McPherson

GRAND PUZZLE PICTURE COMPETITION!

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

Hobbies

2D

April 11th, 1931.
No 1851.
Published every Wednesday.

GIVEN INSIDE!

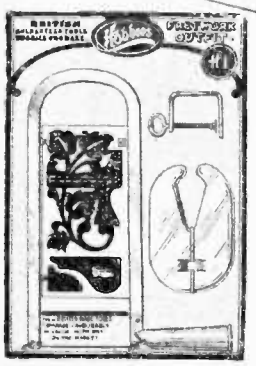
Design Sheet for this Long-distance Monoplane

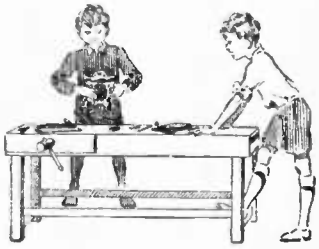
FULL OF PRACTICAL ARTICLES, Suggestions and Ideas.

It will fly 300 Yards!

Published by GEO. NEWNES. LTD., 8-11, Southampton Street, Strand, London, W.C.2.

Every day of every month





If you want to give yourself a good time—a happy time and a profitable time—you cannot do better than get a Hobbies Fretwork Outfit. Every week the pages of Hobbies show heaps of things to make—and a Fretwork Outfit provides the tools you need. There are complete sets of tools from 1/- to 45/-, and each one contains enough for you to start. Anything in wood can be cut out, and you can start without further outlay or practice. Hobbies sets contain sound British Tools—insist upon them to be satisfied.

Obtainable from leading stores and ironmongers, Hobbies own Branches in London, Glasgow, Manchester, Leeds, Birmingham, Sheffield, Southampton, Brighton.

The Hi.

Look at the value here! A handframe and spare blades, a modern metal cutting table and cramp, a simple pattern to cut out and instructions how to begin work.

1/-

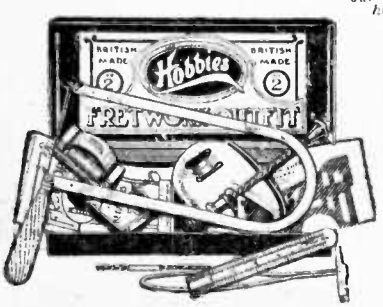
The "DOMINION."

Another sound set of tools. The latest pattern handframe and spare blades, a polished steel cutting table, sandpaper block, small hammer, metal rule, special speedy drill, instructions how to start, and wood and coloured pattern for a simple toy. **7/6**

The No. 2 OUTFIT.

This set of tools is contained in a box with hinged lid. In addition to the tools there is a 48-page book with illustrated instructions how to begin work. The tools include a special handframe with detachable handle. **5/-**

Postage is extra on each price.



A FREE BOOK.

If you have not had a copy of "For Makers of Things in Wood," write for one now to Hobbies Ltd., Dereham, Norfolk. It is interesting to read, and illustrates all manner of things you can make.

HOBBIES

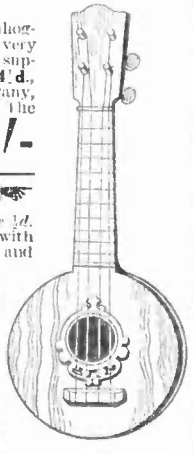
BRITISH FRETWORK OUTFITS

HOME MADE MUSICAL DESIGNS

A particularly interesting set of designs which can be made up by any fretworker. Every one has sold in thousands already—Hobbies sale affords an opportunity to buy at a greatly reduced price.

GRAMOPHONE

A full-size playing instrument, built in Mahogany with the fretsaw. Can be made in very short time from the wood and fittings supplied. Design No. 1690. Price **4d.**, or 4½d., post free. A parcel of planed mahogany, with moulding, for 3/3, or 4/3, post free. The motor and accessories as illustrated cost 2/- or 2/- ost free **SALE PRICE, Wood & Motor** **22/-**



UKULELE BANJO

DESIGN No. 1525. Price 4d. *Postage ½d.* A full-sized Ukulele made in mahogany with pine for the sound box. Wood, strings, and pegs, usually cost 4/3. A special cheap parcel during the sale. **SALE PRICE 3/3**

A UKULELE

Design No. 156 Special. Price 6d. Post free 7d. Designs for making a full size instrument. A parcel of selected mahogany, padouk and instrument pine, set of strings and pegs and a 20-page handbook how to play, price (complete) 4/3, or 5/- post free. **SALE PRICE 3/6**

BUY NOW

UKULELE NECKS

A specially shaped neck suitable for either of the above designs, cut and finished ready to fit supplied for **1/9** *or* **2/-** *post free.*

A ONE STRING JAPANESE FIDDLE

This parcel includes special parts of beech (for the neck), pine, and selected wood for all parts required. The necessary key and "E" string, a bow, and an instruction manual how to play the instrument (2/-) for 7/3, or 7/9 post free.

Design No. 768. Price 4d. **5/6** **Post 6d.**

Obtainable from Hobbies, Ltd., Dereham, Norfolk, or from any of their branches in London, Glasgow, Manchester, Birmingham, Sheffield, Leeds, Southampton, Brighton.

HOBBIES LTD.

BRANCHES & AGENCIES.

Below are the addresses where Hobbies goods can be purchased. In addition all leading stores and ironmongers stock or can obtain your requirements in fretwork and woodwork, designs, wood, turned legs, moulding, polish, wireless accessories, etc., etc.

HOBBIES OWN BRANCHES—

LONDON - - 65 NEW OXFORD ST., W.C.
LONDON - - 147 BISHOPSGATE, E.C.
LONDON - 83 NEWINGTON BUTTS, S.E.11.
GLASGOW - - 326 ARGYLE STREET.
MANCHESTER - - - 10a PICCADILLY.
BIRMINGHAM - - 9a HIGH STREET.
SHEFFIELD - - - 214 WEST STREET.
LEEDS - 10 QUEEN VICTORIA STREET.
SOUTHAMPTON - 25 BERNARD STREET.
BRIGHTON - - - 68 LONDON ROAD.
CANADA - 844 YONGE STREET, TORONTO.

HOBBIES AGENCIES—

Aberdeen.—Jas Mutch, Ltd., 47 Broad Street. Bedford.—Messrs. T. S. Carpenter & Co., 105 Midland Road. Blackburn.—Mr. H. Mercer, 69 Darwen Street. Bradford.—Messrs. T. Underwood & Co., 13 and 15 Manchester Road. Cambridge.—Mr. H. S. Driver, 28 Hills Road. Canterbury.—Mr. T. D. Goodman, 33 Burgate Street and 16 St. George's Street. Cardiff.—J. Halls (Tools), Ltd., 31 Morgan Arcade; Chiswick—Messrs. Lucas & Co., 390, High Road. Croydon.—L. H. Turtle, Ltd., 6 Crown Hill and 53 North End. Dover.—Mr. E. F. Bockham, 15 Worthington Street. Dublin.—Mr. J. J. McQuillan, 36 Capel Street; Dundee.—Mr. J. Pain, 45 Murray Gate. Folkestone.—Mr. W. Allsworth, 16 & 18 Guildhall Street. Hastings.—Mr. W. H. Mozley, 4 York Buildings. Hull.—Mr. O. F. Walker, 17 and 18, George Street; Leicester.—Mr. Frank Berry, 3 Loseby Lane; Liverpool.—Mr. C. Lucas, 35 Manchester Street; London.—Messrs. H. Osmaa, 166 Aldersgate Street, E.C.; Newport, Mon.—J. Halls (Tools), Ltd., 31 High Street; Reading.—Mr. W. J. Sarient, 44 West Street; Swansea.—J. Halls (Tools), Ltd., 5 Gower Street; Wigan.—Mr. Thos. J. S. Clephan, 23 Standishgate; York.—Messrs. J. H. Shoulsmith & Sons, 132 Micklegate.

HEAD OFFICE & WORKS:
DEREHAM, NORFOLK.

GROOVED LEGS MAKE TABLE-MAKING SIMPLE

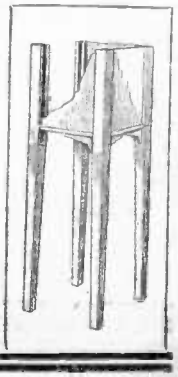
Isn't it much better to make a table yourself just the size you require rather than pay a big price for one larger than you want? Any amateur can do his own work now, and quite simply, too. These mahogany legs have ⅜in. grooves in them to hold side supports. The illustration below shows how the four legs are used.

REDUCED PRICES

Offered cheap before April 18th. 28½in. Legs in mahogany, with 9in. groove for ⅜in. boards. Postage 9d. extra. Ask for No. 39 Legs.

3/6 *for* **4**

From Hobbies Ltd., Dereham, Norfolk, or any of their Branches or Agents.



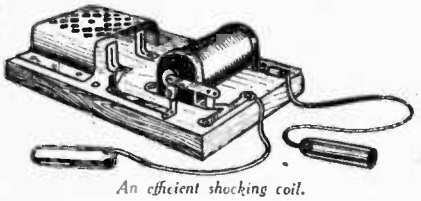
Hobbies

Vol. 72. No. 1,851. Published Every Wednesday APRIL 11th, 1931

THIS WEEK'S CLEVER IDEAS

An Efficient Shocking Coil.

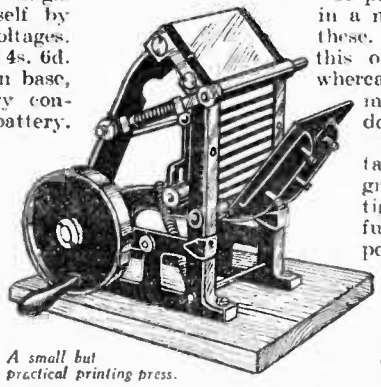
THE electrical device known as a shocking coil (shown here) had its counterpart years ago on most railway stations in the form of a massive machine. You placed a penny in the slot and could test your resistance to an electric shock by increasing the current retailed for your penny by turning a knob. It is problematical whether any beneficial results accrue from passing electric currents through the body—extremely doubtful, in fact—but whilst it may not do good, it is equally certain that mild voltages can do very little harm. The shocking coil is a fascinating piece of electrical apparatus, for one can enjoy the tingle of a mild shock, and accustom oneself by degrees to stoical toleration of higher voltages. The coil shown retails with battery at 4s. 6d. It is mounted on a polished wooden base, equipped with a nickel-plated battery container to take an ordinary flash-lamp battery. Variations of current strength can be effected by sliding the tube, which passes through the coil, in or out.



An efficient shocking coil.

A Practical Model Printing Press.

MORE and more are boys' clubs making use of their own little printing presses for the production of club circulars, notices, tickets, etc. These small presses, of course, cannot produce work equal to the trained compositor who has access to full-size machinery, but these small presses produce quite satisfactory jobs, and in many cases quite successful school magazines have been produced on them. That shown is 7in. high, and is supplied complete with type for 27s. 6d.



A small but practical printing press.

A Catapult Parachute.

THIS catapult propels an egg-shaped container. When this is shot into the air the container opens out and releases a parachute which descends in realistic manner to earth. It costs 2s. 11d.

Knot Loosening Scissors.

ON page 764 of our March 14th issue we published an idea for making a pair of scissors which would loosen knots in string. This article is marketed by Hampson's Patents, 33, Craven Road, Paddington, W.2, at 2s. 6d. a pair. We recently were afforded an opportunity of testing a pair, and found that they were extremely effective in unravelling knots which would not yield to the usual finger-nail action.

A Substitute for Paraffin.

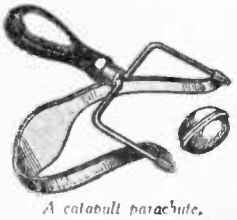
FOR years amateur mechanics have regarded paraffin as a necessary aid to cleanliness. It has been used for washing out mechanisms, it has been poured on to bearings which have set "solid," and it has been applied to rusty nuts and bolts in the hope that it will enable them to be unscrewed.

So far as its main uses are concerned, however, paraffin to-day has been replaced by two other fluids—flushing oil and penetrating lubricant.

A penetrating lubricant replaces paraffin in a multitude of other uses, and, besides these, does numbers of jobs of its own; for this oil definitely lives up to its name, whereas paraffin, whilst it "creeps" in the most unpleasant way (as we all know), does not *penetrate*.

As a test of its remarkable properties, take two pieces of glass—old photographic plates will do—squeeze them tightly together with a pair of powerful spring letter clips and smear a little penetrating lubricant on the bottom edge. Leave the plates standing so that the oil *should* drain off, and take a look at them again in a few minutes' time. Instead of draining off, the lubricant will be seen to be working its way *uphill* between them.

Applied to tight nuts and bolts it will do its work in under half an hour, whilst it can be relied upon to discern, and cure, that elusive squeak. An uncanny fluid, this, but one for which the amateur mechanic may be thankful.



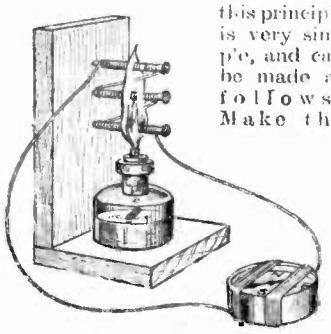
A catapult parachute.

NOTES AND NOTIONS from our READERS

A Thermo-Electric Cell.

THERMO-ELECTRICITY, as the name implies, is electricity formed by heat.

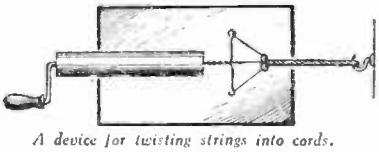
To make an instrument to utilize this principle is very simple, and can be made as follows. Make the



A thermo-electric cell.

small stand shown in the sketch and drive in three nails, as shown. The nails are then connected by pieces of 24 S.W.G. copper wire. A small spirit lamp is then placed on the base to heat the joints.

To complete the cell the wires are connected to a small galvanometer, which can be made by winding a few turns of wire round a pocket compass. On heating the joints with the lamp, the compass needle will move to a position at right-angles to the coil,

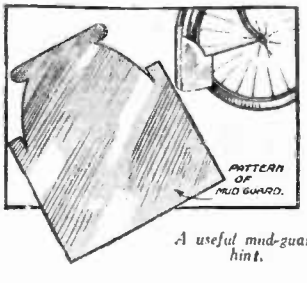


A device for twisting strings into cords.

showing that a small current is being generated.—W. E. (Edmonton).

A Device for Twisting Strings into Cord.

SEVERAL feet of rope can be made in a few minutes by an easily-made device which is so small that it can be held in the hands during the operation. Take a round block 1¼in. in diameter and 6in. in length. Bore a hole down the centre and push



A useful mud-guard hint.

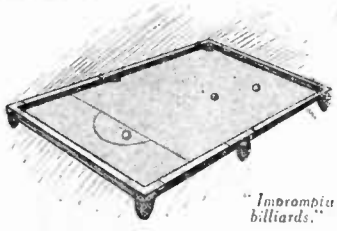
THAT DODGE OF *YOURS!*

Why not pass it on to us? We pay Five Shillings for every item published on this page. Mark your envelope "Notes and Notions."

a handle through as shown in the sketch. Solder four pieces of copper wire to the handle and make a loop in each as shown. Insert four pieces of string through the looped wires and attach the other ends of the string to a hook. By turning the handle the string can now be twisted into cord.—D. B. (South Africa).

A Useful Mud-guard Hint.

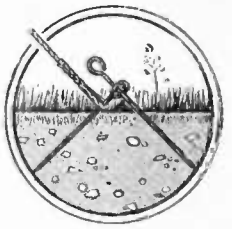
WE all know how tiresome mud splashes can be to the all-weather cyclist, but by adopting the device shown in the sketch it will make them practically impossible.—(Streatham).



"Impromptu billiards."

"Impromptu Billiards."

GREAT fun can be obtained from this simple game, which costs practically nothing to make. Obtain three "Ping Pong" balls; colour one red, and mark one other ball with a black spot. Surround the ordinary dining-table with stripwood or battens, and mark out the table with chalk (see sketch). An ordinary walking-stick will serve as a cue, and the method of scoring is as in ordinary billiards.—F. H. (Southsea).



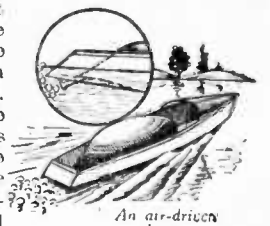
A secure anchorage for a tent

A Secure Anchorage for a Tent.

HERE is a simple method of making a staple whereby a tent may be securely fixed to the ground. By fixing two iron staples in the ground, as shown in the sketch, a sure and safe anchorage is made.—R. E. (Kent).

An Air Driven Boat.

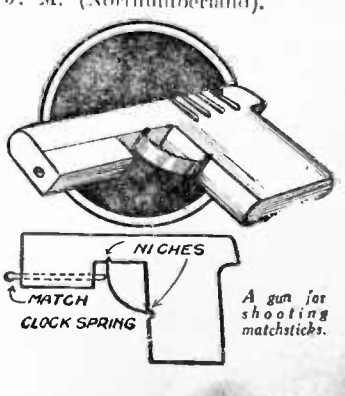
THE boat is driven by the escape of air from an inflated toy balloon. Make a hole in the stern of the boat and put the front of the balloon in the hole. When the air escapes from the balloon the boat is driven forward at quite a good speed.—D. B. (Riversdale).



An air-driven boat.

A Gun for Shooting Matchsticks.

THIS type of gun is quite simple to make, and can be made from a piece of wood and part of a clock spring. When you have cut the wood into shape, bore a hole in the barrel. Cut two notches in the gun to fix in the spring, as shown in the diagrams. The gun is fired by pressing and releasing the spring.—J. M. (Northumberland).



A gun for shooting matchsticks.

