

It is true to say that he knew almost everyone associated with the birth of the cycle and motor industries. As a raconteur he was unsurpassed, and his services as a speaker at luncheons and dinners was keenly sought. He was one of the founder members of the now famous Roadfarers' Club, and on his 80th birthday, which took place in 1946, a dinner was given to him at the Waldorf Hotel at which he managed with one puff to blow out the entire 80 candles which decorated the top of his birthday cake. There were many distinguished guests that evening, including his fellow clubmen Mr. H. H. England, the Marquis of Donegall, W. J. Mills, and many others who paid tribute to him. When he was in his 70's he broke the handicapper's heart by riding in a Club 25 and returning a handicap time of under the hour

He was a good singer, too, and in his day was in great demand at social occasions. His memory for people and faces and events was quite remarkable, and he could tell anecdotes about almost everyone who had been in the cycling movement during the past 60 years. As a practical joker he was supreme, and was responsible for the famous incident, the painting of the white lion sign outside the "White Lion" coaching inn at Cobham, on the Portsmouth Road, which was owned by C. A. Smith. This joke became front page news. This enormous moulded white lion was the pride of C. A. Smith's eye. He arrived down one morning at six o'clock to find that overnight its body had been painted in stripes like a footballer's jersey in the Bath Road Club's colours, red, white and blue; its tail looked like a barber's pole, and the lids of its eyes were bloodshoot. Paint was still dripping on to the pavement. It was some years before C. A. could be persuaded that it was not the work of another Bath Roader named Bauer, who was the only member staying at the hotel that night, and whose bicycle had been suitably decorated all over in pillar-box red by C. A. as a revenge!

The late E. Coles-Webb.

His loss will be mourned by a very wide circle of friends, and the fact that Father Time delayed the severing cut of his scythe until he was sixteen years over the allotted span is only a partial consolation for the loss of one who seemed physically in the running to be a nonagenarian. I, one of his closest friends, will miss him more than most.

Honour for Gordon Randall

COLLEAGUE Gordon Randall whose delightful sketches have decorated the pages of *The Cyclist* both in its present form and when it was a weekly journal, was honoured by having one of his water-colours selected for the Royal Academy. The water-colour was of Parsley Hay, Derbyshire. This is all the more meritorious because it was Gordon Randall's first attempt at getting a picture hung in the academy, although he has exhibited at other galleries for several years. Indirectly, it is an honour for the journal, for he painted it when on tour seeking material for our pages. Well done, Gordon!

Death of Frank Patterson

ALL those who love the roads and the scenes of this English fairyland will deplore the passing of that famous artist, Frank Patterson, who brought to the pages of our contemporary travel-tempting sketches of the very essence of England. It can truthfully be said that the fineness of his line and his use of white space combined to form a black and white pictorial art which he had made his own. He was a prolific worker and although he has passed from this mortal coil it will be many years before his stock of hitherto unpublished sketches is exhausted. He had drawn for the cycling press exclusively for over 50 years, surely a record for any artist who has served a journal.

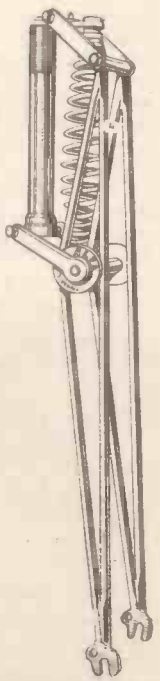
The Bath Road 100

THERE was a full field as usual for the Bath Road 100 this year, which took place on August Bank Holiday. It is rather an unhappy reflection that not one of the hundred entrants was a member of the promoting club. The late Bath Road Smith would have been shocked to find that this club of which he was a founder member, one time secretary and later president, could not find a man worthy of the event. It is a classic race and I am the proud possessor of the original Bath Road 100 Cup which C. A. Smith left to me when he died.

The inauguration of the B.R. 100 attracted immediate attention and entries came from all of the London clubs, including the North Road. Unfortunately, round about that time a dispute took place between the B.R. and the N.R. and the dispute reached dimensions of a national quarrel, for letters about it appeared in all of the daily papers, including the dignified columns of the *Daily Telegraph*. The wound has long since healed, and the officials and members of both clubs are friendly again.

Spring Forks

BOB SERGENT, of Moorfields, Liverpool, 2, has just put on the market the "Alfa" tubular girder spring forks which are suitable for any make or model of cycle whether motor-assisted or not. They weigh 5 lb. against the 2½ lb. of a normal pair of forks. They are made for use with 21in. or 23in. cycle frames, and can be supplied with a 7in. or 8in. steering stem. They have adjustable fork dampers, chromium plated spring, separate mudguard stay fixing lugs, grease gun nipples to all spindles and are finished in heavy glossy black enamel. They cost £4 17s. 6d. complete, and are illustrated on this page.



