# A WATER-DRIVEN GENERATOR

NEWNES

# PRACTICAL MECHANICS

1/-

EDITOR: F. J. CAMM

MAY 1951

## CASTING IN SOFT METALS • See Page 224.

PRINCIPAL CONTENTS

# When I want a *CLIP* I turn to

# TERRY'S

*(the Spring people)*

**I go to TERRY'S for all kinds of CLIPS—steel, bronze, stainless, etc. When I want a clip made to specification, Terry's Research Department is a big help in the matter of design (Terry's with 96 years' experience should know a thing or two!)**

*Want to know all about springs?*
Here is the most comprehensive text-book on springs in existence.

Post free 10/6

## *and 3 Special Clips*

No. 81

No. 300

Nos. 80 and 81 come from ½" to 2" from stock. No. 300, an exceptionally good drawing board clip, costs 5/- a doz. (inc. p.t.) from stock.

No. 80

*Sole Makers:* HERBERT TERRY & SONS, LTD., REDDITCH • London • Birmingham • Manchester

HT4F

PRACTICAL MECHANICS

EDITOR F. J. CAMM

MAY, 1951
VOL. XVIII. No. 209

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

## FAIR COMMENT

By The Editor

### PERPETUAL MOTION

I WAS not surprised, after an announcement in the daily Press the other day to the effect that someone had at last solved the secret of perpetual motion, to receive a crop of letters from readers asking for details. We were told that a Birmingham firm of precision engineers had undertaken to make an experimental model of a mechanism which, it is claimed, has ended the centuries-old search for perpetual motion. The inventor has applied for a patent. The manufacturers of the model state that they still have to be convinced that perpetual motion is possible, but they are prepared to give it a trial.

The inventor says, quite rightly, that scientists have stated that perpetual motion is impossible because of the laws of gravity, but he claims that that is the fundamental on which his mechanism relies. Well, I am always anxious to encourage inventors, but I do not need to be convinced that perpetual motion is impossible because I know it to be so. The possession of a patent for perpetual motion does not mean that the idea will work. Older readers of this journal will remember that some years ago I conducted some research at the Patent Office and unearthed some dozens of patents for perpetual motion, and I summarised them in the form of an article in this journal, giving proof why they could not possibly work. Indeed, the inventors themselves now know that they will not work. There are always those, however, who feel that they will succeed where others fail, and I wish them success, even though I realise that they are wasting their time.

The Philosopher's Stone, the squaring of the circle, the turning of base metals into gold, and perpetual motion are all in the same class. Many years ago I made some models of the more general suggestions for perpetual motion, since those who believe in it will not accept scientific argument but are convinced when they can see the actual device.

One of the oldest ideas for perpetual motion is the unbalanced wheel. This consists of an ordinary wheel with curved spokes which provide tracks for polished steel balls. It is claimed that such a wheel will be continually out of balance and therefore continuously in motion. My models were most accurately made, but of course they did not work! I used them for demonstration purposes for a number of years.

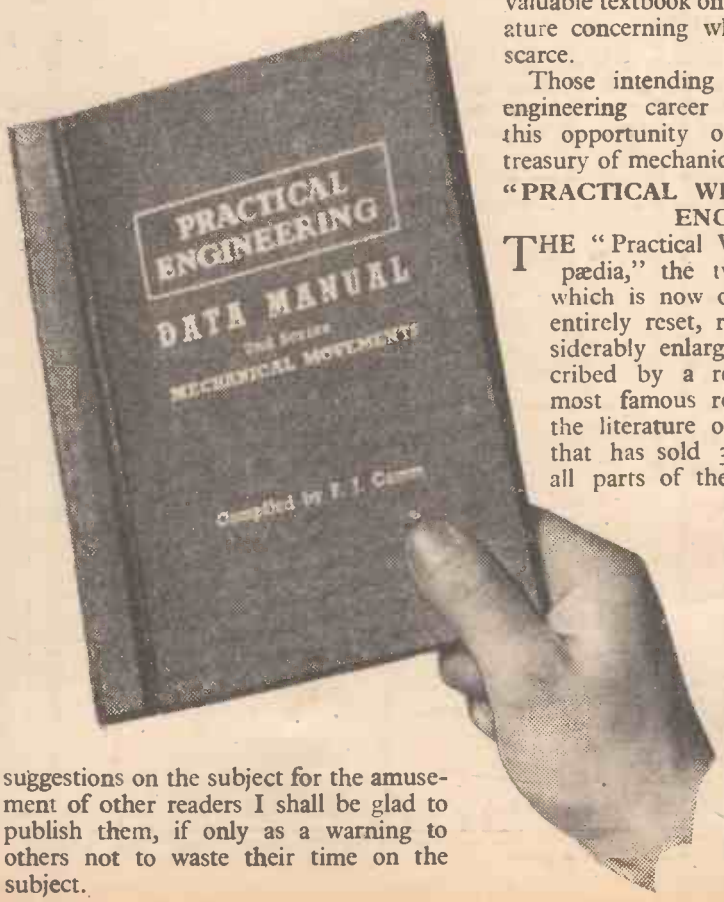
SUBSCRIPTION RATES
Including postage for one year

Inland - - - - - 14s. per annum.
Abroad - - - - - 14s. per annum.
Canada - - - - - 13s. per annum.

Editorial and Advertisement Office: "Practical Mechanics," George Newnes, Ltd. Tower House, Southampton Street, Strand, W.C.2
'Phone: Temple Bar 4363
Telegrams: Newnes, Rand, London
Registered at the G.P.O. for transmission by Canadian Magazine Post.



However, it is an interesting topic, and if any of my readers care to submit




suggestions on the subject for the amusement of other readers I shall be glad to publish them, if only as a warning to others not to waste their time on the subject.

### MECHANICAL MOVEMENTS

READERS will remember my series of articles on the "Elements of Mechanisms," which explained the fundamental principles of mechanics. Ever since that series ended I have had a large number of requests from teachers, technical colleges, and from readers asking for a continuation of that series, giving practical examples. With a monthly publication such a venture would run for too long a period for it to be practicable.

In our companion journal, *Practical Engineering*, which is published at 4d. every Friday, eight Data Sheets are given every week, and for 2s. 9d. readers may obtain the loose-leaf binder shown below, so that they may collate them as the series grows week by week. The series will extend for at least 13 weeks.

A supply of back issues has been specially retained so that late-comers may start from the beginning. When completed the series will comprise a valuable textbook on the subject, literature concerning which is extremely scarce.

Those intending to go in for an engineering career should not miss this opportunity of acquiring this treasury of mechanical knowledge.

### "PRACTICAL WIRELESS ENCYCLOPÆDIA"

THE "Practical Wireless Encyclopædia," the twelfth edition of which is now on sale, has been entirely reset, revised, and considerably enlarged. It was described by a reviewer as "the most famous reference work in the literature of radio—a book that has sold 300,000 copies in all parts of the world since its original publication in 1932."

It contains many new sections on Radar, Television, Remote Control, Oscillators, Kirchoff's Laws, Photo-electric Cells, and an entirely new series of Circuits for receivers and amplifiers.—F. J. C.

# Casting in Soft Metals

## A Method of Making Dies from Laminated Steel Plates

By E. W. TWINING

THE kind of die which is the subject of this article is that called for in making quantities of small castings in metal alloys having fairly low temperature melting points, such as type metal. These alloys consist of a large proportion of lead with varying quantities of bismuth, antimony, tin or zinc, whereby they are hardened and rendered capable of assuming more smooth and more sharp and definite forms when cast into suitable moulds.

Probably no more suitable mixture of the metals referred to can be found for general purposes than that used in casting the type from which this page was printed. It is brittle, will not bend and has no great tensile strength, but it is hard and is eminently suitable for use in the making of models, ornaments, paperweights and of parts of mechanisms where the stresses transmitted through them are light. Bearing surfaces of this metal on steel pins stand up well. For many years toys have been cast in these alloys, and before the 1914-18 war came chiefly from Germany.

The dies in which these toys were made used to be very costly, and doubtless are more so now, for diecast toy models—made in England—are still in the shops. The high cost is, of course, not surprising when it is borne in mind that such dies are milled, routed and engraved in solid blocks of steel; sometimes with sliding pieces and otherwise movable cores. Dies of this kind are often made for fitting into and being operated in a machine and the molten metal is frequently forced into the die.

Such expensive methods of working are, of course, only warranted when thousands of castings are needed, and when only a few dozen off are wanted it is out of the question. Even if two or three hundred are required the probable cost of die-sinking in the ordinary way may prevent the job from being a commercial proposition.

In the years between the two great wars the writer had from time to time to make in his shops quantities of small models of several kinds. In no case, however, did such quantities warrant the making of solid dies and, when the question of die-casting first arose, someone suggested the building up of dies by means of laminated plates. This is mentioned because the writer wishes to make it clear that he did not invent the method himself. In any case the scheme was adopted and proved successful. Later it was used in combination with machined-from-solid dies, so that some parts were solid and others laminated. This, however, is by the way, and it is only with laminated dies that this article deals, and that, too, more by way of suggestion than by definite instruction. For, given an idea, the practical mechanic will be able to enlarge upon it, elaborate it and adapt it to the needs of the moment—on the job he wishes to undertake.

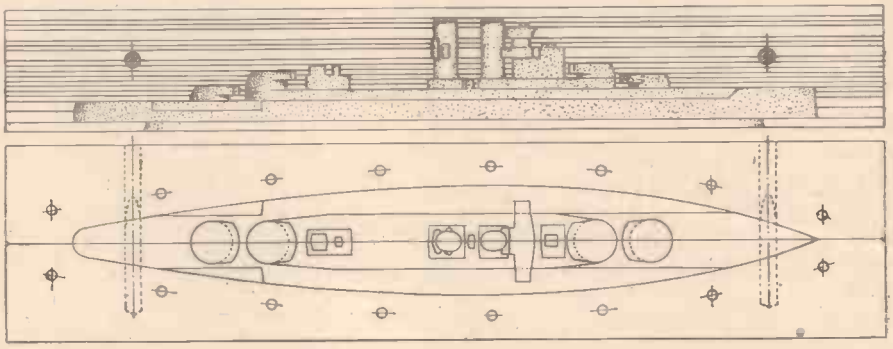


*Fig. 1.—Dies for casting models of a battle-cruiser.*

### Cutting the Steel Plates

Briefly, and as will be seen from the illustrations, the scheme is to cut a series of steel plates, all of exactly the same size on outside edges, pierce these with openings of various shapes and sizes, rivet them, or bolt them, together, and in some cases divide them on a centre-line for parting and removing the casting. In some dies the edges of the plates around the cut openings must be chamfered so as to give uninterrupted curvature to the object from one plate to the next above and below it. In most sets of dies there will need to be a cover plate at top and bottom, one pierced for pouring the molten metal and the other unpierced. In the case of most dies it is imperative that the plates be kept perfectly flat and true in order to prevent the casting metal from creeping between the plates.

Now let us take an example. In Fig. 1 is shown the dies for casting a quantity of models of a battle-cruiser. It represents no particular ship except for the fact that it is something like H.M.S. *Queen Elizabeth* was in the year 1918. That, however, is immaterial. Any other ship can be modelled in exactly the same way. Tramp steamers, liners, big cargo vessels or tug-boats.

An important point to note is that the plates in this case are not all of the same thickness; nevertheless this is the most simple kind of die that the writer could have chosen to start with. For this model 18 plates are required, including the top and bottom cover plates.

The first thing to do before cutting any plates will be to make a careful drawing, in elevation and in plan, of the ship or other object required, just as is done in Fig. 1; then, from the plan view, make careful ink tracings of each change in the outline from the water-line or bottom plate up to the top. In the case of Fig. 1 16 tracings will be required. Draw a centre-line and also the rectangular outline of the plates. Saw out and file true all the plates, and, each on its respective plate, stick down the tracing. For this sticking some medium other than glue or paste will be advisable, and either an oil varnish or celluloid cement is recommended. A thin film of varnish on the plate, allowed to become quite tacky before applying the tracing, will be as good as anything. If tube glue is used, apply it to the plate and lay the tracing on it; do not glue the paper. In either case the paper will expand, whereas with the varnish or celluloid cement it will not. It will be obvious to the reader that the object of the tracings is to provide outlines on the plates and, if tracings were not stuck to them, it would be necessary to cut templates and from these scribe lines on the plates to file to.

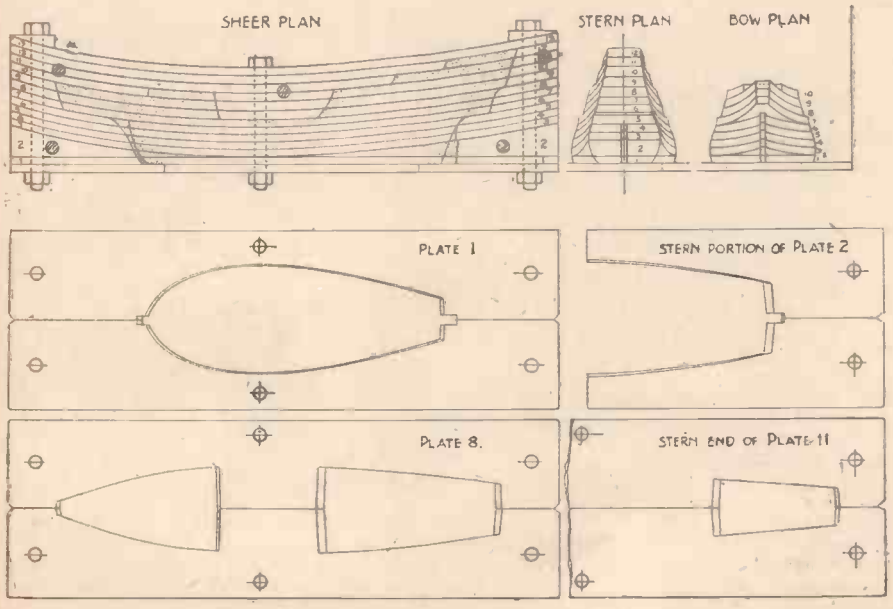



*Fig. 2.—Dies for casting models of an Elizabethan ship.*

### Divided Dies

Now there are two ways in which the two halves of the die can be made: One is to cut each plate in two parts, butting them together on the centre-line—in which case each tracing need be of only one side of the ship because the two parts can be folded back to back and filed out together, and the other way is to make each plate the full width of the mould in one piece, pierce it for the openings, rivet or bolt all together and finally saw the whole die down on the centre-line. In other words: (1) make it from the start in two halves and (2) make it in one piece and divide it, by sawing, afterwards. The first way involves less labour, but the second is the more accurate since, each plate being still in one piece, will rivet up with one side exactly in line with the other.

When we come to the subject of Fig. 2 a little consideration will show that the first method of making cannot be resorted to; the plates have to be bent to a true curve, and this must be done before they are parted down their centres and before they are pierced, otherwise the curve in each half, or side, will not be exactly the same as in the other half. Therefore it will be best to cut the bottom and plate No. 1, the two wedge-shaped pieces No. 2, and bend all the rest from No. 3 to 13 in succession, making sure that each will fit one into the other without air gaps between. Then silver solder the small levelling pieces for the bolt heads, on the top plate, and drill through the lot for the six long holding-together bolts. Finally, after piercing, saw them apart with a very fine slitting saw.

In the making of the drawing and tracings for this ship's hull allowance will have to be made for the thickness of the saw-cut and for filing up smooth the sawn surfaces. This allowance applies particularly to the thickness of the rudder and stem post.

The crosshatched circles in the sheer plan, Fig. 2, indicates the pins which are required to be inserted in order to ensure the registering of the two halves of the die. They are shown also in Fig. 1.

### Relief Ornamentation

It is pointed out that in making dies for casting models of old-time ships much can be done in the matter of reproducing relief ornamentation. Thus by filing the edges of the plates to a slight chamfer the beading and stringing will be rendered in relief. The stern cabin windows can be in relief (on the sides) by chamfers and filed cross cuts, and the chain-plates for the shrouds, although not shown in Fig. 2, certainly ought to be formed by suitable cuts in the plates in line with where the shrouds come.

The bottom plates shown in Figs. 1 and 2 are there only to form definite outlines for the "runners," i.e., the openings through which the molten metal is poured. After the dies are opened and the casting removed this runner, or superfluous type metal is sawn off and the metal filed true to the waterline.

It is presumed that the reader knows that the castings need not be left solid unless they are to be used as paperweights. If desired and in order to economise metal they can be made hollow by reversing the dies after filling. This was, or is, known as the "fill and spill" method, but its success depends upon a critical temperature of both the metal and the die, especially that of the latter. The ship's hull, Fig. 2, or a model of a galleon, ought to be split and it is quite easy to do, provided the dies are held in a suitably designed, handled, frame or clamp with an arrangement for opening the dies. Filling and spilling is done over the metal pot.