THIS WEEK'S MENTAL NUT

A AND B got a job to paint the lamp-posts in a street. A arrived on the job first and had painted three lamps on one side when B arrived, who pointed out that A's contract was for the other side, so A started afresh on the other side while B continued on the side already started by A. B finished his side first and then went over and finished six lamp-posts for A, thus finishing the job. There were an equal number of lamp-posts on each side of the street. Who painted the greater number of lamp-posts?

Answer to Last Week's Problem

NOTE that we said "twice as deep," not "twice as deep again." When finished, therefore the hole will be twice its present depth; the present hole is therefore, 3ft. 6in. deep and the man 2ft. 4in. above ground. When completed, the hole will be 10ft. 6in. deep and the man will then be 4ft. 8in. below the surface.

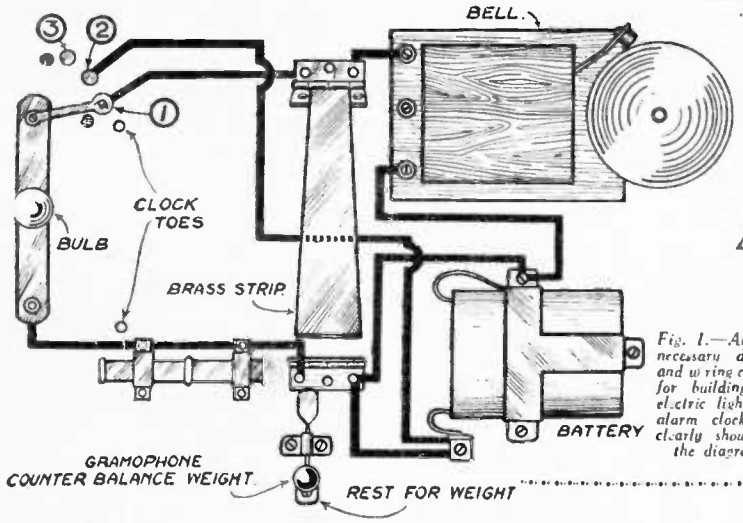


Fig. 1.—All the necessary details and wiring circuit for building the electric light and alarm clock are clearly shown in the diagram.

AN ELECTRIC LIGHT AND ALARM CLOCK

An ordinary alarm clock with a continuous electric light and alarm.

By M. Easton

MOST of us have an alarm clock to rouse us each morning, but here is a device where not only does an alarm bell ring but an electric light is automatically switched on. It is quite simple to make, and quite a number of readers will find it very convenient. Obtain a piece of wood for the base 13in. by 8½in. by ½in., and fix a battery tester with bulb inserted 1½in. from the top by means of a screw at each end (see Fig. 1). Fix a switch on one end of the tester (see Fig. 2), and drive in three studs to act as stops for the switch (see Fig. 1). Now take two ¾in. hinges and screw them down to the base. To the top hinge solder a brass strip ½in. by ½in. by 3½in., and from a piece of brass or tin cut and bend a bolt as shown in Fig. 3. Next cut two fasteners to hold the bolt as shown in Fig. 4.

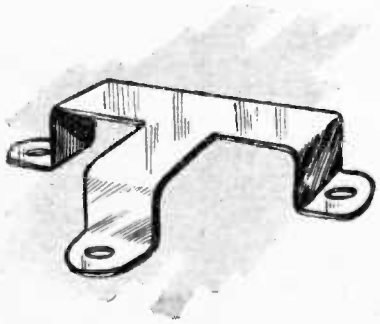


Fig. 6.—The battery case.

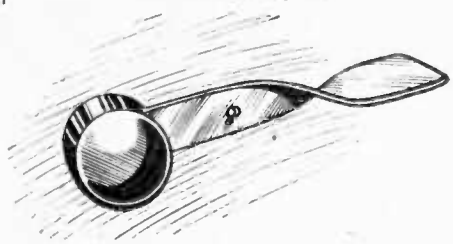


Fig. 5.—The fulcrum and lever.

The Fulcrum and Lever.

The fulcrum is made from a piece of strip tin or brass ⅝in. by 3in., and the lever from a strip ⅝in. by 2½in., and bend to the shape shown in Fig. 5, with the balance weight attached. Now make a holder for the battery as shown in Fig. 6. The alarm key of the clock should be soldered at the loose joint to make it stand straight out.

The Wiring Circuit.

The wire is connected from No. 1 screw to the hinge, and from the hinge to the contact stud on the right of the bell (see Fig. 1). Now connect from the stud on the left of the bell to the battery case, and then from the battery case to the bottom hinge. This completes the bell circuit. For the light circuit connect a wire from No. 2 screw to the battery case and from the battery case to the battery tester. No. 3 screw is to switch off all the power.

How it Works.

Place the switch on No. 1 screw, wind and set the alarm, and place the clock on the base, where marks have been made for the toes. Fit in the battery and rest the long brass strip connected to the top hinge on the alarm key, and the alarm is now ready to go off. Before drawing the bolt to stop the bell, push the switch on to No. 2, and this will keep the light on but disconnect the bell. If a light is required during the night before the alarm has gone off, push the switch on to No. 2 screw, but when finished don't forget to push the switch back to its original position.

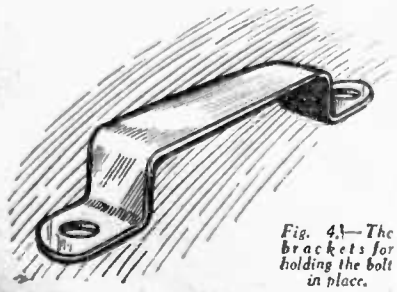


Fig. 4.—The brackets for holding the bolt in place.

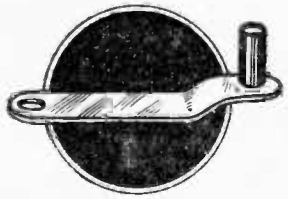


Fig. 2.—The switch.

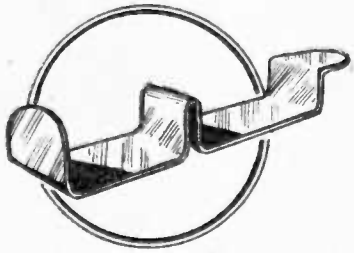
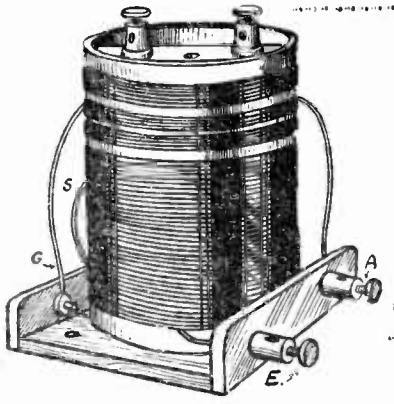


Fig. 3.—How the bolt should be bent.



The completed coil.

A CHEAP "DUAL" WIRELESS COIL
and
HOW TO MAKE IT

By J. C. Drinkwater

THE only item which need be bought for the construction of this particular coil is the wire—the rest of the materials will be found in any junk-box. First of all, collect the parts in the appended list. If no cardboard former is at hand, it can easily be made by rolling a flat piece of cardboard, 10½in. by 5in., round a small jam-jar, and then gluing it. The next thing is to wind the wire on the former (see Fig. 1). This can be done in the usual way, but if a quicker and neater job is required it will be necessary to rig up a winder—such as shown in Fig. 5. If this is used it will be best to fit the two strips of wood into the ends of the coil after making the holes.

They can be drilled or burned in the wood (by means of a red-hot nail), and should be about ⅛in. in diameter (see Fig. 6). The strips are fixed (one each end) flush with the ends of the former by means of the small brass wood-screws, as shown in Figs. 2 and 3. The coil base, which is of wood, 3¾in. by 3¾in. (square), should next be made. This is made of ¾in. wood, and two holes in *opposite corners* should be drilled so that the base can be screwed to the baseboard of the wireless set (see Fig. 8). A coat of shellac or varnish will improve the appearance.

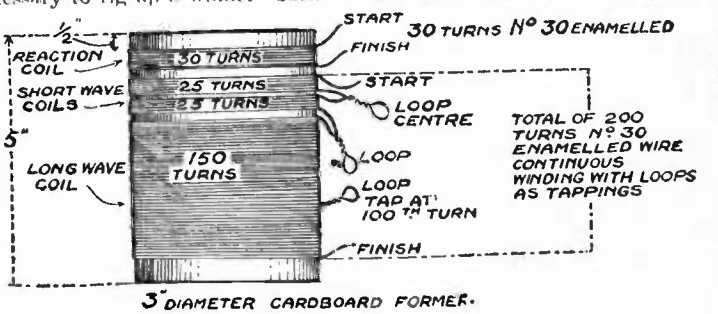


Fig. 1.—Details of the coils' construction.

Fixing the Coil to the Base.

The coil is now fixed to the base by means of the strip of wood already fixed to the bottom (see Fig. 4)—*i.e.*, the bottom of coil is where the long wave winding *ends*. Two of the wood-screws are inserted in the two outer holes of the strip and the coil is screwed to the base, taking care that the top (terminal) strip is at right-angles to the sides of the base, as in the completed coil. Now get the two *ebonite* strips, 3¾in. by 1in., and after drilling the holes, file the top corners down, as shown in Fig. 7. This is not essential, but adds to the appearance of the coil. The ebonite strips can then be screwed to the base.

The Terminals.

Six terminals (bell or telephone type) can now be fitted—two in each ebonite strip and two in the topwood strip of the coil (reaction end). The coil is now ready for connecting up.

The coil-ends can now be brought direct to the terminals or, if a better and neater job is required, a short length of thin rubber-covered flex can be used, the coil-ends cut off short, and the flex soldered on and taken to the respective terminals. If desired, short lengths of "Systoflex" could be slipped over the ends instead. The start of the reaction winding should be conected to the terminal R2 on the wood strip and the other end to terminal R1.

Short-wave Winding.

The start of the short-wave winding is taken direct to grid terminal on the ebonite strip. The centre-top of the short-wave winding (which comprises the *end*

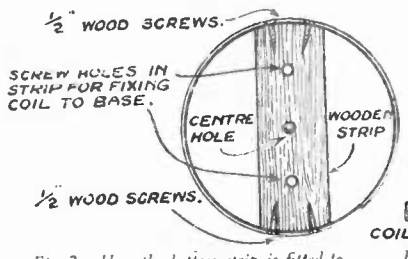


Fig. 3.—How the bottom strip is fitted to the coil.

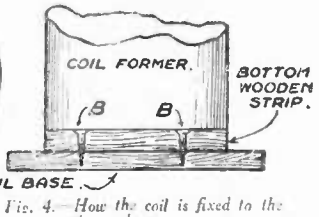


Fig. 4.—How the coil is fixed to the base.

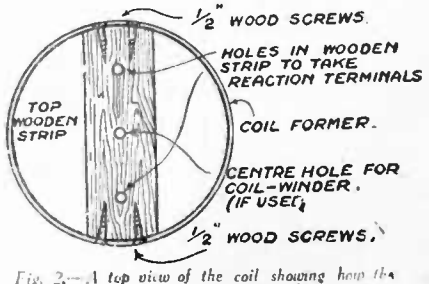


Fig. 2.—A top view of the coil showing how the top terminal strip is fitted.

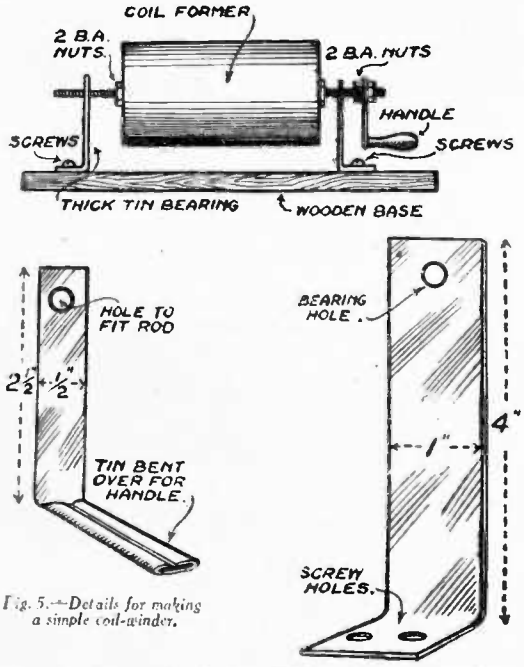


Fig. 5.—Details for making a simple coil-winder.

of the previous twenty-five turns and the start of another twenty-five turns) are twisted together and connected to the ebonite strip on the other side of the coil which is the aerial terminal (see Fig. 9). The end of this (second) twenty-five turns and the start of the long-wave coil are twisted together and joined as above and connected to the terminal S. Coil up the tapping close to the coil at the 100th turn, as this is not used normally. Connect the *end* of the long-wave winding to the earth terminal. This completes the coil, and it can now be fitted in the set and tested.

How it Works.

Before proceeding further it would perhaps be advisable to look at the theoretical diagram (Figs. 10 and 11) so as to get a clear idea of "how it works." It will be seen that the short-wave coil consists of a total number of fifty turns—centre-tapped at the twenty-fifth turn—this is in accordance with the latest practice, and makes for good selectivity. As a further aid to selectivity a small condenser (.0003), of the semi-variable type (such as a Formo-Densor), is included in the aerial circuit, but this is not normally necessary, but is an added refinement. The aerial can be taken either through this condensor or direct to the coil by connecting the aerial to terminals A1 or A2. The end of the short-wave coil is connected to the long-wave coil and to an ordinary push-pull switch by which the long-wave coil is short-circuited when the switch is "out," and signals are then received on short waves. When the switch is pushed "in" (and plunger disconnected with contacts, as is usual), the long-wave coil is then brought in circuit for the long waves. Fig. 10 will make the practical connections easy.

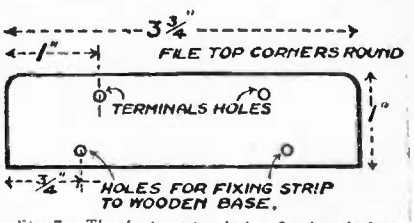


Fig. 7.—The ebonite strip which is fitted to the base of the coil.

The Reaction Winding.

With most valves the reaction winding given will be satisfactory, but if reaction is too fierce, try taking a few turns *off* the reaction coil. If not enough reaction (with the particular valves in use), *add* a few more turns on the top of the existing ones. These remarks only apply to special cases, but it is a technical fact that certain valves require more reaction than others.

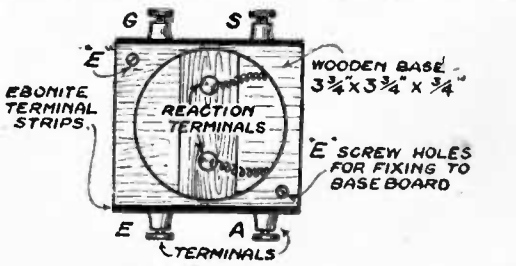


Fig. 8.—The base for the coil.

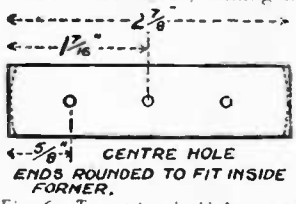


Fig. 6.—Two strips should be cut, as shown, to fit into the top and bottom of the coil.

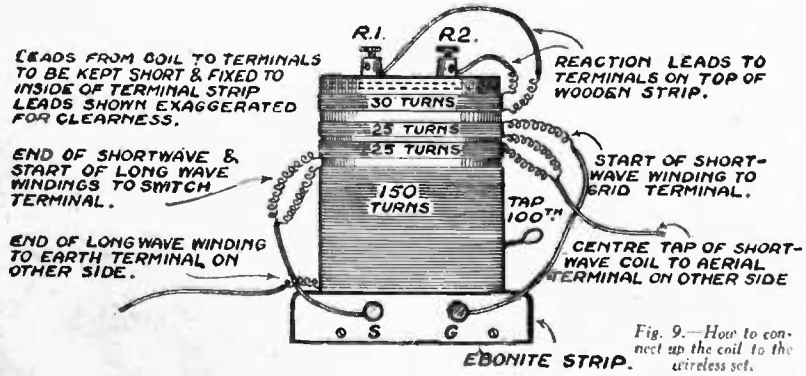


Fig. 9.—How to connect up the coil to the wireless set.

Detector Valve Voltage.

Before making any alterations *do* make certain that the detector valve voltage is *correct*—a point many people overlook when the reaction is too fierce—about sixty to eighty volts H.T. is sufficient for most valves. With some aerials it may be necessary to make use of the 100th turn long-wave tapping, but this should not be at all necessary on the average aerial. To do this, simply disconnect the end of the long-wave winding (200th turn) from the earth terminal and connect

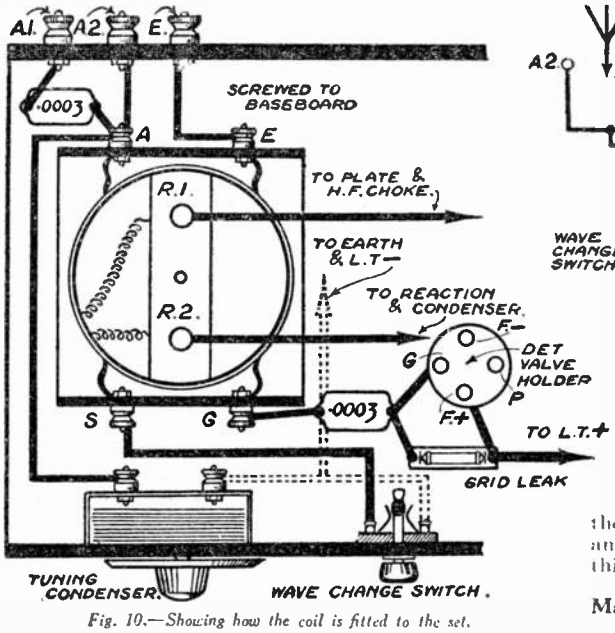


Fig. 10.—Showing how the coil is fitted to the set.