The new "Alfa" shock absorbing forks for cycles with or without motor assistance.

CYCLORAMA

By H. W. ELEY

Malham Cove, Yorkshire.
The great limestone outcrop near Skipton

A Peep into the Very Far Past!

I WONDER how many men connected with the bicycle industry can recall two makes of machine which rejoiced in the names of "Tam o' Shanter" and "Circe"? Curious names these, and they came into my purview through a note I received recently about the retirement from the Dunlop Company's service, of Mr. Ivor Davies . . . who joined the old Liverpool Rubber Company, some fifty-four years ago. Now, this same Liverpool Rubber Company made several "lines" . . . including the "Lockfast" cycle tyre, and—the two complete bicycles the names of which I have quoted! Of course, it is all going back a very long way, and "Tam o' Shanter" and "Circe" must long ago have been forgotten, but I was intrigued by the names, and I am hopeful that they might cause some "old timer" to write me, giving other names from the misty past!

Down Dorset Way

RECEIVED a letter the other day from a "son of Dorset" (so my correspondent describes himself)—and it told me of fair and fascinating places in this shire of the south. My letter-writer was born at Dorchester, the pleasant county town, and reminded me that the famous Thomas Hardy was born at Upper Bockhampton, quite close to Dorchester. The letter went on to suggest that my next cycling tour should be in Dorset; it told me of ancient Poole and its harbour; it mentioned the famous "Walls of Wareham," which have withstood fires, storms, and the remorseless march of time. I know these mysterious earthworks, their grass-grown banks and ditches, built in the dim past as ramparts against the Danish invader. This old Dorset place of Wareham seems to have attracted invaders on many occasions, and it is doubtful whether the earthworks ever really protected the town. My "son of Dorset" is evidently an enthusiast for the towns and places of the county, and their histories. He mentioned in his discursive, friendly letter, that in 1685, three luckless prisoners, taken in the Monmouth Rebellion, were hanged on the old ramparts at Wareham. In fact, his letter dealt with several morbid topics, for it also told of the slaying of King Edward the Martyr, that unfortunate king who was stabbed at Corfe, by his stepmother Elfrida, in the year 978. However, the letter ended on a pleasant note about Thomas Hardy and his lovable characters in such books as "Under the Greenwood Tree" and "The Mayor of Casterbridge." One of these days I must go to Dorset . . . and look up my friendly correspondent, and maybe drink ale with him in an old Dorset inn!

English Weather

WHENEVER I get amongst old men (and I often do in village inns) I find that sooner or later, the topic of conversation veers round, like the weathercock, to the subject of weather. The winters and summers of yore! The mighty snowdrifts of the bygone years! Those tropical-like summers when the sun blazed down on the shimmering fields for weeks on end . . . the old men, over their pipes and glasses, chatter on and on . . . and each one endeavours to "cap" the story told by others! Now, I believe myself that in some curious way, the seasons are changing, and, certainly, we can no longer assume with any confidence that March will be the month of winds and gales, that July and August will bring torrid heat, or that January will be a month of ice and snow. But I am convinced of one thing: nothing that the old men can recount, in the way of severity of weather, can possibly surpass the "samples" we have had in recent years! There was that Arctic winter of early 1947, when here in Derbyshire, the snowdrifts were like mountains, when dozens of villages were cut off for weeks, and bread was delivered by venturesome volunteers, on horseback! No! when the chatter in the cosy bar of "The Golden Fleece" turns to the weather, the old men are now inclined to be silent; they have seen the "terrible times" of their youth more than equalled . . . and the talk moves from the weather to the next darts match between the "Roan Mare" and the "Fighting Cocks"!

Flash-back to Wartime

THE other day, whilst rummaging among various tools and "gadgets" in an old box in my storage shed, I came across two little blocks of wood which brought back vivid memories of wartime conditions, and the days when rubber was almost unobtainable—when the Japs held our Malayan rubber estates, and every conceivable kind of substitute was tried out by our research men and factory chiefs. The two pieces of wood were—wartime cycle pedals! Made from beech, they were nicely fashioned, very smooth, and drilled. But what poor substitutes they seemed! If there is "nothing like leather"—well, for some purposes, there is "nothing like rubber"! And I think that the cycle pedal block is one of them!