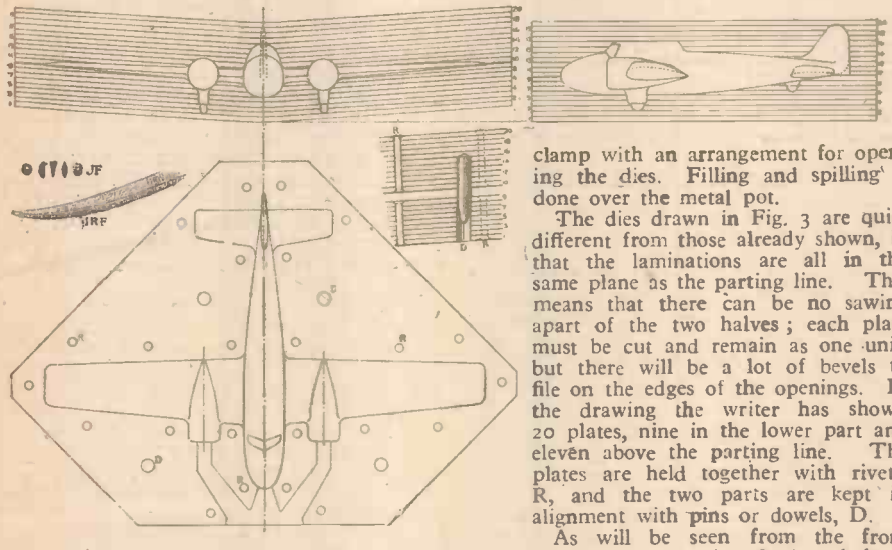



*Fig. 3.—Laminated dies for casting aircraft models.*

The dies drawn in Fig. 3 are quite different from those already shown, in that the laminations are all in the same plane as the parting line. This means that there can be no sawing apart of the two halves; each plate must be cut and remain as one unit, but there will be a lot of bevels to file on the edges of the openings. In the drawing the writer has shown 20 plates, nine in the lower part and eleven above the parting line. The plates are held together with rivets, R, and the two parts are kept in alignment with pins or dowels, D.

As will be seen from the front elevation of the aircraft the whole of the twenty plates are bent to a curve on the centre-line; this is done in order to provide for the dihedral of the main wings and tail plane. Were the plates kept flat the difficulties of forming the wings and the wing section would be increased enormously. As it is a special file will be needed, partly for the main wings and partly for finishing the shape of the fuselage. This file can be made from a new, five-inch half round: H.R.F. in Fig. 3. Heat the end to a bright red, bend to a curve as shown, heat again and plunge into cold water, then into oil. A few jeweller's files of the sections drawn at J.F. will also be useful, especially for the undercarriages and the fin and rudder. Note that the bottom of the rudder must be cast down to the parting line and filed away to correct shape in all the castings.

### Provision for Pouring

In order to provide a means of filling the dies with the molten metal an opening must be cut for a runner, and the best place for this will me at the nose of the fuselage; running will then be done with the dies standing vertically upon the tail end of the aircraft. In order to ensure that the engine nacelles are filled to the tops and that the metal flows to the wing tips it will be as well to provide branches of the runner to the nacelles; then, when pouring, see that the metal enters all three openings as nearly simultaneously as possible. The runners are drawn in the plan view of Fig. 3, but not in the side elevation: they can be cut in the thickness of two plates, preferably Nos. 9 and 10.

As an example of simple plate dies with movable parts for casting other than small models the object shown in Fig. 4 is given. Just what it is and what it is for does not matter, no one will want to make a thing exactly like it and it only need be said that it is a part of a very light mechanism through which very little power has to be transmitted. There are hundreds of small cast parts called for in the manufacture of light mechanisms and instruments of all kinds, particularly in the electrical industry, and the drawings comprising Fig. 4 are merely put forward in the hope that they will suggest ways and means of diecasting other and different shapes and sizes for which type metal is suitable.

It will be obvious to those interested in this scheme for die making that it is not really essential that such a large number of separate plates shall be used as are shown in the illustrations, particularly in Fig. 4. For instance, in Fig. 3 plates 4 and 5 could be in one piece of double thickness and 17, 18 and 19 in one, of treble thickness. So too in Fig. 4 Nos. 1, 2 and 3 could be one thick plate as also 4, 5 and 6, and so on, but if all the work is to be done by hand with no machining then the thin plates will be easier to handle.

### Die Holders and Handles

It will be understood that all dies become very hot in casting, indeed they have to be heated, say, over a gas ring, before beginning to pour the metal into them; therefore it is necessary to provide holders for them, such holders being fitted with handles and means of opening the dies for removing the casts. In Fig. 5 a suggestion is given for a pair of holders for the ship models. These can be made from flat strip iron or steel of about a quarter of an inch thick by one inch wide,

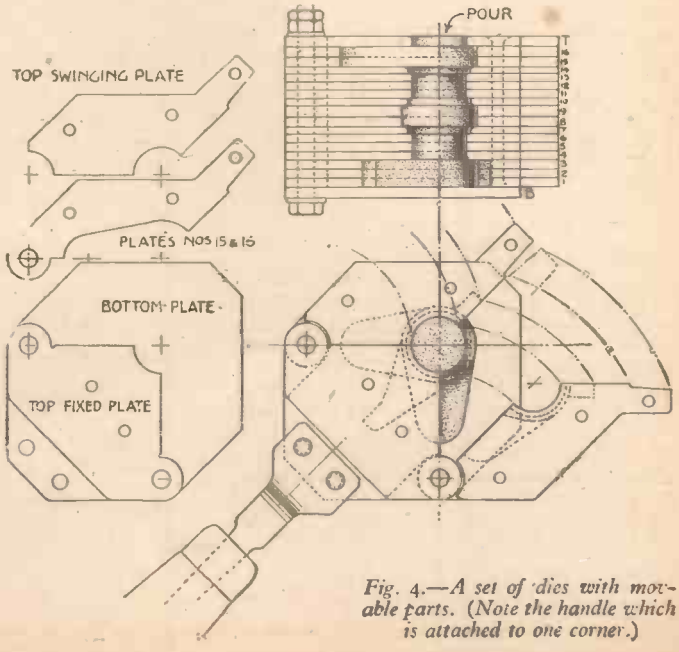



*Fig. 4.—A set of dies with movable parts. (Note the handle which is attached to one corner.)*

bent as shown. The handles are each wrapped round with asbestos string and covered with a bandage of old cotton cloth or surgical bandage.

As will be obvious the two halves of the handles can be hinged together permanently, if desired. This can be done by having two lugs at A, one on each part of the steel strip; the lugs overlapping and a bolt passing through them, but for the purpose of extracting the casting it will be found very much more convenient to be able to disconnect completely the two halves of the dies and, therefore, nothing could be better than the simple hook arrangement shown.

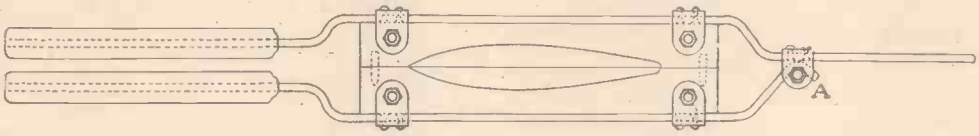



*Fig. 5.—Suggested form of holder for dies for hand operation.*

### Low Melting Point and Alloys

The reader will probably be aware that there are metal alloys, which resemble type metal, but which have very low melting points; a number of them below 212°, so that they will liquefy in boiling water. Rose's metal melts at 212°, Newton's at 205°, Darcet's at 200° and Wood's as low as 155°. If one of these, preferably of the higher temperature kind, can be obtained then it would be possible to make dies from thin plates of hardwood or even of hard cardboard. The plates could be of ordinary cardboard (white pulp board) cut out with a knife, on glass, soaked in shellac spirit varnish, dried and assembled by sticking together.

Obviously wooden or cardboard dies would not require preheating and they could be held in the hand whilst casting but with the exception of the use of such woods as beech, holly, box, or ebony the moulds would not stand up to a very long run of casting. But the scheme is worth considering especially for static things such as ship and other models which are never likely to be subjected to temperatures above those mentioned. The writer has recently had occasion to model some small human figures in clay; from these plaster moulds were made and in these moulds the reproductions of the models were made in one of the low melting point metals.

Referring back to the metal dies: the inside surfaces should be well blackleaded before commencing to cast and from time to time as the work proceeds. Any cracks or fissures between the plates should be filled with blacklead.

# Making an Electric Blanket

## An Inexpensive Low-voltage Appliance for Home Use

By E. E. CHEETHAM

BY making use of ex-government equipment as described, a very efficient electric bed warmer, which will earn the approval of the entire household, may be simply constructed at a fraction of the cost of the commercial article. In addition the low voltages employed considerably reduce the danger from accidental electric shock.

The main requirement is an ex-W.D. electrically-heated jacket, which can be purchased for a few shillings, the price varying from 2/6 to about 5/- in different districts.

The jackets are made from a brown poplin material, with the heating elements stitched inside after the manner of a quilt.

There are four elements each of 12v. rating, one in each sleeve, and one in each half of the body, and as purchased one sleeve and one body element are connected in series, forming two circuits of 24v. which are connected in parallel to the plug.

Taking a pair of sharp scissors carefully cut round the edge of the material, thus removing the heaters, together with the canvas pocket containing them, as this will save the trouble of making fresh pockets on the new blanket.

The reader will now have four long strips of material, each containing a 12v. heater, and these should be fastened by means of large tacking stitches to a piece of suitable material; in my case half an army blanket was used, the strips of elements being spaced according to the size of the material.

### Connecting the Elements

This completes the actual blanket: the method of connecting the elements can be done in three ways, depending on the voltage of the transformer available. The consumption of each heater strip is approx. 1½ amps. at 12v. so for 12v. working, a transformer or 12/15v. with an output of at least 6 amps. is required, the strips being wired in parallel. By connecting the strips in series-parallel a transformer of 24/30v. with an output of at least three amps. can be used, and for use with a 50/60v. transformer of 1½ to 2 amps. output, the strips being connected in series. The actual elements consist of a fine woven gauze of resistance wire, and the joints are best made by wrapping a strip of clean sheet copper round the two ends and squeezing tightly together.

When in use the blanket can be placed on top of the mattress under the covering sheet, and secured with either tacking stitches or small safety pins at each corner to prevent its movement. The flex connection to the transformer terminates in a small two-pin plug which can be disconnected easily for changing the bed linen, etc. A switch should be fitted to the live main on the input side of the transformer, and the connection to the mains should be made by means of a fused three-pin plug.

The writer has had an electric blanket made in accordance with the above description in constant use for a period of more than twelve months, and it has proved a great asset, especially in cases of illness. The blanket may be left on all day if necessary without overheating. Those readers of an experimental turn of mind who require added refinements can no doubt incorporate such improvements as thermostatic, or variable heat control.

**COMPONENTS REQUIRED**

1 Ex-W.D. electrically-heated inner flying jacket.
1 Mains transformer—12/15 v., 25/30 v., or 50/60 v. at 100 watts.
1 piece suitable blanket material about 4ft. square.
1 Flex connector Type 2-pin plug and socket.
1 Switch (either pear or tumbler type as preferred).
Flex for wiring.
1 3-pin plug for connecting to mains. (Fused type.)

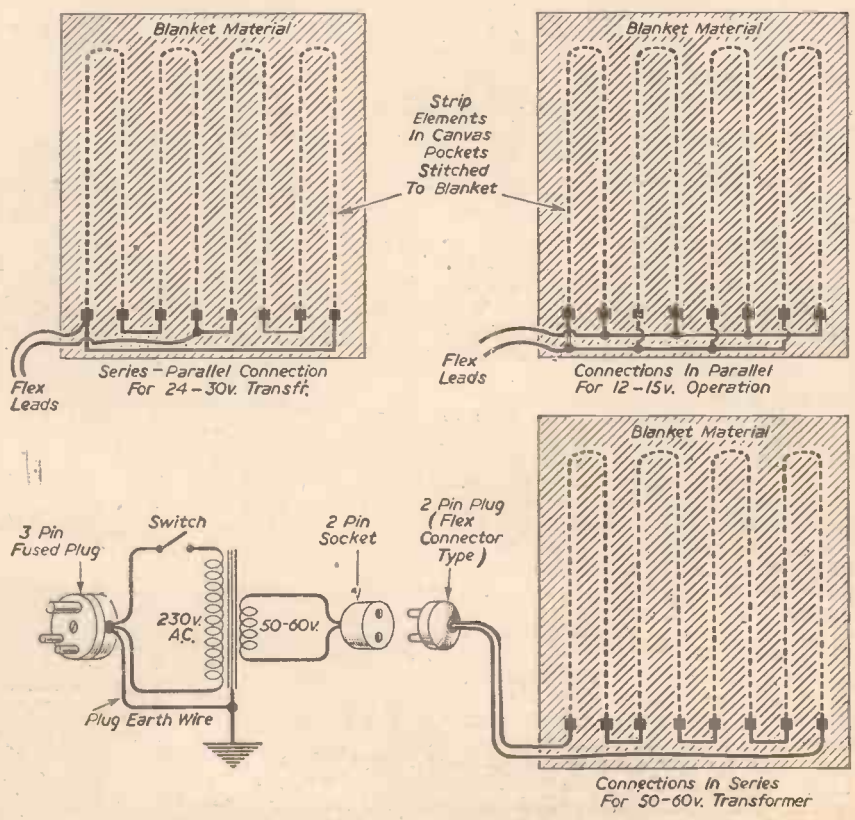



*Diagram showing arrangement of elements, and connections to transformer.*

# Quaint Ideas for Aeroplanes

## Peculiar Features in the Design of Aircraft of Pioneer Days to the Present Time

By C. G. GREY

WHEN I was asked to write on "Some Quaint Ideas for Aeroplanes" I thought of a lot of aircraft I have seen in the past 40 years, and concluded that most of them are quaint; and in spite of all our science and research some of the latest are the quaintest. All the same, rather naturally, in the light of nearly half a century of supposed progress, the earliest ideas were very quaint.

Leaving out the peculiar aeroplanes which did not fly, the first aeroplane that did fly, that of the Wright Brothers (U.S.A.), was one of the quaintest. On the very first occasion when Orville Wright flew for a few yards—really a catapulted, engine-assisted long hop—the pilot lay on his stomach on the lower plane. The machine ran on a rail along which it was towed by a line which ran back and over a pulley to the top of a pylon where it was fastened to a heavy weight. When the weight was released it pulled on the line, and when the machine reached the end of the rail the line fell off and left the machine free to fly if it could, which generally it could not.

*The Boeing XB-47 "Stratojet," one of several jet bombers under development in the U.S.A. in 1949.*

### The Use of Catapults

The quaintness here is that for years we have been launching aircraft from ships by catapults. Moreover, one of the latest crazes is that for very high-speed launching, as with jet-propelled machines, the pilot's inside stands it better if he, to use the polite phrase, "adopts the prone position" (or lies on his stomach). And, quainter still, the latest idea for the Navy is that the deck-landing machines shall—like that original Wright machine—have no wheeled undercarriage, but shall alight on a sort of canvas blanket stretched over the deck and slide along on its "belly."

When the Wrights gave up the "prone position" and sat upright, they took to a quaint sort of control. Instead of one stick, or a wheel on a central control-column, they had a stick on each side of the pilot. Pushing and pulling one of them backwards and forwards "warped" the ends of the wings to control sideways balance, as ailerons do now. The other stick, moving fore and aft, worked the elevator which stuck out in front to make the machine go up and down. It had no tail. And on the top of that stick was a short stick (or handle) which the pilot rocked sideways with a wrist action, and that controlled the rudders at the back.

The engine was situated on top of the lower plane, practically in the small of the back of the pilot and passenger, who sat side by side on the front of the plane with their feet resting on a projecting crossbar, hanging over space. The engine drove two large propellers side-by-side by motor-car chains, and one chain was crossed, like a driving belt on a lathe, so that the propellers ran in opposite directions. It was the quaintest and most brutal form of drive ever used, yet, strange to say, I cannot remember anybody being killed by the breaking of a crossed chain.

But the front elevator, which led to the machine being called the "tail first" type (or *canard* in French or *ente* in German, both meaning "duck"), killed most of the pilots who flew Wrights even when a horizontal tail was stuck on behind. The Wright type of machine was extinct by 1915.

### The First Flying Boat

The next aeroplane to fly in the U.S.A. was designed and flown by Glenn Curtiss, who proved later to be the greatest of all American pioneers in that he made the first flying-boat, from which all flying-boats are descended to-day, and made what was at the time the world's best aero-engine, from which many modern engines are descended. Also, he superintended the design and building of the first flying-boat to cross the Atlantic—(the N.C.—U.S. Navy Curtiss).

Curtiss, to defeat the Wright patent, which claimed that any hand-control of the three directions — up-and-down, sideways and lateral balance—was covered by it, designed and built a biplane in which a wheel, like that of a car, steered the rudder, while pushing and pulling it controlled the two elevators, one in front and one behind the flat tail-plane.

Then, instead of warping the planes (as the Wrights did) he fitted flaps, like ailerons, on the struts between the planes. He controlled the lateral balance by working them by moving his body sideways, from the waist up, with his shoulders "embraced" in a sort of steel tube yoke. That was a bit quaint, but really natural, for when one wing rose (while the other dropped) he just leaned over to that side. It did quite well till Blériot and Farman, who had managed to fly in France, adopted the central stick (commonly called the "joy-stick"), which controlled up-and-down movement and lateral balance, while the rudder was controlled by a crossbar worked by the feet.

Even then the aeroplane people had to be quaint, for one would expect a crossbar for the rudder to act in the same direction as does the handlebar of a bicycle. But, no; the rudder-wires (now tubes or rods or hydraulic controls) were coupled so that when the pilot pushed with his left foot the rudder turned the machine to the left instead of to the right, as one would expect.