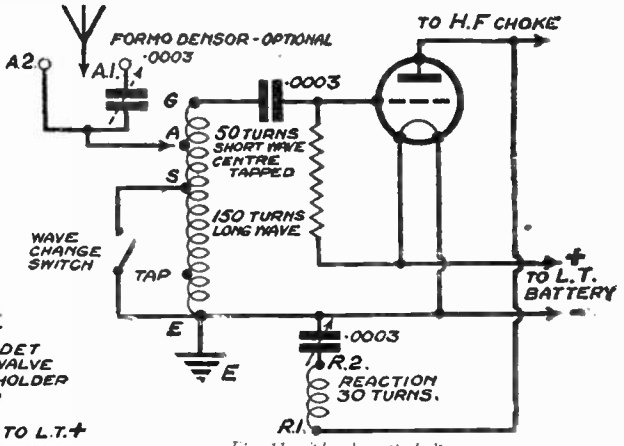


Fig. 11.—The theoretical diagram.

the 100th turn tapping in its place. Coil up disconnected tapping out of harm's way, as before. This tapping (the 100th turn) is totally unnecessary, as a rule, but I have allowed for every contingency and for experiment. There are many people to-day who, out of ignorance, use the full 100ft. aerial allowed by the P.M.G. and *also* a long lead-in often amounting to 30 to 40ft.—it is such cases as these that require experimenting with. Lastly, do not forget to reverse reaction leads on the set if at first there is no reaction effect—I have known many amateurs spend hours tinkering about before doing this most obvious thing.

Materials Required.

One cardboard former, 5in. by 3in. (or a piece of flat cardboard, 10½in. by 5in.).

Two ounces of No. 30 enamelled wire (cost about 10d.).

Six terminals (any type)—bell or telephone.

One piece of wood, 3¾in. by 3¾in. (square) by about ⅜in. thick.

Two strips of wood, 2¾in. by 1in. about ⅜in. thick.

Two strips of ebonite, 3¾in. by 1in. up to ⅛in. thick.

Fourteen ½in. brass wood-screws.

OUR CYCLISTS' CORNER

Conducted by F. T. Bidlake

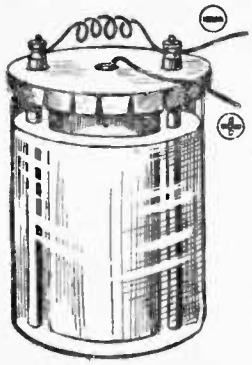
GEARING (*continued*).

RECALLING that the size of a circle can be measured just as easily by the distance round the circumference as by the distance it is across (since every circumference is always 3.14159 times its own diameter, a fact that every Jack Horner has at his fingers' ends if he has ever tackled the geometrical pie), all we need do is to count the teeth on each of the chain rings and use the technically improper fraction found by clapping the bigger number over the smaller one, and using that as a multiplier of the size of the driving wheel to find out what the cycle is geared up to, or, in other words, the size of the ghostly wheel which would require a giant to ride it, if it were an ungeared high old ancestral bicycle.

The Chain Wheel.

Now let us remember that when doing this we naturally agree that our chain rings are circular. It is only then that we can say the number of teeth is a measure of the size. And the point is vital in considering a newly re-introduced idea of using a front chain wheel that is not circular but elliptical. That chain wheel has not one diameter-size, but a whole range of diameter-sizes, from its greatest to its least axis. Consequently, as your gearing up depends on the size of your front chain ring, and by using an ellipse instead of a circle, you have a chain ring varying in effective size as it rotates, you have a varying gear as it rotates, changing from a gear appropriate to its biggest size down gradually to a gear appropriate to its smallest size and back again every half revolution. As, therefore, the non-circular, elliptical chain wheel, varies in effective size as its changing diameter picks up the chain at varying distances from the centre, it follows that

(*Continued on page* 56.)

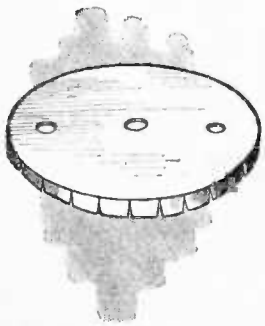


The battery when finished.

A BATTERY TO DRIVE A SMALL ELECTRIC MOTOR

THE object in describing this battery is so that one may be built which will give a really strong current for several hours at a reasonable cost.

The actual construction is simple: a piece of thick cardboard with the necessary spaces cut out is quite sufficient to hold the components in place.



The lid which fits over the top of the jar.

"A" is a large glass jar capable of holding the porous pot, the two carbon rods B and C and 1¼ pints of solution.

The two rods B and C, as shown in the sketch, can be obtained quite cheaply with terminals cast into the top.

D is the porous pot, a good white one is the better, but a closer grained red one will serve quite well.

E is a piece of commercial zinc, 4in. by 3in., bent in the form of a cylinder with a piece of copper wire soldered into the top.

All these, except the zinc, should be held *top* downwards to the depth of about 1½in. in melted vaseline for a few minutes before being assembled.

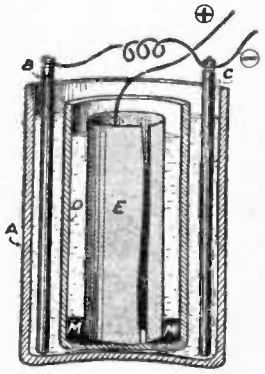
The Solution.

Solution (i.) is made by adding 2½oz. of potassium bichromate solution to 27oz. of distilled water and then *slowly* pouring in 3oz. of pure sulphuric acid.

M is 1oz. by weight of mercury, which should be placed inside the porous pot and renewed as used up in the working of the cell.

Solution (ii.) is 1oz. of the pure sulphuric acid mixed with a pint of distilled water (or in proportion to the capacity of the porous pot).

It is better to get the chemist where you buy the chemicals to accurately measure the exact amounts required.



Showing how the battery is made.

A note on the care of the cell when finished. When the solution (i.) is exhausted it turns blue and more potassium bichromate should be added. If, however, the cell begins to fail when the orange colour remains, more sulphuric acid is needed.

Occasionally the battery should be dismantled, cleaned and placed in running water for a few hours.

If this cell is properly made and cared for it will last for years; it causes no unpleasant fumes, has a high E.M.F. of over 2 volts, and will regain its original strength after hard usage if rested for a time. It is excellent for driving small electric motors, charging accumulators, etc.

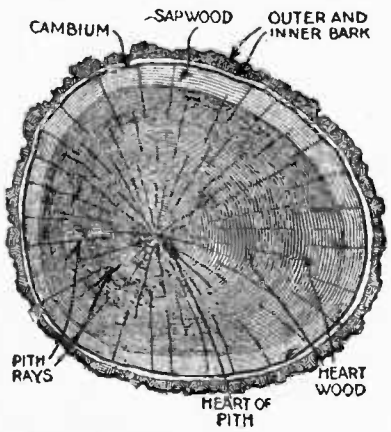
TELLING THE AGE OF A TREE

WORKING from the outside to the inside when studying a tree's growth, the bark is the first consideration. It is of a corky nature and is composed of dry dead leaves. The bark protects the tree against evaporation and outside injury.

Beneath the outer bark is the inner bark, which is soft and moist. It carries the food that is prepared by the leaves to all parts of the tree; very gradually this inner bark becomes the outer bark. The next layer, known as the cambium, is where the actual growth of the tree takes place.

It is a thin layer of living cells that divides and sub-divides, forming on the inside wood and on the outside bark.

Below the cambium we find sap-wood, which carries sap from the roots to the leaves. Heartwood composes the next layer in most trees, though not every tree has heartwood.



Section of tree showing annual rings.

In the very heart of the tree is the pith, around which the first woody growth is formed. From this heart of pith extend rays, connecting the pith with the various layers of wood and the bark, and also storing up food.

Each season's growth is known as an annual ring. Count these rings and the age of the tree is obtained.

It is important that the owners of land containing an appreciable number of trees should become familiar with the various species—their value as lumber or for shade, also the age at which it is best to chop them down.

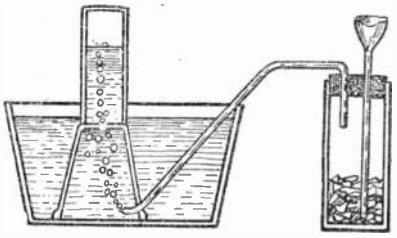


Fig. 6.—How the hydrogen is made.

HOW TO MAKE HYDROGEN FOR FILLING THE "HOBBIES" AIRSHIP

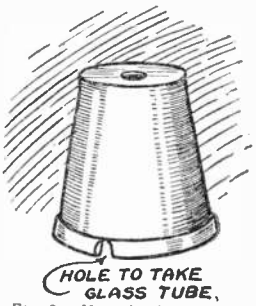


Fig. 3.—How the flower-pot is drilled

THE making of hydrogen is simple, and for less than a shilling a sufficient quantity can be manufactured to fill the airship described last week.

Nearly all the apparatus mentioned here can be found at home.

Apparatus Required.

Procure a flask—a jar or bottle will answer providing it is of fair size—obtain also a cork to fit it. Bore the cork with two holes just big enough to take two pieces of glass tubing. In one of the holes insert a glass funnel; this must go within about a ¼in. from the bottom of the flask, or the hydrogen will escape up the funnel, and insert in the other hole a glass tube bent to the shape shown in Fig. 2. Heat one end of a glass tube, and the end will close, making a neat joint; blow gently down the tube until a bulb of about 1½in. diameter appears; now blow violently; this will smash the bulb, and as a result you will have a glass funnel or a "thistle tube," as it is sometimes called (Fig. 1).

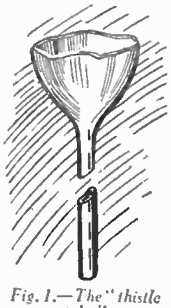
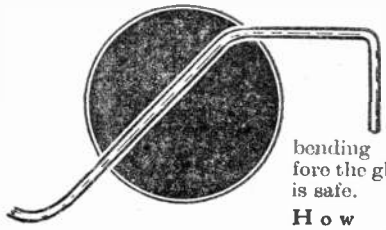


Fig. 1.—The "thistle tube."

It is hardly necessary to give instructions for bending a glass tube, the main things to remember are: that, first, you must keep revolving the tube in order to prevent the sides from caving in; secondly, do not bend the glass suddenly, but by degrees, and, finally, do not start bending before the glass is safe.



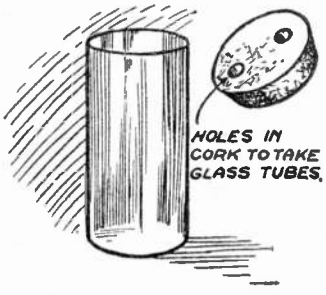


Fig. 2.—(Above) How the tube is bent, and (below) the jar with two holes bored in the cork for holding the tubes

How to Make the Hydrogen.

Now obtain a very small flower-pot and file a hole in the rim (Fig. 3), big enough to admit a glass tube.

You will now require a small glass bowl, and a quantity of jars in which you are going to collect the hydrogen; they must be wide or fairly wide-necked and clean.

Place the small flower-pot in the bowl with the drainage hole pointing upwards; fill the bowl with water about an inch above the drainage hole in the pot.

Place in your flask (or jar) a small quantity of zinc clippings, and cork up the flask.

Procure another flask (or jar) the same size as the one in which you placed the zinc clippings; pour in this empty flask enough sulphuric acid to cover the bottom; now pour in one inch of water, thoroughly mix them together, and pour it down the glass funnel.

Storing the Hydrogen.

Hydrogen gas will immediately bubble off. Let it do so for a couple of minutes, then place the turned-up end of the glass tube through the hole in the rim of the flower-pot (see Fig. 4).

Fill up one of your jars in which you are going to collect the hydrogen with water, and place it mouth downwards on top of the flower-pot, taking care that no air gets into the jar. The best method in which to do this is to place a piece of paper over the mouth of the jar (Fig. 5). Place it on the flower-pot, and quickly flick the paper away.

As the gas goes into the collecting jar it will drive out the water; let the jar stay there for two or three minutes, take it away and stand it mouth downwards in a saucer or shallow tray (Fig. 7). Take the second bottle and repeat the same thing; do this until you have obtained enough hydrogen for filling the airship, or any other envelope. Do not hold the jars mouth upwards, or the hydrogen, being lighter than air, will soon escape.

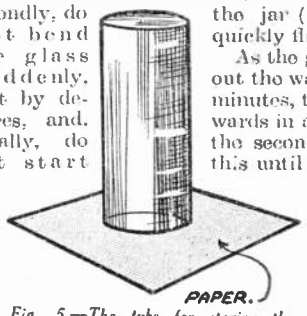


Fig. 5.—The tube for storing the hyarogen.

Filling the Airship.

There are several methods of filling the airship, but the most simplest and inexpensive one is as follows.

Obtain a cork or corks to fit your hydrogen-filled jars; bore two

(Continued on page 44.)

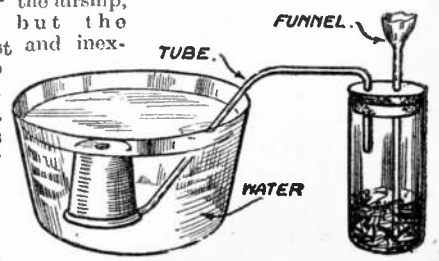
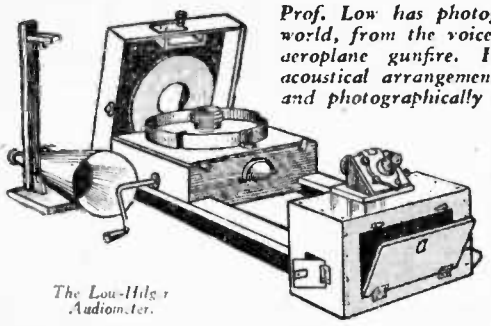


Fig. 4.—The apparatus connected up ready for producing the hydrogen.



The Low-Hilger Audiometer.

Prof. Low has photographed almost every noise in the world, from the voice of the late Dame Nellie Melba to aeroplane gunfire. He has been responsible for the acoustical arrangements in many of London's buildings, and photographically recorded voice in 1912.

"SOUND" SENSE

An interesting article about the Audiometer.

By

Prof. A. M. Low

Prof. A. M. Low.

IF you were asked to say exactly how much water was in a jug of strange and peculiar shape, you would not give it one glance and attempt to supply an accurate answer. Yet this is exactly what the majority of people do in the case of sound.

Sound is due to alternate waves of rarefaction and compression in the air, which beat upon the ear drum and transmit the sensation by nerves to the brain.

Air Oscillations.

Before dealing with the methods adopted to render sound, or the irregular vibrations of noise, visible for examination, it is as well to realise that air oscillations are of a mechanical and vigorous nature. Although the amount of sound energy radiated from quite a large orchestra is less than the radiated power from a burning safety match, the human frame is very sensitive to sound and the ear itself can often detect a movement of a telephone diaphragm which is less than one-millionth of a millionth of an inch!

The mechanical nature of sound is shown by the ease with which it can be reflected. A mirror for sound is sometimes used to reflect voices on to the microphone when a talkie is being made and the same principle can be employed to render a watch audible at a comparatively long distance (Fig. 1).

Sound can also be "bent" by layers of hot air, as is shown by the example of a motor-car driving along a road on a hot summer day. It commonly occurs that the exhaust note seems louder as distance increases.

Sound Recording.

Noise and sound have another property, in that they heat the air through which they pass. This was used during the War to assist in range-finding by allowing the waves of compressed air due to noise to impinge upon wires of which the exact temperature could be measured and, from this result, the distance gauged.

It is very obvious that the ordinary microphone, such as is used in the telephone mouthpiece, affords one method of sound recording. This is carried into effect on many sound films by amplifying the microphone current and causing it to operate a lamp which marks on a film.

All these methods have the disadvantage that the electrical part of the apparatus has a will of its own, and that in consequence it may produce records which are not really true to fact.

Another important point is that the diaphragm and moving portion of most forms of microphone are comparatively heavy. Ordinary sound waves may take place at the rate of 2,000 or 3,000 cycles per second, and, as each instrument or voice alters the rate at which air pressure changes and alters the shape of a curve representing the wave, it is obvious that a heavy diaphragm cannot possibly follow these movements.

Photographing Sound.

There is another method of photographing sound and noise which is particularly accurate because it employs a diaphragm thinner than a soap bubble. This diaphragm is made from floated celluloid, and is so thin that the surrounding air damps out any resonance it might possess.

Sounds at speeds of over 6,000 cycles per second are often inaudible, but a really thin diaphragm will work well up to 30,000 cycles per second. These notes which cannot be heard are very important, for they may combine with other sounds and produce varying effects.

No one would think of measuring the amount of current in an electric light bulb by feeling its heat. Most methods of examination of sound are almost as absurd, but the audiometer which is fitted with one of these diaphragms can show the exact changes of voice produced by a singer and can enable both irritating noises and the sweetest of sounds to be analysed, tested, or, in the case of gramophones and radio, compared with the original.

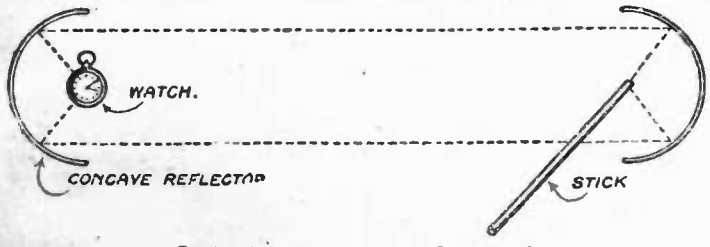


Fig. 1.—A simple experiment in reflecting sound.

