

THE PRACTICAL WEEKLY ON ALL HOBBIES.

HOME
CRAFTS
WOOD
WORKING
MODEL
MAKING
AMATEUR
MECHANICS
ETC. ETC.

Hobbies

2^D

March 28th,
1931.
No. 1849.
Published every
Wednesday.

GIVEN INSIDE!
*Design Sheet
for this
Easy-to-Make
Gramophone
Cabinet*



OF SPECIAL INTEREST TO READERS OF "HOBBIES"

It is safe to say that practically every reader of this Journal has a mechanical turn of mind. No doubt, a large number of readers are already keen motor-cyclists, and thousands of others are doubtless considering the purchase of a motor-cycle for the coming season.

This new work will interest every one of the above. It deals with the repair of motor-cycles in a manner which has never before been attempted. Hundreds of repair and adjustment methods are illustrated by means of specially taken action photographs. The descriptive matter has been specially written by repair experts connected with the different makers.

Part I. contains a special feature in the form of an Engine Timing Disk and the exact method of using this disk to time any motor-cycle engine is described and illustrated in an article in the same part.

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Advisory Editor: J. FARNEY, M.I.M.T.

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A Practical Work for Motor Cyclists & Garage Men

MOTOR CYCLE REPAIR & UPKEEP

Advisory Editor, J. EARNEY.

GETTING DOWN TO BRASS TACKS.

We could write glowing descriptions of the many interesting features which appear in this new work, but we think that readers of "Hobbies" would prefer to form their own conclusions by looking through the list of contents below and then examining a copy of the work on any bookstall.

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General Sections

Overhauling a Motor-Cycle.
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Carburettor Fitting, Tuning and
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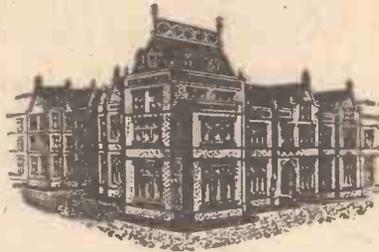
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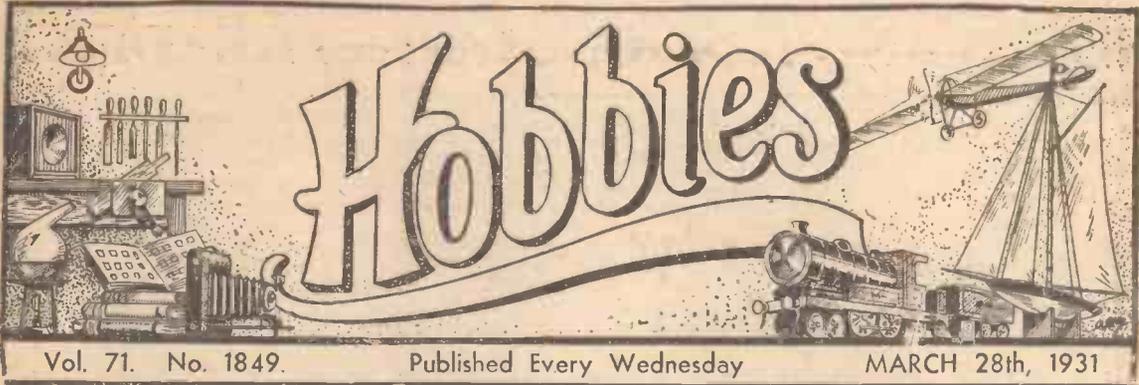
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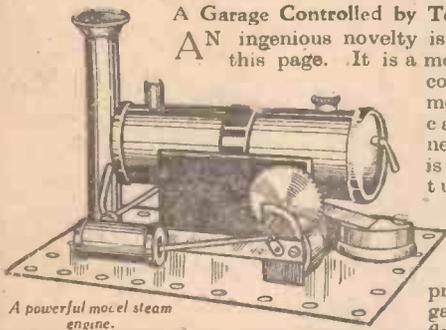




THIS WEEK'S CLEVER IDEAS

Stationary Model Steam Engine.

A MODEL steam engine never fails to fascinate young and old. It is, however, disappointing when the engine merely buzzes round, but does not develop sufficient power to drive other models. The engine shown below, we are informed, under test lifted a weight of 112lb., and it also drove twenty-five working models. It is a Bowman engine fitted with a metal base-plate, drilled so that it may be used in conjunction with other construction and erector sets. A Bowman book is available free to readers by writing to Bowman Models, Ltd., Dereham, Norfolk.



A powerful model steam engine.

A Garage Controlled by Telephone.

AN ingenious novelty is shown on this page. It is a model garage containing a model motor-car. Connected to it is a miniature telephone and when the knob of this is pressed the garage doors fly open and

the car runs out. The telephone will operate the garage from any reasonable distance. It costs half-a-guinea.

A Harmless Rifle.

A HARMLESS rifle which fires cork balls by means of compressed air is shown below. The magazine carries five of these cork balls, so that the rifle is really of the repeating type. It is well made and accurate and costs 12s. 6d.

A Combined Stop- and Wrist-Watch.

THOSE interested in athletics will be interested to know that a combined stop- and wrist-watch has been marketed at the low price of 7s. 6d. It has a centre-seconds hand and the stop mechanism may be operated without removing the watch from the wrist.

A Winder for Model Aeroplanes.

THE winding of model aeroplane propellers is a tedious job, especially when the propeller has to be twisted

a thousand times to wind the elastic up fully. Keon model-aeroplane enthusiasts have usually improvised a winder from an egg-whisk, but a very practical device, at 2s. 6d. is now being sold for the purpose. It consists of a frame and two gears arranged somewhat after the manner of a hand-drill, the main difference being that the chuck consists of two prongs which grip the propeller. Similarly, it was formerly necessary for the model aeroplane enthusiast to make his own rubber lubricant—a somewhat messy job. This necessary substance is now put up in collapsible tubes ready for use.



Four Fine Volumes for the Handyman.

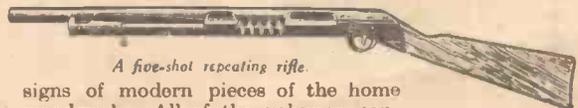
MESSRS. GEORGE NEWNES, LTD.

A model garage controlled by telephone.

(Publishers of HOBBIES, have just published four excellent volumes for those interested in model making. The titles of the volumes are: "Model Aeroplanes and Airships," "Twenty-five Simple Working Models," "The Handyman's Enquire Within," and "The Home Woodworker." The volumes are edited by "The Home Mechanic," whom readers will recognize as one of the expert contributors to HOBBIES. These volumes, which cost 1s. each from all newsagents (by post 1s. 2d.), consist of 96 pages of extremely useful and well selected matter. The "Model Aeroplanes and Airships" handbook contains many designs of models, as well as chapters on full-size gliding, helicopters and wing-flapping models; "The Handyman's Enquire Within" is packed solid with hints, tips, wrinkles, and recipes which every handyman needs; "Twenty-five Simple Working Models" deals with steam, electrical and mechanical models which require very simple equipment to make (no lathe is necessary); and the "Home Woodworker" is full of de-

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A five-shot repeating rifle.

signs of modern pieces of the home woodwork. All of the volumes contain over 150 illustrations, and the series is entitled *Newnes' Home Mechanic* series.

NOTES AND NOTIONS from our READERS

Improving a Sandpaper Block.

EVERY handyman knows how simple it is to make sandpaper blocks, and no doubt he has discovered that the edges of the wooden block oftencut through this sandpaper.

An easy way of getting over this difficulty is to round off the corners of the block as shown in the sketch.—H. S. (Lincolnshire).

Leg Guards from Wellington Boots.

IF you should have a pair of Wellington boots that are past repair, don't throw them away. You can make a useful pair of leg guards out of them. Cut off the feet and you will have a strong pair of rubber leg guards. If you are a keen cyclist you will find them very useful during wet weather.—J. E. (Newcastle).

How to Make an Indoor Aerial.

PROCURE about 30ft. of bare copper wire and wind it closely round a broom handle; now slide it off the stick and twist one end into a loop as shown in the sketch. Attach two insulators of the egg type to each end and stretch the coiled wire out to the required length, fixing it by means of cord to the wall. The lead-in can next be soldered to the loop in the wire, and then carried down to the set. Very good results



Leg guards made from an old pair of Wellington boots.



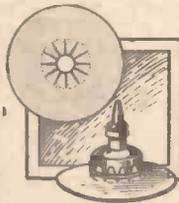
An easily-made indoor aerial

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are obtainable by using an indoor aerial of this type.—N. W. (West Bromwich).

An Ink-Bottle Stand.

IT'S an easy matter accidentally to knock over an ink-bottle and spill the contents, but it's no easy matter to clean up the mess! By making the ink-stand shown in the diagram, the bottle will stand very firmly on the table, and makes it impossible accidentally to knock it over. All you require is a round piece of cardboard about 2in. wider than the bottom of the ink-bottle. Cut the cardboard as shown in the top of the diagram, slip the bottle through the hole, and tie the tabs tightly to the bottle with a piece of string.—H. B. (Manchester).



An ink-bottle stand.

Securing the Hammer Head.

AFTER purchasing a hammer it is always advisable to cover the top with a piece of thin leather, so that if the head works loose it cannot fly off and do damage. Stretch the leather tightly over the hammer head and nail it to each side. Do not use large nails as you are likely to split the shaft.—T. T. S. (Northumberland).

A Candlestick Made from Cotton Reels.

OLD cotton reels can be made into a very useful candlestick, as

shown in the sketch here. All that is needed is a circular baseboard of about 4in. diameter and 1/4in. thick. Then place three cotton reels one on top of the other,



Securing the hammer head.

and a small one on top. All these should be glued together, and a hole bored in the top reel for the candle. The candlestick can be painted to suit other mantelpiece items.—E. N. (Walsall).

Removing Creases from Paper.

HERE is an easy way to remove the creases. Place a clean pillow-case (a large handkerchief will do if it will cover), moistened by flicking cold water over it, on a large and thick magazine or newspaper. Lay the crumpled drawing on the damp linen and fold the other end of the pillow-case over it. Press slowly with a clean, hot iron. This will remove the creases, but the drawing should afterwards be placed under heavy books for a while to prevent curling.



A candlestick made from cotton reels.

How to Make Paper Fuel.

A CHEAP way of keeping your fire alight is to soak some paper in a bucket of water and then roll it into very tight balls. If these are now carefully put on the fire they will burn for a long time.



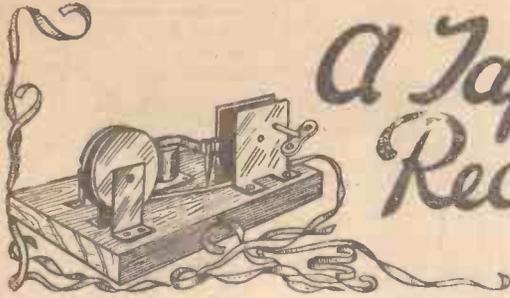
How to make paper fuel

THIS WEEK'S MENTAL NUT.

A man has two ten-quart vessels full of wine and a five-quart and a four-quart measure. He wants to put exactly three quarts into each of the two measures; how is he to do it? And how many manipulations (pouring from one vessel to another) will he require? Was e of wine, tilting and other tricks are not allowed.

Answer to Last Week's Problem.

There were 3,121 oranges in the first instance.



A Tape Machine for Recording Morse!

THIS model is exceptionally interesting to use and make; also, it is a great help to the Morse code learner, for by its aid one is able to send messages and then correct them from the tape.

A motor, either clockwork or electric, is required to draw the paper past the brush. The one used in the original was taken from an old alarm clock and served the purpose admirably.

The balance wheel and escapement were removed, and the paper threaded between the teeth of the second and third gears. This gave a fairly good speed—the motor running from four to five minutes with one wind. A Meccano motor may be easily adapted to perform this operation by gearing it down sufficiently and passing the paper between a $\frac{1}{2}$ in. pinion and a gear wheel.

The Base.

Commence the construction by cutting a base $11 \times 5 \times \frac{1}{2}$ in. and mounting the motor, by means of brackets, as shown in Figs. 1 and 2. The guide tubes through which the tape passes are made by cutting two pieces of sheet zinc and folding them to the given shape (see Fig. 3). The first piece is mounted so that the paper passes from it and immediately between the teeth of the gears. The second is fixed before the brush and in line with the first. The paper tapes used are carnival streamers, twenty of which may be obtained for two pence. A reel to hold the tape is made by cutting two discs of sheet metal 2 in. in diameter. One disc is fixed to a wooden centre, 1 in. in diameter and $\frac{1}{2}$ in. thick. Two brackets, $2\frac{1}{2} \times \frac{1}{4}$ in. are cut from mild steel, drilled to take a $\frac{1}{16}$ in. wire axle and fixed on the base with $\frac{1}{8}$ in. wood screws. Each piece of the reel is now drilled to take the axle and mounted between the brackets. A roll of tape is mounted by removing the reel, slipping

the paper on it and replacing; the paper is then threaded through the two tubes and between the gears.