Topical Advertising

SINCE rail and bus fares increased, the cycle manufacturers, in their Press advertising, have been striking the topical and appropriate note: "Use a bike and save fares." It is a good and forcible argument, and should, I feel, turn the thoughts of many a business man to the virtues of the cycle as a means of transport to and from business. In the early days of my Dunlop years, when the old "Para Mills" at Aston Cross constituted the manufacturing headquarters, and I lived in the then rural Birmingham suburb of Erdington, I always cycled to and from the office . . . ignoring the tram and the bus. The cobbled surface of the Lichfield Road was not ideal for cycling, but I saved money, I kept my health . . . and I commend the bike to those office-workers who grumble so strongly at the ever-mounting fares charged by the transport concerns. Buy a bike—that is the answer to the problem!

Superstition Land

OLD superstitions, and the belief in "charms" and witches, may have largely died out in these islands, but it is quite wrong to imagine that they are dead. In fact, they survive in surprising places . . . places adjacent to large towns . . . where one would have thought that the hard rationalism of to-day would have long ago killed any lingering beliefs in the "evil eye," and the power of inanimate objects to bring luck or bad fortune. But it is not only in remote parts of Cornwall, and in Ireland, where superstition lives on! Recently, I talked with an old Derbyshire woman who believed, quite firmly, that to carry a sprig of an alder tree about the person was a sure means of warding off ill-fortune and certain ailments. And the same woman informed me that it would never be my lot to meet with a violent death if I always made a point of turning round, twice, whenever I met a white horse! The magical virtues of hares' feet, the evil power possessed by the magpie, the beneficent influence of a robin if he enters the house . . . all these and many other beliefs still flourish in country districts. One can dismiss them all as rubbish . . . but one cannot kill them, and the big business done in "lucky pixies" from Cornwall, all over England, is the measure of the strength of superstition in our sophisticated land. In Ireland, the leprachaun and the banshee show no signs of dying; and the most matter-of-fact English townsman will solemnly "turn over his money" when he sees the new moon!

Those Stately Homes of England

SOME time this summer I plan to cycle to the Dukeries . . . that famed district of stately homes and ducal mansions. Welbeck . . . Clumber . . . Worksop Manor: the names conjure up mental pictures of earls and dukes, rolling in their wealth; of vast estates and rolling parklands; of great forests and sylvan retreats. Some of these amenities remain . . . but shorn of nearly all their one-time glory. Some are now show-places for the million . . . with an impoverished owner glad to collect the half-crowns paid by the sight-seers, in order to keep the "stately home" from decay. Ah well! times have changed . . . but the trees in the great parks are as lovely as ever, and the glamour of the past clings to the venerable houses where poverty may now stalk the long corridors and austerity take the place of one-time affluence.

Wayside Thoughts

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

The Changes Come

HOW our habits change with the years. Once a fine Sunday was a day to make the miles fly away, break county borders and return home full of personal satisfaction. Then in middle life we ease off, making a round of perhaps sixty miles and arriving home just after tea-time to a congenial hour or two of reading and feeding. Now—with three-score-and-ten on the board—I confess to a liking for a quiet afternoon after the morning run and possibly a few genial miles in the eventide. During the last year the morning run has been invaded very joyfully by a trio of grandchildren who ring me up to make a date and time, and want to know where we shall go, what new spot or field track I can introduce them to, for the purpose of taking their school companions and bragging about their discoveries. These rides are really grand excursions, anything up to thirty miles, but they must have a stopping place for the youthful sustenance of pop and buns. These three youngsters are great fun, and for their tender ages they can ride, often leaving me at the foot of a long slope to sweep up it at speed for the pleasure of turning at the summit and drifting down to join me again.

Being Careless

A WEEK or so ago I fell off my bicycle through sheer carelessness—indeed, I scarcely knew how it happened. I was slowing up to wait for the green of the traffic lights, and I think I must have caught a pocket in the bar, and subsided in a heap with the bicycle almost atop of me. When I had untangled myself, elbows and knees were making their presence felt, but nothing worse, so I jumped on and slunk away from several concerned spectators, patching the raw places when I got to the office. I mention the little incident because it seems worth a note of warning, first, to be careful and, secondly, to admit carelessness if we have been guilty of it. The reminder of the incident, however, persisted for a week or more, and I was surprised. Last time I bumped to earth the resultant bruises had no effect on me, but this time, twenty years after, things were different. When I moved suddenly, I discovered all kinds of little strains had developed in places which I'm certain never came in contact with the road, and hot baths and embrocation apparently had little effect in soothing them. It's all right now, but I take the experience as a warning that the years impose a toll of more things than at first seem probable, so if any of you see me in the future being extra careful, don't be surprised. Evidently wheeling gymnastics are now beyond my capacity, which is a pity, but it seems wise to recognise the truth.