### Henry Farman

Quaintly, also, Henry Farman, one of the first two or three men who really flew in France (his father was English and repre-

*Six turbo-jets and eighteen dry-fuel rockets combine 42,000 lb. thrust in this spectacular take-off of the Boeing "Stratojet."*

sented the *Daily Telegraph* in Paris), having been a notable bicycle racer, insisted on regarding his rudder-bar as a handlebar, and always had his rudder-wires coupled to the rudder crossed, so that when he pushed his right foot the machine turned to the left. Which would seem natural to any cyclist or motorist, but not to an aviator.

So far I have written only of very early aeroplanes, almost all of which were biplanes and flew—some badly and some well—for that time. Probably the least quaint aeroplanes were the Blériot and the Antoinette, both monoplanes and both recognisably related to our high-speed aircraft of to-day. Old Levavasseur, who designed the Antoinette, was then regarded as quaint because he was so far in front of his time. Believe it or not, in 1913, before the first of our modern Great Wars, he built a 12-cylinder vee-type engine with electrolytically deposited water-jackets, direct-injection of petrol, and steam-cooling. The aeroplane had streamlined casings (which we called "pants") over the wheels of the undercarriage, and the engine was properly cowled-in, whereas all others stuck out prominently. Then the 1914 war came along and the beautiful Antoinette expired.

### Anthony Fokker

One of the quaintest of all aeroplanes of that day was built by a young Dutchman named Anthony Fokker. He, like many other youngsters who built models, then and to-day, believed that he could build an aeroplane which needed no control except a rudder and elevator to steer it up-and-down and sideways—which to-day we should call being "inherently stable." So he built a machine which although in essence an orthodox monoplane had such square-shaped wings, cocked up at such an acute angle to one another (a dihedral angle, as it was called), and had such a mass of wires and struts in its undercarriage, that it looked like a cross between the "Bread and Butter Fly" and the "Jabberwock" in the "Alice" stories.

Tony Fokker flew it and demonstrated it in Germany. It nearly killed a German friend of mine, named von Bismarck, but the German Government recognised that Tony had brains, so they kept him in Germany during the war and he built some of the best fighting-machines on either side. Also he produced the famous "interrupter gear," which allowed a machine-gun to fire through a revolving propeller without hitting the blades. That struck aviation people as quaint at the time, unless they got hit, but it is rather outside the scope of quaint aeroplanes.

Really why I brought Tony (he is dead now, I am sorry to say) into this story is that talking to me one day, and feeling frightfully depressed, he said, "If aeroplane designers could see the spray in the air as you can see the spray from water they would all be ashamed of themselves. Can you imagine a boat designer who wanted to put on more power to improve his speed sticking extra engines out in the water on each side of his boat? And that is what we all do with aeroplanes to-day." And that, mark you, is the reason for a lot of quaint aeroplanes from that day (about 1930) to this. Designers *will not* try to see, or imagine, the spray in the air.

### Wind Tunnels

All nations which produce aeroplanes have spent thousands, or millions, on wind tunnels in which they measure head-resistance of aeroplanes and parts when pushed or pulled through the air. But nobody has discovered what is a proper streamline to give the least resistance to the air. Just look at the quaint things that are pushed through it.

Two classic examples of quaint divergence of opinion between eminent designers are the great modern airliners the Lockhead Constellation and the Boeing Stratocruiser. The "Connie" has a body like a trout and a nose like a shark, the cleanest, most streamlined-looking thing one could imagine, and the body sweeps up into the tail-unit (fin, tail, rudder and elevators) so that one can almost *see* the air being led into the control surface in the way it should go. The Boeing has a nose like a bulldog. The fuselage (body) is, in section, like a figure 8, the lower lobe of which slopes suddenly up to the tail, so that one can hardly imagine that it has been designed as a streamline. Yet, with the same engines, those two airliners have almost identical performances for speed and climb.

### Sir A. Cobham's Air Circus

Sometimes an aeroplane just looks quaint, though it may be eminently fit for its job. I remember a biplane designed to carry a dozen joyride passengers at a time, and which was built by Airspeed Ltd. under the supervision of N. S. Norway (Nevil Shute, the famous novelist) for Sir Alan Cobham's touring Air Circus. It had a Gipsy engine on each lower wing and a third on the middle of the upper plane. The idea was to have plenty of power for take-off, and to have an engine of proved reliability for which spare parts were easily obtainable.

It was called "The Airspeed Ferry," and it could get off with full load in about 50 yards from grass; its speed was only about 75 miles an hour, and it could land almost at a standstill. The Cobham officials used to marshal the passengers in a queue and the machine used to land right alongside them, like a bus drawing in to a kerb. As soon as it stopped one official opened a door on one side in the front and another opened a door on the other side at the back. And as the passengers walked out of the front the waiting passengers walked in at the back.

The machine would take off, fly a couple of circuits of the field, and land, and so on all day, and it made a lot of money.

### The Savoia Seaplane

A quaint machine of a very different type was the Savoia seaplane, about which I could never make up my mind whether it was a twin flying-boat with two small hulls or a float-plane with two enormous floats. The Italian *Regia Aeronautica* (Flying Corps) had many of them. A fleet of about 20, led by the gallant Marshal Balbo, flew from Italy to West Africa, then to Port Natal, Brazil, up to New York, and back to Brazil, where, if I remember rightly, they were given as a present to the Brazilian Air Force. Two or three men flew in each float, and they carried a lot of baggage; they had four engines.

### Twin Mustangs

In the latest war, in Korea, the U.S. Air Force have been using some quaint machines known as "Twin Mustang." The original Mustang was a single-seat fighter, built in the U.S.A. to our R.A.F.'s specifications and with a Packard-built Merlin engine. Pilots loved it in 1944-45 in Europe and in the Pacific War. At the finish the U.S.A. had thousands of them left over, so somebody thought of making them into light bombers in much the same class as our Mosquitoes. So the U.S.A.F. technical staff took a couple of Mustangs, abolished the right wing of one and the left wing of another, threw away their tail-planes and elevators, and joined the two fuselages side by side with a short wing—leaving room for the airscrews to clear one another—and joined the aft ends of the fuselages with a single tail with elevators behind it.

Thus they got a twin-Merlin high-speed light bomber. The pilot sits in one cockpit, the navigator-observer-bomber in the other, and they talk on the usual intercommunication system, known as the "intercom." The machine can lift more than twice as many bombs as a single Mustang can, and they are just about as fast. The two fighters, flying apparently hand-in-hand, do look a trifle quaint, but they are very good, so long as they do not get mixed up in dog-fights with manœuvrable single-seaters.

I could go on for some time discoursing on quaint aeroplanes, and on quaint ideas for aeroplanes, but perhaps I have given you some idea of how positively comic some of the brainwaves of the world's great aircraft designers have been. And, believe me, they are going on being just as quaint.


*This strange-looking helicopter with three motors is known as the Cierva Air Horse.*

# A Radio Deaf-aid Unit

## Constructional Details of an Inexpensive Appliance for Home Use

By F. G. RAYER

WHEN one member of the household is deaf, the difficulty arises that if the radio is turned up to sufficient volume for the sufferer it may be intolerable for other people in the room, and even cause annoyance to neighbours. The ordinary type of deaf-aid can be used by placing it near the loudspeaker, but this form of operation often causes severe distortion, so that programmes are not fully intelligible to the deaf person. Such distortion is caused by the programmes having to undergo a second sequence of reproduction, transit through the air from loudspeaker cone to deaf-aid microphone, and amplification, and is difficult to overcome because many loudspeakers are very deficient in high-frequencies, which is exactly what the average deaf person requires to hear most strongly. In addition, deaf-aid units employ small batteries, and the cost of using these several hours daily is high.

A means of operating the deaf person's headphones directly from the receiver is therefore economical (indeed, running costs are nil), besides giving much more satisfactory reproduction. The unit described here can be employed with any mains or battery set, has received over twelve months' trial with a person with a high degree of deafness, and is probably the cheapest, yet most satisfactory, method which can be employed.

*This illustration gives a good idea of the small size of the unit compared with a pair of headphones.*

### The Circuit

This is shown in Fig. 1, and the isolating condensers prevent any direct current reaching the 'phones, so that there is no chance of shocks, even with mains receivers. These condensers also act as a safeguard when the builder is connecting the unit to the receiver. If a wrong connection is made, neither receiver nor 'phones will be damaged, because no current can flow, and this will be particularly appreciated by the constructor whose knowledge of radio is small.

A separate volume control is employed so that the deaf person can adjust the headphone strength to his own liking. The receiver loudspeaker will be operating in the usual way, of course, and the receiver should be set to a volume level suitable for other people in the room.

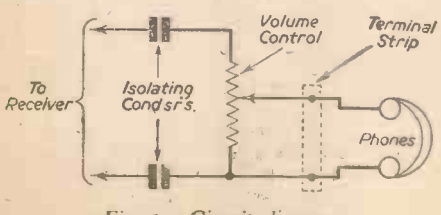



*Fig. 1.—Circuit diagram.*

### Constructional Details

All the parts are mounted in a small wooden box, shown in Fig. 2, which also illustrates the wiring. The capacity of the condensers may be between .01 and .1 mfd., but if condensers are to be bought, then .05 mfd. is recommended. For mains sets they should be good-quality components of, say, 500 volts working. They prevent the high tension voltage in the receiver reaching the 'phones. They may have terminals or soldering tags.

The volume control is a 10,000 ohm potentiometer, with knob. If some component around this value happens to be to hand it can be used, but extreme deviations from this value should be avoided.

If the wooden pieces are cut to the dimensions given, ¼in.-thick material is required, but the size of the case is not critical. It is glasspapered and varnished, and the bottom is attached by four small screws when wiring is completed.

### The Leads

If the user sits near the receiver the twin flex connected to the condensers will only need to be a few feet long. However, in some cases it may be necessary to use longer leads, so that the unit, with volume control, is within easy reach of the user. Any ordinary twin insulated flex of good quality is suitable. The leads pass through a small hole in the case. (Fig. 3.)

The 'phone leads are taken through a second hole and to two small terminals on an insulated terminal strip, for ease of connection. There will be no polarity to observe. The bottom is then screwed on.

### The Headphones

It is best to keep a pair of 'phones especially for the unit, and permanently connected. Some deaf people require special 'phones, but in the majority of instances the robust ex-Service 'phones so cheaply obtainable are perfectly satisfactory. The type known as "high impedance" 'phones must be used. Attention should be given to the headbands and other adjustments so that they are comfortable for the user.

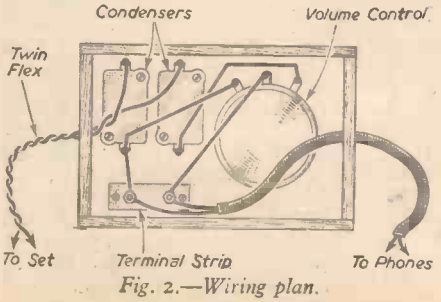



*Fig. 2.—Wiring plan.*

*Plan view of the unit with top of casing removed.*

### Connecting the Unit

The twin flex leads must be taken to the primary of the output transformer in the receiver. If the latter has high impedance extension sockets, simply plug into these. If the receiver is battery-operated, one tag of the transformer primary will go to H.T. positive, and the other, except in push-pull circuits, to the output valve anode. With battery sets, the builder can put on the headphones, set the volume control to midway, and try touching the bared ends of the flex on the various speaker transformer tags or leads. The correct ones will then easily be found. No damage can be caused by wrong connections.

### Using with Mains Receivers

With mains receivers this can also be done, but the builder should take care to touch no bare leads, tags, joints, or so on. In addition, keep volume down to begin with, or do not place the 'phones actually over the ears.

When the correct points have been found, twist or solder the leads on, or add a small insulated strip with terminals or sockets. With mains sets, switch off and withdraw the mains supply plug before touching bare joints or doing the permanent fixing-up. There will then be no chance of shocks.

The deaf person should be shown how to use the unit volume control, starting from minimum, and turning it up until satisfactory hearing of the programme is obtained. The unit will be most appreciated by many deaf people who may otherwise often forgo programmes they would like to hear.

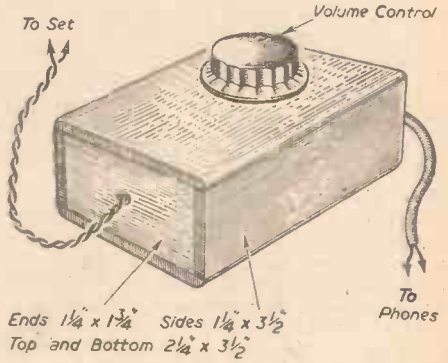



*Fig. 3.—View of the completed unit giving dimensions for the casing.*

# Autobiography of a Gadget Maniac—2

By THE MARQUIS OF DONEGALL

(*Continued from page 201, April issue*)

EVERY young schoolboy, I suppose, goes through the gamut of white mice, rabbits, caterpillars and tortoises.

Having always preferred "mineral" to animal, I soon "swopped" my rapidly increasing rabbit family for enough cash to buy a course at the newly-founded school of mechanics. Eton was pretty advanced in lots of ways. For instance, while German opera was banned in 1914, German was taught throughout that old war to language specialists, such as myself. A school of carpentry had existed for several years for those who were enthusiastic enough to devote their pocket money and time to this art. The same applied to the new school of mechanics.

We were not very well equipped either in materials or knowledge, but it was not long before house-masters found themselves being presented with useful things for the house, such as letter-boxes, postal-scales, giant ladles, calendars, paper-cutters and pencil sharpeners.

When, however, I insisted on building a small electric motor to run off torch batteries, it was considered to be going a little *too* far, and the whole position was aggravated by the fact that I absolutely refused to say for what purpose it was needed.

### A Rockery Fountain

The fact was that, as a reaction to forced potato digging during the war, those who were keen on that sort of thing were allowed to lay out flower-beds for a prize. One friend of mine was quite a horticulturist in a small way, and it became obvious to me that the only thing his flower-bed needed to make sure of the prize was a small rockery with a fountain in the middle. The rockery was easy, but as nothing except seed or bulbs was allowed to be bought, it was obvious that the fountain, together with its pump and the electric motor to drive it, would have to be made in the school of mechanics.

After some cajoling and a great deal of help from a local electrician, quite a neat little motor was duly completed, and the day came when the secret had to come out of the bag.

It was with trepidation, the evening before the judging, that my friend and I asked our house-master's permission to go out after "lock-up" and instal my contraption.

Next day we shared the first prize, my friend for his flowers and I for my efficient, but not very artistic, fountain.

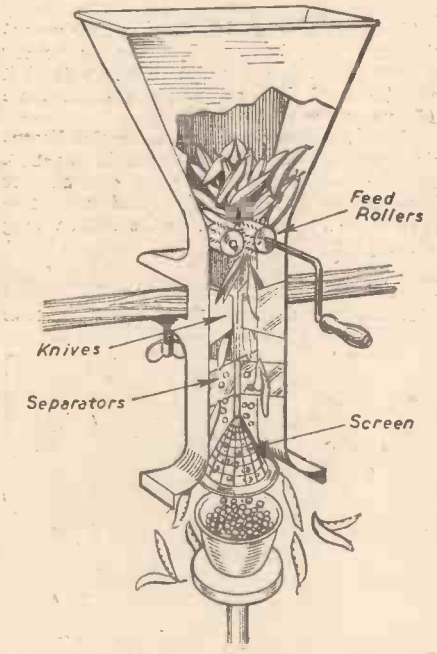
The next thing was a gramophone. Chiefly, I think, because they were strictly forbidden. At that time the best-known portable was a Decca, familiar to those who remember Bairnsfather's "Old Bill" cartoons.

My object was to make a much smaller one that could be conveniently hidden in a boot-box in my room and played at dead of night with a sewing needle. The sound-box (my crude effort produced such cacophony that it had to be discarded) and the spring had to be bought, but the finished article produced a passable imitation of the noises made by the maestros of jazz of that time. Replaying some of these 1918 records to-day, the conclusion is reached that almost any raucous noise would have done.

Nevertheless, these old bone-shakers of 1917 to 1924, when jazz started to become "refeened," hold a place of honour in my collection of some 2,000 records telling the day-by-day history of jazz in the last 33 years.

Some people look down their noses—or, at any rate, shut their ears to this hobby of mine; but is it any more insane than furnishing your whole flat with objects emblazoned with the monograms of the L.M.S., Wagon-Lits, Cleveland and Ohio, and the Canadian Pacific?

To revert to my "gramophone." It was playing scratchily in the boot-box in my room one evening when, to my horror, the house-master entered.




*A suggested pea sheller. If this gadget could be made to work it would probably make a lot of money.*

The truth came out and I brought the gramophone up for air. "Quite ingenious," he said. "Could not possibly disturb anybody's work except your own. As you never do any, you'd better keep the thing!"

### The Photographic Urge

A great opportunity was provided somewhere around this time by the creation of the photographic society. All sorts of chaps who had never before handled a Brownie o invested 5s. (that, I think, included a film) and joined.

The enthusiasm for photography amazed the masters for quite a while. The truth, of course, was that you cannot be interrupted while you are developing a film in the dark-room. Now the society's dark-room was conveniently placed in an open space, and a very primitive predecessor of air-conditioning (which another member rigged up) enabled us to smoke ourselves silly for months. The fact that the master in charge who paid occasional visits was a chain-smoker also helped. Unfortunately, the assistant to the headmaster, who was a non-smoker, came in one day. That put paid to our air-conditioning plant.