The Coils.

Obtain two $1 \times \frac{1}{2}$ in. carriage bolts and file the heads flat. Cut two discs of cardboard 1 in. in diameter, put one on each bolt and press it close up to the head (see Fig. 4). For a yoke cut a piece of mild steel $1 \times 2\frac{1}{2}$ in. and drill two holes to take the bolts, $1\frac{1}{2}$ in. apart. Slip this on to the bolts, screw on the nuts and wind the bolts with 24 D.C.C. wire. The coils should be wound in opposite directions leaving about 3 in. of wire at each end for connections. Mount the magnets by means of $\frac{1}{8}$ in. nails through the corners of the yoke, cutting a hole in the base for the nuts (see Fig. 5).

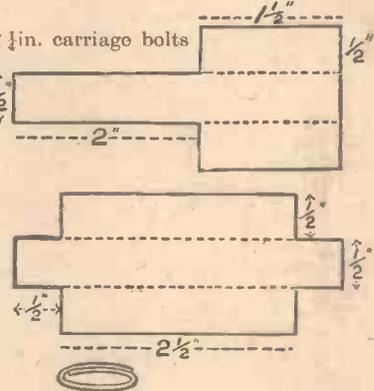


Fig. 3.—Details of the guide tubes through which the tape passes.

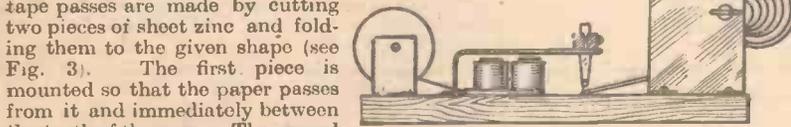


Fig. 2.—Side view.

Figs. 1 and 2, and mounted on the base so that the hole in the brush holder comes above the paper strip. The brush, an ordinary water-colour one with the handle cut off, is fixed in the holder so that, when the armature is pressed down on to the magnets, it just touches the paper. Now make the tapper key as shown in Fig. 7.

Connect the ends of the coils to two terminals on the base. The armature is a strip of mild steel $4\frac{1}{2} \times \frac{1}{8}$ in., drilled at each end to take $\frac{1}{8}$ in. wood screws. The brush holder (see Fig. 6), is a piece of wood $2\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$ in., fixed on the steel strip. The brush is held in position by means of a $\frac{1}{8}$ in. round-headed wood screw. The armature is bent as shown in

Testing the Instrument.

To test the instrument connect it up to two dry cells and a tapper key. Press the key and see that the brush



Fig. 5.—The method of mounting the magnets.



Fig. 6.—The brush holder.



Fig. 7.—The tapper key



Fig. 4.—Showing how the magnets are wound.

just touches the paper. Ink the brush by transferring ink to it by means of a larger and thicker brush. Wind up the motor and tap out a message, which

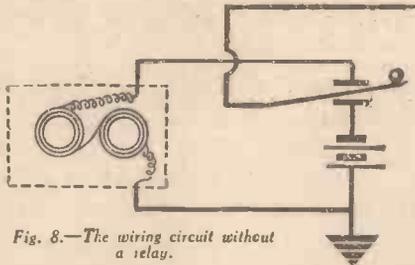


Fig. 8.—The wiring circuit without a relay.

should come through the machine as a series of long and short marks on the tape. A relay must be used when the wiring exceeds 20yd. in all; that is both return and line wire. Fig. 8 shows the connections without a relay. Only one station is shown, as the other is exactly similar.

The relay, shown in Figs. 9 and 10, is an instrument by means of which local circuits may be closed from a distance. If the relay described here is carefully made, it will be sensitive to currents of the order of twenty milliamperes.

The Magnet.

The magnet is a carriage bolt mounted on a $3\frac{1}{2} \times 5\frac{1}{2} \times \frac{3}{8}$ in. base, as in the tape machine. The top disc of cardboard is $1\frac{1}{2}$ in. in diameter and the bottom metal plate $2\frac{1}{2} \times 1\frac{1}{2}$ in. The magnet is wound with No. 32 S.W.G. wire, the ends of which are connected to two terminals on the base. The armature is

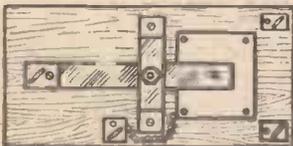


Fig. 10.—Plan view

is desirable. The strip is bent as shown, and fixed to the base with a small nail and a screw eye to act as a

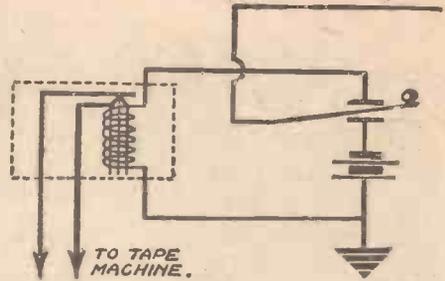


Fig. 12.—The wiring circuit showing how the relay is connected

terminal. The bridge which carries the screw to adjust the tension of the armature is a $4 \times \frac{3}{8}$ in. strip of mild steel fixed on the base with small wood screws (see Fig. 11). The tension screw is a $1 \times \frac{1}{8}$ in. bolt, which screws through a nut soldered in the centre of the bridge. The armature is one terminal of the local circuit and the magnet the other. The bottom plate of the magnet is connected to a terminal on the base.



Fig. 11.—The bridge which carries the screw to adjust the tension of the armature.

The Line Current.

When a current flows through the magnet coil of the relay, the armature is drawn down until the bolt in the end comes into contact with the magnet. This closes the local circuit.

The relay is connected as in Fig. 12, only one station being shown, as the other is exactly similar. Two dry cells should be used in the line circuit, and two more to operate the tape machine. The tapper key consists of a $4 \times \frac{1}{2}$ in. strip of springy brass mounted on a 5×2 in. base. A bridge is fixed over the key, so that when it is not in use the two make good contact. The end of the key is always connected to the line wire, while the bridge is connected to the instrument and the lower contact to the battery.

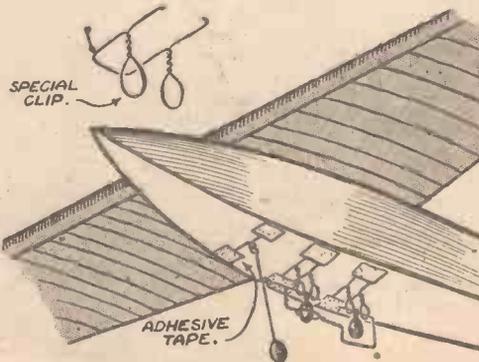


Fig. 9.—Side view of the relay instrument.

MODEL AEROPLANE TOPICS

Bomb Dropping.

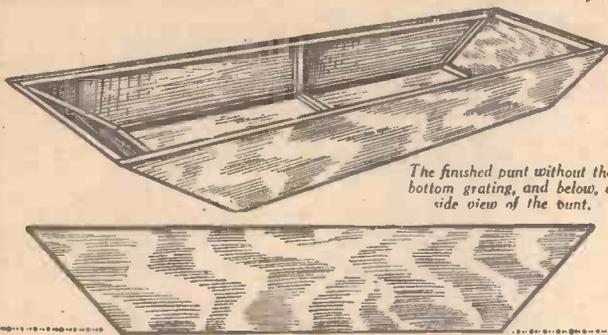
By suitably adjusting the positions of the bombs, weight, and release pins, the bomb or bombs can be made to drop at almost any desired point. Care and experimenting are necessary to get the total weight of bombs, plus swinging weight, not too great for the machine, but it is surprising what weights can be carried, even by well-designed paper gliders, if the weight is applied at the centre of gravity. This



The method of attaching the gear to a fuselage aeroplane.

is most important in all machines.

The best wire to use is thin mild steel wire, sold in penny coils as "floral wire." A diagram is given of the apparatus attached to spar and fuselage models (see centre). No actual sizes have been given, because the arrangement depends entirely on the type of model to which the gear is fitted. With a little care and patience, very interesting results can be obtained from almost any machine.



The finished punt without the bottom grating, and below, a side view of the punt.

MAKE YOUR OWN PORTABLE PUNT

By "Riverside"

THE punt described below is about the simplest that a fellow can attempt. It can be made by any person who has few tools and not too much leisure, one for whom a river or big pond is an attraction and which is within easy reach of home. We require a handy little lightweight punt with an exceptionally shallow draught. Such a craft would be quite suitable for the seaside, also, in calm weather, and would be an especially suitable craft for use with bathing in the river.

The punt is to be 6ft. long overall and 3ft. wide, with a depth of 2ft. These measurements may be varied to your own ideas, and it is a good plan to increase the depth if the length is increased.

Sufficient timber should be obtained by calculating closely your requirements. It is a very good plan to prepare a set of working drawings and make them to a fairly large scale. From them you will be able to get a very close estimate for your materials. The framing of the punt should be not less than lin. square timber. Deal will do, but pitch pine is better, whilst oak is better still. The bottom, sides and ends are fashioned from selected three-ply.

A good assortment of varying length screws should be bought, preferably of brass, and a pound or two of pitch.

How to Commence.

First measure up and cut out your framing timbers. These will be two 6ft. and two 4ft. lengths for the framing, the four-feet coming at the bottom to allow of the usual sheer at stem and stern; a series of cross bearers will be required for the ends and bottom, and at least three uprights for each side. When all is done, give them a good coat of creosote or solignum to ensure them standing the water well. Some will prefer to leave the coating of the framework until the punt is finished. There is a certain saving of time in doing so, but it will be obvious that some of the framing will not get the protection it needs, since it will be covered up before the final coat is possible. Now proceed to screw up, seeing that the frame sets square in all angles. Now you are ready for plating with plywood. The stern and bow plates will have to be put in flush, and for this reason some careful planing of the framing will be required; this will be apparent when you remember that the fall from top to bottom at the end of the punt is at an angle of 45 degrees.

The Bottom Framing.

Be sure to make the bottom framing as strong as

possible (see Fig. 3), and don't hesitate to use several bearers if you or your chums are at all weighty.

Now put on the bottom and sides (see Fig. 1), taking very great care to fit your plywood flush to the framing. When all this has been done it is practically certain that your sides or bottom will leak, though the water will swell out the wood considerably. Now comes the pitch. This should be melted and run in very carefully from inside the punt. In hot weather the pitch is inclined to become soft and may injure the clothing of the punters. This can be obviated by obtaining some rot-proof canvas and lining the joints, the canvas adhering to a layer of pitch. Afterwards the canvas can be painted. The pitch can also be run into the joints of the outside. Avoid using too many screws, especially close together or you'll suffer from considerable splitting of the framing.

The next step is to make a good grating for the floor of the punt (see Fig. 2). This must be laid on an absolutely true frame, and it is better to so arrange matters that the

bearers of the grating fit in between those that form the framing of the bottom of the punt. It is a good plan to make your grating on the same plan as found on the large ships—that is in squares of two inches. This

not only makes a neat job of it, but it adds enormously to the strength of the grating and also of the punt. It is on the floor that the weight comes, and although the water will support it, the grating does ease the strain which otherwise would tend to open the seams.

It will have been observed that the policy here has been to obtain a really light-weight craft, so that it can be transported from house to pond or stream quite easily. If, however, you are very near the water, say with a river at the foot of your garden, it would be just as well to go for stronger framing.

Another method of ensuring watertight joints, but not quite so simple in practice as the pitch, is to take strips of cloth or canvas, and having soaked them in a good oil paint, place them between the framework and the plywood before you begin to screw up. If you choose your screws carefully and take care they are thin, oil them, and drive them gently, you will work with



Fig. 2.—The grating for the bottom of the punt. (Continued on page 834.)

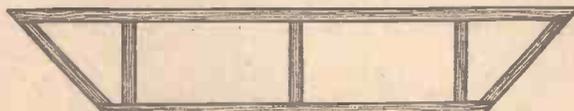


Fig. 1.—The sides, top and bottom joined together.

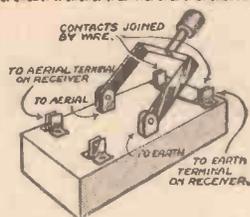


Fig. 3.—The method of connecting up the lightning switch.

ERECTING AN AERIAL AND EARTH SYSTEM

By Hobbies Radio Expert

THE two most important factors in the efficiency of an aerial are insulation and height. The energy collected by the aerial is quite small, and, consisting of "high-frequency currents," takes the shortest path to earth. You must, therefore, take care that the shortest path to earth is through the tuning coil of your set, and not *via* the mast or house to which the aerial is fixed. For the same reason the actual aerial wire should be suspended in such a position that it does not run parallel with any earthed body, such, for instance, as a wall or roof. Three feet should be considered the very minimum distance which should be allowed between the aerial and any other earthed body. For most readers the simplest aerial to erect will be one which is suspended from a pole at the bottom of a garden, and a chimney stack or pole fixed to the side of the house.

The Mast.