The Low-Hilger Audiometer.

The principle of the Low-Hilger Audiometer is very simple. A light is thrown from a strong bulb, or an arc, on to a small mirror platinised on to the surface of

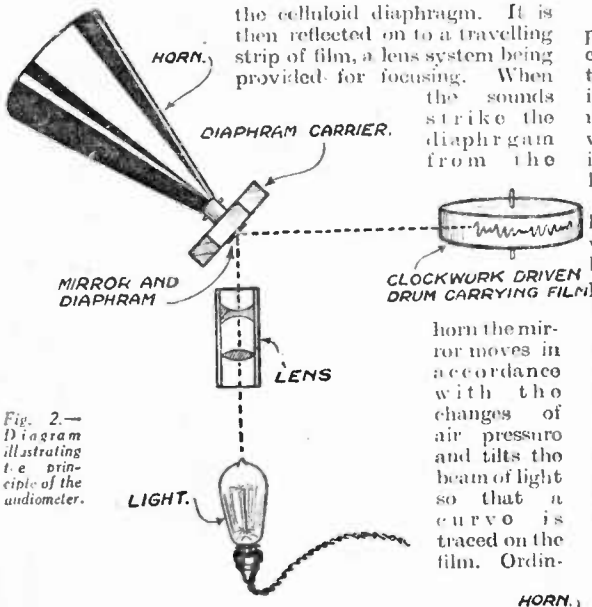


Fig. 2.—Diagram illustrating the principle of the audiometer.

the celluloid diaphragm. It is then reflected on to a travelling strip of film, a lens system being provided for focusing. When the sounds strike the diaphragm from the horn the mirror moves in accordance with the changes of air pressure and tilts the beam of light so that a curve is traced on the film. Ordinary mechanical arrangements are made for exposing different parts of the film as may be required, and in the case of optical examination alone a line of light instead of a spot is thrown on a strip of black paper bearing wide vertical white lines. Owing to the persistence of vision this enables the actual wave form to be seen before a permanent record is made (Fig. 2).

Quite an effective little model can be made by preparing a cardboard stand as shown in Fig. 3, and by covering a hole with a thin celluloid diaphragm. To make this diaphragm a solution of celluloid in amyl acetate is prepared, or accumulator repairing cement can be used. One drop is allowed to fall on a bowl of water, when it will immediately spread out and often show iridescent colours due to "separation" of the white light into its component colours.

A loop of wire is then slipped into the water and lifted out carefully, carrying with it the diaphragm, which can then be gently pressed against a rim of glue laid round the hole in the cardboard stand. A small piece of silvering can be scraped off an old looking-glass and a portion about ¼in. square glued to the diaphragm.

By suspending a drum, upon which the necessary lines have been ruled, and by using a slot in connection with a lens from an ordinary pocket flash torch, a beam of light is projected on to the disc while the latter is spun round gently by blowing on the rim.

As soon as sound is allowed to enter the trumpet the wave shape of the sound recorded can be seen. Such diagrams help to locate acoustical faults in buildings and to analyse the many stray sounds which so seriously waste physical and mental energy in our everyday life.

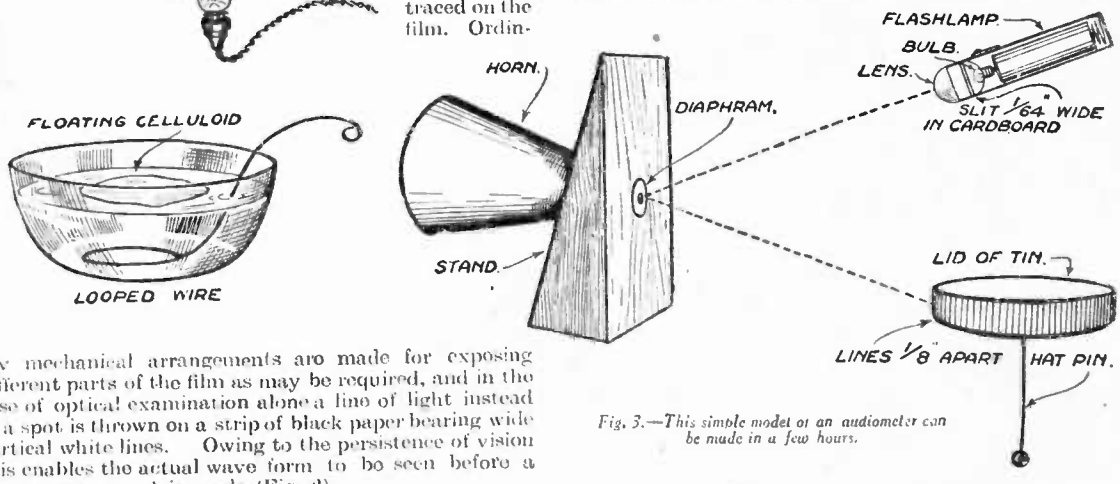


Fig. 3.—This simple model of an audiometer can be made in a few hours.

HOW TO MAKE HYDROGEN FOR FILLING THE "HOBBIES" AIRSHIP (*continued from page 42*).

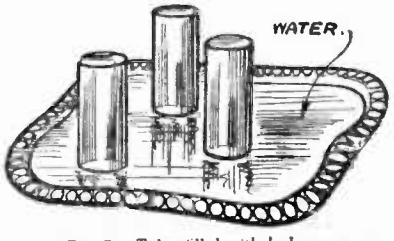


Fig. 7.—Tubes filled with hydrogen.

holes in the cork to take two pieces of glass tubing. Bend a long piece of glass tubing at a right angle, and insert it in one of the holes in the cork.

A much shorter piece of glass tubing is bent at right angles, and inserted in the other hole.

Connect the end of the long glass tube by means of a rubber pipe to the tap, and the other to the lip of the airship. Take one of your hydrogen-filled jars, and, holding it upside down, tightly place in the cork.

Now turn the jar up the right way, and turn on the tap (Fig. 8). This will force the hydrogen into the airship, with sufficient force to expand the rubber or gold-beaters'-skin. When the jar is full of water uncork it, and replace another, and so on until the airship is full.

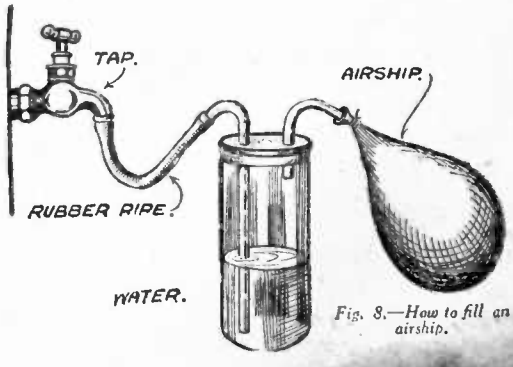


Fig. 8.—How to fill an airship.

Fig. 1.—Below is described how names and pictures are made to continue throughout the entire length of a stick of rock.

Do You Know—

How Rock, Hollow Toy Soldiers, or Nuts are Made?

By L. Wallington

IT is highly improbable that, at some time or other, every reader of HOBBIES has not eaten and enjoyed a stick of rock, watching as they did so the name or picture continue throughout its length until the last piece has vanished, and not a few of them, I expect, have wondered exactly how the colouring is obtained so accurately right through the centre. Well, this is roughly how it is done. The rock itself is firstly not made in the lengths in which you buy it, but is much larger in diameter, like a thick slab, and in the centre are placed the words or picture, say, for instance, "Brighton Rock," moulded in coloured sweetmeat. A rolling operation now takes place, and gradually the thick slab begins to lengthen, becoming smaller and smaller in diameter as it does so, but with the pink or red words still retaining their shape in the centre. So it continues until the desired size is obtained (see Fig. 1), when it is cut into various lengths ready for the shops.

Model Soldiers.

We come now to an entirely different subject, in the shape of model soldiers. When one of those little men is broken it is found that the metal from which it is made is almost of paper thickness. Many of you know that when a casting is made in which it is necessary to obtain hollow portions, sand cores are used, in order that after the cast is made the sand can be broken up and removed. This course, obviously, is not practical in the case of toy soldiers. How, then, is it done? It is by this method. The metal in the first place is not pure lead—it would be much too soft and heavy for the purpose—so with it are mixed a certain proportion of antimony and zinc. This metal is very brittle and flows quickly, being known commonly as type metal, owing to its application for that purpose. Metal moulds are used, split into halves and hinged together at one end, being in turn firmly fixed to a pair of long handles, similar to a pair of tongs.

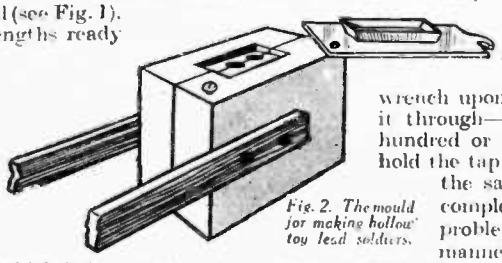


Fig. 2. The mould for making hollow toy lead soldiers.

The Mould.

At the foot of the mould is a small plate bearing a pouring cup, as you see in Fig. 2. This plate is pivoted at one end, and when in position clips under the small screw. With the metal hot, the mould is held firmly together and the metal poured in, and this is where the whole secret lies, for immediately enough metal is in the mould the latter is quickly turned upside down and the molten metal allowed to run out into the ladle or pot again; with a quick flick the hinged plate is knocked round, cutting off the flow and forming the footplate upon which the soldier stands. The mould now being opened, discloses a glistening miniature soldier complete in every detail. Exactly what happens is this: immediately the metal is poured into the mould it chills, and by the quick reverse most of it runs out, leaving behind a thin shell adhering to the mould. This is the toy soldier, entirely hollow, and weighing about fourteen to the pound.

Tapping Out Hexagon Nuts.

The third ingenious idea, which probably took quite a lot of thinking out, is the method employed in tapping out hexagon nuts in mass production. All of you are aware that to tap out a nut—that is, to put a thread in it—it is necessary, with the exception of screw-cutting it in a lathe, to put a tap through it. To do this with single nuts is, of course, quite a simple job—you place a wrench upon the square of the tap and turn it through—but the problem arises when a hundred or two are to be screwed, how to hold the tap and also how to turn it and at the same time allow the nuts to pass completely over the end of it. This problem was solved in the following manner, and those of you who have already scanned the drawings have guessed the secret. It is, in short, a bent tap. Glance at Fig. 3, and you will see that the tap A rests inside a hexagon tube B, into which the nuts fit snugly, and in passing along the tap they hold it exactly in the centre. At the end of this tube there is another piece, C, which is allowed to revolve, taking with it the tap. You will see now that the nuts pass over the cutting edges of the tap, receive their thread, and are then forced along the revolving section C by the nuts following, where they are free to drop out into a receptacle placed ready to receive them. There are many other methods of making screwed nuts, but of all of them this is the most modern and certainly the most ingenious, for it ensures that every nut is of the same size.

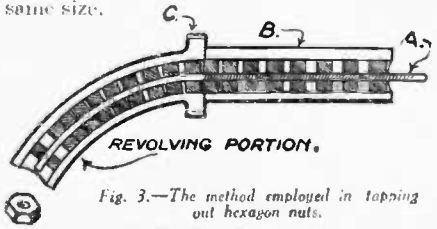


Fig. 3.—The method employed in tapping out hexagon nuts.

A USEFUL TOURING BAG FOR CYCLISTS

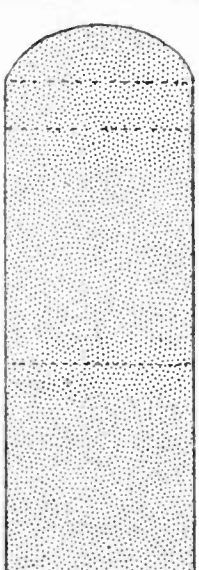
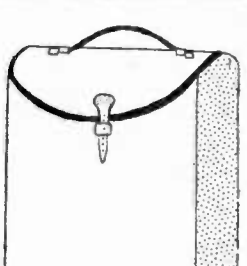


Fig. 1.—Shaping the front and flap.



IT is fashioned from soft leather, and it may be made at home so easily that a drawing and directions for making are given. Length, from top to bottom, 15ins.; width, 12ins.; back to front, 4ins. The top is a kind of flap and comes right over to fasten with strap and buckle. Under the strap is slipped the larger one which will hold it on to the cycle carrier.

Let us suppose you determine on making it yourself. You will need to obtain a piece of leather—or two pieces will do four feet long and not less than one foot wide. The quality of the leather should be good, soft, and about a tenth of an inch in thickness. Cut off 3½ft. and with a sharp leather knife shape one end to make a rounded finish shown in Fig. 1. Then cut two sections to make the sides each 15ins. by 4ins. These are stitched very carefully with the usual leather awl and waxed thread, beginning at the bottom. The handle is now fashioned (see Fig. 2) and two strappings are made, under which the ends will slide to make a carrying handle. It is better to buy a stout strap 6ins. long, and cut it in two for stitching on the front of the bag. But you can, if you wish, make the fastening from any scraps of leather left over. It should be mentioned that for ease in carrying, the handle strap should not be less than 3ins. wide, and it is shaped near either end so that it narrows so considerably as to get a purchase underneath the over-stitched straps. It can be inserted and withdrawn merely by doubling the widened ends to allow of them being pushed through.

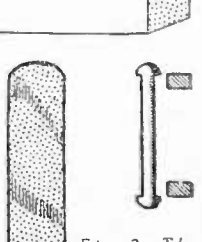


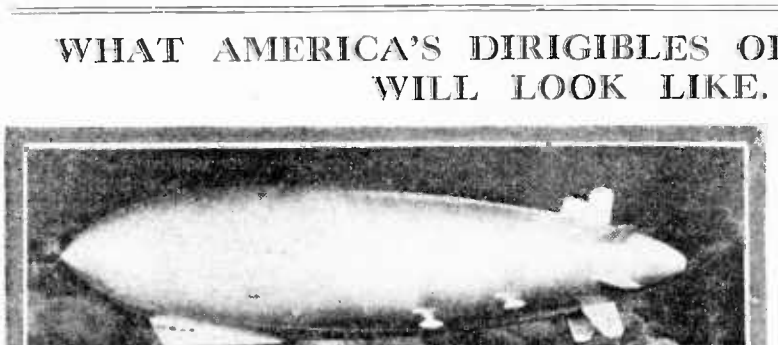
Fig. 2.—The handle and sides.

This bag has a remarkable capacity, whether used as a carrying bag or for the cycle carrier. If care is used in strapping it on the carrier either with one long or two short straps, it will be obvious that the top can be unstrapped without removing it from the carrier, and any article placed near the top taken out for roadside use.

One very great advantage of this bag is that it is quite waterproof—a very important detail when touring, especially when the need for dry clothing is imperative at the end of a soaking day.

Such a bag as this should be made for five shillings: it will last a lifetime with ordinary care, and looks well if kept polished with boot cream, and serves in many ways.

WHAT AMERICA'S DIRIGIBLES OF THE FUTURE WILL LOOK LIKE.



THE $1,500,000 metal-clad dirigible for which Congress has appropriated $200,000 for preliminary engineering and test work. The airship will be built for the Army, and will be particularly designed to act as an air tender for a fleet of airplanes. The ship will be larger and faster than the Graf Zeppelin. The metal skin of the bag will in itself act as the container for the helium gas, being reinforced by circular rings and longitudinal members. Eight motors of between 600 and 800 horse-power will drive the ship at a maximum speed of 100 miles per hour, while carrying a useful load of 40,000 pounds.

Model Aeroplane Topics

THE "HOBBIES" TRACTOR MONOPLANE

A splendid long-distance Flier which may be made from this week's Design Chart.

THERE are among our readers a very large number who, so far, have never yet attempted to undertake the making of model aeroplanes, but who, though they are not quite sure how to go to work, are frightfully keen, and have always been interested in the various models we have produced. This week provides their opportunity, because a special model tractor monoplane has been designed for them, and a special set of parts with all the necessary accessories is being supplied so that any fellow handy with his fingers can really start right away to make up the model here pictured. In addition, the actual parts which he needs are shown in full-size drawings on the design sheet, so that he can check off the construction as he goes along, and be sure that he is doing it correctly. Thus, the absolute beginner can be certain of results, and can produce for himself the tophole model illustrated. This is no baby: it is a real flying plane, measuring 34in. long, and with a wing span of 30in. The usual trouble of obtaining the necessary parts in just the right weight, thickness, style and length required is overcome by the complete box of accessories mentioned. Here we have a special fuselage hollowed to get a lightweight body. There is also a shaped propeller ready for fixing, sufficient struts and silk to make tail, rudder and wings, the necessary wheels and all bearing wire, brass strips, etc., even down to the spring, glue and tiny tacks which hold the strips together. What is simpler, therefore, than following the patterns given on the design sheet, getting out the various parts concerned and making up a real flying monoplane? Beginners may imagine that any odd wood will do, but, as a matter of fact, the birch which is supplied for this special purpose is specially light—it weighs only 45lbs. per cubic foot—and is of the right texture and balance to hold the plane on its course, at the proper angle. The true test of any model is the way it stands up to a nose dive, and it is impossible to get a true airplane unless the parts have been correctly planned for stability and balance. It must be remembered that the machine has to be put together so that it can be drawn through the air without shaking itself to pieces, and at the same time, land without buckling its nose or breaking its propeller. This means the suitable bracing of spars, the careful choice of timber, and the correct alignment and fixing of wings, chassis, etc.

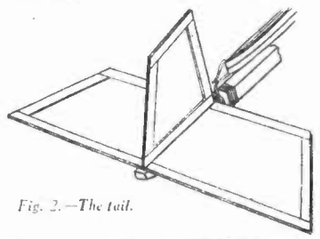


Fig. 2.—The tail.