And so, in the early 'twenties, we pass from Public School—with the embryo collection of jazz records—to Oxford. Here a number of semi-forgotten gadgets came on the market. It was the age of the crystal set and of writing to *The Times* if you "got America."

By this time I was thoroughly tired of winding up gramophones and saw no reason why the mains supply should not be used for the purpose. I went to an electrical engineer in the town and together we succeeded in fitting an electric motor into a portable. It worked very well. Some years later, Messrs. Alfred Hays, of Bond Street, fitted electric motors to H.M.V. portables and you could also wind them up, which was an improvement on mine.

I may be wrong, but I do not think that at this time there were any electrically powered gramophones on the market because, some time after my electric portable was working, I bought in America a gadget which I attached to my large H.M.V. This was an electric motor which attached on the outside of the cabinet in place of the winding handle. On pressing a button it rewound the motor, but it was preferable to do it between records as it made a noise like a miniature electric drill. However, the spring of my gramophone played eight records at one winding, so that the 30-seconds whirring only took place about once in half an hour. When I left Oxford the first electrically amplified gramophones had not made their appearance.

### My Early Means of Transport

There was nothing very remarkable about the 1919 Wolseley Ten, except that I got caught with it as a first-year undergraduate, and had to get a motor-bike instead.

I haven't seen a Zenith with a graduo-gear for years, but I suppose there were good reasons for abandoning the principle of the rubber belt that provided imperceptible gear-adjustment. But I have always looked back on that old Zenith as the ideal machine for comfortable touring.

I cannot leave Oxford without some mention of the Hall-Scott. Nettled that the authorities had caught me with the Wolseley Ten, I determined that, when my second year came, I would have the largest and most monstrous car in the University.

This created a problem for a while owing to the fact that I was pretty broke, but a tragic accident at Brooklands, in which Zobrowski, the famous racing-driver, was killed, solved it. I bought his Hall-Scott for £40.

### Three Miles to the Gallon!

It must have been a toss-up what to call this monster. It had a Hall-Scott aeroplane engine that filled a bonnet fully 7ft. long, the chassis was Itala and the wheels were Austro-Daimler. All this mass of metal transported merely two bucket seats, and it did 3 miles to the gallon. A starting handle four feet long was provided so that two people could put their full weight on it at the same time. It never failed to start at the first attempt and it had a clutch that enabled the driver to move it an inch.

In spite of the fact that it was perfectly civilised in traffic, the Proctors most unjustly took a very dim view of it after it got a back-firing fit in the High one day.

As a result of this, I acquired one of the original shipments of Chrysler 70's—one of the landmarks of car manufacture, I think, and cast the dust of the University from my feet before it decided to send me down for failing five times in Old Testament History.

# Building Aluminium Boats—3

## With Notes on Design

By G. F. WALLACE, A.F.R.Ae.S.

(*Continued from page 194, April issue*)

TO simplify the design of the fittings, the mast should always be of square section where it enters the hull. Fig. 20a shows the construction of the mast step, and Figs, 20b and 20c show the support at deck level. The construction in Fig. 20b is used when the mast comes midway between two frames, and Fig. 20c is used when it comes close to one frame. The latter support should be used, if possible, in an undecked boat.

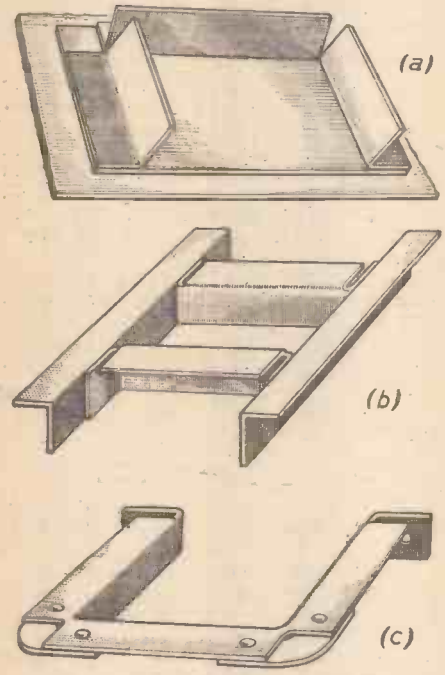



*Fig. 20.—Details of mast supports.*

### Stem

Two methods of forming the stem are shown in Fig. 21 (a and b). The type (a) should only be used on small, sharp-bowed boats, such as canoes. In small boats, using method (b), it is usually sufficient for the stem piece to be made from the same material as the plating. If a stronger stem is required the plating can be doubled.

### Rowlocks

The standard cast-iron fitting normally supplied with the rowlocks is used. In a decked boat the construction is as shown in Fig. 22 (a) and in an open boat as shown in Fig 22 (b).

### Rudders and Hinge

There are two types of rudder recommended, the fixed blade type and the hinged blade type. For small centre-board boats the hinged blade is considered to be the most practical, and is illustrated in Fig. 23. The blade should preferably be made of aluminium sheet 3/16in. thick, but if this is unobtainable steel sheet can be used instead. The fixed blade type of rudder is shown in Fig. 24, and is made entirely of wood. The type of rudder hinge fittings usually supplied by boatyards cannot be used because they are usually made from brass castings. A very satisfactory hinge can be made from the frame angle, as shown in Fig. 25. The hull attachment is shown at *a* and the rudder attachment at *b*; if required, a fixed pin can be made from bolts as shown at *c*.

### Masts

Some difficulty may be experienced in obtaining sawn wood of suitable quality for masts, and if bought from a boatyard they are apt to be expensive items. For the amateur of limited means, it is best to make the mast from a pine or fir sapling. These are sold for a few shillings for use as clothes posts, wireless poles, etc. A straight pole, an inch or two larger in diameter than the finished mast, should be selected, the bark stripped off and then left to dry out in a dry shed for at least six months. It is often difficult to get the mast absolutely straight, but this is of no great importance except on a Bermuda-rigged racing boat.

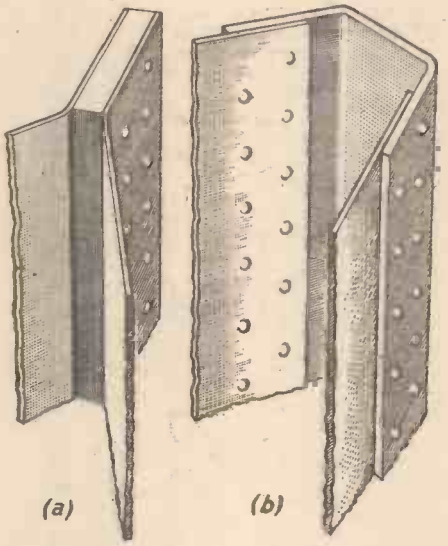



*Fig. 21.—Methods of forming the stem.*

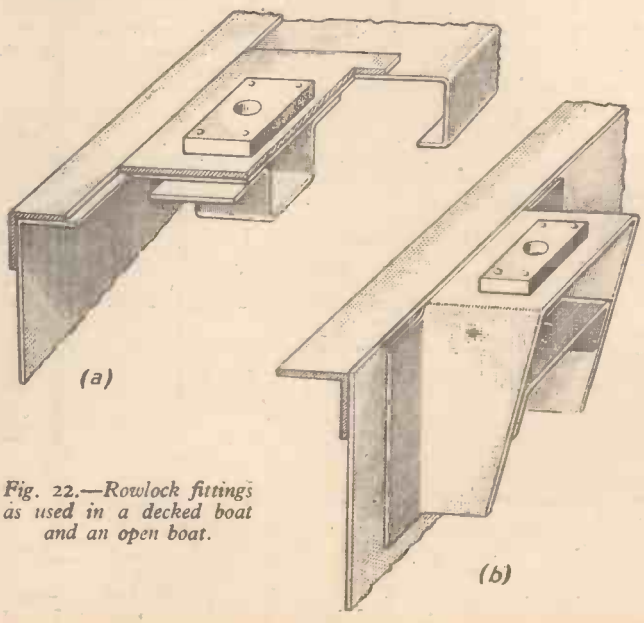



*Fig. 22.—Rowlock fittings as used in a decked boat and an open boat.*

### Sails

It is possible for the amateur to make his own sails and a book on the subject has been published. My own experience, however, is that it is wisest to have the sails made by a professional sailmaker.

### Outboard Motor Brackets

Outboard engines have to be clamped to wooden brackets. These should be made as shown in Fig. 26, running the full length of the transom and attached to gunwale and chine. In a sailing boat the outboard bracket must be offset from the centre line of the hull to allow sufficient movement to the tiller. On other boats the outboard bracket should be placed on the centre line.

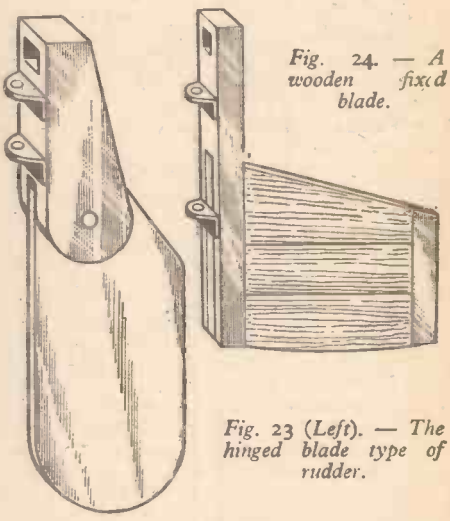


*Fig. 24. — A wooden fixed blade.*

*Fig. 23 (Left). — The hinged blade type of rudder.*

It is essential that good, well-seasoned timber only be used for outboard brackets, builder's deal is not good enough.

### Hatches for Watertight Compartments

It is necessary to have access holes in the watertight compartments. These should be in the deck and covered with a wooden cover, as shown in Fig. 27. The cover is held down by the bolt *a*, which engages the bar *b*. The hole is oblong in shape and the bar is of such a length that it will pass through the hole on the diagonal, but engages the stiffening angle *c* when turned across the short side of the hole.

### Painting

To obtain the maximum resistance to corrosion, it is essential that the boat should be painted. Care must be taken, however, to use the correct type of paint. On no account must paints containing lead, copper, or mercury compound be used. Preferably a zinc chromate base priming paint should be used and any standard paint or enamel can be used over this. If

zinc chromate primer cannot be obtained, it is probably best to use bituminous paints for both priming and finishing coat. Proper degreasing of the aluminium surface is essential, and this should be done with the following solution:

| | |
|---|---|
| Water ..... | 1 gall. |
| Washing soda ..... | 8 oz. |
| Waterglass ..... | 2 oz. |

Swab the aluminium with hot solution until all grease is removed and slight chemical action by the solution on the metal takes place. Then remove thoroughly all traces of the solution by hosing down with cold water. Finally, apply the paint as soon as possible after the aluminium has dried.

The time taken to build a boat depends on several factors such as the size of the boat, amount of leisure available, availability of materials, etc. For the amateur of average skill, a 12ft. dinghy would take five to six months to build. This means that work should be commenced as early in the year as possible. If a late start is made, the fine weather and light evenings arrive with the boat uncompleted, and there is a great temptation to rush the final operations, to the detriment of the boat. In boat building it is of great importance never to scamp or botch any part of the work, as the results may prove disastrous, and even lead to loss of life.

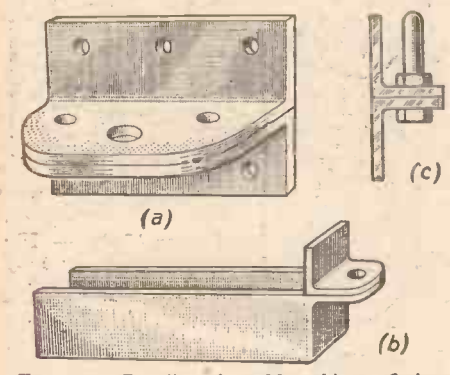



*Fig. 25.—Details of rudder hinge fittings.*

The first thing is to order the materials. Delivery dates vary considerably, sheet can usually be obtained within three weeks, but extruded sections may be anything from three weeks to three months. These are delivery times ex works; if you live over a hundred miles from the works you must allow another month on the railway. It is best to start with the chine and gunwale angles, because the soft aluminium used for them can usually be obtained locally from stock. First obtain sufficient timber for the formers, and make them up to the required shape. Cut the chine plate into strips equal in width to the length of the two legs of the chine angle, and curved to the radius of the boat in plan; this is shown clearly in Fig. 28. Now clamp the strips on to the formers, as shown previously in Fig. 10 and beat to shape with a wooden mallet. The same former can be used for the gunwale angle but the strips are clamped to the opposite face of the former. In the case of the gunwale there is no need to shape the former to the sheer curve as this is usually more than taken up by the spring in the material after forming.

### Cutting the Plating

The next thing is to cut up the plating to form the sides, bottom, transom and watertight bulkheads. The first thing is to roughly degrease the plate with paraffin and rags. Now mark out the plate from the development drawings of side and bottom. A soft pencil or a scriber can be used for marking out; the pencil is more easily seen but the scriber line is more permanent. Great care must be taken in marking out, because once the plate is cut it is impossible to rectify errors, and mistakes may lead to scrapping a quantity of expensive plate. The best plan is to mark out a section of the work one evening and check it carefully the following evening before doing any fresh work. All marking out should be checked at least once before any cutting is done. The tools required for marking out are: a straight edge three to four feet long, a large square, a two foot rule and steel measuring tape, also a set of splines at least 4ft. long. The splines can be made quite easily from builders deal planed down to about $\frac{3}{8}$in. by $\frac{3}{4}$in. section. When marking out has been completed, the plate should be cut up with a hacksaw. Some difficulty may be experienced at first in keeping to the scribed line, but it is easy enough after a little practice. The sawn edge should be trimmed up with a file and finished off with emery cloth. It is advisable to wear an old pair of leather gloves while sawing up and handling the untrimmed sheet. The sheet must now be thoroughly degreased, using the degreasing solution previously mentioned. Every particle of the degreasing solution must be removed with cold water, and it is best to hose the sheet down vigorously and not rely on swabbing it off with rags. As soon as the sheets are dry they should be given one coat of priming paint. Where two or more sheets have to be joined together to form the side or bottom, they should be riveted together now. If there is any difficulty in storing the complete length of side or bottom, this operation can be left until final assembly of the boat, but at this stage it is usually difficult to find room in the building shed to do it. The gusset plates for the frames can now be made from the material left over from the sides and bottom. Mark out one plate accurately, cut to shape with a hacksaw and trim the sawn edges. This plate can now be used as a template for marking out the others. When putting the faying angle on the lugs of the gusset plates remember that this operation "hands" them, and that there is a right and left hand gusset for each frame. It is also a good plan to number each gusset as it is completed, as this saves time in sorting them out when the frames are assembled. The frame angle should now be cut to length in accordance with the cutting list, they should also be numbered.

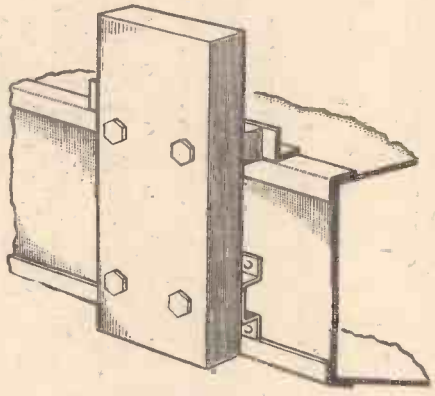


*Fig. 26.—Outboard motor bracket.*

### Assembling the Frames

The frames can now be assembled; great care must be taken over this, every dimension being checked at least once, because it is on the frames that the shape of the finished boat depends. The frames are assembled in a jig, made by screwing strips of wood on to a bench as shown in Fig. 29. The bench must be large enough to take the largest frame in the boat. Strip *a* represents the bottom of the boat and is fixed permanently; strip *b* represents one side and is also fixed permanently; strip *c* represents the opposite side and strip *d* the top of the frame. These two strips are moved to suit the dimensions of the various frames. It is best to start with the biggest frame in the boat, because this not only fixes the maximum size of the jig but usually has no faying angle, and is the easiest to build. Fix the wood strips so that the inside edge of the wood represents the outside dimensions of the frame. Then clamp the bottom and side members of the frame against the wood strips as shown in Fig. 30. Now lay the gusset plates in their correct position and scribe round the edge of the gusset plate on to the bottom angle. This indicates the correct position of the gusset on the bottom angle. Now remove the bottom angle from the jig, clamp the two gussets into their correct place on the frame angle with small parallel clamps and drill the rivet holes.