The most satisfactory mast consists of sections of steel tubing screwed together, with the bottom section about 2in. in diameter, and the top about 1in. Lengths of the timber known as 2in. quartering may also be bolted together to form quite a good strong mast. A pulley should be fixed at the top to enable the aerial to be lowered periodically in order that the insulators may be cleaned. The mast should be supported by guys at either side and at the back. These may be of either rope or galvanized wire, and should each be broken in two places and insulators inserted.

Where a total length of 60ft. can be obtained, use a single wire aerial, but if the amount of space at your disposal will only allow a run of about 30ft. or less, then use a double wire aerial with the two wires spaced by means of a bamboo stick, with a separation of 3ft. Do not have the wires closer than this.

"Egg" and "Reel" Insulators.

Insulators of either the "egg" or "reel" variety are both cheap and efficient, and in the case of a single wire aerial, six should be the minimum to use, three at either end. They should be joined together to form a chain, as shown in Fig. 1, and at the lower (or garden) end, one end of the chain should be attached to a length of good quality rope threaded through the pulley. One end of the aerial should be securely fixed to the other end of this chain. At the house end, the other chain of three should be fixed to a pole, or a length of galvanized wire attached to a staple in the wall or chimney stack, so that when the aerial is attached to the end of this chain the down-lead will hang about 3ft. from the wall, and, if possible, directly above the window through which it is eventually to be led.

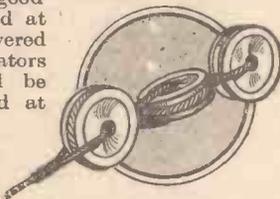


Fig. 1.—For a single wire aerial three insulators should be fitted either end.

The Aerial and Lightning Switch.

The best material for an aerial is the stranded copper wire, known as 7/22's. This consists of seven separate strands of No. 22 gauge copper wire, twisted together like a rope, and is quite cheap. At the house end, the aerial wire should be passed through the hole in the end insulator to form a double bight, as shown in Fig. 2. In this way the aerial and lead-in are all in one, with no connection to become corroded. If, however, owing to your having insufficient wire or any other reason, a joint has to be made, it should be thoroughly soldered, and then bound with insulation tape of the rubber variety, or painted, to avoid corrosion.

Outside the window, a lightning switch should be fitted, and this should be of the type known as "double-pole-double-throw" (unless, of course, you can afford one of the proper lightning arresters). The method of connecting up the switch is shown in Fig 3, and if wired up in this manner the aerial is completely disconnected from the house when the switch is in the "off" position. The wire to earth should be of the same material as the aerial proper, or of some thicker wire. Do not use anything thinner.

The Earth Connection.

There is no doubt that the ideal earth connection is a buried plate of metal. This should be as large as convenient (a 7lb. biscuit tin is quite good), and the earth wire should be securely soldered to it. Dig a hole about 3ft. deep, place at the bottom a layer of coke or some similar rubble, put the earth plate on this, and cover with another layer of coke. Fill in the hole, and well water. Remember that the earth connection should be kept as damp as possible to keep the resistance low. Of course, if a buried earth is inconvenient, a connection to the water pipe may be made, but this should be a main pipe, if possible, and connection made by means of a proper earth clip. Whatever type of earth is employed, keep the lead to it as short as possible. Do not let it travel all round the house, but take it by the most direct route.

Gas pipes are not recommended for the earth, not so much on account of the danger which exists, but because most of the joints are painted, and, therefore, if this has been well done the sections of pipe are insulated from one another.

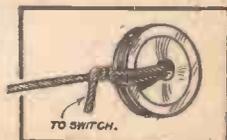
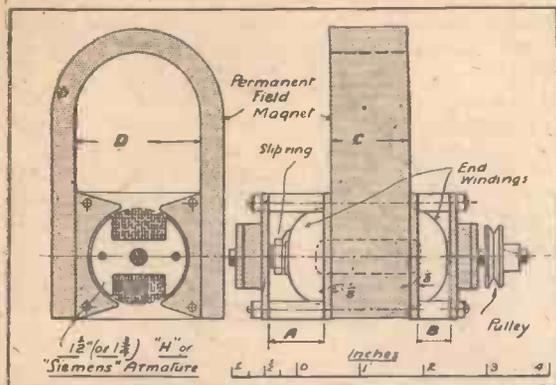


Fig. 2.—The wire passed through the insulator to form a double bight.

Building a Model Airship
NEXT WEEK!
See page 855.



HOW TO BUILD A MAGNETO DYNAMO

By H. Greenly

Fig. 1.—A front and side view of the magneto dynamo.

THE magneto dynamo, the construction of which I very briefly referred to in a recent article on making a charging dynamo, is quite an interesting machine to build. For purposes of light production it is remarkably efficient, as small dynamos go. The current is of an alternating character, the armature circuit having no commutator and, therefore, it cannot be stored in an accumulator.

Making a Magneto Dynamo.

The building of a magneto dynamo must be tackled in quite a different way to the ordinary charging dynamo. There is no possibility of the amateur starting from the beginning in the ordinary way, using raw material, wire, and a lathe. The permanent magnet of this type of machine needs to be made of a very special kind of steel, forged in powerful presses, hardened to the utmost degree, and then magnetized. All these processes are beyond the resources of the amateur. Now that magnets are universally used for motor-car ignition purposes, horse-shoe magnets of the very best cobalt steel, with a magnetism of almost perfect permanence, can be picked up quite cheaply from any large scrap-iron merchant. A magnet from this source may form the basis of a model dynamo such as that described herewith. If the whole magneto is obtainable, so much the better, as the pole pieces, armature, armature shaft, and bearings may all be utilized.

General Dimensions.

In the present case I have supposed that only the magnet is available, and as this may be of any size, I have not figured the drawings. The dimensions may be made to suit the particular magnet obtained. Only two dimensions are really important. "C" (Fig. 1) the width, and "D," the distance between the poles. It is, therefore, only necessary to carefully measure off these dimensions, and then to forget about the magnet until all is ready for it to be fitted up.

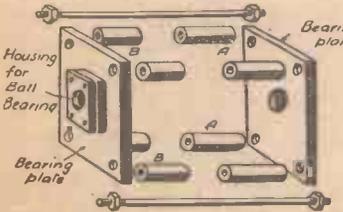


Fig. 3.—How the pole pieces are held together.

Pole Pieces.

The pole pieces are the basis of the machine, and these should be made of soft iron (mild steel will do quite, as well). As illustrated in Fig 2, there

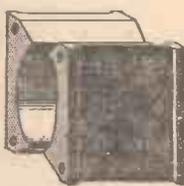


Fig. 2.—The pole pieces.

are two poles with an inside cylindrical bore fitting with a small air gap the size of armature that is found most applicable. The two pole pieces are held together as a complete unit by the bearing plates, distance pieces, and long bolts shown in detail in the sketch, Fig. 3. The distance pieces are made either out of stout tube or brass rod bored for the long bolts.

The pole pieces must be of soft iron or mild steel, and be bored out together on the face-plate of a lathe. The holes for the long bolts are then marked out and drilled, the pole pieces being clamped on to a cylinder or plug of the same diameter as the armature tunnel and maintained in this position as a drilling jig for the bearing plates.

The bearing plates are of brass, and may have either plain or ball bearings. Both of these types of bearing were illustrated in detail in the article on "Making a Charging Dynamo" in HOBBIES dated Feb. 14 and Feb. 21, 1931.

The Armature.

The sketch, Fig. 4, illustrates the armature. It is of the "H" or Siemens type, and, as indicated, should be made up of stampings, the number of which should be just sufficient to build up a core of the same width (C) as that of the permanent field magnet. These lamnations should be varnished and then threaded on to the armature shaft (Fig. 5) and secured by the nuts and washers shown in the sketch of this component. To hold the stampings together, a couple of 3/16 in. diameter iron wire rivets (or bolts) may be fitted in the heads of the armature as shown in the drawings. These will allow the stampings to be removed from the shaft as a complete unit.

Armature Winding.

The winding of the armature is of the simplest character, a plain coil of wire round the waist of the "H" stampings. Although it is more awkward to perform the actual winding with the shaft in place, it is better in the long run to wind on the wire after the whole component has been fitted up. To obtain the best balance an equal amount of wire should be made to pass on each side of the shaft in arranging the windings at the ends. This portion of the wire is of no value electrically—the end windings are to be considered as a necessary evil—

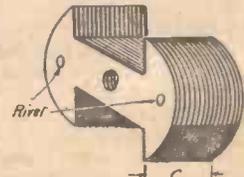


Fig. 4.—The armature.

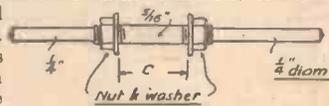


Fig. 5.—The armature shaft.

and should be made as compactly as possible. As the amount of space they occupy is an indeterminate quantity, the length of the distance pieces A and B (Figs. 1 and 3) may be settled upon after the armature has been wound. The starting end of the coil should be electrically connected to the shaft. The other (finishing) end of the coil is led to an insulated slip ring.

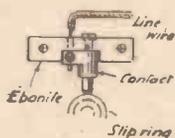


Fig. 6.—Another method of making the collecting brush.

Slip Ring Connection.

The only insulated connection to the armature is made through the slip ring and its collector. This method of collecting current from a rotating armature (or rotor) is common in many types of alternating generators and motors. In this machine the slip ring is made by turning up a bush of ebonite or other insulating fibre as shown in Fig. 7, and forcing on to it a turned copper, bronze or brass ring. This ring has the finishing end of the armature soldered to it, after the slip ring has been forced on the shaft as close to the armature core as possible.

Collecting Brush.

The collector may be a strip of springy copper fitted from any fixed portion of the machine with its end resting on the periphery of the slip ring. Another method would be to collect the current by a spring contact plunger retrieved from an old electric lamp socket. This idea is illustrated in Fig. 6. The contact is fitted up to a piece of ebonite carried from

the adjacent end bearing plate. The arrangement of the circuit is shown clearly in the diagram (Fig. 8).

Wire Sizes.

For an output at a pressure of 10 to 12 volts the armature should be wound with No. 30 D.C.C. (double cotton covered) wire, about 20zs. being necessary. For a lower voltage, say 6 to 8, use about the same weight of No. 26 D.C.C. wire.

These sizes are only approximate, as the strength of the magnet is a variable quantity and may affect, one way or the other, the voltage of the current the machine produces.

The advantage of the permanent magnet or "magneto" dynamo is the constancy of the voltage beyond the critical speed of the machine. There is, therefore, little or no danger of burning out the lamps where the dynamo is driven by an engine of variable or un-governed speed. After the full voltage is obtained a further rise will not occur, as in the case of a machine with a wire-wound field, if the speed is increased. To explain this in simple and general terms, it may be said that any extra voltage due to excess speed tends to demag-

netize the field magnet; such reduction in field magnetism will cause the armature voltage to fall; therefore, after a certain speed of rotation the effect on one part of the machine neutralizes the other. For this reason the "magneto" dynamo is so useful for generating the lighting current of a pedal cycle.

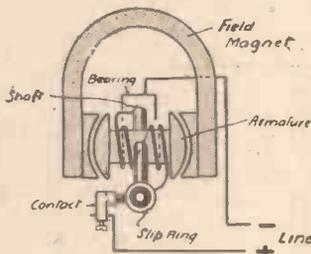


Fig. 8.—The arrangement of the circuit.



Fig. 7.—The collector brush.

MAKE YOUR OWN PORTABLE PUNT (continued from page 831).

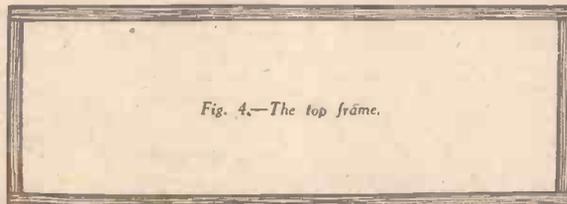


Fig. 4.—The top frame.

greater ease and achieve a much better finish.

The cloth strips mentioned will dry hard because of the paint. If there are any places where the joint does not seem up to watertight standard, use some putty. The objection found to putty is that when hard it too frequently drops out, especially in a punt, where there is the strain imposed by movement. Some ironmongers have putty substitutes in tins, which are reputed to be very effective, though we have not tried them.

Finishing Off.

Go over the whole with glass or emery paper, and get a good smooth surface, and then paint two coats of good oil paint, or—and this is even better from a preservative point of view—use solignum. This can now be obtained in many pleasing colours, though for a punt green takes some beating, followed closely by brown or red.

Paddles and punting pole will be needed, and cushions from the house most likely. The pole is simply a longish broom-handle, because we assume that this little craft

is for shallow, confined waters, save when used on the sea. Then paddles are absolutely necessary, whilst very desirable on land-locked waters. The simplest form of paddle is to make it like a spade, but you must take care in the choice of your wood. Ordinary deal, which fulfils so many purposes, would split. The best way of making paddles is to splice the handle in something the same way that a cricket bat is done. Good stout ash handles will serve splendidly; indeed, the whole might be fashioned from this useful wood.