As previously mentioned, the tractor monoplane shown has a hollowed fuselage, and a section of it on the design sheet shows the depth to which this hollowing is made. The wood supplied is grooved throughout its length, and all the maker has to do is to put on the cover strip and glue it securely down, tying the body up temporarily with string until the glue has set. Whilst this is happening, the planes themselves can be got out, and a diagram is given half full size of one of the wings. Cut off from the strips one piece 30in. long, and another piece 27in. long. Six lateral cross spars (G) are required for the wings, 5in. long, the end ones (H) are 5¼in. long, and the centre one (F) measures 7¼in. All these cross spars have to be bent to the shape given in the diagram on the design sheet. This is simply done by holding in the steam of a kettle, gradually bending, and then allowing to get cold without altering the shape. All these cross spars are glued at equal distances on the two long strips previously cut, and at each joint one of the small nails is driven through to give additional strength. Each wing of the plane must then be lifted until they rise at an angle shown at Fig. 1. The longest strip of silk is now required to cover this plane. It is stretched from wing to wing first, and then across its narrower width. Turn over round the edges of the wood and glue securely down on the underside. Do not apply the glue too thickly in any case, but rather get it very thin and tacky before pressing the parts in place. The only other silk covered parts are the tail plane and the rudder. Both of these are shown exactly full size on the design sheet, so that there is no trouble in cutting out the silk and cutting off strips of the wood in order to make up these two parts. Before putting on the silk of the rudder, however, it is necessary to fix a wire stanchion round with about 1¼in. projecting below. This wire is bound with the twine supplied, and the silk of the rudder glued over all of it. This wire stanchion passes later through the fuselage, and is bent underneath, as shown in the full-size drawing. The tail plane, like the wings, has a centre strut projecting beyond its ordinary width, and this is the strut by means of which the whole part is bound down to the tail end of the fuselage. It is there glued in place, and additional strength is given by the macrana cord being turned round half a dozen times and then glued again. The rudder is now stood upright along the centre of the width of the fuselage, and the wire stanchion stuck through a hole and turned down underneath. In front of the rudder is the tail skid, which forms the boss to which the elastic motor is fixed. The exact shape of this wire is given on the design sheet. It is put through before the skid is bent, then turned the right shape,

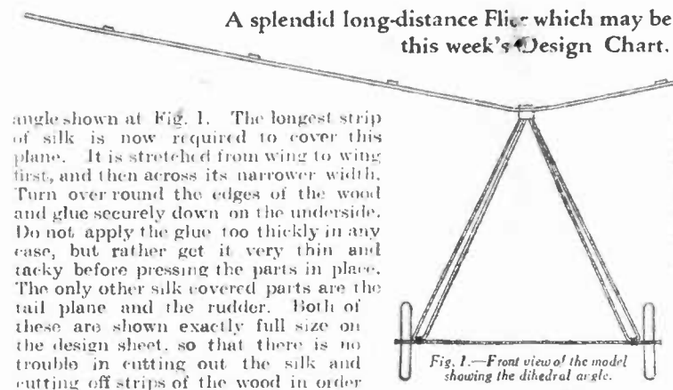
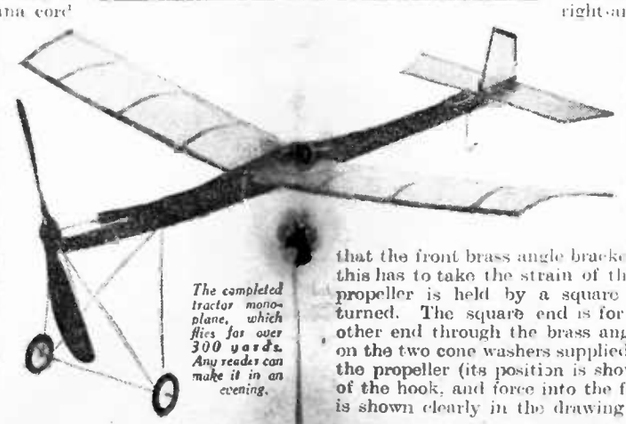


Fig. 1.—Front view of the model showing the dihedral angle.

HOBBIES TRACTOR MONOPLANE

Complete set of parts including a hollowed fuselage, all necessary strips for the planes, prepared silk, lengths of wire, wheels with rubber tyres, turned propeller, enough elastic for 10 strands, a tin of varnish, tube of glue, fine and coarse sandpaper, binding cord, and washers, nails, brass strips, and all accessories complete in strong cardboard box, 34ins. long.

Price 7/6. Postage 9d.



The completed tractor monoplane, which flies for over 300 yards. Any reader can make it in an evening.

and fastened in place by the cord being bound round it and glued. Make a good joint for the eyelet of the elastic by wrapping a small strip of tin round, and soldering fast, or by adding a brazed eyelet and squeezing flat with pincers. A picture of the tail is given at Fig. 2.

At the other end has to be fixed the undercarriage and a propeller. For the undercarriage, a piece of 18 S.W.G. wire is used, and bent to the shape shown by the detail at Fig. 3. A cross strip is added, as can be seen, to provide the axle for the wheels. This is 7in. long, and is bound on with wire and soldered firmly.

Sufficient of the axle is left projecting to take the bushed 2in. diameter wheels, and when they are fitted, a small brass eyelet or cap can be put on and fixed with a spot of solder. The wheels will then run true, and are, of course, finished by having the rubber tyres put over them. The whole of this undercarriage is sprung on to the front end of the fuselage. Its position is plainly shown on the design, where it is bound tightly with macrana cord. The two ends of the wire fit over the nose, and the turned end is on the underside. The open ends lie by the side of the right-angle bracket, which is the prop for the propeller-shaft. This little brass angle plate is supplied, and is screwed down so that the end of it is just level with the actual nose of the fuselage. The wire undercarriage can now be fixed with macrana cord and a coating of glue. See that the front brass angle bracket is very firm, because this has to take the strain of the twisted elastic. The propeller is held by a square pattern hook already turned. The square end is for the elastic. Put the other end through the brass angle plate, and then put on the two cone washers supplied, pass the wire through the propeller (its position is shown), turn over the end of the hook, and force into the front of the boss. This is shown clearly in the drawing at Fig. 4. Be careful to fix the propeller with the shaped edge of the blade forward, so that when the elastic is turned later on the convex surface will meet the air first. The action is to cut the air and throw it backwards, thus drawing the model itself forward.

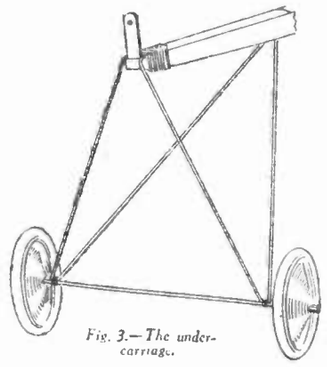


Fig. 3.—The undercarriage.

The elastic supplied is 22ft. long, of a suitable texture and elasticity to make a powerful drive of the propeller. This is looped to provide 10 strands, the two ends being tied together very tightly with strong thread, whilst the elastic is being stretched. It passes through the loop behind the propeller and through the stanchion just in front of the tail. The position of the wings is indicated on the design by an upright vertical mark, but this, of course, cannot be taken as definite, because each builder will alter the balance with a little more solder, or glue, or string, or weight of wood somewhere. This mark, however, indicates the approximate position of the front edge of the wing spar. This wing is held in place by a loose collar formed of a piece of the strip metal supplied. Two of these are required, and they are cut off just the right length, so that when they are turned round the fuselage they will grip the projecting strut of the wings firmly. Put the wing in place, pass a piece of string round the projecting portion and round the fuselage, in order to cover all the length of the strip of metal required. Solder the two ends of the strip together to prove that they will grip the main plane firmly when brought up to position. The model is now complete, and can be tested out for flying. For the first time give the propeller 200 turns, increasing this gradually until the maximum of 600 has been reached. Test out on a short trial flight by holding the machine well above the head, and launch gently into the air. If it tends to ascend nose first, the main plane must be moved back a little. If there is a tendency to dive, on the other hand, it must be pushed forward a little.

If the model tends to fly in circles set the rudder, remembering that the rudder will affect the line of motion of the model in exactly the same way as the rudder of a boat affects the direction of travel of the boat. Make quite certain that the airscrew is wound in the correct direction, which is such that, when the model is held in the hand and the airscrew allowed to revolve, the air is driven towards the tail. It is very important to keep the front and rear edges of the plane quite true and to see that the tail and mainplane are in line with one another. Frequently lubricate the elastic and vaseline the bearing. If the elastic breaks, get a friend to lap the two ends over one another and stretch them while you bind them tightly with carpet thread.

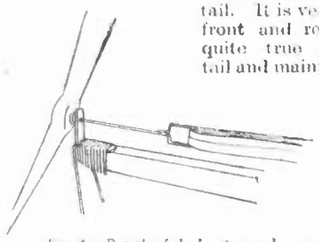
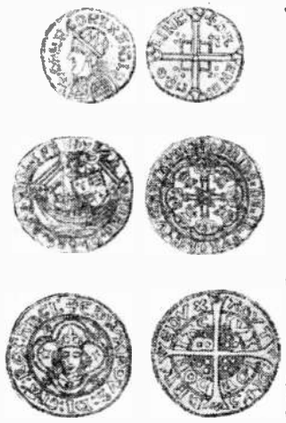


Fig. 4.—Detail of the bearing and propeller shaft.



A COLLECTION OF ENGLISH COINS

Reading from top to bottom.—Silver penny of the Saxon king, Ethelred; gold coin of Henry I., obverse and reverse; and silver groot, Edward III., from the London Mint, giving the king's title and also that of the Duke of Aquitaine.

By F. W Burgess

THERE is no doubt that the collecting of English coins is one of the most popular hobbies, and presents general interest, showing, as it does, much of the story of English history and the progress of development in social life and in commercial industries. The young collector has in the pursuit many opportunities of specialising and supplementing a general collection in some direction in which he may be particularly interested. Specialised collections often spring out of the nucleus formed when collecting some more extended series.

Silver and Copper Coins.

The English coinage dates from early times, and the collector in classifying a mixed collection he may have secured, either in one lot or at different times, soon finds that his cabinet will increase in interest by sub-dividing it, and arranging his coins according to the different periods in which they were minted. He may, on the other hand, prefer, as he becomes a specialist, to confine his attention to some one class of coins. A wealthy man may prefer to invest his money in the gold currency of this country; another may prefer silver coins, and that presents such a very wide range that many are content to confine their attention to some one denominational value. Thus a collection of English silver pennies becomes a fascinating study. Others, again, are content with collecting regal copper coins, especially as these are somewhat limited, both in period and extent, for, as no doubt most readers of this journal know, it became necessary from time to time to supplement regal issues by token currencies, in that trade and commerce demanded more small change; and as workpeople increased in number, they required smaller coins when receiving their wages, and also to simplify their purchases, in the local shops. In this article it will, perhaps, be more convenient to refer generally to the different currencies which can be collected, and which are necessary if anything like a representative collection of old English coins is to be secured.

Bronze and Gold Coins.

Long before the Romans came to this country there was an early British currency, some of the coins being made of bronze and others of gold. They were modelled after the famous gold staters of Phillip of Macedon, crude representations of a figurehead being placed on the obverse, and on the reverse some early British emblem, notably that of a triple-tailed horse, which for a long time became a national emblem. Many collectors of English coins consider those struck in Roman times in this country as being part of our national coinage. Not only were Roman coins struck by emperors, generals and others in authority for payment of their troops at their different camps, but when the Roman colony of Britain was well established, regular mints were set up, and the currency of those days, both in bronze and silver, became that of a national coinage; although supplemented by coins struck on the Continent, there are many which can easily be traced as having been struck in London, by the letters in the exergue "LON," and those in other towns by the first two or three letters of their names, remembering the Roman names of English towns were in many cases different from those of to-day.

Saxon Currency.

The Saxon currency, which circulated from the seventh or eighth centuries on until the time of the Norman Conquest, consisted almost entirely of the silver penny. Of these some are fairly common, and, although there are rare reigns, the young collector can secure many beautifully preserved examples of the coins struck by Canute, Ethelstan, Ethelred, Edward the Confessor and by other Saxon kings. The Norman Conquest made little difference to the currency of this country; the PAX type of the pennies of William the Conqueror are by no means scarce, and many of them well-preserved. The early Kings of England followed, issuing coins from different mint towns. Those of Henry III. are very numerous, and quite a number and variety can be collected at prices varying according to condition from 1s. to 4s. each. Curious coins were struck during the reign of King John, the chief feature of the reverse being a triangle. They were circulated largely at that time in Ireland. As time went on the silver penny, which had been broken in halves and in quarters for use for the purchase of small parcels of goods, was supplemented by regular issues of silver halfpennies, and, in some instances, farthings.

Mint Marks on Coins.

Then came the requirements for the larger coins

and the groat, representing fourpence, was issued in the reign of Edward III. This, in size, was a little larger than our current shilling of to-day, but thinner. It was generally a well-struck coin, and can be secured as representing quite a number of mint towns in this country. These early coins are collectable bearing the mint marks of such leading towns as London, Bristol, Durham and York. The distinguishing marks defining the difference between a town and a city are very noticeable. Thus, those minted in London bear the legend "CIVITAS LONDON," and those in the town of Bristol "VILLA BRISTOLLIE." It may be pointed out that at this period the mint towns mainly working were, in addition to those mentioned, Canterbury, Chester, Exeter, Lincoln, Reading, and Kingston (Hull).

The reign of Edward III is chiefly notable in that it was then that an important gold currency was introduced. Some very fine coins known as florins and half-florins were minted, and a little later the gold noble and its divisional parts came into general use. The groat, the half-groat, penny, halfpenny and farthing were the coins of silver currency. Passing on to succeeding reigns, the collector will find an ample choice both in the coins of Henry VI and Edward IV.

Reading from left to right.—Silver half-crown, James I.; obverse of silver crown of Charles II.; half-crown Charles I. (centre); and obverse and reverse of half-crown of William and Mary.

The Tudor Period.

Some of the reigns following are not so easy to find represented in silver coins, but when we reach the Tudor period there are many varieties of English silver easily obtainable. Those of Henry VII, coined at the usual mint towns, were supplemented by the ecclesiastical mints at Canterbury, York and Durham, and these are distinguished by the initial letter of the then ruling Archbishop. The coins of Henry VII are noticeable in that they appear to be of the first reign in which there was any real attempt at portraiture. The later issues of Henry VII consisted of shillings as well as the smaller coins. The same profile bust, used in the mintage of silver in Henry VII's reign, was continued for a short time in the reign of Henry VIII. Then came a change, however, and the full-faced bust of Henry VIII cannot be mistaken. Some of the coins of this reign, especially the groat, were of inferior quality, for Henry debased the currency, the metal of which it was struck having a larger proportion of copper and quite a small amount of silver. Henry VIII not only debased the quality of the coins, but he reduced the size and weight of them, thus the groat of the first issue weighed 48 grains, the later issues weighed only 40. The smaller coins were reduced even more, especially the penny.

Edward VI.

It is difficult to secure the smaller issues of this period in anything like good condition, for many of them remained in circulation for two or three centuries, and those which have been saved from the melting pot are much rubbed. The coinages of Edward VI were better minted. They were mostly issued from the mints in London and Southwark. They consisted of larger coins as well as the smaller pieces, for there are crowns and half-crowns, as well as shillings and sixpences. These can readily be recognised by the portrait bust of the young King, and the denomination of the coins is defined, in that at the side of the bust in the field of the shilling will be noticed "xii" (12d.) and on the sixpence "vi" (6d.).

Coins Struck During the Reigns of the Stuart Kings.

At this period in English history the coinage rapidly increased in variety, and collectors can continue their researches, varying their collections of English coins with those of Scotch and Irish, which were issued concurrently with those in English mints during many of the succeeding reigns. Special interest attaches to the variety of coins struck during the reigns of the Stuart Kings, the break in the regal coinage during the Civil War, the establishment of the Commonwealth, with its independent issues, its simple designs and its characteristic legend, "GOD WITH VS." Then there were coins struck bearing the portrait of Oliver Cromwell, when he established himself as Lord Protector. The Restoration brought with it a new currency, and so the coinage of silver and gold of regal issues has continued even to the present time. In another issue we will refer to token currency, and perhaps at a later period give the young collector more details relating to the chief features of interest in British coinage of the more recent periods from the Restoration on to Victorian days.

INSTABILITY IN RECEPTION.

INSTABILITY in a receiver can often be traced to a run-down H.T. battery, and in some cases even to a mains battery eliminator. This source of instability is usually only found where the various valves in the receiver are not "decoupled." If a mains unit is used, it is almost essential to decouple the separate H.T. tappings, unless, of course, this has already been done in the actual eliminator. Decoupling consists of the insertion of a high resistance between the actual source of H.T. and the anode circuit of the valves, the junction of these two points being connected to earth via a fixed condenser of 2 or 4 mfds. On the H.F. side of the set 600 ohms will be found sufficient, but for the detector and L.F. stages 10,000 ohms and upwards will be necessary. Of course, allowance will have to be made for the voltage drop occasioned by the insertion of this resistance. A very simple way of carrying out this decoupling in a set which is already built and in use is to remove the wire at present connected to the H.T. + terminal and to replace it with one of the new "Spaghetti" resistances. These are quite flexible, and are fitted with lugs at the ends enabling them to be readily fitted under any terminal. Remember the correct position—between H.T. + and the anode component (transformer, resistance, anode-coil, etc.).

A fine piece of model work. A scale-model of the Royal Victoria and Albert and King George V. Docks.