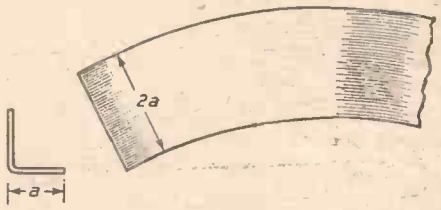



*Fig. 28.—Showing how the chine plate is cut into curved strips.*

Remove all burrs from the holes and rivet the gusset plates to the angle, remembering to put a coat of priming paint between the mating surfaces and assemble wet. Now replace the bottom angle, with gussets attached, in the jig and clamp in position. With the

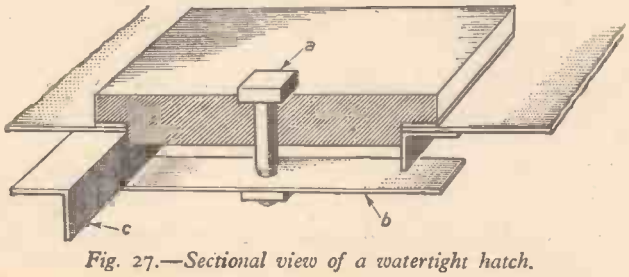



*Fig. 27.—Sectional view of a watertight hatch.*

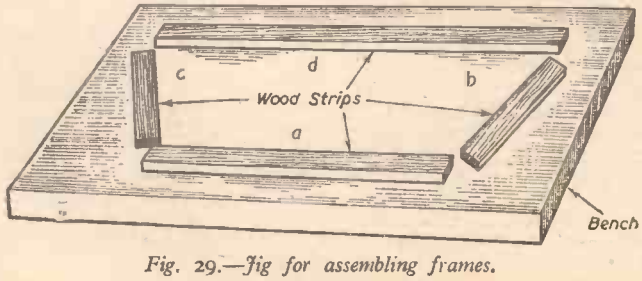



*Fig. 29.—Jig for assembling frames.*

side and bottom angles clamped in position, drill the rivet holes in the gusset and side members. Remove bottom and side angles from the jig and rivet side angle to gussets. If there is no deck beam the frame is now complete. If there is a deck beam, the top gussets should be assembled in the same way as described for bottom gussets. When there is a faying angle on the gussets the angle members must be packed up to the correct faying angles by means of wedges or packing pieces, as shown in Fig. 30. It is sometimes difficult to hold the side angles with "G" clamps when the angle is large and, in this case, they may be held in place with clamping bars as shown at *a*, Fig. 30. The frames should be painted with one coating of priming paint as soon as they are completed. The watertight bulkheads are next made up, but as they are already cut to the correct shape, no assembly jig is necessary. All fittings, such as centre board trunk, centre board, rudder and rudder hinges, rowlock brackets, etc., should now be made up.

### Building the Stocks

The boat is assembled on stocks which must now be built up. The following materials will be required:—

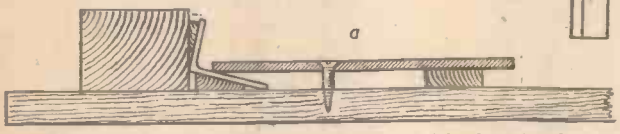
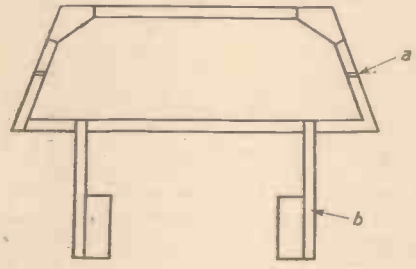



*Fig. 30.—Holding the side angles in place with clamping bars.*

Two lengths of 4in. by 2in. builders' deal, each about the same length as the boat. Several feet of 4in. by ½in. deal and sufficient 1in. by ¾in. deal to form a false deck beam for each frame that does not have a deck beam.

The two lengths of 4in. by 2in. are joined together by two battens and mounted on two boxes or trestles. The distance between them should be approximately half the beam of the boat. A quantity of packing-case timber or 2in. by ¼in. battens will also be required. The frames can now be set up on the 4in. by 2in. members, as shown in Fig. 31. The accurate setting up of the frames is of the greatest importance. They must be at right angles to the centre line of the boat, parallel to each other and at the correct height and distance relative to each other. It is best to work from a datum line, scribed on the frames as shown by *a*, Fig. 31. This datum line is parallel to the base line of the boat and all the frames are so mounted that the datum marks lie on a straight line level with the ground. The position of the frames is adjusted by moving the brackets *b*, Fig. 31, and by moving the frame in the bracket. The battens *c* are to steady the bottom angle of the frame. Items *b* and *c* are held in place by "G" clamps until the adjustment is completed, after which they are secured by wire nails. It will be noticed that the boat is assembled upside down. It is best to start with the middle frame and work out each side from that. When all the frames are in place take a long, thin batten equal to at least half the length of the boat and lay it along side and bottoms to ensure that the frames lie on a fair curve. If any frame appears to be out, its dimensions and position should be very carefully checked and, if necessary, its positioning corrected.



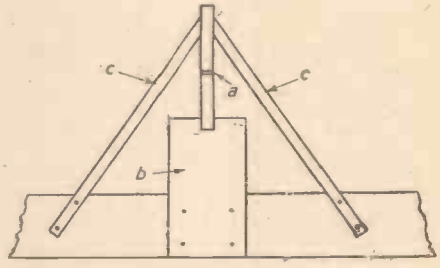



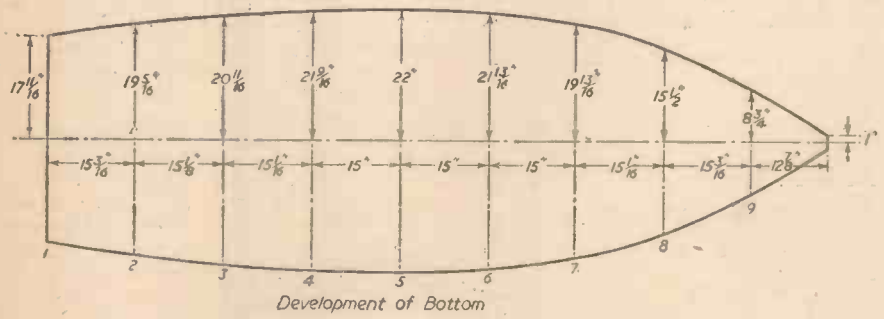

*Fig. 31.—Setting up the frames.*

The bottom and side plates should now be laid on the frames and clamped at the end frames. If all is well, the chine edge of bottom and side plates should meet within 1/16in. If any frame appears to be out of alignment, its position should be carefully checked, and, if necessary, corrected. Now remove the side plates, clamp the bottom plate in the frames at as many points as possible and drill for riveting, through both plate and frame. Take away the bottom plate and remove all burrs with file and emery cloth. A number of short metal thread screws the same diameter as the rivets will now be required. Give the mating surfaces of the frames a coat of priming paint and secure the bottom to the frames at a number of points, say two to each frame, with screws.

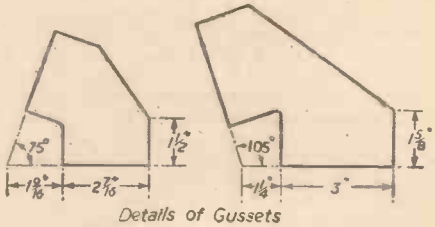
### Riveting the Plating and Frames

Now rivet the plate to the frames. This process should be repeated for the side plates. The transom and stem should now be assembled. As for bottom and sides, clamp in position, drill the rivet holes and rivet up. Now try the chine angles against the chine of the boat. It will probably be found that, owing to the spring in the material, the curve of the chine angle does not exactly match that of the boat. If the discrepancy is not very much, the chine angle can probably be forced into shape during assembly. If the discrepancy is too great to be forced, then the chine angle must be cut in the middle and the joint made good with a doubling piece. Clamp the chine angle in position by means of metal thread screws, two in the middle and two each end. Drill through chine angle and plating. Remove chine and file down all burrs, complete all drilling before starting any riveting of the chine. At this stage it is usually more convenient to work with the boat the right way up, so it should be removed from the stocks and turned over. Great care must be taken when doing this not to distort the hull in any way; the false deck beams must *not* be removed at this stage. Paint both chine angle and chine liberally with "Bostik," place the threads of caulking cotton in position and rivet on the chine. Complete one section at a time and do not start on a section unless the riveting can be completed the same day. An important point is not to start riveting at one end and work down to the other. If you do this, by the time you get to the other end, the chine angle will be stretched and the rivet holes will not line up. The correct way is to put a few rivets in at the ends and in the middle, and then a few at the quarter sections and so on until completed. When the riveting of the chines has been completed, a small fillet of "Bostik" should be run in at the edge of the chine angles.

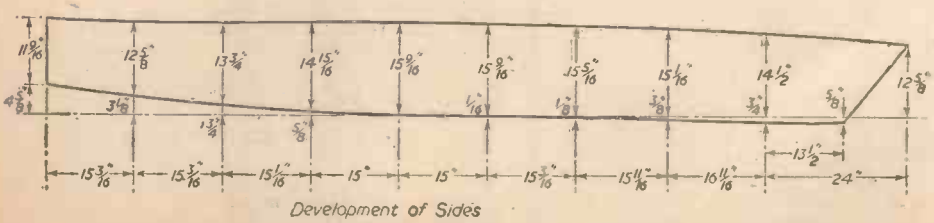
*(To be continued)*



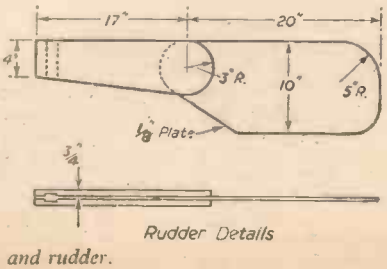

*Development of Bottom*




*Details of Gussets*




*Development of Sides*




*Rudder Details*

*A 12 ft. sailing dinghy. Development diagrams and details of gussets and rudder.*

# Direct-current Motors—3

## The Characteristics and Performance of Series and Compound Motors

By J. L. WATTS

(*Continued from page 124, February issue*)

THE field coils of the series motor have comparatively few turns of fairly thick wire; they are connected in series with the armature and carry the armature current. Unlike the shunt motor the field current of a series motor is not constant, but depends on the load on the motor. In consequence, the speed of this motor varies considerably on a varying load, as indicated in Fig. 11 and curve A of Fig. 12.

We may consider the case of a series motor which is fed from a supply of constant voltage and is driving a steady load, such as a fan. Let us suppose that the load is now reduced, as may occur if the air inlet to the fan is closed so that the air output is reduced to zero. Since the motor torque now exceeds the load torque the motor will now speed up somewhat. In so doing, the rate at which the armature conductors cut the field flux will be increased, thus the back e.m.f. is increased and the armature current is reduced. The back e.m.f. e is proportional to $N\ \phi$, where N is the motor speed and $\phi$ is the value of the field flux. The motor current

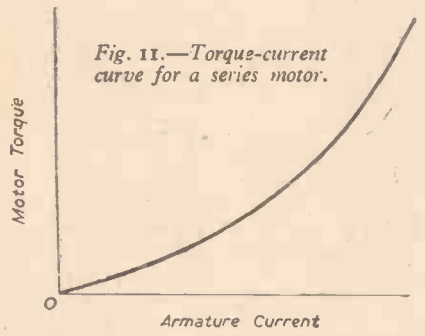



*Fig. 11.—Torque-current curve for a series motor.*

I is equal to $\frac{V-e}{R}$ amps., where V is the voltage applied to the motor and R the resistance of the motor in ohms.

The effects are modified by the fact that the reduced motor current I caused by the increase of back e.m.f. e also reduces the field flux $\phi$, this effect tending to reduce the back e.m.f. As a result the speed of the motor will increase to a greater degree on a given reduction of load than would that of a shunt motor with practically constant field strength. Similarly, if the load on the motor is increased the speed will fall to a greater degree than would that of a shunt motor. The motor torque is proportional to $I\ \phi$. For low current loadings, and consequently low field strengths, $\phi$ will be practically proportional to the motor current I, thus the motor torque will be proportional to $I^2$, approximately. As the current loading is increased and the field flux density increases towards saturation point, the motor torque tends to become proportional to I.

### Use of Series Motor

These characteristics make the motor rather unsuitable for a drive which may become unloaded, as may occur if a driving belt should break or slip off the pulley. In this event the speed of the motor may rise to such an extent that there is risk of the armature and commutator being damaged by the high centrifugal stresses set up in these parts, such stresses being proportional to $(\text{speed})^2$. Certain small motors which drive through gearing, however, have sufficient friction load to prevent the machine reaching a dangerously high speed.

For many industrial drives it is inconvenient if the speed of the motor varies considerably on a varying load. The series motor, however, is suitable for small portable drills with speed-reduction gearing; the motor speed automatically falls when the load is increased by using a larger drill, thus the cutting speed is kept fairly correct. A series motor is also quite suitable for a drive which has a constant load and which cannot become unloaded, such as a direct-coupled fan.

The series motor is particularly suitable for a drive which requires a high starting torque which cannot become unloaded, or which is under continuous control, such as an electric vehicle or a crane. Suppose that an electrically-driven vehicle starts to climb a hill, so that the load torque on the driving motor is doubled. In the case of a constant field shunt motor there would be little fall of speed, but the armature current would be doubled to provide the necessary motor torque. The rate of heat generation in the armature, proportional to $I^2_a\ R_a$, would be

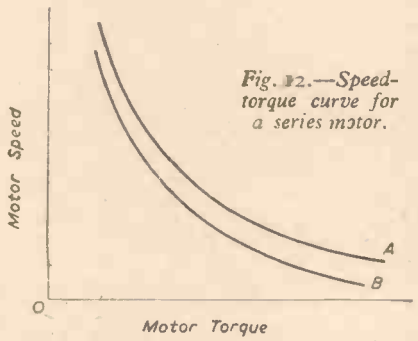



*Fig. 12.—Speed-torque curve for a series motor.*

four times as great as before; whilst the horse-power, proportional to the product of torque and speed, would be practically doubled. In the series motor, however, the doubled load torque would result in an appreciable fall of motor speed, due to the increased field flux $\phi$ resulting from the increased motor current. The required motor torque would be obtained with about $\sqrt{2}$ of the original current, the speed falling to about $\frac{I}{\sqrt{2}}$ of the original value neglecting saturation. The motor current and horse-power would be

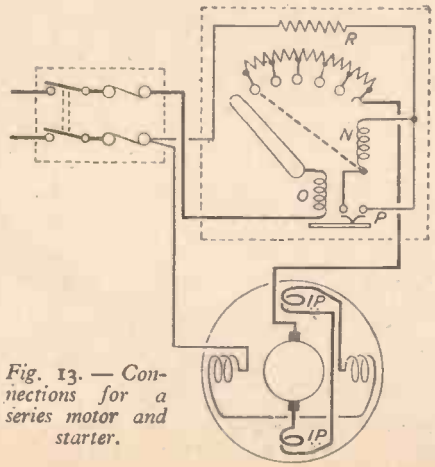



*Fig. 13. — Connections for a series motor and starter.*

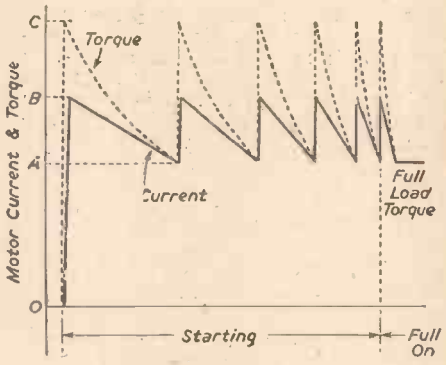



*Fig. 14.—Starting of series motor.*

increased to about $\sqrt{2}$ of their original values, and the rate of heat generation in the motor would merely be doubled.

### Series Motor Starters

Many fractional horse-power series motors, such as vacuum cleaners, portable drills, etc., are started up quite satisfactorily by switching them directly on to the supply mains. The initial motor current is then fairly high and equal to $\frac{V}{R}$ amps., where R is the resistance of the motor. The starting torque will be high, especially if the field magnets are not saturated with normal values of current. Larger motors require a starting resistance in series with the motor to limit the starting current and motor torque, as indicated in Fig. 13. A series motor starter normally requires fewer studs than does a shunt motor of similar size and horse-power because the field coil resistance tends to limit the current, the inductance of the field coils tends to delay the rise of current, whilst every increase of current increases the motor torque to a greater degree than in the case of a shunt motor, particularly if the fields are unsaturated. For example, whilst 150 per cent. of full load current may create 150 per cent. of full load torque in a shunt motor, it may create up to 225 per cent. of full load torque in a series motor. Fig. 14 indicates the starting of a series motor against full load torque, with a starter which is designed to limit the current to 150 per cent. of full load current.

Fig. 13 shows a common arrangement of a series motor starter in which the under voltage release-coil N is fed from the mains through the resistance R. In other cases it may be connected in series with the motor. The overload trip-coil O carries the motor current, excess current causing it to attract the armature to close the contacts P to short-circuit and de-energise the coil N and release the starter.

### Reversal of Series Motors

A series motor may be reversed by reversing the current through either the field coils or the armature. If interpoles are fitted they should be treated as part of the armature circuit, and the connections between the armature and interpoles should not be interfered with when reversing; unless the motor happens to be reversed by moving all the brushes round through one pole pitch. A motor interpole should always have the opposite polarity to the next field pole forward in the direction of rotation. In some cases

the armature of a small two-pole motor is connected between the two field coils, in which event it is usually quite simple to reverse the motor by reversing the connections to the armature. Fig. 15 shows the connections of a double-pole two-way switch used to reverse such a motor.