It will be well to sit up on the bottom and in the centre of such a punt as this, and so preserve the centre of gravity as fully as possible.

Although not handy to carry, the weight of such a punt as this will be such that it may be carried easily by one person, but two would handle with ease.

A final hint.

It is always found that the bottom of a punt gets the worst treatment of the whole, largely through being hauled on and off the shore, and also over rollers at weirs.

Take a tip and see that you place light metal or hardwood runners on the keel.

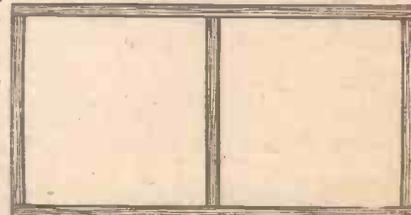


Fig. 3.—The bottom frame.

WIRELESS NOTES AND COMMENTS

INTERESTING EXPERIMENTS

FOR RADIO ENTHUSIASTS

By Hobbies Radio Expert

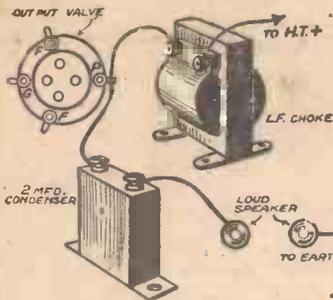


Fig. 3.—The output filter circuit.

HOW many times have you wanted to stay up late and listen in to the dance music?

Here is a simple arrangement by which you can listen in with a crystal set while you are in bed.

Run a single insulated wire from your set downstairs to your bedroom. If you can manage this through the window without using too much wire so much the better. It will make a tidier job of it.

Inside wiring may be done satisfactorily by running the wire along the wainscoting, and fixing it with small staples, or, better still, behind the panels of the wall, if convenient.

When you have fixed this single wire from the set to the bedroom you will only require an "earth" connection, and this should not be difficult to obtain. A neat flex wire to the gas pipe, or, if the bathroom is near, a wire to a water pipe in the bathroom, or even to your iron bedstead. All these will make quite good "earth" connections, and may save you the trouble and inconvenience of having a double wire.

The connections should be made as in Fig. 1. The single wire to your room should be connected to the detector side of your headphones.

Adjusting the Set.

You will, of course, have to adjust your set before you go upstairs, and, to prevent any one upsetting the adjustment of the crystal detector just as you are interestedly following a thrilling part of a radio drama, you should place the set in an out-of-the-way corner of the room, or equip it with a permanent detector, which may not give you quite as good results, but will, at least, prevent your entertainment being suddenly cut off.

Another good idea is to make a wooden cover for your crystal set. Fig. 2 shows how it may be designed. Narrow slits in the cover are bored for half an inch at the bottom of the cover to permit the outside wires to be connected up.

The Output Filter Circuit.

Is your set fitted with an Output Filter Circuit? It is not generally known what a number of advantages are to be obtained with this arrangement. Better quality, elimination of "motor-boating," removal of the H.T. current from the speaker, are only a few of its advantages. The only components necessary for an Output Filter are a low-frequency choke (which should, of course, be of good quality) and a fixed condenser of either 2 or 4 mfd. To connect to your set, disconnect the loud speaker, and connect the low-frequency choke in its place. One side of the fixed condenser is then connected to the terminal which

goes to the anode of the output valve (probably marked on your set "L.S. —"), the other side of the fixed condenser goes to one side of the loud speaker, and the remaining side of the loud speaker goes to earth. A glance at Fig. 3 should make this quite clear. There is no need, when an output filter is employed, to worry about the positive and negative terminals of the speaker; and if you wish to take the speaker into another part of the house, only one lead from the set is necessary. This should be connected to the fixed condenser, and the free terminal of the speaker may be connected to any convenient earthed object. This arrangement is particularly useful during the summer months, when you wish to take the speaker into the garden, as a single length of Electron wire may be fixed permanently along the garden fence, is much cheaper than twin flex, will withstand the weather, and a metal skewer or some other such object may be connected to the other side of the speaker, and stuck into the ground quite close to the speaker.

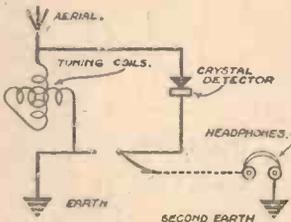


Fig. 1.—The wiring diagram for the crystal set.

Station Logs.

Do you keep a log of the stations you can get on your set? Where a number of stations can be heard, it is advisable to keep some record of the different dial readings, in order that you may get any one particular station without searching, and no doubt a number of you have got such a record, which, in the majority of cases, simply consists of a slip of paper with the various notes in any sort of order, and this is slipped inside the cabinet or anywhere out of the way. When you want to find the reading for a particular station, you have to hunt for the slip of paper, and usually end up by trying to find the station instead of the paper. All this trouble can be avoided quite cheaply, and a much more satisfactory record kept, if you buy one of the proper Station Logs. This may consist of a simple metal frame which may be screwed to the panel or cabinet, and into which slips a card on which are printed columns for the insertion of the station, call-sign, wavelength, and dial readings (up to four dials). A more elaborate and neater affair consists of a small oxydised copper container, which may be fixed to panel or cabinet, and contains a long strip of linen on which are printed the names and call-signs of the principal broadcasting stations of Europe, and columns for the insertion of the dial readings.



Fig. 2.—A wooden cover for the crystal set can be made as shown



Fig. 1.—A front view of the book-ends.

SIMPLY CONSTRUCTED BOOK-ENDS

By W. S. Rogers

Fig. 2.—How the lead weight rests in the right angle between the two main members of the structure.



THESE useful accessories to the bookshelf generally are made too light to be serviceable, or they depend upon the weight of a book to give them stability. It is best to omit the metal sheet that is designed to pass under the book or books, and to weight the book-ends.

Here is a design that provides for a leaden weight within the structure. Fig. 1 shows a front view of the book-end. It may be made 6 in. wide and 8 1/2 in. high. The construction is obvious from the illustrations. The upright and horizontal members may be 1/2 in. thick, and should be joined by dovetailing. The cheek pieces should be 3/4 in. thick.

The curved piece that closes in the cavity for the lead may present some difficulty to the novice; but if he can obtain a piece of stout wooden curtain rod, he will be able to cut out a quadrant with the saw and complete the job with the gouge.

Those possessing a lathe might use that tool for turning a hollow cylinder, which would provide four pieces of quadrant section.

The applied decoration should be cut from thin fretwood or stout (saw-cut) veneer and glued in place.

The wood to be used would be at the choice of the craftsman, who probably would elect to use oak or mahogany.

How to Make the Weight.

Reference to Fig. 2 will show how the lead weight rests in the right angle between the two main members of the structure.

As to the weight, make a mould as shown in Fig. 3. This should consist of two pieces of wood joined together at right angles, and a piece of stout strawboard, bent to the necessary curve and tacked to the wood. The length of the mould should be at least 1 in. more than that of the weight.

Stand the mould on a heap of sand and pour in the molten lead, which should not be heated much beyond melting point. When cold the ends of the weight may be sawn square and its length made a trifle less than the cavity it has to fill.

Those expert enough may finish the work by french polishing or waxing, or the whole surface might be treated with one of the cellulose enamels, in which case the raised decoration could be picked out in gold leaf or one of the bronze powders.

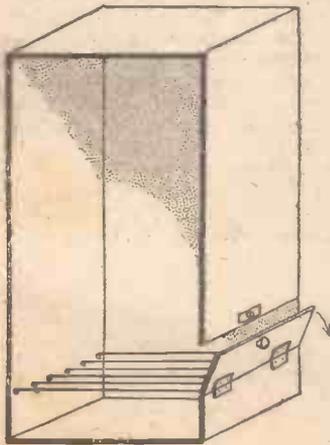


Fig. 3.—Moulding the lead weight.



Fig. 4.—The book-ends in use.

A SIMPLY-MADE AQUATINT DUSTING BOX



An aquatint dusting box.

AN effective dusting box for use in aquatint etching can be made at home quite simply as follows:—

Make a light box, say 15 in. square and 3 ft. high, or any other size that suits your requirements, only keep it tall in shape. The box may be made of 3-ply wood, or even stout cardboard, a strip of fabric being glued over all joints to prevent the dust from leaking. About 3 in. up from the bottom fix a rack of wood or metal bars, about

2 in. between each bar; this is to carry the copper plate. Make a trap-door right across the front of the box; this door should be about 3 in. deep, the bottom edge being hinged on a level with the rack. Unless this door fits perfectly, felt should be glued round the edges to make it dust-proof when closed. Then put a couple of handles on each side and the box is complete.

To operate the box, put a few handfuls of powdered resin or bitumen in it, close the door and shake up the whole thing. Stand it the right way up and bang the box all round with the hand to dislodge any dust adhering to the sides or top. Wait a few moments to allow the coarse particles to settle, then open the door and lay the plate on the rack face up. The dust will then settle on the plate in a few minutes, forming a grain. The plate is removed and the grain fixed by heating.

The longer the dust is allowed to settle before inserting the plate the finer will be the grain. The operation can be repeated if there is not enough grain after the first insertion.

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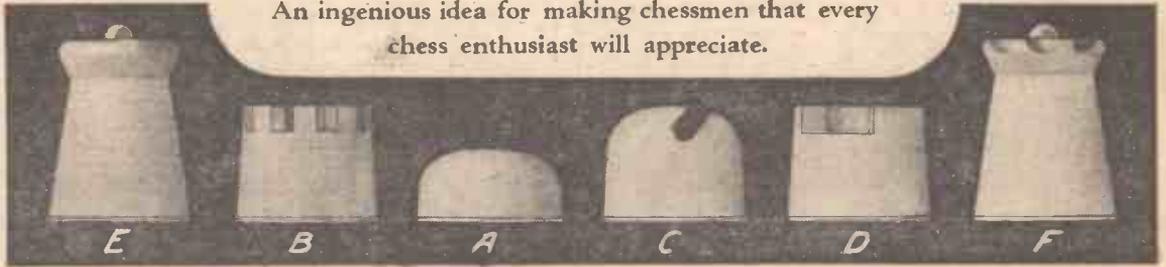
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The six forms have been designed on simple lines, but each is distinct. Procure, say, fifty good quality wine corks. You have thirty-two pieces to make, but you must provide against accidents and unsound corks. Select the corks all of equal diameter. For tools you will require a very sharp knife, a new

of billiard cloth or similar material. You will now have given the pieces the requisite stability (see Fig. 2).

Shaping the Pieces.

In shaping with the glass-paper the work will be facilitated if you make a rasp by gluing a strip of glass-paper to a narrow length of wood (see Fig. 3).

After the weighting process it will be well to go round

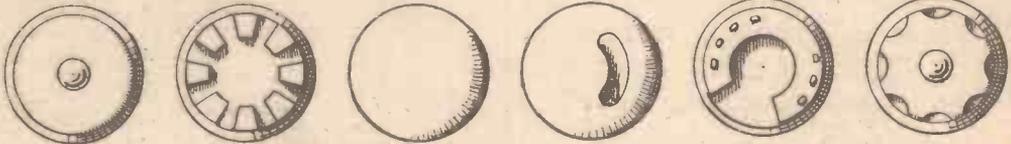


Fig. 4.—How each piece is shaped on top.

coarse file, some medium and fine glass-paper and a special boring tool as illustrated (see Fig. 1). The last is made from a length of thin brass tube. With a rat-tail file bevel one end from the inside, and with a three-corner file cut notches in the bevel all round.

The Number of Pieces Required.

First shape the pieces with the knife, which should be slightly oiled. Finish first with the coarser and then with the finer glass-paper. See that all pieces of the same denomination are alike in shape, size and height. The numbers are sixteen pawns (A), four castles (B), four bishops (C), four knights (D), two kings (E), and two queens (F).

As cork is a very light material it will be necessary to weight the pieces to prevent them being shifted

the outside of each piece with this rasp to make the cardboard fair with the cork surface.

It will be noted that two pieces, the castle and the knight, have a shallow cavity at top, for the making of which the boring tool will come in useful. To finish the bottoms of these cavities, use a disc of glass-paper glued to the end of a piece of dowelling.

The Knights.

The problem of the knight, the *bête noire* of all who essay to make chessmen, is solved by substituting the representation of a horse-shoe, as shown in the plan view of D. In this may be inserted seven small brads, three on one side and four on the other, their heads only showing above the cork surface.

Centrally in the top of king and queen is pushed a small round-headed upholstery nail.

To complete the work, enamel all the pieces, half the set in red and half in white, using cellulose enamels like Luc or Belco, which dry quickly to a surface free from tackiness. At least two coats should be given.