HOW MODEL YACHTS ARE RATED

By V. W. D. Broughton

RATING model yachts is a problem that has exercised the energy of every committee of every yachting club, association, or society (either grown up or model) for the last forty-five years, and each and every Rating Rule that has been devised has at the time been thought to be so perfect that it would satisfy all requirements for all time.

The avowed object of all these rules is to prevent freaks and encourage seaworthiness.

In the case of models, rules are further necessitated by the fact that time allowances or other means of handicapping cannot be satisfactorily devised, so they have to be raced on a classification which will enable them to compete on even terms.

"Sail Area Rule."

This was followed by the "Sail Area Rule," which encouraged beam at the expense of draught, and produced "skimming dish" boats with no room to stand up below decks, but they were dry and buoyant.

This it was attempted to correct by taxing beam and giving a premium to "Freeboard," and so on till the "International Rule Class A" was evolved by The International Model Yacht Racing Association in 1927. This rule is so complicated, however, that it would be impossible for a novice to attempt to build to it and would probably prove an incubus when finished, as this rule is intended for rough water sailing, and the boats resulting from the formula are of considerable size not suitable for sailing on small ponds.

Besides this, if the formula were given, a page of this journal would be required to explain its application and at least another three pages to state the limitations and penalties.

There are a number of these boats in existence, but they are not for the novice.

The "Cuboid Rule."

In contradistinction to this is the "Cuboid Rule," which is simplicity itself, but is liable to engender freaks and monstrosities. The rule is:—

"The hull is to be so constructed that it can be packed in a box, the dimensions of which are 36in. by 11in. by 11in., and the weight of the model, in sailing trim, including masts, spars, rigging, and sails does not exceed 12lb."

This will perhaps lead to a scow or dinghy type, with the maximum beam and depth of keel allowable—no counter or bow overhang—together with an enormous sail area, in fact, a perfectly hideous type.

Another defect this rule will tend to foster will be the absence of freeboard.

No matter what rule is enforced, boats will be evolved which will excel in light weather, medium weather or heavy weather so in racing there will always be an element of chance.

Then again, the art of sailing a boat and getting the best out of her is a gift which cannot be attained without a vast experience. A comparatively bad boat in the hands of an expert will often outpace a very superior model. To some people this art seems to come more or less naturally—others never attain it.

Model Yachting Clubs.

The best advice which can be given to a novice is to get in touch with a model yachting club, find out the rules under which they sail and ask one of the members to give him the "lines" of a boat from which to work.

A great deal depends on the skill with which a boat is built. For instance, if two boats are built on exactly similar lines and the hull of one is made to weigh two or three pounds more than the other, the lighter boat will be able to carry two or three extra pounds of lead on her keel, thus enabling her to carry more sail.

Similarly, light rigging will have the same effect, only here ounces instead of pounds will have the same influence, as the stability of a ship depends on the distance of the force applied above or below its centre of buoyancy. In other words, it is necessary to keep the centre of gravity as far below the centre of buoyancy as possible.

Then again, the manner in which the sail is carried has a great deal to do with a boat's sailing qualities.

A boat with a long, low rig will carry more sail effectively than a high-rigged boat, but if the low-rigged boat is sailed on a comparatively small pond with high banks or a crowd of the admiring public, no wind will reach her sails till she is near the centre of the pond, whilst her sister with a higher rig will fill her sails and glide away.

A Suggested Rule.

A good rule would be "to have a tank, say, 10in. wide, 8in. deep and 30in. long and limit the weight to 12lb. The boat to float in this tank without touching either the ends, sides or bottom. Unlimited sail area, freeboard, and overhang at bow or stern." This would, perhaps, lead to excessive overhang, but a clause could be added to prevent this. The above dimensions should be decided upon after due consideration by experts.

110 PRIZES FOR READERS

OTHERS HAVE WON—WHY NOT YOU?

FIRST PRIZE: Goods to the total value of £4 : 4 : 0 from any advertiser or advertisers in "Hobbies."

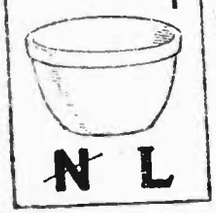
SECOND PRIZE: Goods to the total value of £2 : 2 : 0 from any advertiser or advertisers in "Hobbies."

108 other prizes, including Fretwork Machines, Silver Watches, Carpentry Sets, Construction Outfits, Model Sailing Boats and Steam Launches, Cameras, Steam Engines, etc., etc.

The two previous picture competitions captivated the hearts of thousands of readers, and the lucky winners have written to say how much enjoyment the prizes have given them. This encourages the Editor to make a third generous offer of awards for the correct and nearest correct solution of a few pictures representing Christian Names. The first eight given below will show you how simple it is to win. Look firstly to see that the name is in the list and then fill in your coupon. The remaining sixteen pictures will be just as easy to solve.

CHRISTIAN NAMES.

1



FREE COUPON

FIRST SET.
Write your solutions very plainly in ink.

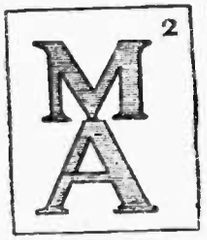
1 .....
2 .....
3 .....
4 .....
5 .....
6 .....
7 .....
8 .....

KEEP COUPONS AND PICTURES TOGETHER UNTIL CLOSING DATE IS ANNOUNCED.

All the Christian names illustrated this week are included in the following list :—

BASIL	BESSIE
PANSY	QUEENIE
VIOLA	ARCHIE
VALENTINE	STEPHEN
CHARLES	RODERICK
STUART	ERIC
FLORA	MONA

2



3

YOU MAY SEND AS MANY COMPLETE SETS OF THE 24 PICTURES AS YOU LIKE.

4

SECOND SET OF PICTURES —NEXT WEEK. LAST SET —"HOBBIES" DATED APRIL 25.

5

6

7

8

1.—Readers may make out as many complete sets as they like, but all entries must be written on coupons taken from this and the next two weeks' "HOBBIES."

2.—Only one name may be inserted against each number on the coupon. Defaced or altered coupons will not be accepted.

3.—Each complete Set of 24 Pictures will be judged on its own merits.

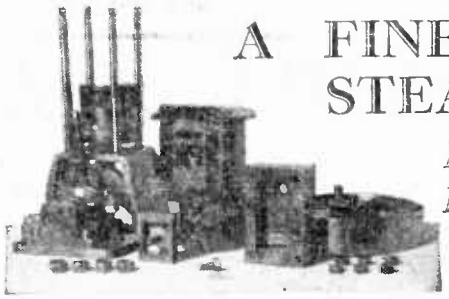
4.—The first prize will be awarded to the reader who sends the greatest number of correct solutions to any one complete set of 24 pictures. The remaining prizes will be awarded in the order of merit.

5.—Should either of the first three prizes offered be won by more than one reader the cash value of the article will be equally divided.

6.—No responsibility can be undertaken for pictures delayed or lost in the post.

7.—The Editor's decision in regard to all questions will be final.

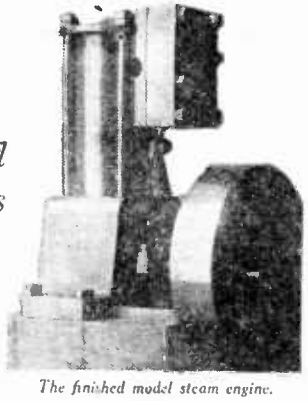
ONLY 16 MORE PICTURES TO COMPLETE



A FINE VERTICAL STEAM ENGINE.

Easily Made from Odd Parts with Simple Tools

The various parts of the vertical engine.

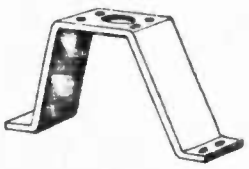


The finished model steam engine.

TO build a model steam engine in a really sound way—an engine which will run continuously and withstand hard work—it is not always necessary to purchase castings and laboriously machine and fit them up in the orthodox manner. Quite good results can be obtained by making up the component parts out of odd pieces of raw material or scrap parts from some entirely different machine.

The little vertical engine illustrated in the accompanying photographs was designed and built in this manner by a one-time apprentice to the writer in his spare moments, and I have prepared a drawing of a similar engine for our readers to try their skill.

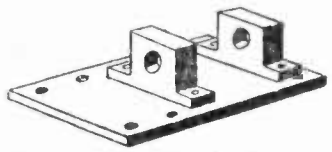
Naturally, it is impossible, where use is made of the "metal junk" box—such a collection of what mother would call "that boy's rubbish," is always worth preserving—to specify that each and every part shall be of certain dimensions. Therefore, in putting the scheme before you. I have prepared a general arrangement drawing and attached a scale thereto which will determine all the main proportions of the model. If it is necessary to adapt any particular piece of scrap material the dimensions can be amended to suit the case. The detail drawings are drawn in perspective, and clearly indicate the shape of each part. The basis of the whole design will be the acquiring of a short piece of tube to form the cylinder and, if it is at all possible, a plug of brass or steel which fits it easily, but with sufficient tightness to retain the steam. I have also shown a groove in the piston which, if not already there, can be made with a narrow file—failing means of turning it. With this cylinder and piston work can proceed.



The "A" frame.

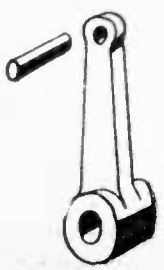
The cylinder should be cut to the required length and built up with four long studs or bolts on to the A frame, which is bent up out of stout sheet material and is mounted on a rectangular metal base plate. The top of the A has to be drilled for the four bolts (or drilled and screw-tapped if studs are utilised), and an opening made to clear the piston and the piston rod. As designed, the cylinder spigots into the A frame, but this construction is not absolutely necessary. Where a lathe is available it can be adopted. In fact, the operations of turning are only necessary where a better job can be obtained by using this king of workshop tools. Every amateur engineer aspires to the possession of a lathe sooner or later, and lucky is the boy who possesses one—or is in a position to get such work as the turning-lathe produces done to his own requirements.

On the metal base plate is also fitted two bearings, roughly of the profile illustrated. These can be screwed and soldered—or soldered only—to the metal base as shown in the sketch; the space between them being sufficient to clear the eccentric. The bearings must be drilled at exactly the same height for the crank-shaft. The best way to do this is to clamp the two bearings together, drilling them at one operation. Any slight error can then be corrected by threading the bearings on a short length of shaft of the same size as the final crank-shaft and filing the under surfaces exactly level with each other.



The base-plate.

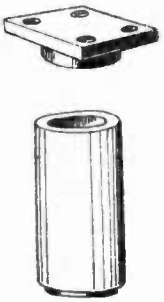
The wooden sub-base may be left to the last, but if the fly-wheel is available or its diameter is known the thick-



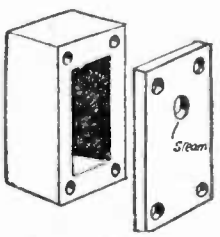
The gudgeon pin and connecting rod.

Slide valve.

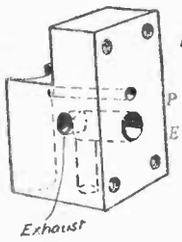
Valve spindle.



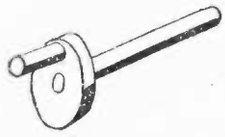
The cylinder, cover and piston.



Valve chest and cover.

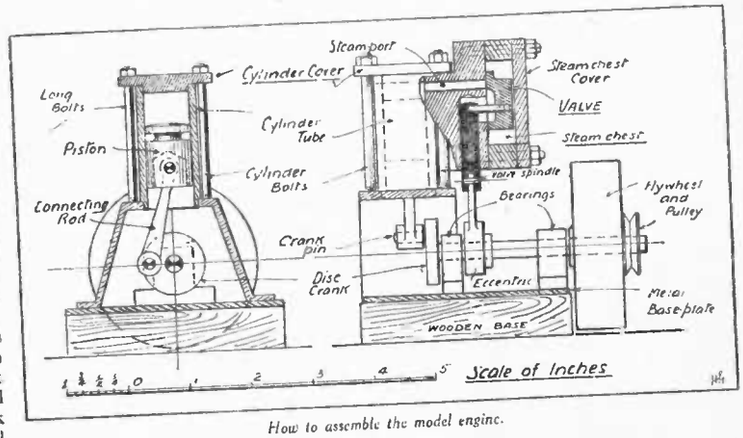


Right. The steam port block.



Left. The disc, crank and crankshaft.

Right. The eccentric.



How to assemble the model engine.

ness of the wood that will be used can be settled upon, a piece cut to size and fixed on to the metal base. The fly-wheel must clear the table on which the finished engine rests.

The crank-shaft is made out of a length of steel rod about ¼-in. diameter, and has a disc crank fitted on to one end of it. The other end should fit the fly-wheel as tightly as possible. Nothing is so annoying to the user of a model engine than a loose fly-wheel.

The piston is drilled with as large a hole as is possible—leaving only walls of about a sixteenth of an inch in thickness—to take the little end of the connecting rod. It has then to be cross-drilled for a piece of say ⅛in. steel rod forming the gudgeon pin.

The connecting rod can be made out of brass strip, the big end being arranged with the longest length possible to withstand the wear of the crank pin. The big end could be made by soldering a long brass bush on to a thin strip, in which case the lower extremity of the strip (the rod portion) should entirely encompass the bush. Otherwise it is a better plan to saw and file the whole connecting rod out of the solid material.

The eccentric and the fly-wheel are the only things that may have to be purchased, and are both quite common and reasonably cheap model engine fittings. The total travel of the eccentric should not be less than three-sixteenths of an inch, although an eighth-inch-throw eccentric can be utilised by reducing the lap of the valve. The eccentric should have a set screw, so that its position on the shaft can be adjusted to give the highest possible speed. The most notable feature in the whole engine is the adoption of what is known in model engineering circles as the "Spicer" slide valve. The valve is operated from its exhaust cavity, and this scheme eliminates all glands. No moving spindle is subjected to high pressure steam. So long as the slide valve is efficiently fitted, as it should be, no leaks can occur.

The port block is soldered to the cylinder tube and has, when fixed, a port drilled through to the cylinder, marked P on the sketch. Below it is a larger drilling (E) which meets the exhaust pipe hole, and a vertical hole in which the intermediate spindle works.

The latter has the upper end drilled to engage the pin fixed in the exhaust cavity of the valve and is slotted and drilled at the lower end to take the eccentric rod, as shown in the detail sketch. The slide valve is a rectangular block of brass which should neatly fit in the sides of the steam chest so that it works up and down freely, but without any tendency to wobble or work crab-fashion across the steam ports. The working face has a slotted cavity formed by drilling two blind holes as close together as possible.

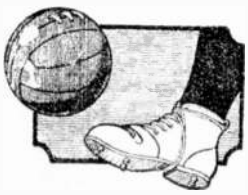
The slide valve and the face of the port block should be quite flat. They can be ground together with a little bath brick and water (don't use emery on brass parts), until a good working and steam-tight fit is obtained.

Brown-paper joints, smeared with a little thick oil, or oil and paint, are used between the adjacent surfaces of the cover, port-block and steam chest. Another don't—you cannot expect to obtain a tight steam joint unless the parts fitting together are quite flat, *i.e.*, don't expect the paper joint to make up for bad workmanship. If you find you cannot file quite flat in the orthodox manner, take the part firmly in the fingers and rub it on a large, smooth-cut flat file. Finish it, in the same manner, on a piece of plate glass with some abrasive between to do the cutting. If the parts are not working joints emery powder can be used on brass parts. Why it is not recommended for working parts is that the particles of sharp powder are apt to stick in the metal and cause rapid wear and tear during the future running of the machine.

CYCLISTS' CORNER (*continued from page* 40).

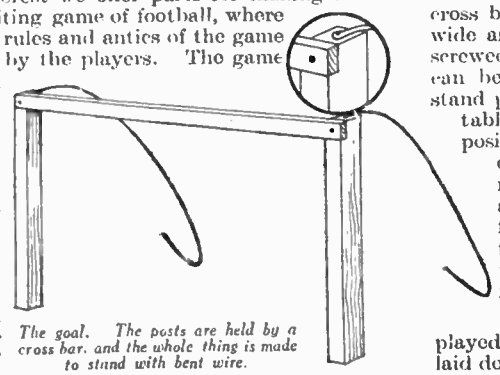
if the cycle is travelling at a uniform speed on the road the pedalling rate is not uniform, but rises and falls twice in each revolution. So you may dwell on the down stroke and hurry past the end of the stroke. This non-uniform motion is characteristic of elliptic gears. But trials years ago led men to believe that uniform speed per revolution of the pedals is humanly more acceptable than irregular pedalling. And the circle thus far is victorious in competition with any ellipse as a cycle drive. There is no fallacy in it, you get a varying leverage, but you also get a varying pedalling speed. Swings and roundabouts are indicated!

The Great CUP-TIE GAME



A top-hole table game for you, so you can make your own teams and play for the Cup. The "men" kick a ping-pong ball with great realism. Fun is fast and furious if you cut out a couple of teams.

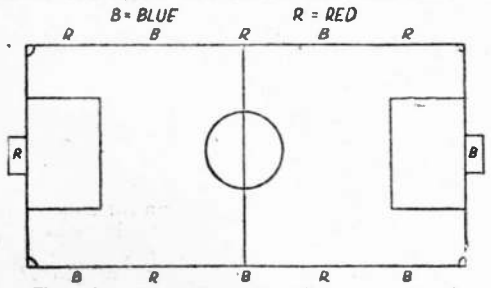
EXCITEMENT and interest in the great Cup Tie Final are increasing, and will continue to do so until the 25th, when the great Stadium at Wembley will see the battle of the two teams fought out. In view of this interest we offer parts for making an excellent and exciting game of football, where all the ordinary rules and antics of the game can be enjoyed by the players. The game is quite simple, and can be played by any number of players on any ordinary large table. The figures are cut from plywood, and a loose leg provides the kick. A ping-pong ball is employed for the "leather," and players arrange themselves round the table in opposing sides. There is a goal at each end, and the table may be marked out in the usual way. Enough figures are cut to supply each player with one. The idea, of course, is to score a goal against the opposing side, with a time limit imposed.