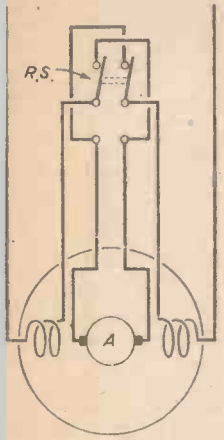



*Fig. 15.—One method of connecting a reversing switch to a series motor.*

### Speed Variation by Armature Circuit Control

The speed of a series motor on a given load can be reduced by reducing the voltage applied to the armature. The usual way of doing this is by connecting a resistance in series with the motor, as shown in Fig. 16(a). The volt drop across this series resistance of $R_c$ ohms is equal to the product of armature current $I_a$ and resistance $R_c$. If the resistance of the armature is $R_a$ and that of the series field coils (plus interpole coils, if fitted) is $R_f$ the voltage applied to the armature will be $V-I_a(R_c+R_f)$. The back e.m.f. generated in the armature will be equal to $V-I_a(R_c+R_f+R_a)$, and the motor speed will be proportional to the back e.m.f. and inversely proportional to the field magnetic strength $\phi$. Since the volt drop across the series resistance $R_c$ increases with increase of load current $I_a$ the use of this resistance will cause the speed to fall on load to a greater degree than otherwise, as indicated in curve B of Fig. 12.

The safe full load current of the motor is almost constant, since it depends largely on the size of the conductors, and the motor torque is proportional to $I_a\ \phi$. It follows that the safe full load torque of the series motor is practically constant at all speeds obtained with series resistance control, thus the full load horse-power is proportional to the speed. This is subject to a possible slight reduction at low speeds, due to reduced cooling. Series resistance control has the disadvantage that there is considerable waste of power in unwanted heat at the control resistance; also, the speed variation on load is increased.

### Speed Control by Field Regulation

The speed of a series motor on a given load can be increased by reducing the field current, which may be done by connecting a diverter resistance across the field coils, as shown in Fig. 16(b). The field coils will then only carry a portion of the armature current, thus the field strength $\phi$ will be reduced. The speed is proportional to $\frac{e}{\phi}$, where e is the back e.m.f. generated in the armature. The actual change of speed obtainable with a given change of field current depends on the degree of saturation of the field magnets, a greater reduction of field current being required for a given increase of speed if the field magnets are well saturated and operate at a high magnetic flux density.

The motor torque is proportional to $I_a\ \phi$, so that a diverter resistance gives an increased speed with reduced motor torque; thus the safe full load horse-power with diverter resistance control is almost constant, subject to a possible slight increase at high speed due to improved ventilation. Where the load is subject to very rapid changes it is possible that the current in the inductive field circuit may change less rapidly than in a non-inductive diverter resistance. If, then, the motor load and current increase, the field strength would increase more slowly, the motor torque would increase comparatively slowly, and there might be a certain amount of "hunting" or fluctuation of speed. This may be avoided by using an inductive diverter resistance, which consists of a few turns of conductor round an iron core.

### Operation on Changed Voltage

The speed of the series motor can also be changed by supplying the motor from another voltage V, the speed on a given load then being proportional to $V-I_a(R_a+R_f)$. When a series motor is run on a higher voltage than that for which it was designed its speed on a given load torque will be increased. If the motor is a large one its speed will be almost proportional to the voltage, on a given load torque. The safe full load torque and current will be practically unchanged by change of voltage, thus the full load horse-power will be proportional to the speed.

An economical method of speed control, which is often employed on an electrically-driven vehicle, is possible by using two series motors. These are connected in series with each other for starting and low speeds, as indicated in Fig. 17(a). On a given load current the speed will then be less than half the normal value, whilst the total torque will be twice the normal value of each machine. The motors are connected in parallel with each other for high speed operation, as shown in Fig. 17(b); each motor then receives the full supply voltage and runs at normal speed. Since each motor carries half the total current the combined torque with a given current in parallel will be half that obtained with the same total current and the series connection. This system enables variable speeds to be obtained without wasteful resistance losses, although a control resistance is often used as well for additional speed control.

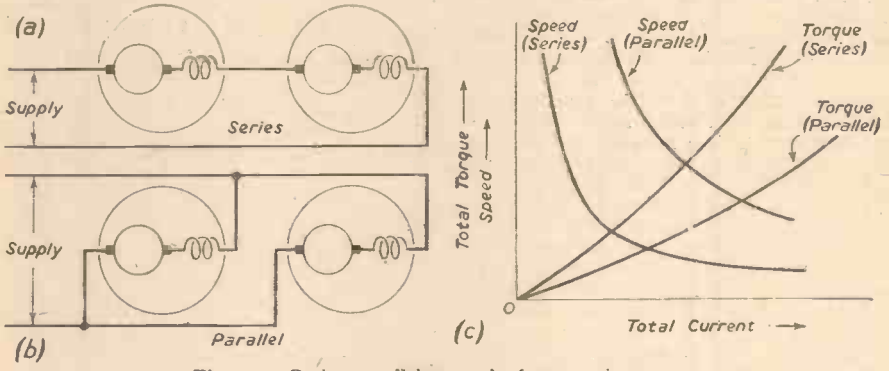



*Fig. 17.—Series-parallel control of two series motors.*

### Modification for Different Voltage

In order to adapt a series motor for a different voltage without change of torque, horse-power, or full load speed, the number of turns on each armature and field coil should be altered in proportion to the voltage. The largest possible size of conductor should be used; usually it will be necessary to change the cross-sectional area of conductors in inverse proportion to the voltage, i.e., to change the diameter of the conductors in inverse proportion to the square root of the voltage. Thus, if the voltage is halved, the number of turns in each coil should be halved, the cross-sectional area of the wire doubled by using wire having $\sqrt{2}$ of the original diameter. The safe full load current of the motor will then be inversely proportional to the voltage. In the case of operation on half voltage, however, it is possible to avoid rewinding the field coils; these coils merely being reconnected into two sets which are in parallel with each other and in series with the armature, so that half the armature current flows through each field coil. The armature must, of course, be rewound to carry twice the original value of current.

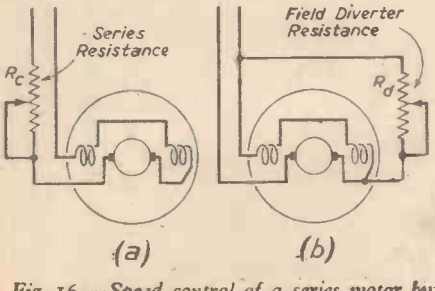



*Fig. 16.—Speed control of a series motor by means of resistance.*

### Compound Motors

The compound motor has both a shunt field winding and a series field winding. The two windings are usually connected so that they create magnetism of the same polarity, i.e., so that they assist each other. In this case the starting torque obtainable with a given value of starting current is rather more than would be the case with a similar shunt motor. This is due to the field-strengthening effect of the fairly high starting current which flows through the series field coils. This arrangement, which is known as cumulative compounding, is therefore suitable for drives which require a fairly high starting torque but a fairly constant speed on a varying load, such as air compressors.

Due to the fact that the series field winding strengthens the field magnetism on heavy loading, the speed of the cumulative compound motor may fall to a rather greater degree than that of a plain shunt motor. This characteristic is desirable for certain machines, such as presses, where the load is intermittent but very heavy. Specially designed cumulative compound motors are often employed on such drives which incorporate flywheels; the function of this arrangement is to assist in equalising the load on the supply mains over the whole of the running period. At the instant when the press delivers its power stroke the motor and flywheel slow down, thus some of the momentum of the flywheel is used in driving the press, and the current loading on the motor is reduced. At the end of the power stroke the load falls and the motor speeds up to restore the kinetic energy of the flywheel ready for the next power stroke. If the motor was of a type which ran at almost a constant speed over the full range of load, the flywheel would serve little purpose; there would be little or no fall of speed of the motor and flywheel on the power stroke, the motor drawing a very high current from the mains to maintain its speed. Unlike the series motor, the speed of the cumulative compound motor has a definite limit on light load. The characteristics of compound motors,

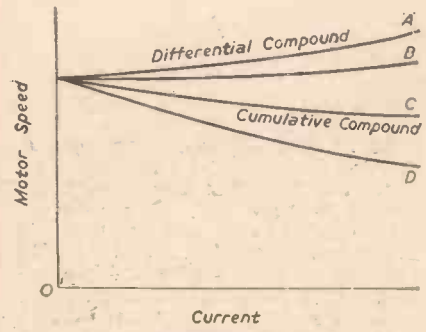



*Fig. 18.—Characteristics of compound motors.*

of course, depend on the number of series turns fitted on each pole.

**Differential Compounding**

In the differential compound motor the series and the shunt field windings are connected to create magnetism of opposite polarity, so that they oppose each other. This arrangement tends to give the motor a rather more constant speed on a varying load than in the case of a shunt motor because the series coils weaken the field at heavy loads. In some cases, the speed of the differential compound motor may rise considerably on increased load. The curves A and B in Fig. 18 indicate the characteristics of two differential compound motors, whilst curves C and D show those of two cumulative compound motors. It is usually necessary to cut the series field winding of a differential compound motor out of circuit at starting, otherwise the considerable weakening of the field by the starting current through the series field winding may necessitate the starter arm being moved over to increase the armature current so that the motor can develop sufficient torque for starting. In some cases the series field windings might be powerful enough to reverse the field magnetism and cause the motor to start up in the reverse direction if the starter allowed a high starting current.

**Reversal of Compound Motors**

A compound motor of either type can be reversed by reversing the current through all the field coils or through the armature (plus interpole coils, if fitted). As there are two sets of field coils the simplest method of reversal is usually by reversal of the armature current, as indicated in Fig. 19. It may be seen that the polarity of the field coils is then unchanged, the polarity of the interpoles being reversed so that each interpole has the opposite polarity to that of the next field pole forward in the direction of rotation.

**Speed Control of Compound Motors**

The speed of the compound motor can be increased by using a resistance in the shunt field circuit. In most cases the series ampere turns are small compared with the shunt ampere turns, in which case the safe full load torque with shunt field control will be practically inversely proportional to the speed, and the full load horse-power practically constant. On the other hand, if the motor has a comparatively strong series field, this will have a much greater effect at high speeds than at low speeds. If cumulative compounded, the speed variation on varying load may then be increased at high speeds; if differential compounded, the speed may rise appreciably on increased load when running at high speed. The speed of a compound motor may be reduced by using a resistance in series with the armature; this method is wasteful of power and increases the speed variation on a varying load.

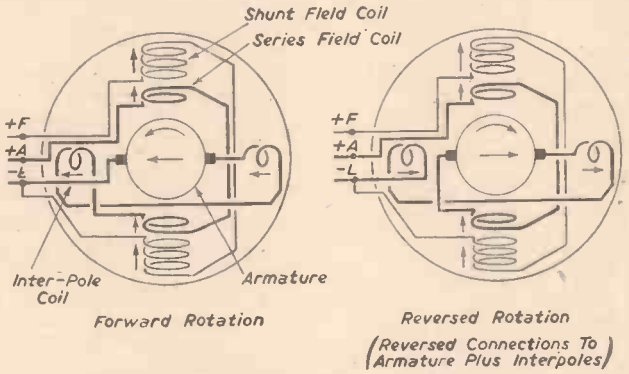



*Fig. 19.—Method of reversing a compound motor.*

**Operation on Changed Voltage**

The effects of operating a compound motor on a reduced voltage are generally similar to those obtained with a shunt motor, being somewhat modified by the series field current. On reduced voltage the series field windings will have a comparatively greater effect; the speed of a cumulative compound motor may then fall appreciably on increased load, whilst that of a differential compound motor may rise on increased load. Care must be taken that the series field windings of a differential compound motor do not overpower the shunt field winding when run at high speed on heavy load.

When operating a compound motor on a higher voltage than normal, a resistance should be connected in the shunt field circuit to limit the shunt field current to its normal value, so that these coils will not overheat. In this case the full load armature current and torque will be unchanged, the speed and horse-power being practically proportional to the supply voltage. In order to modify a compound motor to operate at a different voltage without change of speed, full load torque or horse-power, the armature and field coils should be rewound, the number of turns on each coil being proportional to the voltage. The largest size of conductor with the required number of turns should be used; generally it will be necessary to change the cross-sectional area of the wire in inverse ratio to the voltage, i.e., the diameter of the wire in inverse ratio to the square root of the voltage. The full load current will then be in inverse ratio to the voltage.

If required to run on half the normal voltage the armature may be rewound as mentioned above, but the shunt and the series field windings each reconnected into two parallel sets. The paralleled series field coils will, of course, be connected in series with the armature; if interpoles are fitted their coils may be similarly treated. The paralleled shunt coils should be connected across the mains. This will result in the motor characteristics being practically unchanged, the full load motor current being doubled on the half voltage.

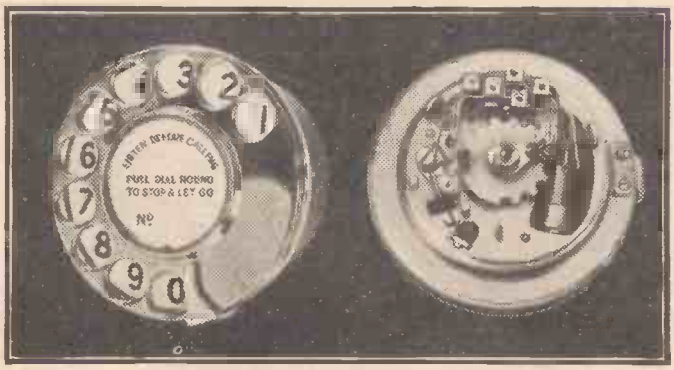
# Items of Interest

**New Automatic Telephone Dial**

A NEW type of automatic telephone dial mechanism, designed by the General Electric Co., Ltd., has now been adopted as standard by the British Post Office after extensive tests carried out at home and abroad over a period of five years.

The new trigger dial reduces the possibility of dialling errors, and is automatically compensated for wear. It is completely interchangeable with any existing British Post Office type dials.

Tests have shown that correct dialling is still obtained even after 20 million impulses have been transmitted. Prolonged use in the Bagdad area has demonstrated that the dial is completely dustproof when fitted with a plastic cover at the rear, and arduous service in Singapore has confirmed that it fully withstands the effects of a humid climate.



*The new G.E.C. Trigger Dial.*

**"Princess" Flying Boats**

THE first pair of engines were recently installed in the first of the three giant "Princess" flying boats now under construction by the Saunders-Roe Company, at Cowes, Isle of Wight. Close rivals to the 130-ton Bristol "Brabazon" air-liner, the Saunders-Roe "Princess" flying ocean liners are slightly smaller than the landplane, but will be 10 tons heavier, more powerful and faster. The 35,000 h.p. of her jet propeller engines will give a cruising speed of 330 m.p.h. The aircraft can accommodate 105 passengers on the twin decks of her "double-bubble" hull.

**New Road-surfacing Machine**

A NEW machine which, it is claimed, restores the roughness of granite (setts) in a roadway and so reduces skidding, is in use on one of Nottingham's worst corners.

A number of rotary drills are set in a frame, which is so mounted that the weight is almost equally balanced. By slowly pushing the machine forward, and at the same time carrying out a weaving action, the operator can prepare a strip about 24in. wide. The drills chip at the setts which have been worn smooth and gives them a rough surface which enables motor tyres to have a better grip on the road.

# A Water-driven Generator

## Constructional Details of a Small Plant for Supplying L.T. and H.T. Current

By W. P. HALKET

THE water for driving this wheel must have a fall of at least 40in. and its flow must be sufficient to fill a pipe 2⅜in. internal diameter.

Under these conditions the wheel will turn at approximately 40 revolutions per minute, and the generator specified, with the field coils wired as described later, will deliver a charging current of nearly one ampere to one 2-volt accumulator, or supply a radio set with about 150 volts high tension.

The wheel is of very simple constuction and is based on a 28in. front bicycle wheel. Attached to the rim are 10 buckets formed from ordinary food tins.

### Construction

Fig. 1 shows the arrangement for coupling the wheel to the generator, and also the brass bush, which may be a piece of brass tube 5/16in. internal diameter, which runs in the external bearing.

Take out the ball-bearings and, after replacing the axle, screw the cones hard up against the inside of the hub.

Make a driving plate as shown, slip it over the axle and bolt it where two spokes cross, using a large washer inside. Then screw a nut on to the axle to lock the plate against the cone. This plate prevents the cones from slackening off, since the axle is screwed right hand and the generator turns right hand.

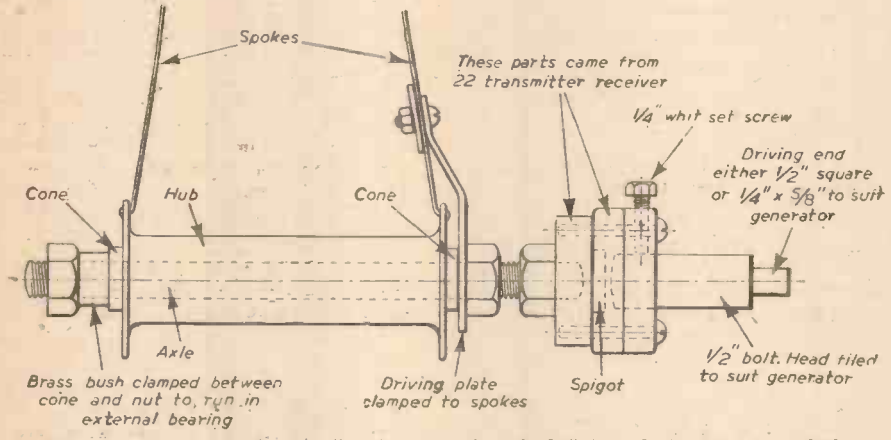



*Fig. 1.—Details of the coupling between the wheel hub and the generator shaft.*

The small brass bush which runs in the external bearing is clamped tightly between a nut and the cone. It turns with the wheel and, though of small size, it shows very little signs of wear.