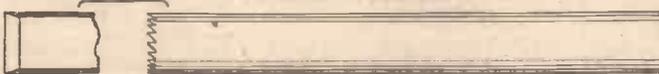


Fig. 1.—The details of the boring tool.

during play, say by one of the players' coat sleeves. Therefore, you must bore a cavity in the bottom of each with the boring tool above described, fill it with shot, and glue over it a disc of stout cardboard, over which again may be glued a piece



Fig. 2.—How the chessmen are weighted.



Fig. 3.—A rasp made with a piece of wood and glass-paper.

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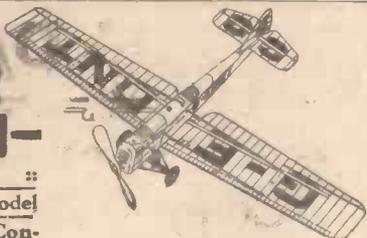
The efficiency of a loud-speaker, apart from its design, is mainly dependent on the strength of the magnet used in its construction.

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an old magneto against the existing magnet on the unit. Care must be taken to see that the magnets are in unison, *i.e.*, north to north. This can be ascertained by means of a compass, or, failing this, a threaded needle which has been magnetised by being drawn across one pole of the magnet.

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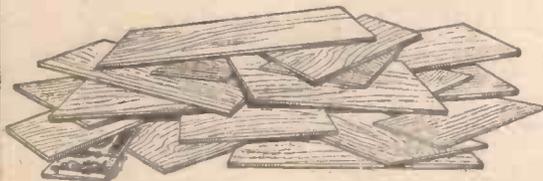
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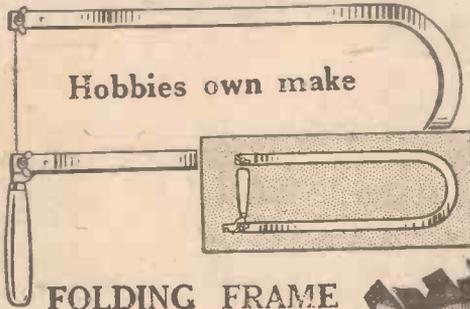
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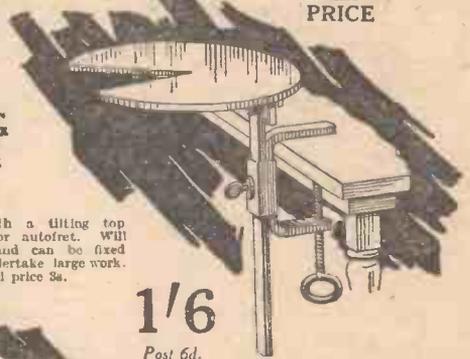
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MODERN FRETWORK



This is a continuation of earlier articles, dealt with by an expert, giving all those little hints to the fretworker which make him proficient.

IN a previous article of this series we gave the worker particulars of how and where to paste the design to the wood. This obviously means that he will want to know something about taking it off again. Because, although a large amount of wood is cut away, there is still the actual pattern left upon the work. This paper has to be cleaned off before the work is completed in order to allow the grain of the wood to show. For this reason we should not use paste too thickly or too strong when putting the pattern on, for it only makes it the harder to clean away. The pattern remains are cleared away with sandpaper or glasspaper. This exceedingly useful accessory is obtainable in a number of grades varying from very fine to very coarse. The grades are usually numbered—going from 00, which is very smooth indeed, to No. F 2, which has a really rough surface. Naturally, different classes of work call for different grades of paper, and the worker should have a supply of each in his tool chest. It is obtain-

Use Sandpaper on a Block.

able in sheets for a few pence, or Hobbies Ltd. also supply it in narrow strips, in bundles of a dozen assorted grades. The coarse grade is only to be used on rough work, because it is liable to scratch the wood and tear the grain. A fairly coarse sheet can be used first on the fretwork pattern to clean off some of the remains, but the finishing rubbing must be done with a smooth grade. This, of course, demands more work than a coarse sandpaper, but it is worth it, because a fine paper will clean the wood thoroughly and leave its surface beautifully smooth and with a slight gloss upon it.

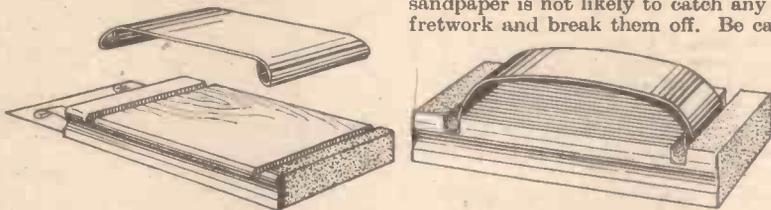
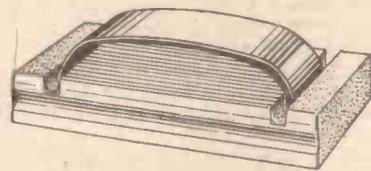


Fig. 1.—An ingenious device for holding sandpaper flat and firm. The spring handle provides a grip and a holder at the same time. It is supplied by Hobbies Ltd.



surface of the wood near the edge of the work is not rubbed more than the rest, or it will become thinner and unlevel.

The work is held quite flat to the bench, and a couple of light

steel cramps on the edge of a table are excellent for this if the piece is fairly large. Another simple plan is to nail strips down to the bench to serve as a stop for the work, and prevent it sliding about (see Fig. 3). In this way the work is held close up against a "stop" and the sandpapering can be done much more easily. Remember, too, the back of the work will also need a light rubbing to take away any little odd bits of the grain which the saw may have torn

out. In some cases, of course,

both surfaces will be seen—

as in the case of shelves and doors—so that the back must be cleaned to the same smooth appearance as the front.

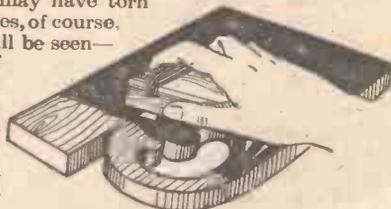


Fig. 2.—Hold the sandpaper flat on to the work, so it does not break any frets.

Sandpapering is never a very enjoyable job, but it is a sign of good work if it is carried out thoroughly. The beginner is, in his excitement and enthusiasm, apt to get on with his cutting and get out all the parts before he commences cleaning any of them. This is not a good plan, because one is likely to get tired of this work. It is better to



These are some of the splendid little toys any fretworker can complete from odd bits of wood. Design patterns are available for all of them.

sandpaper each part as soon as it is cut, and have it thoroughly cleaned before going ahead with the next piece.

Save Time Where You Can.

Many patterns in fretwork are now nothing more than a plain rectangle of wood. In such cases there is no need to paste the paper down; the measurements can be marked direct to the board, drawn out in pencil, and then cut out. In this way the time and work of sandpapering will be saved. One must, of course, be

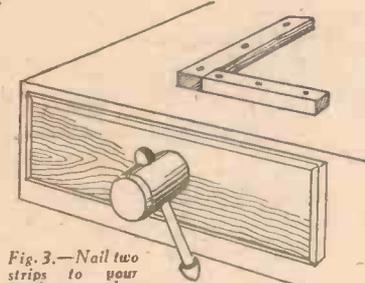


Fig. 3.—Nail two strips to your bench to provide a stop for the wood when sandpapering.

careful to see that the measurements are true, and a good plan is to pin the pattern to the wood with drawing-pins and then prick through the necessary corners or points with a pin. The paper is then taken away and the parts linked up with pencil and ruler.

Another point sometimes arises with the duplication of certain parts of the design. Very often two or more pieces are required, but there is only room for one on the sheet. This means that further designs have to be purchased or further patterns drawn. There are two methods of doing this, and the worker can choose his own from them. One is by means of tracing paper, and the other is to use carbon paper. Either plan is quite good, and suitable sheets of either are obtainable from any stationer or from Hobbies Ltd. Their use is quite simple.

Use single-sided carbon paper, and keep it flat and uncreased as far as possible. Either black or blue will do, and lay the carbon on the piece of wood upon which you want the design. Over it lay the design to be drawn, and pin them both with a few drawing-pins. Thus we have wood, carbon paper and design all fixed together as shown in Fig. 4. Then take a sharp-pointed pencil and go over the outline of the design carefully. A sharp-pointed wooden skewer or similar piece of wood will do just as well. Press on firmly and only go over the line once, being careful to keep exactly to the pattern. When the tracer has been over every line, take away the paper and pins, and you have your design drawn on the wood. A little touch here or there in comparison with the original design should make it O.K. for cutting out.

Methods of Obtaining Duplicates.

With carbon paper the design has to be drawn each time it is required, but with tracing paper the same

pattern can be re-traced several times. The tracing paper should show the pattern through quite clearly. Pin the design and a piece of tracing paper above it on to a board (see Fig. 5). Then, with a sharp and fairly black pencil, trace off the design seen through the transparent paper. Now take the paper off the board, turn the tracing paper over, and go over the lines again with a pencil, but this time on the reverse side. See that good, clear black lines are made. Then put the tracing paper down on to the wood to be cut, pinning it so that the original tracing is on the top side. Once again the pattern is traced over with pencil or sharp instrument to bring the lines on to the wood itself. Of course, the tracing can be pasted down, but if so one must be careful to see it does not curl or stretch. Put the paste on to the wood, as usual, and lay the pattern down, rubbing lightly from the centre to get out all air bubbles and creases.

Cutting Two Patterns at Once.

In some instances when two or more patterns are required alike, they can be cut together, so saving the trouble of tracing or duplicating. Cutting together should only be undertaken in thin boards, so the wood is not too thick to be easily worked and turned. Three pieces of $\frac{1}{8}$ in. board, or two pieces of $\frac{1}{4}$ in. material, can be cut together, but only an expert worker should undertake two pieces of $\frac{1}{4}$ in. or

$\frac{1}{2}$ in. wood. In plural cutting the greatest essential is to see that the blade is upright. This point was mentioned in a previous article, and it is even more important when one is cutting two parts at once.

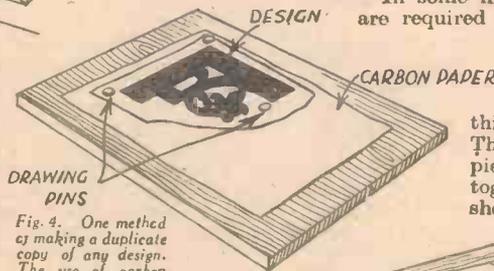


Fig. 4.—One method of making a duplicate copy of any design. The use of carbon paper.

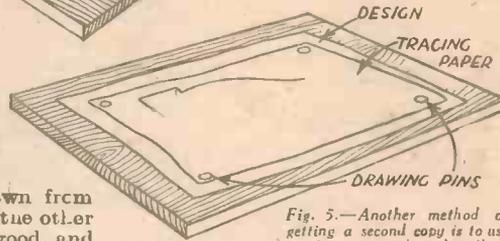


Fig. 5.—Another method of getting a second copy is to use tracing paper as here described.



Fig. 6.—Two boards nailed together so two parts are cut alike in one operation.

For plural cutting the design is pasted on the upper board, and the two nailed together at various points as shown in Fig. 6. Long, thin nails are driven in round the outside edge of the pattern, and in one or two points of the pattern. They must be long enough to project on the underside of the wood, when they are turned over to grip the two boards tightly. The interior work is then cut in the usual way, and the outer edge last. The two parts then come apart, and the work of cutting duplicate pieces has been undertaken in one operation.

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THE ART OF MAKING KNOTS

By "Home Mechanic"

A previous article on Knot Making appeared in our issue dated March 14th.

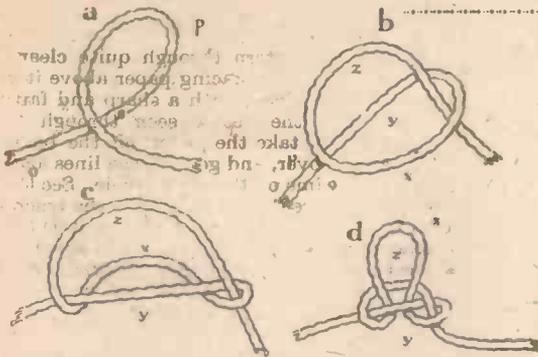


Fig. 1.—How to form the harness hitch.

CONTINUING the subject of the last article, we give some more useful information on knots and their uses. If a loop which will not slip is needed in the middle of a rope, both ends of which are liable to strain, the harness hitch, Fig. 1, is most effective. It can be tied, as you will see, even if both ends of the rope are already made fast. The only difficulty it presents is the second stage (b). Having made your half-hitch, as shown in Fig. 1a, turn it towards you so that the point in the loop marked p lies on the point 9. Fig. 1b looks, at first sight, like a thumb knot, though you will soon see it is not if you look carefully at it. Notice in b the three pieces marked x, y, and z. Now go on to Fig. 1c, the third stage. Take x under y. In the fourth stage (Fig. 1d), x having passed under y is taken over z and pulled up into a loop. The two free ends are now pulled to tighten the knot, and your non-slipping loop is complete. This knot is useful for shortening a rope, and for many other purposes.

making knots being the running end? Thus, in Fig. 3 (1), x, x are the standing parts, and y, y the running ends. The hawser bend is also used for joining wire ropes together.