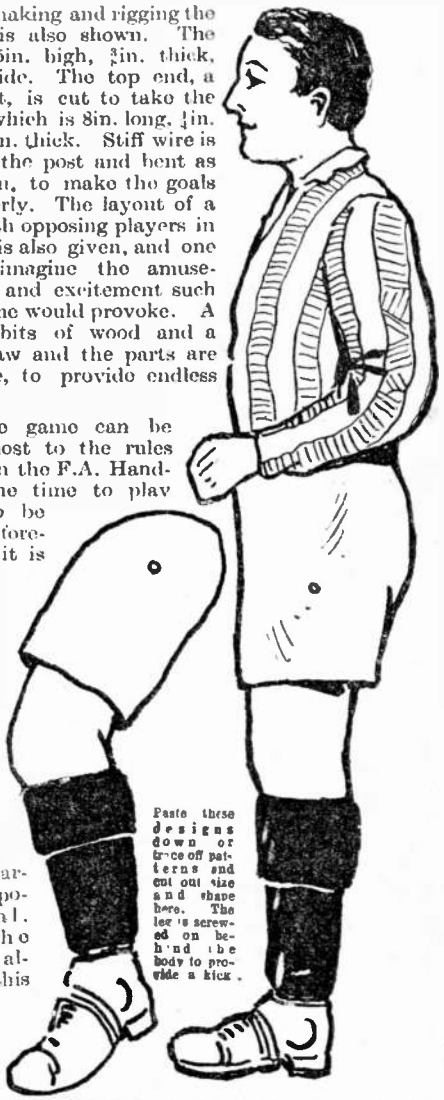
The goal. The posts are held by a cross bar, and the whole thing is made to stand with bent wire.

The footballer is cut from $\frac{3}{16}$in. or $\frac{1}{4}$in. plywood, and a leg and foot is screwed on in the position shown, so it hangs loosely. Make the screw hole through the short leg large so it swings easily, and fit a washer between the two pieces of wood. When this is fixed the figure is ready to use in a realistic and simple fashion. By holding the footballer firmly on the body, and bringing it down sharply to the table, the loose foot will shoot forward to kick the ball. After a little practise the player can become quite adept at the game, and the ball can be kicked and guided anywhere.

A number of figures can be cut and painted both sides in the colours of any favourite teams. The two parts of the figure are drawn here full size. The method of making and rigging the goal posts is also shown. The posts are 5in. high, $\frac{3}{4}$in. thick, and $\frac{1}{4}$in. wide. The top end, a halved joint, is cut to take the cross bar, which is 8in. long, $\frac{1}{4}$in. wide and $\frac{1}{8}$in. thick. Stiff wire is screwed to the post and bent as can be seen, to make the goals stand properly. The layout of a table with opposing players in position is also given, and one can imagine the amusement and excitement such a game would provoke. A few bits of wood and a fretsaw and the parts are made, to provide endless fun.



This is how you set out a table with six players in each team. The "field" is like a real footer pitch, and a fine game can be enjoyed.



The game can be played almost to the rules laid down in the F.A. Handbook. The time to play should also be decided beforehand, and it is also advisable to have a referee. The kick-off is taken by the player nearest to the centre line, and he naturally tries to get the ball to one of his own side, nearest his opponents' goal. Hooking the ball is not allowed and this constitutes a foul. Knocking with the model is a foul, but if the ball is bouncing it can be stopped by the model, either sideways or front ways. Playing the ball or stopping it with the hands constitutes "hands." If the ball goes off the table, the nearest opposing player to the offender at the point where it went off throws it in *along the table* (not in the air). The goalkeeper may stop the ball anyhow (as long as it is with the model).

OF all the accidents that may befall a stamp at birth the most violent is that which leads to the invasion of its vital organs. The central picture, whether it be a portrait, a view or a vegetable, is a stamp's most prominent feature, and when the printer contrives to hang it upside down, as he has done on rare occasions, the effect is striking and the results are far-reaching. On any other plane of experience a like accident would be doomed to instant extinction and condign oblivion, but such a natal mischance is actually the silver spoon of philately: the bar sinister assumes, in the world of stamps, an immense commercial significance. Such varieties are known to stamp collectors as "inverted centres," and, as compared with the patterned products of a prudent printer, they are preserved, guarded and admired far more than the uninitiated might think to be either reasonable or right. The explanation is, of course, quite simple. The whole structure of philately is built upon rarity, and a picture permanently presented to the view upside down is a most uncommon object, and is valued accordingly. There is little room for aesthetic in philately: stamps that command the highest prices are mostly very ugly.

New Zealand 4d. of 1909 which has recently been found with the centre inverted.

The Famous 1854 Issue of India.

There are no examples of inverted centres among the stamps of these islands. Queen Victoria never saw her portrait in such an undignified position: neither did King Edward, nor yet our present King. In the British Colonies, however, there are several cases of inverted centres, though in only one, as luck would have it, was the Sovereign's head involved.

INVERTED CENTRES

By P. L. Pemberton.

This was the famous 4 annas of the 1854 issue of India—an octagonal stamp which, even in its normal state, has a ready-made look of rarity. The framework of the design is in red, and the head of Queen Victoria, which occupies the centre, is in blue. In very rare cases the head appeared inverted in relation to the frame: examples exhibiting this untoward phenomenon are worth a round £250 if in perfect condition. Most of the known specimens are cut to shape; that is to say, the margins around the stamp have been trimmed close to the design—an operation of misguided neatness which cost from £150 to £200 a time, according to the degree of thoroughness with which it was performed. Last year a dealer in Sydney, Australia, was lucky enough to buy, for a pound or two, a small general collection which contained a fine specimen of this great rarity, but it is not often that the list of known examples of stamps of this class is added to.

The Inverted Head of King Edward.

The inverted head of King Edward is not known on a postage stamp, though one sheet of the handsome 2s. 6d. fiscal stamp of the Transvaal was issued in this condition. Curiously enough, it was also the Transvaal that was concerned, some years ago, in persistent rumours of the existence of an "inverted centre." The story went that, during the currency of the ½d. black and green with portrait of King Edward, an old Jew bought a sheet of them at the head post-office in Johannesburg. A few minutes later he returned and, handing the sheet to a clerk, asked if they were all right. The latter noticed that on all the stamps the King's head was upside down, and offered to exchange them, but the Jew insisted on retaining the sheet and went away with it. Though this is alleged to have happened close on thirty years ago, no specimen of the error has yet come to light. If the story were true it seems almost incredible that all the specimens should have got lost: the tale is, therefore, generally discredited.

A Recent Discovery.

Perhaps we ought not to give up all hope of unearthing a specimen of the Transvaal inverted centre when we consider the history of a similar variety of a New Zealand stamp whose discovery has provided one of the sensations of the current season. After twenty years the 4d. stamp, printed in chestnut and blue on bluish paper, has been found with the little view, which occupies the centre of the design, inverted. The 4d. stamp in this design was superseded in 1909 by the issue with portrait of King Edward VII.

Jamaica 1/- stamp which exists with the centre upside down.

HOBBIES COMPETITION PAGE

1

2

3

4

5

6

A Simple Contest for every reader

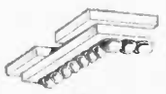
Have you sharp eyes? If so, let them try and win one of Hobbies famous A1. Fretmachines for you. The drawings shown here are parts of the designs illustrated in Hobbies 1931 Catalogue. All you have to do is to pick out the design they come from, make a list of the number of these designs, and post it along to Hobbies. The parts shown here may not be the same way up as they appear in the design in the Catalogue, but they are all there. It is a fascinating and interesting competition, open to all readers. There is no entrance fee, and the competition is complete in this issue. Read the conditions below and follow them carefully, otherwise you may be disqualified.

CAN YOU SPOT THEM?

Read these Notes Carefully

Find the designs from which these parts were taken. They are all in Hobbies 1931 Catalogue. When you have found them, put the figures 1 to 12 down the side of a postcard, and by the side of each the number of the design from which the part is taken. Add your name and address plainly, and send the card to Competition Dept., Hobbies Ltd., Dereham, Norfolk. Note the address carefully. All postcards must be received by April 18th, and must bear 1d. stamp. Only one entry can be made on each card. The Machine will be awarded to the first correct list read after the close of the competition. No correspondence can be admitted in the contest, and the Editor's decision is final.

7



8

9

10

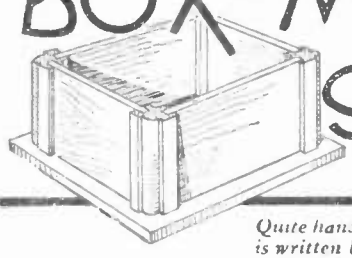
11

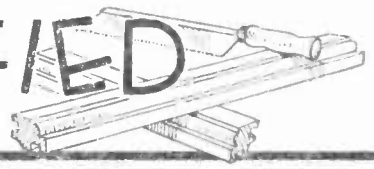
12

Send in your entry now to win the

A1. FRETMACHINE PRIZE

BOX-MAKING SIMPLIFIED





Quite handy to be able to make a box any size you want, isn't it? This special article is written by an expert to show how any amateur can undertake it quite simply.

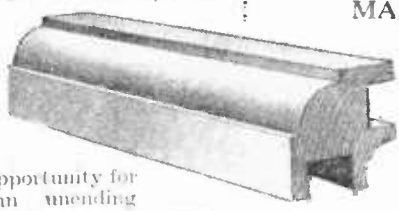
BOXES of all shapes can be now quite easily made by any amateur woodworker by means of the grooved moulding which is obtainable in a variety of shapes and sizes. This moulding, as can be seen from the picture herewith, is supplied with a groove on two sides, by means of which the framework of the box is held in place without any trouble. The ordinary butt joints are not easy to make, and the proper dovetail work requires a great deal of measuring and cutting. In both cases, too, the edge of the wood is seen, and never looks very elegant, particularly if the box is a fancy one. The grooved moulding, on the other hand, not only provides an easy fitting for the sides of the box, but forms a handsome and shapely corner post. Four pieces of the moulding are cut the height of the box, the sides are slipped into the accommodating grooves, a top and bottom frame are added—and the whole thing is complete. There is thus an opportunity for making an unending variety of shapes and sizes. Boxes of all kinds can be quickly and easily constructed—tie-boxes, nail boxes, and the like—or the larger and more elaborate boxes which form cabinets for wireless sets or containers for gramophones. Regular readers of these pages will have noticed designs in which such moulding has been incorporated, and a good idea of the range of usefulness can be gained from the group of articles shown below. The moulding is obtainable plain, or with shaped outer surface (as shown in the illustrations). The square moulding is in mahogany, but the shaped kind is cut from hazel pine, and in consequence can be stained to any shade to match the rest of the work. Both are obtainable with a groove to take ⅜in., ½in. or ⅝in. boards. The smallest boxes should be made in the first mentioned. The largest size is suitable for such containers as gramophone cases and wireless cabinets.

The shape of the box to be made can be altered to suit individual requirements. It can be tall or short, square or oblong, as desired. The work of construction is the same. A solid baseboard is cut from fretwood. If the box is small, ¼in. timber is sufficient, but with a larger shape a board ⅜in. thick should be used. The height of the sides having been decided upon, cut off four lengths of the moulding a little longer than the dimension of the height, and lay them together. Get one end of all four level by putting a ruler flat against them. Then mark off the exact measurement of the height of the box, and lay a square across all four pieces (see Fig 2) to ensure all pieces being the same length.

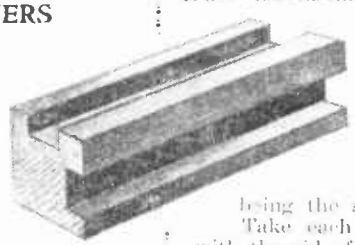
Take each piece and, with the aid of the square, mark all round it before cutting to this mark with a tenon saw. Make sure the saw cuts straight through.

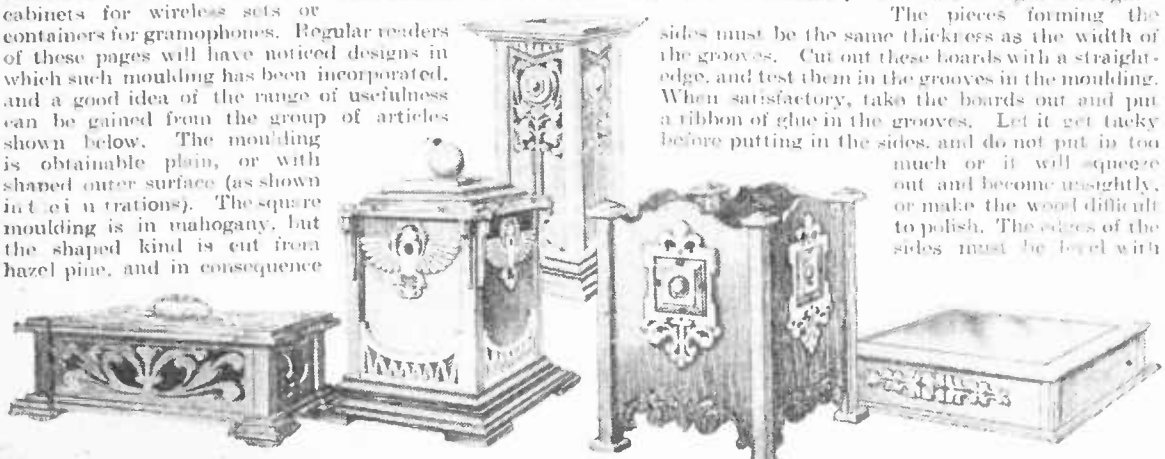
The pieces forming the sides must be the same thickness as the width of the grooves. Cut out these boards with a straight-edge, and test them in the grooves in the moulding. When satisfactory, take the boards out and put a ribbon of glue in the grooves. Let it get tacky before putting in the sides, and do not put in too much or it will squeeze out and become unsightly, or make the wood difficult to polish. The edges of the sides must be level with

GROOVED MOULDING FOR MAKING CORNERS



Moulding is cut with a groove to take the sides of the box. Just cut the board, glue the pieces in the corner posts and you have your box. Two kinds are obtainable as shown here. Some examples of its use given below are taken from the Hobbies catalogue.





These are some examples of the way in which this moulding makes box-making quite simple.

the ends of the moulding. One thus has a hollow box frame, and a point to remember is to ensure it being a true rectangle. Test this out with a square, and have a piece of string ready to tie round. Draw the string quite tight, but remember to put a pad of paper under it at the corners to prevent marking the moulding. Tie the string as close as possible, and leave the framework until the glue has set.

The box frame is now ready to fix down to the base, which must be large enough to take the projecting shape of the moulding (see Fig. 3). The box is glued to the base, and screws should also be driven upwards from the underside into the corner posts and edges of the sides. The illustration at Fig. 3 shows the construction of the box exactly. To cover the edges of the sides in the moulding, a narrow frame of wood must be glued to the top. This rim can be glued down and little blocking strips put along the inside underneath, where they will not be seen.

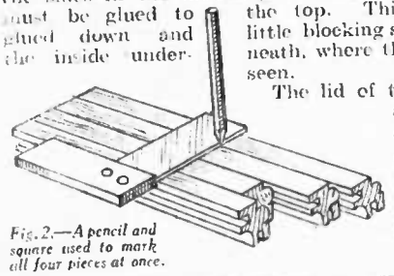


Fig. 2.—A pencil and square used to mark all four pieces at once.

The lid of the box can be a simple piece of wood hinged on, or can be made to fit by having a piece glued beneath it to fit the rim glued round the box frame. The whole box can be stained and polished in the usual way, but it is advisable to stain the shaped moulding to the shade of the rest of the work before fitting it finally in place.

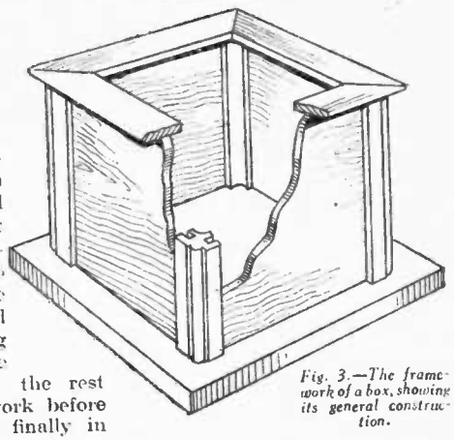


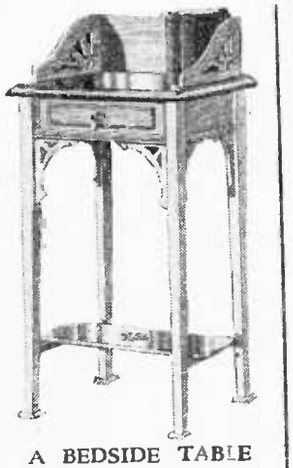
Fig. 3.—The framework of a box, showing its general construction.

Particulars of sizes and price of the moulding, with illustrations, are given in Hobbies 1931 Catalogue, and every handyman should be conversant with its uses and possibilities. It only costs from 1d. per foot for the narrowest grooved variety, up to 3d. per foot in mahogany with a ⅜in. groove.