The Truth of the Matter

THE advertisers of the "fliffer" motor engine aid to the bicycle tell us it takes the "hard work" out of the pastime, and unfortunately some people accept the suggestion. That's up to them: I've nothing against the "fliffer" unless—and I am trying to be candid—it is the innate prejudice of the old cyclist, but I strongly object to being told there is "hard work" in cycling if the individual knows how to ride and is fit enough to undertake it. I am an oldish man, but I don't make hard work of cycling, and have no intention of so doing. The way may be hilly, the wind contrary, or the rain and wind unkind, but the need to hurry seldom exists, and the philosophy of travel surely suggests acceptance of something you can't alter, and the use of a longer period of time to make your miles. The folk who find cycling "hard work" are of the type who take no trouble to get reasonably fit, often ride the wrong type of machine geared too high, and accept the riding position without any regard to their comfort. All the advice handed out over the years just passes them by, and apparently it is easier to say "hard work" than mend their ways. It is I suppose, the result of the bicycle's popularity. If we were obliged to do something of a special kind to become cyclists like the advocates of other games, there might be fewer riders—though I'm not so sure of that—but there would be far greater enthusiasm for the pastime, and most riders would be real cyclists. To me the folk who say cycling is "hard work" are just voicing an excuse for laziness and would rather be carried around as luggage than be active travellers. I've no objection to that if it suits them, but I do seriously object to the blackening of my choice in games as a given reason for other people's love of inactivity.

Is it Worth While?

OCCASIONALLY I write a paragraph extolling the pleasure and value of cycling, and at the end of inditing a sentence wonder if it is all worth while. And I leave the unfinished paragraph until the morrow, take a twenty miles ride on the way home and all the old enthusiasms return. I have spent a lifetime trying to persuade people that by cycling they are given a happy simplicity and a vigorous healthiness at a price matched by no other game, and I do not appear to have got very far on the road to acceptance. For the greater part, rich folk scorn cycling, and far too many people who do ride—some of them because they must—treat it as a cheap means of locomotion to be discarded directly they feel they can afford something they call better. There isn't anything; but because I believe that whole-heartedly it is no reason why they should not indulge in idle travel, providing they keep on cycling for the sheer joy of it, instead of—as so many do—scorning it as a means to preserve health and improve their acceptance of beauty. Perhaps I am becoming impatient in my elder age and desire to see miracles occur too suddenly. They say it takes more than a lifetime to create an understanding of values in the mind of the public, and although I've seen cycling expand enormously in the last fifty years despite many times reading that motoring in its various forms would kill it, I'm still wondering if folk really know anything about it. It is an age of impatient restlessness as a result of which some of the winsomeness has been squeezed from life, and into this whirl we are all plunged willy-nilly; yet I believe the great relief from this modern urgency is cycling, the quiet acceptance of an individualism completely perfect in its wise activity, and its generosity of movement.

The Quiet Hour

IT was morning in the early part of May that I woke while the moon was in full flood and the myriad stars were winking at it, that I suddenly made up my mind this is the day to hear the dawn bird-chorus, an orchestral loveliness that is offered to all of us in the spring of the year and so few of us accept the invitation. It costs nothing but an early turn-out, yet what a return for so little trouble. A cup of tea, and off I went to a wooded place within a mile or so of home, and within five minutes of arrival and before I was aware of the changing sky the larks cascaded their music, almost immediately followed by an old cock pheasant and the start and return of the cuckoo. Then the whole air trembled with song as if heaven itself was spilling its beauty in sound. I never saw a human soul in that forty minutes of sheer delight to which I offered up the incense of tobacco in thankfulness; and a few minutes later I was in bed again indulging an extra hour with a sense of satisfaction. It is useless trying to describe such an experience for there are no dramatics; it is just a spring dawn trickling into existence, just a moment when all the world about you seems so exceedingly glad to come alive again and find so much of beauty round about. The best of it has gone by weeks ago, but it is wise to remember, the spring dawn song should be a fixture in every cyclist's diary, preferably made as a lonely pilgrimage, for then the joy of it is not invaded by human contact.

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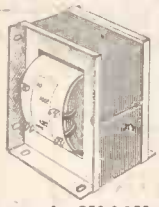

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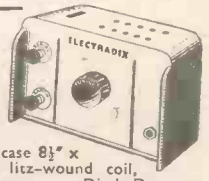

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