You remember the bowline—the single bowline, that is, of which we spoke in the last article? Fig. 4 shows the bowline on a bight, a rather more complicated affair, but quite easy to make with a little practice. A bight, by the way, is a double end of cord or rope. The important stage is shown in Fig. 4 (3)—the loop (a) must pass under both the standing part and the running end. Now notice the next stage, Fig. 4 (4); the loop is passed over the whole knot until it lies over the standing part and the running end, Fig. 4 (5), the double loop (b) is then pulled until the knot is tight. This knot gives a pair of absolutely non-slipping loops on the end of a rope. Its use is shown in Fig. 4 (6). You have all seen men painting the funnels or sides of ships, sitting on little plank seats supported by two loops of rope. You probably did not know that those two loops were formed by means of the bowline on a bight, but that is the knot used for the purpose.

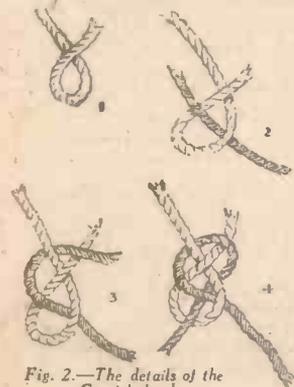


Fig. 2.—The details of the Carrick bend.

I gave you several ways of joining two ends of rope or cord, if you remember. Fig. 2 shows yet another, the Carrick bend, which is a very secure knot for moderately thick stuff; it is not very useful for joining ends of thin material such as string, for if so used, it is apt to jam. I think that the figure makes the method of tying it fairly plain. It is, of course, on the same principle as the reef-knot. If you have to join two pieces of very thick rope, no ordinary knot is secure enough; the only reliable joint is the hawser bend, shown in Fig. 3. The ends are first loosely bent together by half-hitches, Fig. 3 (1), then, to make all safe, the running ends of the hawsers are lashed or "seized" with turns of cord to the standing parts, Fig. 3 (2) a, a.

The Hawser Bend.

Did I tell you, by the way, that the body of a rope as called the "standing part," the end used for

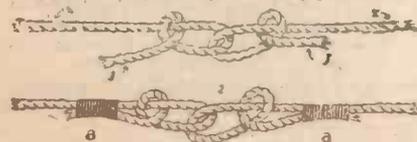


Fig. 3.—The hawser bend.

The Lever Hitch.

Our next knot is the lever hitch, shown in Fig. 5. Sometimes we wish, as is seen in Fig. 5 (4), to raise a

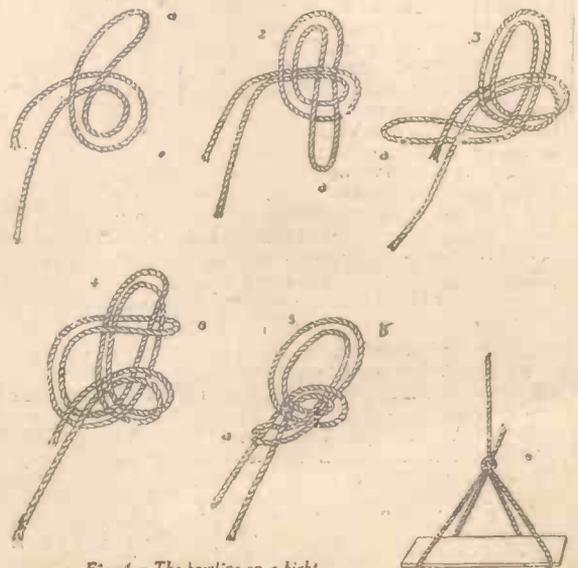
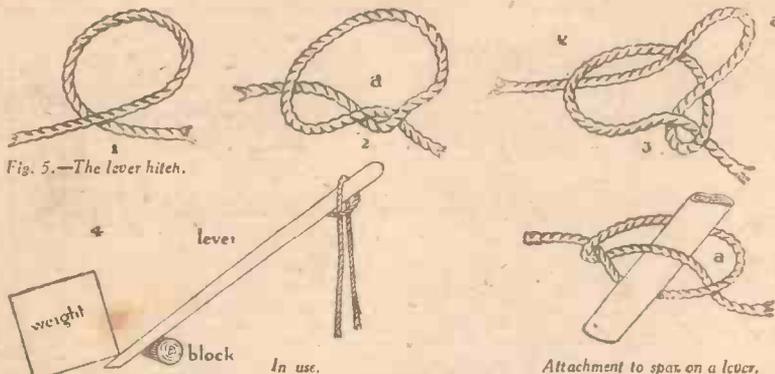


Fig. 4.—The bowline on a bight.



heavy weight by means of a lever. If the lever is long and the weight heavy, we must fasten a rope to the end of the lever by a simple fastening which will allow men to pull on both ends of the rope. The knot best suited to the purpose is a very simple one, as you can see. (1) (2) and (3) show its making, and (4) the way in

Attachment to spar on a lever.



Fig. 6.—The knot in use when slinging a barrel upright.

which it is used. This knot can also be used for fastening a spar across a rope, provided that there is always a certain amount of strain on both ends of the rope. A slight modification of it, Fig. 6 (1) is used for slinging barrels, etc., in an upright position. You will see that the knot is formed simply from the lever hitch by taking an extra turn at x in Fig. 5 (3). In Fig. 6 (2), you will see the knot in use. Fig. 7 is also another form of lever hitch.

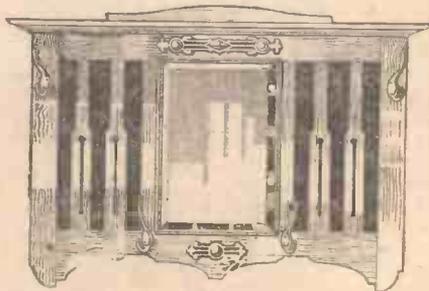


Fig. 7.—Slinging a barrel on its side.

(To be concluded.—Ed.)

A Simple Fitment for a Modern Hall

If you are an amateur carpenter, here is a simple piece of work to undertake. If you have any friends settling down into a new home, they will surely be delighted if you give them this as a wedding present! Looks good—doesn't it? Just the sort of thing to make in your spare time to sell as a profitable piece of work. It is all straightforward and only a few carpentry and fretwork tools are necessary. The whole fitment is built in oak, contains a splendid



piece of glass and is fitted with four sets of hangers. When complete it measures 2ft. 10in. long and 2ft. 1in. high. The mirror is 15 by 10in. Every reader has an opportunity to make this fitment because next week our gift design sheet will contain patterns and charts of all the necessary parts, whilst particulars will be given how to go ahead with the work. Every amateur carpenter must make up his mind right away to start work on it as soon as he can.

“SEEING RED” WITH A CAMERA (continued from page 839.)

Now if you photographed this on an ordinary plate you would get Fig. 1, in which the effect of the bright red is completely lost. You will note that the greens are not so dark as the reds, and not so dark as some greens would appear in a photograph. The reason for this is that in this particular green there is more blue (which photographs white) than yellow, which photographs almost black.

If you wanted to get a really correct rendering of the greens, reds and browns in this troublesome subject, you would proceed as in the case of the little china figure illustrated in the article on “Photographing Coloured Objects,” which was published in HOBBIES, February 28th issue. That is to say, you would use a panchromatic plate, and screen your lens with an Ilford

Gamma (or Imperial Impan) light filter. But, if you want to bring out the contrast between the red and the green in this particular original by making your camera “see red,” you will use a panchromatic plate or film with a red filter on your lens. The result—a very striking one—will be Fig. 2.

A Drawback.

I wonder whether you will notice it. It is only a little one, but rather interesting and instructive. When you seek to heighten contrasts you are almost sure to lose something, and here, by making the red appear as if it were almost white, you lose your red ball. Be careful, then, in any attempt to “see red” with your camera; not to overdo it.

AMATEUR MICROSCOPY

ACCESSORIES FOR THE MICROSCOPE



WITH even the simplest microscope it is necessary to have a certain number of accessories. The greater the number the easier the work of microscopy will become. There are some of these accessories which are

absolutely essential, whilst others may be termed refinements of a hobby.

Forceps are one of the principal articles employed by the amateur or professional in microscopy. Several pairs of these may be obtained for quite a moderate outlay, but it is possible to manage very well with only three pairs. It is desirable in any case to buy one pair (see Fig. 1), whilst the handy-man, having seen and worked with them, will then be able to turn his ability to the fashioning of others. But for the one person who can make forceps there will be a dozen who will prefer to buy. A visit to a dealer in microscope accessories is, therefore, advisable.

Scissors are another detail which are quite essential to the prosecution of this interesting pastime. The usual domestic pair will serve for most objects, and a pair of folding nail scissors has often been pressed into service.

Here, however, there is a chance to go ahead a little and lighten the work, besides increasing its interests, by purchasing scissors specially designed for the use of the microscopist. If scissors are bought, care should be taken to have one pair of the strong and straight kind, whilst the other pair should have curved blades and be fashioned upon more delicate lines.

Needles.

Needles are another essential of the microscopist's cabinet. These vary from the large bodkin kind to those of the smallest possible diameter. Again, it is suggested that they should be bought rather than made, because the dealer in microscope accessories will stock every kind which it is desirable to employ. Some of the needles are curved, and although it is not very difficult to heat the ordinary needle and then bend it into any required shape, it is rather a laborious undertaking, and unless a "Bunsen" burner is available, it is rather a ticklish job.

If home-fashioned needles are employed, the ordinary sewing variety should be pushed eye downwards into the sticks until only a fourth of the needle protrudes, and, if this must be bent, it will be necessary to bring it to white heat before this bending can be undertaken.

Dipping-tubes.

These are also essential to successful microscopy,

They may be home-made quite easily, and to any fellow who has the necessary time and a workshop some useful dipping-tubes may be fashioned in a very simple manner by purchasing a few lengths of thin glass tubing. These lengths should preferably be of variable diameter. Again, the "Bunsen" burner, or a fierce flame from an ordinary jet, will be needed to heat the glass tubes to the necessary point when they may be manipulated into any desired shape. There is just a word of caution necessary here. The melting of the tubes must not be carried too far, otherwise it will be found that the ends will become sealed up.

For general use the dipping-tubes may be retained perfectly straight, and they are operated by placing a finger over one end and then allowing the tube to fill with liquid by removing the finger; when filled the finger is replaced and the liquid may be lifted from one receptacle to be discharged into another. All that is necessary is to remove the finger again.

Watch-glasses comprise another useful accessory of the microscope. It is desirable to buy a series of them of varying sizes. They are very cheap, and especially useful for containing objects of a fluid nature.

It will be obvious that the watch-glass cannot be used for any real bulk of fluid, and if fluids are to be placed under the microscope, it is desirable to have some-thing rather deeper than the watch-glass. It is possible to purchase shallow salt-cellars, whilst porcelain ointment boxes and the smaller porcelain photographic developing dishes are very useful in this connection.

The "Scalpel."

If you ask the expert microscopist about the pocket-knife, he would say why not use a scalpel. They are not expensive, and, if possible, one at least should be added to the box containing your equipment.

A hint is necessary here. It is that whatever is bought for use with the microscope should be of the best quality possible. No good work was ever done with inferior tools, and it is a great mistake to begin under a misapprehension that because a microscope is of a home-made variety, it does not matter what accessories are bought to use with it.

There is a good deal of delicate work necessary in connection with the microscope, and it is a truism that it is the more delicate objects which can be brought under the magnifying-glass that will give the greatest enjoyment.

Another essential portion of the equipment for use with the microscope is a collecting-box. Fortunately, any box will do for this purpose. Preferably it should be of tin and something like 1ft. long by 6in. wide by 4in. deep. It may be larger or smaller; if too small, it will be found that many specimens collected on a journey into the country cannot be brought home

(Continued on page 854.)



Fig. 1.—Stage forceps are a very useful

accessory for microscopy

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BEFORE this number of **HOBBIES** appears, a very striking new set of stamps will have been issued for South-West Africa. I have been privileged to inspect a set of proofs, and am thus able to describe the designs. In the confection of these attractive pictorials the well-known London firm of Bradbury Wilkinson have been at great pains to produce the little works of art in the expert manner which their long experience in this class of printing has perfected. Hitherto the stamps used in the erstwhile German Colony were the contemporary stamps of the Union of South Africa, overprinted either with the name in full or with the initials S.W.A. The new set, however, is quite definitive, and each stamp is inscribed with the name either in English or in Afrikaans (the South African dialect of the descendants of the original Dutch settlers). The languages appear on alternate stamps on each sheet, so that any pair, whether vertical or horizontal, consists of both kinds side by side. This is a concession which was first employed in the Union, in view of the large Dutch population, and as no one, whatever his speech, could be in any doubt, either as to the nature of the stamps or as to their denominations, which appear in plain figures on each, the

THE STORY of a LATE GERMAN COLONY.