CHOOSING FRETWORK DESIGNS

FRETWORK is unlike other hobbies in that it affords a constant change of work. This is brought about by the thousands of designs to choose from, and the very wide range of articles which can be made. A glance through back numbers of HOBBIES will reveal a bewildering number of classes of work which can be undertaken. This range of subjects means that the worker can make something to appeal to almost everyone. His set of fretwork tools can be used to make up suitable birthday presents for all his friends, whilst the hundred and one things which he can make for his den or bedroom can be chosen from the designs published. This choosing demands a little more than ordinary thought. A great deal of it depends on the ability of the worker, for it is better to do something well than to attempt to undertake a bigger piece and fail. Choose your design to please the person for whom you are making it, rather than because it is one you like yourself. A handkerchief-box is always popular for a lady, but it would be absurd to offer them a tie-press. On the other hand, small toys are just the things for younger pals or little brothers and sisters.

Do not wait until the birthday or special occasion comes along, but pick your subject in ample time for the preparation of the work. When you choose the design, make sure to get the fittings and accessories for it at the same time, because when there is a big run on any special parts, it occasionally happens that these are out of stock and the whole work may be held up until a further supply is obtainable.



A BEDSIDE TABLE

Any amateur carpenter can make this quite easily from the particulars and patterns we shall give next week.

If you attempt to sell your pieces of work, see that you choose designs which will be saleable.

Simple models are good, whilst anything really useful generally goes well.

Large pieces of work are, of course, in the furniture line, and will appeal to the carpenter as well as the fretworker. Clocks and musical instruments are easily disposed of, and generally yield an excellent profit. Go through the back numbers of HOBBIES you have, or through the general catalogue sections, and make a list of those which you hope to undertake for your friends or yourself. See that you can get the design and all accessories. Keep this list as a guide, and add to it those you wish as they appear from time to time.

They can be divided into the two classes of simple and difficult, so that some can be made when you have an hour or two to spare, and others which will take longer because of the greater amount of work involved.

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, enclosing a stamped, addressed envelope. All letters and queries must bear the full name and address of the sender.

Enclose a Stamped, Addressed Envelope!

WILL all those querists who require their replies sent through the post please note that a stamped, addressed envelope *must* be enclosed for that purpose? I can assure you that the trouble we go to in replying to queriests and providing them with hard-to-get information is well worth *that!*

The "Home Mechanic" Series.

GEORGE NEWNES, LTD., the publishers of HOBBIES, have just published four very fine handbooks with the following titles:

"MODEL AEROPLANES AND AIRSHIPS."

"THE HANDYMAN'S ENQUIRE WITHIN."

"TWENTY-FIVE SIMPLE WORKING MODELS."

"THE HOME WOODWORKER."

These volumes contain no less than 96 pages and over 150 illustrations each, yet they may be obtained for the very small sum of 1s. each (by post 1s. 2d.). Ask your newsagent to show you a copy! I have been looking through them, and I must say they are equal in every way to books sold usually at 2s. 6d. They are simply packed with interesting matter, and the pages sparkle with explanatory diagrams and fascinating photographs.

Our Competitions.

READERS will note that the promised picture-puzzle competition appears on page 54 of this issue, and that another competition appears on page 60. These competitions create an enormous demand for the paper, and my advice to you is *to order* your copies to make sure of receiving them, otherwise you may find yourself short of one of the sets of pictures.

Articles by Readers.

A FEW weeks ago I invited readers to submit to me articles describing something they had made or some particular method of doing a job. Many quite interesting articles have been submitted to me, and many readers have been awarded a guinea as a publication fee. Readers who wish to write articles for publication should bear the following points in mind. Write on one side of the paper only, let the matter be original (one or two readers have copied their information from other publications!), draw all rough sketches on separate sheets of paper, leave an inch margin on each side of the paper on which you write, leave plenty of space between the lines, write your name and address on the top left-hand corner of each manuscript—finally, do not let your article extend beyond 750 words.

NEXT WEEK.

FREE DESIGN SHEET FOR A BEDSIDE TABLE

MAKING A WIMSHURST MACHINE

MAKING A CANVAS CANOE

A FRAME AERIAL

A HOME-MADE TELEPHONE

Model Aeroplane Topics—Stamps—Electrics—Model Making—Cycling Notes, etc.

QUERIES AND REPLIES.

Making Gold and Silver Paints.

W. E. (Crewe) wants to know how to make gold and silver paints at home. This cannot satisfactorily be made in small quantities, the cost alone being prohibitive. Gold and silver paints are usually bronze powder and aluminium powder mixed with celluloid varnish. This is made by dissolving celluloid chippings in acetone and amyl acetate. A fairly efficient substitute can be made by introducing bronze or aluminium powder into cellulose "thinners."

The Ashington Photographic Society.

R. W. Evans, 44, Park Villas, Ashington, Northumberland, wishes us to state that he has formed a photographic society in Ashington under the title of "The Ashington Photographic Circle," with headquarters at the Ashington Miners Welfare Institute. Meetings are held every fortnight, and several successful demonstrations of interest to beginners have been given. Full particulars of membership will be forwarded to anyone applying to the address given.

The Difference Between the Ptolemaic and Copernican System of Astronomy

The ptolemaic system of astronomy, M. D. (Cumberland), differs from the copernican in that it supposes the earth to be fixed in the centre of the universe and that the heavens revolve round it. This belief, of course, was founded by Ptolemy.

Wireless Licence Query.

A wireless licence, T. T. (Swansea), enables you to erect one aerial either indoor or outdoor at a given address. You are entitled to use as many sets as you like on that aerial.

Anti-Freezing Solution for Acetylene Lamp.

Place about two-pennyworth of glycerine in the water container of your acetylene lamp. G. L. (Matlock), thoroughly mixing it with the water. This will prevent it from freezing.

Glider Queries.

There is a chapter on full-size gliding G. R. C. (Macclesfield), in "Model Aeroplanes and Airships," just published from these offices at 1s., or by post, 1s. 2d. This chapter explains how to join a club, how gliding is taught, and contains valuable information on gliding generally. For further details of gliders, apply to The British Gliding Association, 44a, Dover Street, London, W.1.

Stamp Valuation

Very sorry, indeed, T. B. (Motherwell), that we cannot undertake to value the very many stamps enumerated in your letter. I suggest that you get in touch with Sefi, Pemberton and Co., Ltd., 12, South Molton Street, London, W.1. By the way, we can only send postal replies when a stamped addressed envelope is enclosed. See the notice at the top of this page.

Waterproofing a Tent.

The following solution, F. C. (Bradford), is perfectly satisfactory for waterproofing a tent. Boil ½oz. of isinglass in 1 pint of soft water and strain it. Next, dissolve a ½oz. of castile soap in another pint of water and strain it into the first solution. Now dissolve 1oz. of alum in quart of water, strain and add it to the other solution, thus making 2 quarts of liquid. Place this in an old saucepan over a fire and stir until the whole simmers. Brush it on hot with a large flat brush, working well into the seams. Do not wring the fabric out, as this weakens the fibres of it. Allow it to dry in the open.

Cleaning Suède Leather

Suède leather may be cleaned by moistening a piece of soft linen with benzine and stroking the leather against the grain. When the linen becomes discoloured use a fresh piece, until the leather becomes clean. This is in reply to E. H. (Glasgow).

Steam Engine Fitting.

Oscillating cylinders for the model steam engine recently described in HOBBIES are obtainable from Bassett-Lowke, Ltd., Northampton, or Stuart Turner, Ltd., Henley-on-Thames, H. R. H. (Sunbury Common).

Channe Tunnel—Facts and Figures.

The Channel Tunnel, sometimes referred to as the Chunnel, would be 32 miles in length, 24 miles of which would be under the sea. It would take eight years to bore, and would cost 20 millions. Its suggested depth would be 160ft. to 180ft. The longest existing tunnels are the Simplon (12¼ miles), St. Gothard (9¼ miles), and the Mont Cenis (8 miles). The longest English tunnel is the Severn (4½ miles). This is in reply to O. S. (Cardiff).

Advertisements are accepted for these columns at the rate of 4d. per word, prepaid.

SALE AND EXCHANGE

Address communications to the Advertisement Manager, "Hobbies," Southampton St., Strand, London, W.C.2.

FOR SALE.—Hobbies I.D.L. Machine. Only used few times, £2 10s. or near offer.—S. Talbott, Lower Road, High Ongar, Essex.

POWER.—Unique Complete Sets. ½ h.p. Petrol Motor Castings, 9s. 9d. Part Tooled Lists, 3d.—H. Madisons, Littleover, Derby.

ART.—MAKE MONEY if you sketch; write for free booklet. Art Studios, 12, 13, Henrietta Street, Strand, W.C.2.

A HANDY PARCEL of Fretwood.—From ⅛in. to ¼in. thick in varying widths of useful size. Enough to do half a dozen jobs. A bargain at 1s. 6d. Post free 2s. 3d. Hobbies Branches or Hobbies Ltd., Dereham, Norfolk.

FRENCH POLISHING MADE EASY.—"Speedaneez" Friction Polish requires no experience, grain filler, oil or spiriting off, merely rub it on. Complete outfit, 1/3, 2/-, 3/- post free.—Speedaneez Products, 214, Walworth Road, S.E.

CINEMATOGRAPH FILMS. Machines. Accessories. Lists Free. Sample Film, 1s.—Filmerics, 57, Lancaster Road, Leytonstone.

TURNED LEGS for the home carpenter. A variety of sizes and styles at reasonable prices. Particulars free on request. Hobbies Branches or Hobbies Ltd., Dereham, Norfolk.

INTERESTED in building models? Get Hobbies list of designs and illustrations of practical, easy to build models. Free on request. Hobbies Ltd., Dereham, Norfolk.

GRAMOPHONES. Motors, Fittings, Records. Catalogue free. Cash or terms. Build £12 model for £6. Instructions 3d.—C. H. Burt, 185, High Street, Deptford, London.

MAKE Money Picture Framing, Tray and Furniture Making. Grand Guide and List. Post Free, 6d.—Watkins Provider, Newport, Mon.

BRITISH FRETSAWS are strongest, sharpest and best. Used by all the best workers. 4d., 6d. and 9d. a dozen. From all Ironmongers or (post extra) Hobbies Ltd., Dereham, Norfolk.

THE MODEL ENGINEER and Practical Electrician. Every Thursday, 4d. If you are interested in anything mechanical, you should get a copy.—Percival Marshall, 66, Farringdon Street, E.C.4.

A FIRESIDE FACTORY.—Hobbies Woodcraft Machines for profitable spare time. From 35s. Obtainable on easy payments. Illustrated lists from Hobbies Ltd., Dereham, Norfolk.

ENGINEERING BOOKS. Booklet Free. —Gentley's Publishing Co. (Dept. H.), Halifax.

STAMPS.

SIX TRIANGULAR STAMPS, 6d. Large list free.—Felix Sykes, New Barnet.

HINTS FOR HOME DECORATORS.—Best Book obtainable. Full instructions on Painting, Paperhanging, Staining, Graining, Varnishing, Enamelling, Stencilling, Sign-writing, Polishing, Distempering. How to renovate damp walls, baths, furniture; and scores of recipes for making paints, colours, insecticides, household, toilet and spring cleaning preparations. 144 pages. Price 1s. post free.—Texalo Co. (Dept. 32), South Shore, Blackpool.

WANTED, by John Noble Ltd., Organisers of Weekly Clubs. The Ideal Club Leads for Value! Big commission. Little trouble, no expense. Marvellous bargains in Fashions, Footwear, Furniture, Bedding, Outfitting, etc. Over 50 Years' Reputation for Value, and Service. Send p.c. NOW for particulars and most wonderful Bargain Catalogue ever published.—John Noble Ltd. (Dept. A. 177), Manchester.

REPEAT ORDERS every post. Seven beautiful Coloured Inks, post free, 7½d.; 2 sets, 1s.—Hacketts, 23, July Road, Liverpool.

TRANSFERS. Wood Inlay, Floral, Dutch, Japanese, Birds. Selection, 1s. 6d. Includes catalogues. H. Axon, Jersey, Eng.

MODEL BOATS AT REDUCED PRICES

CLOCKWORK BOAT

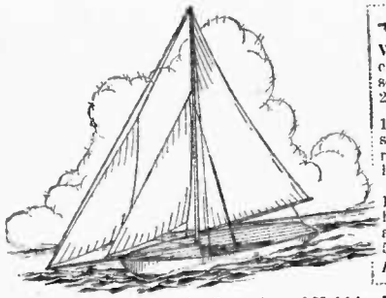
With 22in. deck, strong clockwork movement, well finished hull, brass rudder and twin bladed propeller. Stop and start action fitted through the deck. Light riding hull in two colours. Well made and finished.

USUALLY 19/6

8/6

Postage 9d.

Big bargains here in boats. No junk—every boat sound in every respect. Ensure a happy holiday with a Hobbies boat. Only obtainable at these prices during the Sale. Closes April 18th. Make your purchases now.



The ACE

With 11in. deck, collapsible mast solid. Usually 2/6. **1/9**

12in. deck — clean sails — solid — well rigged. Usually 3/6. **2/9**

14in. deck, hollow hull, well balanced. Usually 5/9. **4/6**

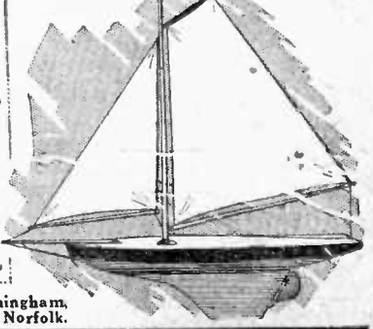
WHITEWINGS

With 20in. deck, hollow hull, two colour and decking. 5in. Beam, guaranteed to sail, as illustrated. Usually 8/6. **7/6**

SEAGULL

An improved rigged yacht. 23in. deck, hollow hull, well balanced and finished, 27ins. tall. Usually 17/6. **15/-**

Postage 6d. extra on the Aces and 9d. on the other two



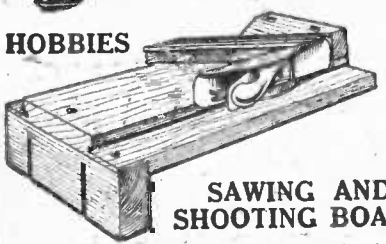
Obtainable from the Branches of Hobbies Ltd. in London, Glasgow, Manchester, Birmingham, Sheffield, Leeds, Southampton, Brighton. Or by post from Hobbies Ltd., Dereham, Norfolk.

Printed by NEWNES & PEARSON PRINTING CO., LTD., Exmoor Street, Ladbroke Grove, W.10, and published by GEORGE NEWNES, LTD., 8-11, Southampton Street, Strand, W.C.2. Sole Agents for Australia and New Zealand: Gordon & Gotch, Ltd. South Africa: Central News Agency, Ltd.

These prices last only until April 18.

SPECIALLY FOR THE HANDYMAN

Hobbies Ltd. are making a special offer of many of their lines at greatly reduced prices to clear their shelves. Every one is a real bargain—an opportunity to save money—make up your tool chest and lay in stocks. In some cases only a few are left—we cannot replace when they are cleared. The early buyers get the best bargains.



SAWING AND SHOOTING BOARD

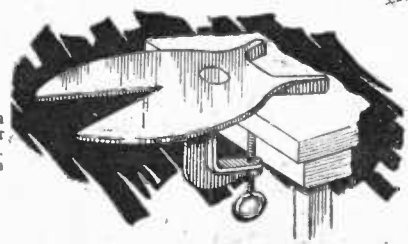
3/6 *Post 6d.*

A two-in-one tool. Mitres can be planed smooth after having been cut with a saw on the other side of the board. Made in seasoned beech. A really serviceable tool for any handyman who undertakes odd jobs.

BOX OF MIXED NAILS

These are those special nails with shanks no thicker than a pin, a necessity to every fretworker—now is the time to buy. USUAL PRICE 6d.

Post 2d. **4d.**



The "FAVOURITE" CUTTING TABLE

This table has a unique method of fixing, and one which secures it rigidly to the bench. Made of cast metal, smooth and strong.

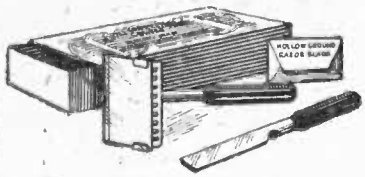
USUAL PRICE 2/3 NOW **1/1½**

Postage 6d.

BENT IRON SHEARS

Steel cutters for bent iron work. Also useful on odd jobs where cutting tin or metal is necessary. A small stock to clear at about half price.

1/3



A RAZOR SET

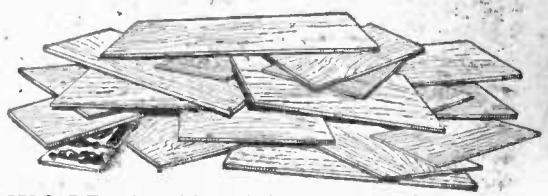
4d. *Post 2d.*

We happen to have on our shelves a few "Flying Man" Razor Sets, and in order to clear them they are put in the Sale at 3 for 1/- or 4½d. each. The razor is complete with blade, and holder for sharpening.

A SPECIAL 8in. HANDSAW

We only have about 100 of these saws. They are reliable little handsaws for small work, and particularly useful for young beginners. The offer cannot be repeated. Honestly worth double.

1/- *Post 3½d.*



WOOD A special parcel of assorted wood of all popular kinds. In wide boards from ⅛in. to ¼in. thick—oak, mahogany, satin walnut, etc., planed and ready for use. Every one worth double. Ask for Hobbies Bargaon Parcel.

1/6 *Post 9d.*

BUY NOW

YOU can save MONEY!

Call at Hobbies Branch at 65 New Oxford St.—147 Bishopsgate—83 Newington Butts—326 Argyle St., Glasgow—10a Piccadilly, Manchester—9a High Street, Birmingham—214 West St., Sheffield—10 Queen Victoria St., Leeds—25 Bernard St., Southampton—68 London Rd., Brighton. Or send your order by post to Hobbies Ltd., Dereham, Norfolk.