The coupling bushes (shown in Fig. 1) were taken from a 22 transmitter-receiver chassis (Duke and Co., Ilford, Essex, 7s. 6d.). The bush next to the wheel has a threaded hole which fits the axle tightly. Part of the other end of this bush is cut away to leave a spigot which is made to fit the second bush which is screwed to the first. This second bush requires to have a ¼in. Whit. hole drilled and tapped in it for the set-screw which binds the ¼in. dia. steel bar which transmits the drive to the generator. This bar is made from a ½in. dia. carriage bolt, the head being filed to fit the slot on the generator spindle.

If the reader has a lathe he will, no doubt, evolve a less clumsy coupling, but the one shown gives no trouble.

Fig. 2 shows the wooden block which is used to form the tin buckets to the taper required. This taper is necessary in order to prevent the body of one bucket from interfering with the water flow to the bucket immediately before it.

Before cutting the tins solder round the joint, both inside and outside, for about ½in. down at the open end of the tin. This prevents the joint from opening when the tin is bent to the forming block.

Draw a line across the base of each tin at right-angles to the above-mentioned longitudinal joint. Then on the joint side of the line cut round the periphery with a a pair of snips, removing the rim from one-half of the base. Cut along each side of the joint to within an inch of the open end and remove this part of the joint altogether.

Now push in the forming block so that the centre line marked on it registers with the joint. Clamp in a vice, bend over the free half of the base, then fold the sides over on top of it. Run solder round all the joints which overlap. With a mallet, tap this flap portion inwards until it fits approximately to the curvature of the wheel rim.

Divide the rim of the wheel into 10 and drill 10 3/16in. holes, moving in two cases, ½in. ahead to avoid the spokes. Then mark 10 more holes and drill them. Drill corresponding holes in each bucket (Fig. 4). Make 10 washers as shown in Fig. 2. These go inside the buckets under the screw next to the open end of the bucket.

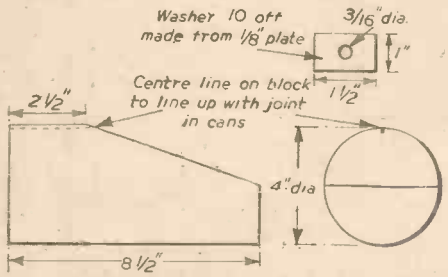



*Fig. 2.—Details of forming block for shaping buckets*

*General view of the water-driven generator in its setting on the side of a hill.*

### Mounting and Housing the Generator

Fig. 3 shows how the generator is mounted in the base of the housing.

This housing consists of the pressed steel case of the 22 transmitter-receiver placed vertically on one end with a sliding door fitted to it. It is held securely to a cement base by four bolts.

Fit a wooden shelf above the generator, as indicated, to support the batteries. The underside of this shelf carries the cutouts and condensers marked "A" in Fig. 5.

The holding-down bolt for the rear support bracket of the generator must have its head soldered to the outside of the housing before the housing is cemented down (see "B" in Fig. 3).

The distance pieces between generator and housing are ⅜in. long and are made from brass tube.

A suitable support, "C," for the external bearing can be made from flat or angle iron. It is cemented securely, and the holes in the bottom lug of the external bearing are slotted to allow for some adjustment.

### Water Pipe

Fig. 4 shows the arrangement and dimensions of the water pipe.

The adjustable nozzle is simply a piece of galvanised iron folded round in the form of a clip and tightened by the screw and nut through the upturned flanges. With a heavy flow of water it should be pushed back. With a lighter flow the water is used more efficiently if it is brought forward.

To stop the flow of water I cover the inlet to the pipe with a rubber cup.

### Electrical Adjustments

In order to get the generator to charge at a low revolution of the wheel it is necessary to place the field-coils in parallel with each other as well as in parallel with the armature.

Take off the end cover of the generator and cut the wire between the coils, solder leads to the ends, bind with tape and, having drilled a ¼in.-dia. hole on the underside of the cover, bring the leads out through this and connect them to the L.T. terminals

on the top of the generator. In case of error in this connection reverse the leads if necessary.

### The Charging Cutout

This is a 250 ohm solenoid with a make contact.

Take off the armature and unscrew the coil from its mounting. Then put on top of the coil a close, single-layer winding of 28 or 30 s.w.g. cotton-covered wire. Break in the centre and wire the two coils in parallel. This is necessary as there is not sufficient space between the high-resistance coil and the body of the cutout to allow for a heavier gauge of wire for the top winding.

Reassemble and make a metal clip to go round the coil, and clamp it to the underside of the battery shelf.

The action of the cutout is as follows:—

The high-resistance coil is connected in parallel with the generator and when the generator reaches a given output the armature is attracted and closes the contact, sending the charging current through the low-resistance winding of the cutout and the battery. This current passing through the low winding of the cutout assists the high-resistance winding.

If the water is cut off or if for some reason the voltage of the generator drops below that of the battery, the battery immediately begins to send a current back through the low-resistance winding. This neutralises the magnetism produced by the high-resistance winding of the cutout and the armature is released and breaks the contact, thus preventing the battery from discharging through the generator.

The H.T. current may, of course, be drawn from the generator, and it is only necessary to earth the negative terminal and run a wire from the positive to the radio set through a smoothing circuit.

However, when a battery is being charged the H.T. voltage is low and, since the generator is likely to be some way from the house, it would be awkward having to go to the generator to switch the battery off. Of course, if no battery is on charge it is only necessary to start the wheel running to obtain full H.T.

Fig. 5 shows the complete circuit, and it will be seen that a cutout is placed in the H.T. positive lead to the radio set.

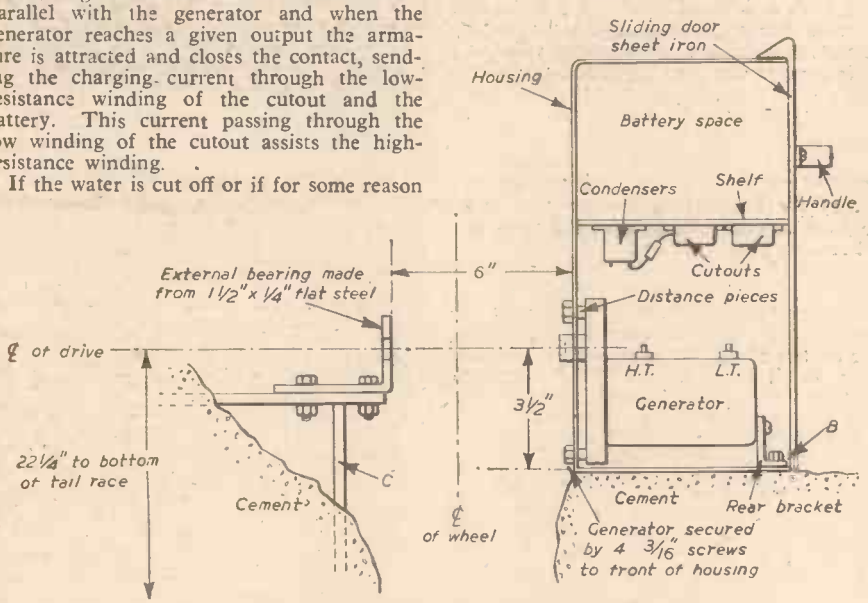



*Fig. 3.—Arrangement of housing and external bearing.*

This cutout is again 250 ohms resistance, but it breaks contact when the current flows through the winding.

The action is as follows:—

With a battery on charge the L.T. reaches the battery through the H.T. cutout contact which is closed.

On switching on the radio set the condensers in the set charge up, drawing a heavy current momentarily. This is normally sufficient to attract the armature of the cutout and so break the L.T. circuit. The H.T. voltage immediately rises and the anode current of the radio set takes over, holding the armature.

On switching off the radio set the anode current stops and the battery comes into circuit again with the generator.

Included in the smoothing circuit is a press-button switch which, when closed, momentarily sends the full H.T. current through the cutout. It is quite definite in action, but is only used when the water supply is very low.

Since the radio set will have a stand-by H.T. battery it is necessary to fit a two-way on-off switch in the H.T. supply, as shown in Fig. 5.

The main choke in the smoothing circuit is an ordinary small mains smoothing choke, but I found it necessary to add the other, which is the primary of a loudspeaker output transformer, in order to smooth out the high-pitched note produced by the commutator. I did not find it necessary to place a condenser across the L.T. commutator.

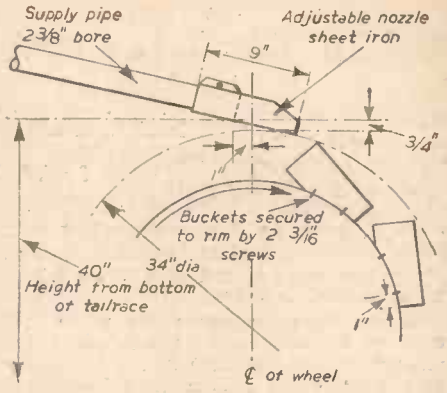



*Fig. 4.—Showing the position of discharge nozzle in relation to buckets.*

### Running the Generator

An ammeter is essential when charging, and if you do not possess one, either buy a 0-5 or shunt a milliammeter with a low resistance adjusted to a known current.

I have been experimenting with a generator other than that specified, with the wheel running very slowly.

This generator has an L.T. output of 28 volts, but I find that by again placing the field-coils in parallel with each other, for very slow running—about 20 r.p.m.—it will charge at about ¼ amp. However, it is not such a well-constructed generator as the one specified, though I would advise any reader to use a higher voltage generator if he has insufficient water to drive the other.

This water wheel has been in operation for over three months, often running continuously for a fortnight, and has given no trouble.

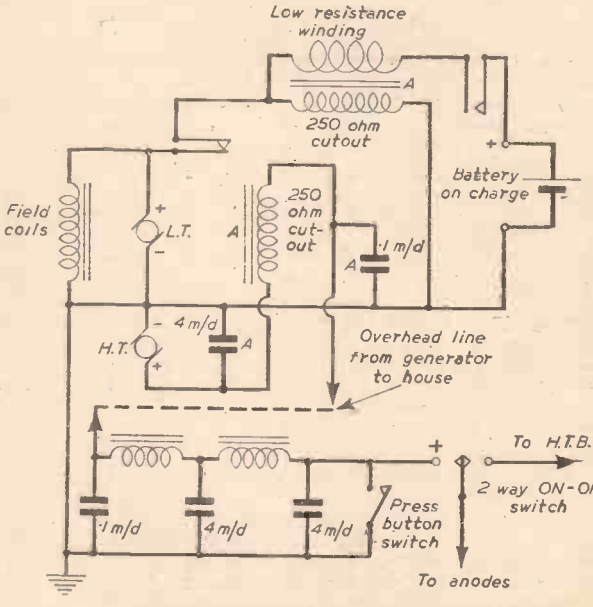



*Fig. 5.—Circuit diagram of electrical connections.*

## LIST OF PARTS

**Mechanical**

1 28in. front bicycle wheel.
10 National Food tins.
2 Coupling bushes (22 transmitter-receiver).
1 Brass bush 5/16in. bore x 5/16in long.
1 ¼in. carriage bolt.
3 Axle nuts.
20 3/16in. x 1¼in. screws and nuts.
2 3/16in. x 1in. screws.
1 3/16in. x ½in. screw and nut.
1 ¼in. Whit. set screw.
10 Washers (Fig. 2).
1 Pressed-steel case (22 transmitter-receiver).
1 Piece galvanised iron 20in. x 9in. for sliding door.
4 3/16in. screws x 1¼in.
4 Distance pieces 3/16in. bore x ⅜in. long.
1 3/16in. x ⅜in. screw and nut.
1 4 B.A. x ½in. screw
4 ½in. x 2in. hexagonal screws, nuts and washers.
1 Wooden shelf to fit housing, and screw-nails.
1 Piece flat steel 8in. x 1½in. x ¼in.
1 5/16in. x 1½in. hexagonal bolt, nut and washer.
Flat or angle iron for external bearing support.
1 Length of cast iron pipe 2⅜in. bore.
1 Piece galvanised iron 9in. x 9in.
1 ¼in. x 1in. screw and nut.
1 Piece of wood 4in. diameter x 8½in. long.

**Electrical**

1 Generator Type 1, 6.3 v. L.T. and 320 v. H.T. (Mail Order Supply Co., London. 12/6.)
2 250 ohms cutouts, one make the other break.
3 4 mfd. condensers 350 v. working.
2 .1 mfd. condensers 350 v. working.
2 Smoothing chokes.
1 Press-button switch.
1 2-way on-off switch.

# Inexpensive House Telephones

## Details of Construction and Operational Notes

By R. V. HARDY

SOME remarkably efficient and inexpensive house telephones were recently constructed by the writer from ex-Government telephone handsets, readily obtainable from various surplus stores for a few shillings. These handsets comprise a low impedance receiver, a carbon granule microphone and a "Press to Talk" switch incorporated in the handle, with a six-core cable terminating in a metal-cased plug. This plug was removed.

Fig. 1 is a theoretical diagram of a complete two-way telephone which is particularly useful for internal communication in the house, between the house and garage or workshop, or for general office use. Two identical sets are required for two-way communication, and the batteries, etc., are housed in neat wooden containers with a rest on top to hold the handset. The telephones are connected by means of four

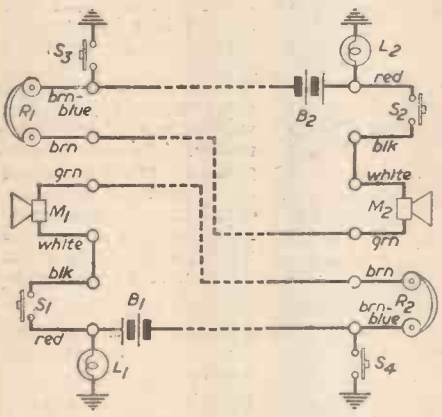



*Fig. 1.—Theoretical circuit diagram.*

wires; the writer used two lengths of twin bell wire, which resulted in a neat job.

M1 and M2 are microphones, R1 and R2 the telephone receivers, B1 and B2 are batteries consisting of two U2 cells connected in series for each battery. L1 and L2 are call lights consisting of ex-Government warning lamps fitted with 2.5-volt flashlamp bulbs. Lamps were used in this particular instance as the telephones were required to work between the operator's box and attendant in a small cinema where an audible call was not permissible, but a small buzzer or bell, mounted on the outside of the front cover of the battery container may be substituted if desired. S3 and S4 are switches for operating the call lights, and panel-mounting push switches are ideal for this. It will be noticed that one side of each of these switches and one side of the two call lights is connected to a common earth. S1 and S2 are the "Press to Talk" switches incorporated in the handles of the handsets and must be depressed when speaking in order to energise the microphones.

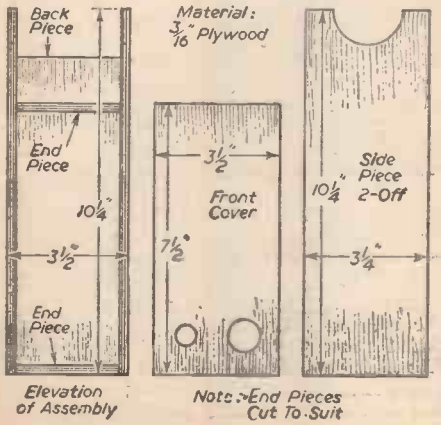



*Fig. 2 (Left).—The parts forming the casing.*

### Battery Containers

Fig. 2 gives particulars and dimensions of the battery containers, which were constructed of 3/16in. plywood, glued and bradded together, the front being fastened by means of four small screws for ease of removal when changing batteries. The positions of the batteries, call lights and their associated switches are clearly shown in the photograph Fig. 4, while the diagram Fig. 3 indicates the method of fitting the two U2 cells in the battery compartment by means of two brass clips, electrical connections being made by means of thin strips of brass bent as shown. The tag blocks for terminating the connections in the battery container are also shown in Fig. 3 and are easily made by screwing 6 BA soldering tags on a block of wood.

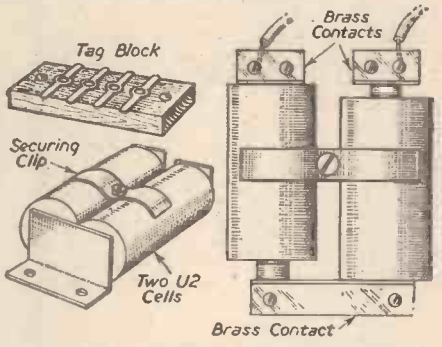



*Fig. 3.—Batteries and connections.*

### Office Telephone System

For office use, where communication is required between several points, a switchboard is necessary. This may be quite a simple affair, and Fig. 5 is a theoretical diagram of a switchboard suitable for placing on a manager's desk for communication with two other points. C1, C2, C3 and C4 are buzz bars and S6 and S7 are four-pole make-and-break switches. Either out-station can call the manager's office at will, the appropriate light indicating which of the two switches has to be depressed to make connection. When the manager wishes to call either station he depresses the appropriate switch S6 or S7, then presses the call switch S1. He can, if desired, speak to both out-stations simultaneously. Any number of additional out-stations may be connected to the switchboard by merely adding additional switches and connecting them to the buzz bars. The telephone sets used for the out-stations are identical to those described for two-way communication.