By P. L. Pemberton.

the current South Africa stamps. Like the latter, too, they are recess-printed,



The triangular African 4d. in Afrikaans

regular South overprinted Afrikaans

or engraved, and as much of the area as possible is taken up by the charming little scenes which give the set its pictorial character. The values and subjects are as follows: 1d., green and black, picture of a Gom Pauw, which is a species of bustard—a handsome, upstanding bird. The 1d., red and grey, shows the Cape Cross—a monument erected on the sea shore, north of Swakopmund, to mark the spot where Vasco da Gama, the famous Portuguese navigator, landed in 1497; a Portuguese galleon is seen off the shore. These two low values are inscribed "Postage and Revenue," and are the only ones of the set which may be used for either purpose.

What the Stamps Feature.

The remaining values are inscribed "Postage only"; the 2d., printed in sepia and blue, shows a view of a curious arched rock on the coast known as Bogenfels. The 3d., blue and greyish blue, has a view of Government Buildings at Windhoek, the capital. The 4d., purple and green, depicts an inland view at Waterburg; the 6d., grey and blue, a view of Luderitz Bay; and the 1s., blue and brown, a bush and river scene. The next two values introduce us to some of the indigenous fauna: the 1s. 3d. depicts a brace of eland—the largest and most useful of all the tribe of antelopes, whose brisket, when suitably cooked and served, is considered a great delicacy. The 2s. 6d., grey and carmine, shows a group of zebras and wildbeesten drinking in charming amity at a water hole, situated, so I am told, at a place called Etoscha Pan. The 5s. value presents a view of some Kaffir kraals, and the 10s. a fearsome-looking growth known as the Wellwitschia plant. Though the South African set stops at the 10s. value, the new South-West African issue includes a £1 stamp. This is printed in dark green and brown-purple, and bears a view of the Waterfall at Okuwahakana.



Pictorial South African stamp overprinted S.W.A.



Union of South Africa stamps overprinted in English and Afrikaans.

sentimental character of the gesture is apparent.

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New Air Stamps.

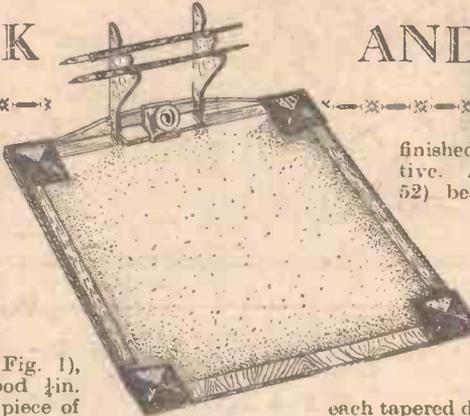
The needs of the Air Service have not been forgotten. The recent provisionals, which have been the objects of so much financial speculation, are replaced by new pictorial 3d. and 10d. stamps. The lower value shows a monoplane hovering over the town of Windhoek; the 10d. shows a D.H.9 biplane in flight.

(To be concluded next week—ED.)

A PEN-RACK AND BLOTTER

It may safely be said that everybody writes at some time or another, and the combined pen-rack and blotter illustrated is sure to please some friend, or you can use it yourself. The article is quite simple to make by any owner of a fretwork set, and the work is well within the range of the beginner. To commence with, a base is required (see Fig. 1), consisting of a piece of fretwood $\frac{1}{2}$ in. thick, and 16 in. by 14 in. Any piece of nicely-grained wood will do for the base—satin walnut or light oak, such as supplied by Hobbies Ltd., already cut and planed. The stand is fitted with a special inkwell from which the ink will not spill, and which allows the pen to dip just far enough to get a supply. This is also supplied by Hobbies Ltd. for 8d., or 10d. post free. Mark off lightly in pencil the position for the corner pieces to form a base for the ornaments— $\frac{1}{4}$ in. wide and 2 in. long.

Take one of the sides of the base (which will form the back) and mark off the positions for the two pieces for the rack. These are a distance of $5\frac{3}{4}$ in. from either end (see Fig. 1). Midway between this comes the inkholder, and to fix it in place two pieces of $\frac{1}{4}$ in. wood $1\frac{1}{2}$ in. by $1\frac{1}{2}$ in. are cut ready for gluing later. Now cut off four pieces of $\frac{1}{4}$ in. by $\frac{1}{4}$ in. stripwood 2 in. long, and four pieces $1\frac{1}{2}$ in. long (Fig. 2), and glue these strips on the corners of the base in the positions already marked, as shown at Fig. 3. Four raised square ornaments (Hobbies No. 210) are next fixed on the stripwood corners with a little glue, and the recessed corners thus formed will provide for the sheet of blotting to slip under, whilst the ornaments will also make the



finished article look much more effective. A strip of $\frac{1}{8}$ in. half-round (No. 52) beading is glued along the outer edges of the base between the corner ornaments, as seen in the picture of the finished blotter.

Now cut a piece of $\frac{1}{4}$ in. by 1 in. stripwood 4 in. long for the centre support between the pieces forming the pen-rack. From the same size wood cut two pieces $3\frac{3}{4}$ in. long, and with one edge of

each tapered down to $\frac{1}{8}$ in. at the end, as shown in Fig. 4. Before fixing these pieces on the base, the parts forming the rack should be cut.

For the rack proper, cut two pieces of wood to size and shape given in Fig. 5, the thickness being $\frac{1}{4}$ in. First cut the wood 4 in. by 2 in., and pencil off squares of $\frac{1}{4}$ in., when it will be a simple matter to mark off the shape of the front with the pen slots as shown.

Having marked one piece, cut it out with the fret-saw, and then the second piece may be marked off from this, and likewise cut out. After cleaning all the parts with sandpaper, glue the two pieces (Fig. 6) in position on the base, and screw them from the underside. Then glue the support pieces between, as clearly shown in the finished article. The rack supports should be glued in place between to make the completed pen-rack quite rigid. When these parts are fixed, glue on the small squares which hold the inkwell. They are put in the corners of the rack and back and glued to the base (see Fig. 6). The blotter should be nicely finished with a coat of stain, and completed by folding a large sheet of blotting paper to fit the base, as shown in the illustration, the corners fitting neatly under the ornaments.

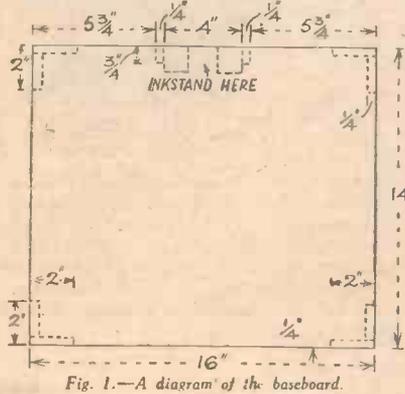


Fig. 1.—A diagram of the baseboard.

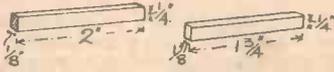


Fig. 2.—The two parts to form the raised corner platforms.



Fig. 3.—The corner pieces in place to take the ornaments.

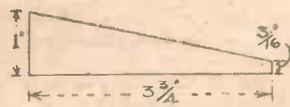


Fig. 4.—The tapered pieces for the back of the blotter



Fig. 6.—The small blocks which hold the inkwell in position are shown between the pen-rack.

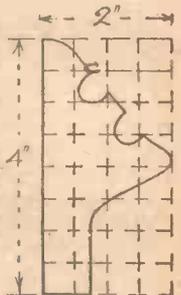
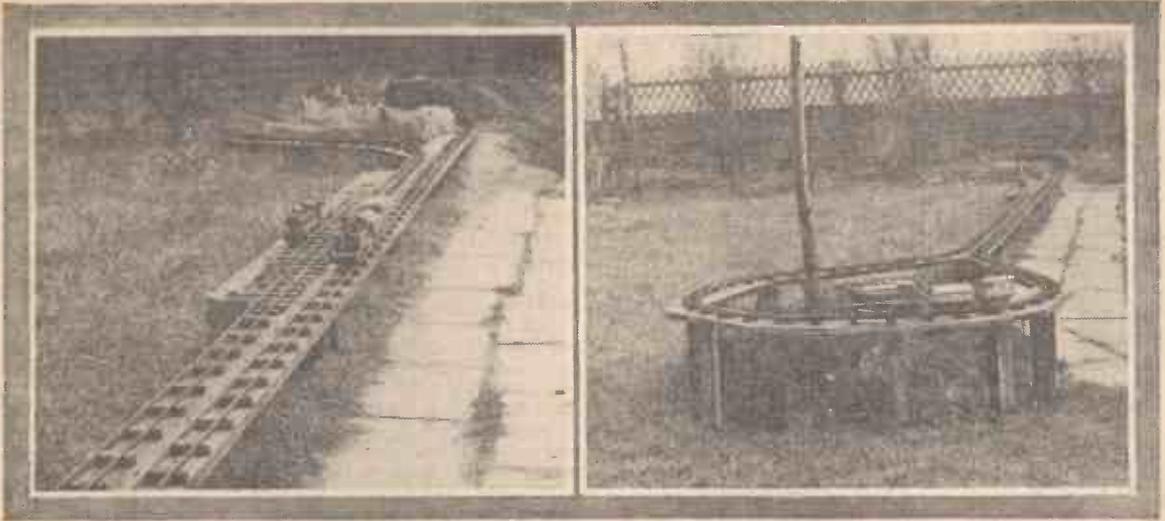


Fig. 5.—Mark the $\frac{1}{4}$ in squares on a piece of wood and draw the shape of the rack shown

IMPORTANT NOTICE! All correspondence intended for the Editor or Advertisement Manager **MUST** be addressed to "Hobbies," Messrs. George Newnes, Ltd., 8-11, Southampton Street, Strand, W.C.2.



Photographs of the garden railway layout described below.

A LAYOUT FOR A GARDEN RAILWAY

IN planning a model railway for a suburban garden, space is usually somewhat restricted, and it is necessary to exercise considerable ingenuity to fit the railway into a place where it is easily accessible but not unsightly or in the way. The railway illustrated in the two photos and the small plan shows the method adopted by the writer, and may help some HOBBIES readers.

The reason for making an endless track was because the "star turn" among the locomotives which we possessed was a "Bowman" steam loco. Now this engine runs very well indeed, but is not fitted with a reverse arrangement; on a track with termini, it would therefore be necessary to lift off the engine and turn it round every few moments, but with the track illustrated the engine will run unattended for about twenty minutes. The loop acts as a siding for rolling stock and the shunting loco (a clockwork one with a reverse), while the steam "express" passes along the "main line," though, if required, the steam train will, of course, run round the loop, while the "goods" waits on the main line.

Jumping the Two Tracks.

The bringing together of the two tracks, although it makes the curves very severe at the ends, provides a long length of double track which was a great attraction in the present case, and the railway was arranged alongside the stone-flagged path, so

that it could be attended to without wearing bare patches on the grass through constant treading in the same spot.

The total length of the track is about 70ft., and owing to the garden being on a slight slope, one end is at ground level while the end farthest from the wall is raised about 15in. on a wooden "viaduct." This was made by driving 3ft. lengths of creosoted timber, 4in. by 2in., into the ground, levelling the top ends with a spirit level and nailing 6in. by 1in. planks on as shown.

The Loop.

The track is chiefly Bowman make, but the complete loop, including the points and crossings, was built up of separate rails, chairs and sleepers, and is much nearer to scale than the Bowman track; the latter was used in the interests of economy, as it is much cheaper and its appearance is reasonably good.

The end of the railway nearest the wall runs through a cutting built up of pieces of rock, the space enclosed by the curve being planted as a rock garden. A flag-stone laid over the top converts this cutting into a tunnel.

The railway was built last summer, and has stood the winter outdoors quite well. It is intended to elaborate it during the coming summer with some of the many railway accessories which have been described in HOBBIES recently.

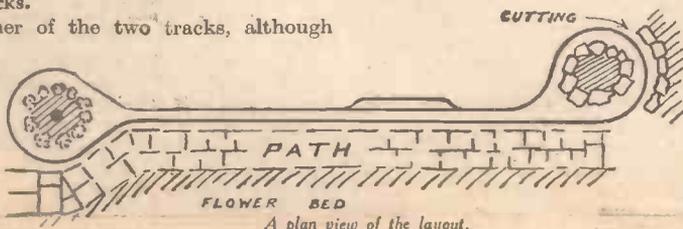
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The "Hobbies"
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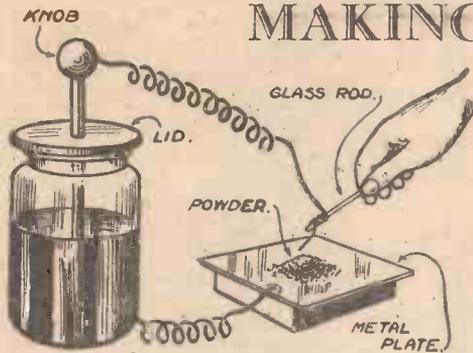
A Rock Garden
and Pool

Coming Shortly!
Another Puzzle
Picture Competition



A plan view of the layout.

MAKING A LEYDEN JAR



Igniting gunpowder with a Leyden Jar—only one experiment which may be performed with this piece of apparatus.

THE discovery of the Leyden Jar is always a point for debate, but it is generally attributed to Muschenbroek, who, in 1764, was trying to accumulate electricity in water. He held a jar of water in his hand into which a nail was projected, thus forming a Leyden Jar, from which he got a shock.

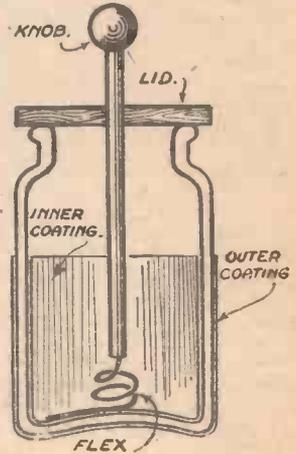
Select a good two-pound jam-jar of clear white glass and dry it thoroughly by leaving it in an oven for several hours. Coat the jar with shellac varnish both inside and out, and stick tin-foil over this to a height of 4 in. As this is rather a difficult operation, it should be done on the inside first by cutting a circle and sticking it on the bottom. A strip 4 in. wide should now be fixed on the sides and pressed down so that no air bubbles remain between it and the glass, the outside is treated in a similar manner. Cut a circle of dry wood to cover the mouth of the jar and drill it to take $\frac{1}{4}$ in. diameter metal rod. This rod should be 8 in. long and having a round metal ball at one end, while to the other a length

of bare flex is soldered so that when the lid is placed in position the flex makes contact with the inner coating.

Charging the Jar.

When the jar is quite dry it may be charged from an electrophorus by merely touching the knob of the jar with the charged sole. After doing this about six times bring the finger towards the knob, when a fat spark will pass, causing a sharp shock. Place a little dry gunpowder on a metal plate, connect the plate to the outer coating of a charged Leyden Jar, and bring the jar so that a spark passes between the knob and the plate. The gunpowder will be ignited. A shock is sometimes felt during this operation, and to avoid it the knob of the jar should be connected to a wire wrapped round the end of a glass rod and the powder ignited in this method. A suitable electrophorus for these experiments was described in HOBBIES, No. 1,838.

It may be safely said that the Leyden Jar is one of the most useful pieces of apparatus in static electrical experiments, as it forms a most convenient way of storing energy.



The elements of a Leyden Jar.

AMATEUR MICROSCOPY (continued from page 849).

in a sufficiently good state to provide useful objects for the microscope.

The Collecting-box.

This should be fitted inside with partitions, which, again, should be so divided that they will take a number of small boxes of various kinds. There are some extremely little tin boxes which are supplied with gramophone needles and small lozenges. These pack into very little space, and if you can collect, say, a dozen gramophone needle-boxes, they may be fitted into partitions in the larger boxes. It is desirable to put an adhesive label on the lid of each box, upon which you can pencil the nature of the object which you collect and place within.

Useful as are the small gramophone needle-boxes, it is essential that others should be carried. Here, again, there is a vast range of tin boxes. Some supplied for cigarettes will be especially useful for bringing home leaves and other vegetable products.

Still another useful box, though not so often seen to-day as in the past, is of the porcelain variety, which used to be sold with tooth paste. Possibly these are still obtainable without purchasing the tooth paste, and very often a chemist will have a supply in which he will put ointment. If approached the chemist

will sell a few of these porcelain boxes without any contents.

Glass Tubes.

Test-tubes fitted with corks are extremely useful, and space should be found in the collecting-box for these. They should be of varying size. Space should be provided in the collecting-box for a series of small bottles, such as those in which scent and other similar liquids are obtained from the chemist. If these have glass stoppers which are perfectly water-tight, so much the better.

Take care to provide some suitable fastening for the collecting-box, as many a good day's work has been spoiled through the lid of the box coming open and allowing the contents either to escape or to become hopelessly jumbled. It is an excellent plan to purchase a small attaché case of the cheapest possible kind into which your collecting-box will exactly fit. Then, with string or, better still, strap webbing or leather, the box may be made quite secure and carried unobtrusively in its attaché case.

A live cage is also very useful (see Fig. 2). This consists of a wooden base and a circular brass container with a glass top. This might be made at home, but it is better bought. It is a most useful accessory in which to place insects which would otherwise escape.



Fig. 2.—A live cage.



Let Your Editor Help You. Address your letters and queries to The Editor, "Hobbies," Geo. Newnes, Ltd., 8-11, Southampton Street, Strand, London, W.C.2. All letters and queries must bear the full name and address of the sender.

The End of the Volume.

THIS issue completes our first volume. It was twenty-six weeks ago that we placed in your hands No. 1 of the new HOBBIES. They have for me been twenty-six pleasant weeks, for thousands of readers have metaphorically visited me, and I, too, have been able to visit them—by correspondence! It has been absorbingly interesting to read the letters from old readers and new readers; they have not hesitated to tell me what they *want*, and these constructive letters have been of immense help. We have just finished our first journey together. With next week's issue we start on our second. My aim will be in the new volume to make HOBBIES even more interesting and indispensable to you. This task will be made easier because of the thousands of enthusiastic readers I have gathered round me. That regular order with your newsagent is my reward!

Puzzle Picture Competition.

THE week after next I shall start another series of Picture Puzzle Competitions. This form of competition is, I know, extremely popular among my readers and, like other picture puzzle competitions which have gone before, this one will extend to three issues—twenty-four pictures in all. Make certain that you get your copy—but, no! It's quite unnecessary for me to add the usual tag!

Another Model Airship.

A FEW weeks ago I published in HOBBIES articles describing the construction of a very successful model airship. This created quite a lot of interest, but, unfortunately, the supply of envelopes available speedily gave out. Since then my technical staff have been experimenting with another form of airship, the envelope of which is made of paper and does not have to be purchased specially made. We have now arrived at a satisfactory design, a model has been built and undergone successful tests, and the design will be published next week! It will not

be necessary to inflate the envelope with hydrogen. You will thus perceive that we have wiped out two expensive items which were not readily obtainable all over the country.

Free Model Aeroplane Design Sheet.

IN our issue dated April 11th we shall present a design sheet for making a long-distance tractor monoplane, the design for which has been produced by our technical department. This design sheet will take the place of our usual woodwork

NEXT WEEK

**Free Design Sheet for
MODERN HALL STAND**

BUILDING A MODEL AIRSHIP

**A PORTABLE THREE-VALVE
Wireless Set**

**Model Aeroplane Topics—
Stamps—Electrics—Model
Making, etc. etc.**

sheet and has been included in response to a general demand. The model is capable of flying 300 yards when hand launched, or 250 yards after rising from the ground. It really is a splendid flier, and can be erected at a nominal cost. Arrangements are being made for parcels of materials to be supplied quite cheaply to readers.

QUERIES AND REPLIES.

Identifying Flags.

Dipping the flag means lowering it slightly by means of the halliards and hoisting it again. This is done several times, and is a salute to another ship. The black flag means piracy,

and in the old days when buccaneering was so much the vogue the flag was frequently embellished with a skull and cross bones cut out of white bunting and sewn in the centre of the black ground. The white flag, or flag of truce, is hoisted to denote a wish for cessation of hostilities, also a sign for peace. A yellow flag denotes that a contagious disease exists on board a vessel, and is also flown whilst she is in quarantine. The pilot's flag is half yellow and half white. The "Blue Peter" is a white flag with a blue centre and denotes the vessel is ready to commence her voyage. A flag flown upside down means a signal for assistance; when night falls the flag is useless and flares are then burnt to attract attention. When fishing vessels return with the flag, "halt mast high" it denotes that one or more of the crew are dead either through an accident or falling overboard. If the King is aboard his yacht the Royal Standard is flown. The most peculiar flag is the "Long Pennant," which is often 60ft. in length. The Red flag is a sign of danger, denoting high explosives on board. A green flag surmounting a buoy shows that a wreck lies beneath it. The word wreck is often shown on the flag. I hope this is the information you require, T. G. (Greenwich).

Model Aeroplane Competitions.

Several National Model Aeroplane Competitions are held every year, K. L. D. (Hove), the body governing the sport in England is the Society of Model Aeronautical Engineers, 72, Westminster Avenue, Thornton Heath, Surrey. Probably the largest model aeroplane club is The Model Aircraft Club, 48, Narcissus Road, West Hampstead, N.W.6. If you get into touch with either of these clubs they will send you full details of the competition rules.

The First Balloon Ascent.

This was made in 1782, N. O. D. (Lymouth) by the two paper makers of Annonay, the Brothers Montgolfier, who discovered the lifting power of hot-air. They constructed a balloon to which was attached a tray carrying a source of heat to provide a continuous supply of hot air. A cock, a sheep and a duck were sent up first!

Melting Points of Metals.

Cast-iron melts at 2,210°; wrought-iron, 2,912°; steel, 2,600°; copper, 2,160°; brass, 1,900°; lead, 608°; tin, 446°. The degrees are Fahrenheit, and this information is in answer to V. O. Ipswich). To convert Fahrenheit degrees to centigrade subtract 32 and multiply by 5-9.

Wireless Condenser Queries.

The aerial tuning condenser in your wireless set, H. A. (Darlington), should be .0005 mfd., a constant aerial tuning condenser is a small fixed condenser having a value between .0001 and .0003 mfd., and is connected in series with the aerial.

Making Shellac Varnish.

The shellac should be obtained in a solid flake form. It should be broken up into small pieces and dissolved in methylated spirits. The solution should be made as thin as possible, as it can easily be thinned down by the addition of a little more spirit.

The Funny Bone.

A blow upon the inner and underside of the elbow gives rise to a tingling sensation which seems to reach the little finger. It is not the bone, however, which gives rise to this sensation but the ulnar or elbow nerve and the unpleasant feeling resulting has led to the common misnomer the "funny bone."

Ink for Ticket Writing.

This may be made, W. H. D. (East Ham), by grinding ivory black on a piece of marble or slate in Japan goldsize to the consistency of treacle. Spread the colour on a piece of stout blotting-paper and let it remain for an hour. This will extract the grease from the goldsize. Now collect the colour in a pot and thin it down with benzine. This ink will give a flat surface.

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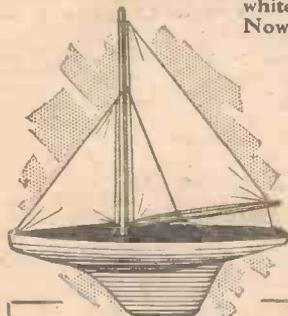
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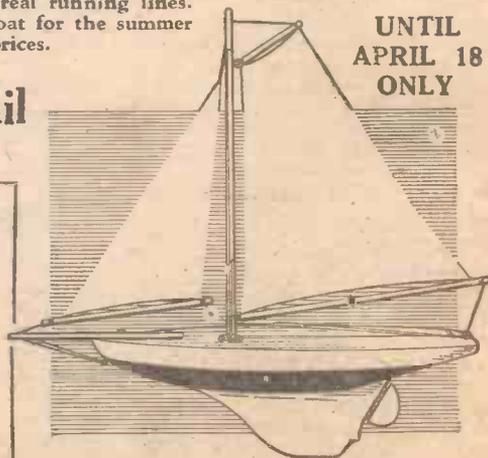
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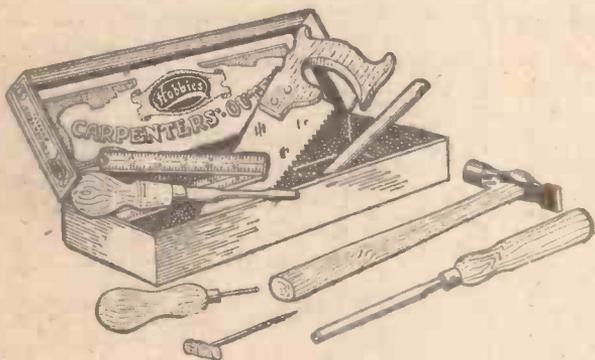
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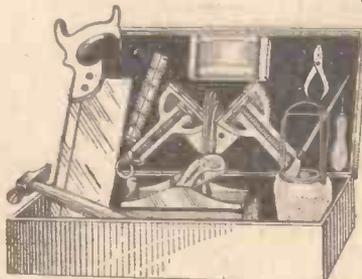


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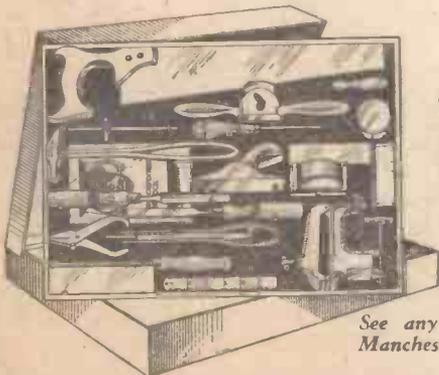


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