*Fig. 4.—General arrangement o a two-way telephone.*

### Call Lights

It will be noticed that call lights L1 and L2 (Fig. 5) are connected across a pair of contacts in switches S6 and S7, and are shorted out when these switches are closed, thus removing them from the microphone circuit.

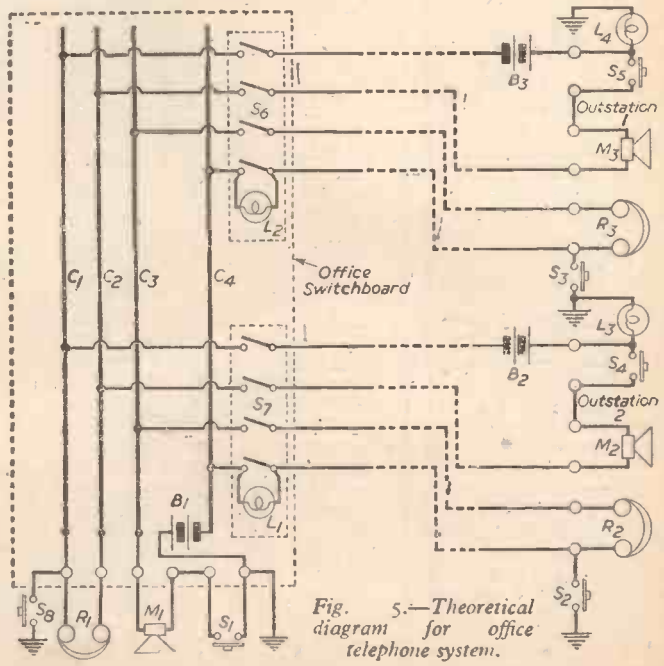



*Fig. 5.—Theoretical diagram for office telephone system.*

# Scientific Farming of the Future

## The Farmer Will Wear Engineer's Overalls and Sit in His Control Room

By Professor A. M. LOW

ONE man sitting in a control lorry could plough six different fields at the same time, using six different tractors, none of them with a driver. The secret is wireless control, made many times more effective by radar developments during the war. This picture of one man working six tractors is more than a vague possibility of the future. That it is practicable has been demonstrated by Major-General E. E. Tremlett, who commanded an A.A. division during the war. It is, I believe, the first application of radio control to the farm and it shows how far this system has developed since I demonstrated the first radio-controlled aeroplane on Salisbury Plain thirty years ago.

We are not likely to have many radio-controlled tractors in Britain in the near future, but these tests are signs of the coming revolution in farming. The scientist is turning farmer or, if you prefer it, the farmer is turning scientist, and in the next fifty years we shall see the elimination of much of the monotonous and laborious work on the farms, work that for centuries has made the farm labourer prematurely old and often crippled.

In the last two centuries industry has been revolutionised. Engineers have not only replaced man-power with steam or electrical power but have devised thousands of ways of eliminating human labour altogether, so that complex machines can largely control themselves. But farming has remained almost unchanged. We have replaced horses by horsepower to a certain degree, but it remains a crude, dirty business, based on cheap and plentiful labour.

To-day the labour is neither cheap nor plentiful—and is not likely to be again. The only way we can hope to supply the growing demands of the world for food is in the same way that we hope to supply its need for clothes, boots and a thousand other things. It is by making machines do the work and devising machines to look after machines!

### Automatic Tractor Ploughs

Visitors to one district of Texas in recent years have sometimes been astonished to see three tractor ploughs following each other, neatly furrowing a huge field, and not a driver to be seen. The secret here was not radio control but a small mechanical device in front of each tractor making it follow the course of the previous furrow. The farmer-inventor has only to plough the first furrow round the field and then set the tractors going one after another for them to go on hour after hour, turning at the corners and stopping themselves automatically if anything goes wrong. Three men are saved days of monotonous work by this method.

The idea can only be applied on very large, flat fields and I quote it as an example of what can be done by applied science rather than because I expect we shall see it in Britain. In countries with comparatively small farms we may expect the development to be rather along the lines of radio control. The farm of the distant future may have a "control" tower where the farmer will be able to sit in comfort in any weather, operating half a dozen different implements, perhaps of different kinds, at the same time. If anything goes wrong, the assistant engineer, as the farm "hand" will be called, will go to the machine on his caterpillar workshop and adjust it. The workshop will probably carry a large portable shed which can be erected in seconds over the machine so that repairs may be made under cover.

### Machines to Replace Farm Labour

I have always been appalled at the discomfort with which those engaged in farm work are prepared to suffer. Long before we get full mechanical development the standard tractor will probably be a "saloon," and there is no reason why it should not have electric heating and a wireless to provide music while you work. Forking loads of "muck," stacking sheaves, digging drains, hedging and ditching are all time and labour wasting. There already exist power machines for performing the task in a fraction of the time required by human labour. Next autumn we shall again see an army of men and women engaged in picking up potatoes and lifting sugar beet. A single machine can replace them and dig, top and clean nearly 50 tons of beet a day. A "finder" grabs the top of the beet plant, a circular knife tops it at the same time as a digging blade scoops it up. Rollers with teeth clean off the mud and a short elevator lifts it on to the harvester. These machines are already revolutionising the U.S. beet industry. Used with flame-thrower weed-killers and machines for planting the seed at regular intervals, they have replaced armies of labourers who did the singling, hoeing and harvesting.

Engineers to-day can design a machine to perform any agricultural operation however complicated it may seem. The cotton picking and cultivating machines are having far-reaching political and economic effects in the South of the U.S. They even have machines like giant vacuum cleaners which pick nuts!

Great changes will take place with the development of the aeroplane as a farm implement. Where farms are large, the aeroplane will be extensively used for such purposes as sowing, or distributing insecticide. The farmer's great enemy is time. There come days when conditions are exactly right. They may stay right only for 24 or 48 hours. With hand labour he cannot hope to deal with more than a small fraction of his land in this time. By using helicopters he might sow a thousand acres in a day. Good weather is not yet within our control!

These are glimpses of things to come on the farm. The idea of making hay in our present crude way, entirely dependent on the weather, will, in fifty years' time, seem as fantastic as a car without a hood would be to-day. The grass will be gathered, artificially dried and stacked, saving not only labour but the dreadful waste that occurs when the weather is unfavourable.

*A Miles "Aerovan" flying low over the ground and showering wheat to complete the seed-sowing on a farm in Northamptonshire.*

### Further Mechanisation

Uncertain weather can result in the value of a crop being halved in a week—and the weather is always uncertain! Instead of the clumsy business of cutting cereals and storing them in ricks until the thresher is available the "combine" will be universally used, with artificial grain driers overcoming the damp when required. There will be machines to pick, shell and clean peas before delivering them to the canning or quick-freezing factory — probably at the end of the field. There will be machines to pick fruit, machines to plant strawberries, tomatoes, lettuce and cabbages. Many of the latter are already at work, planting cabbages at the rate of 200 a minute, spacing them exactly and giving them a squirt of water to help them on the way!

The chemist and biologist will play a big part in the farming revolution. We have glimpses of things to come in collective weed-killers that destroy weeds but leave crops untouched, in artificial insemination making it possible to breed thousands of pedigree animals from one bull, in the production of higher yielding strains of plants and animals. By-products of atomic fission may have some startling effects on farming.

The change in farming will come slowly, not only because farmers are cautious but also because it will cost an immense sum. A mechanised farm I visited had £6,000 worth of machinery for 500 acres—the owner said he required another £6,000 of plant.

# Making a Car Heater

## Constructional Details of an Efficient Home-made Appliance

By G. HANNINGTON

THERE are several types of interior heaters for cars on the market to-day, but the majority of these are fairly expensive to purchase, and not particularly easy to fit. The heater described below can be made by anyone who has a little skill with tin shears and a soldering iron, at a cost of less than fifteen shillings.

The principle of the heater is to employ a duct to carry fresh air, which has been warmed by passing through the radiator, to the interior of the car. The system is, therefore, one of air-conditioning rather than mere heating, and the continuous introduction of fresh, warm air from outside avoids all "stuffiness" in the car.

The main materials required to construct the heater are: Sheet tinplate, 24 or 26 gauge, 24in. square; 9in. length of 2in. diameter brass (or copper) tube; 11in. length of 2in. diameter flexible rubber hose; 2 Jubilee-type clips 2¼in. diameter; one Bowden-type choke control.

The measurements given in the accompanying sketches apply to a Ford 8 h.p. car of immediate pre-war vintage, but modifications can readily be made to adapt the heater to fit most popular makes of car with thermo-syphon cooling. I have given this heater a thorough trial through two winters and it has given excellent results with no trace of engine overheating.

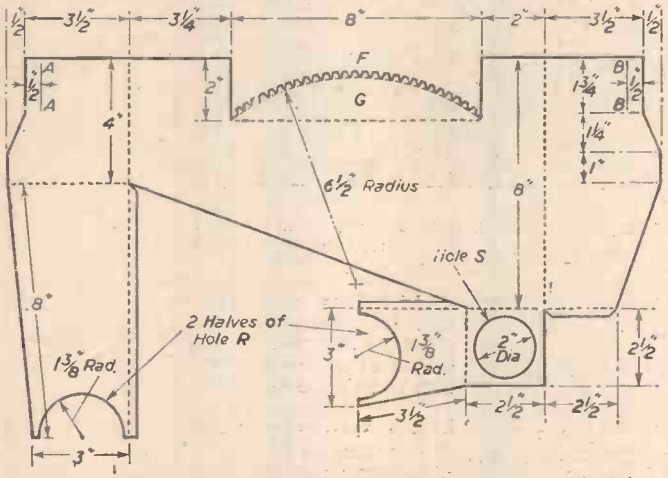
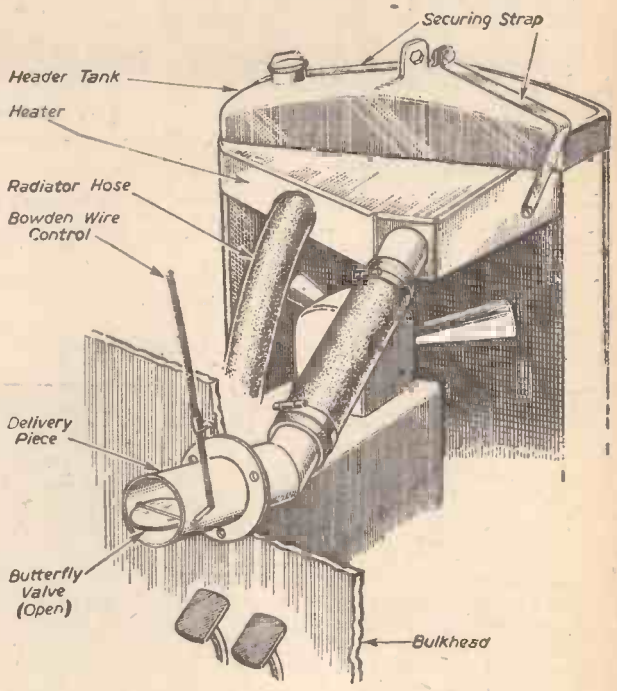



*Fig. 1.—Shape and dimensions of tinplate blank for forming the heater casing.*

### Constructional Details

To construct the heater the plan (Fig. 1), modified if necessary, should be marked out on a sheet of gauge 24 tinplate about 24in. square and cut out. By bending at the dotted lines an open-fronted "box" is formed to fit under the radiator header tank to collect air heated by passing through the radiator, and by radiation from the underside of the header tank. Owing to the position of the top radiator hose, this box encloses the hose which passes out through the hole marked R. The edges of this hole should be bent over to avoid chafing the hose. When the box has been checked for fit it should be soldered, inside and out, at the joints. The front part of the floor of the box marked F has to be raised to form an arc to allow room for the rotation of the fan. This is done by bending the segment G up at right angles to the floor of the box. The serrations are then bent at right angles to G and the cover (Fig. 3), suitably curved, is soldered to the serrations and to each edge of the space F. A 2in. length of brass tube 2in. in diameter is soldered at the hole S at about 30 deg. to the horizontal. The two supports (Fig. 4) are cut out and bent at right angles along A A and B B, and are then soldered one to each side of the box at A A and B B on the inside. They bear on the underside of the header tank and thus hold the box in place. The box lid (Fig. 2) is similarly marked out and bent and soldered in position. This completes the box, which, after a coat of black enamel, may be secured in place by two ½in. metal straps bolted to the sides of the box and connected together above the header tank by a nut and bolt.




*General view of the completed car heater.*

### Bulkhead Fixing

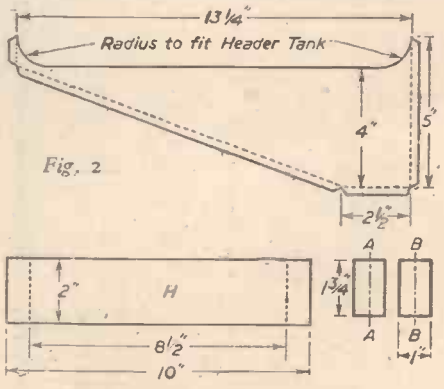
Next a 2in. diameter hole is cut in the bulkhead in a convenient position on the driver's side above the clutch and brake pedals. This is the only modification required to the car itself. The delivery piece (Fig. 5) is fitted into this hole. It consists of a 150 deg. elbow-joint made of 2in. brass tube, the horizontal part of which carries a flange by which it is bolted to the bulkhead. The end of the horizontal part is fitted with a butterfly valve which is spring-loaded against a stop in the closed position and opened by means of a Bowden wire "choke"-type control connected to a lever on the end of the butterfly spindle. This control may be mounted on the dashboard.

When the box and delivery piece have been fitted to the car they are connected by a suitable length (in the case of a Ford 8 h.p. car approximately 11in.) of 2in. internal diameter rubber hose, secured at each end by Jubilee-type clips.

The removal of the heater is so simple that this is recommended during the summer months to avoid the possibility of overheating in very hot weather. It is emphasised that no engine fumes whatever can be introduced into the car by this form of heater.

Experience has shown that warm air is delivered after about three miles of running from cold, but normal temperature is only attained after some six or seven miles. To obtain the maximum benefit from this installation all holes and other air leaks in and around the bulkhead should be sealed off.

If the temperature of the air delivered is not considered to be sufficiently high a further improvement can be made by placing a strip of perforated zinc in front of the box, immediately behind the radiator honeycomb. The effect of this is to reduce the velocity of the air passing through the top part of the radiator and thus to allow its temperature to rise to a higher value.




*Figs. 2, 3 and 4.—Details of the top of heater, fan cover and supports.*

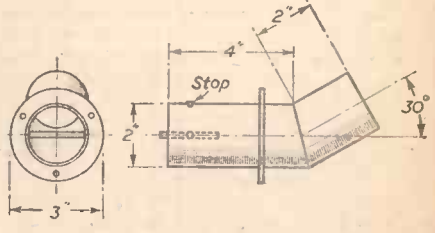



*Fig. 5.—End and side views of the delivery piece.*

# The WORLD of MODELS

By "MOTILUS"

## Garden Railway at Dietschiberg : Model Ferry Boat : A 7¼in. Gauge Model "Royal Scot"

I AM sure visitors to Switzerland this summer (and I understand they will be many), who are interested in model railways, will welcome an opportunity of going to see the very comprehensive model railway built by Dr. A. Oswald, in his garden on the Dietschiberg, near Lucerne. Readers may remember my previous description of this one-tenth scale railway, with its excellent electrically-driven locomotives. Dr. Oswald is continually making additions and improvements to his layout and during last winter was hard at work on his south-west spiral tunnel, the lowest third of which has been in service since last May.

The accompanying illustrations, Figs. 1 and 2, show the two entrances to this new spiral tunnel; they both bear the date 1949, the year of their erection, similar to all the other tunnels Dr. Oswald has built. When he last wrote me he still had to blast some seventy feet of solid rock. The length of the complete tunnel, which should be finished by the time this appears in print, will be 400ft.

Those who have not already seen this fascinating electric model railway may like to know that it is easily reached by a tram from Lucerne to the funicular railway for ascending the Dietschiberg. At the top is a restaurant where refreshments can be obtained, and Dr. Oswald's home and garden are only two minutes' walk away. The model railway is open to visitors for a small charge during the spring, summer and autumn, and the Doctor loves "talking shop" to anyone interested in the construction and working of the railway.

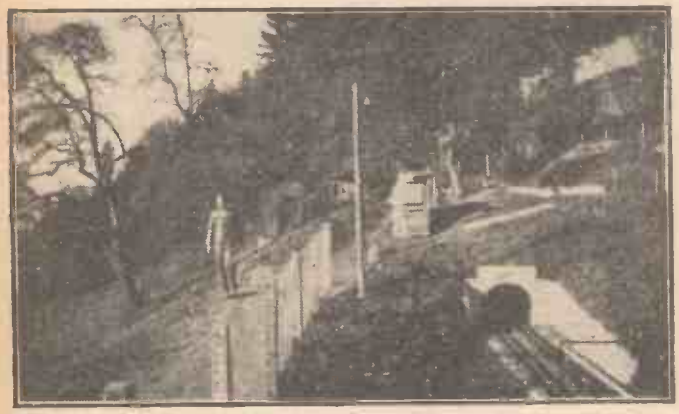


*Fig. 1.—One entrance to the south-west spiral tunnel, bored through solid rock, to enlarge the model railway of Dr. A. Oswald, at Dietschiberg, Lucerne, Switzerland.*

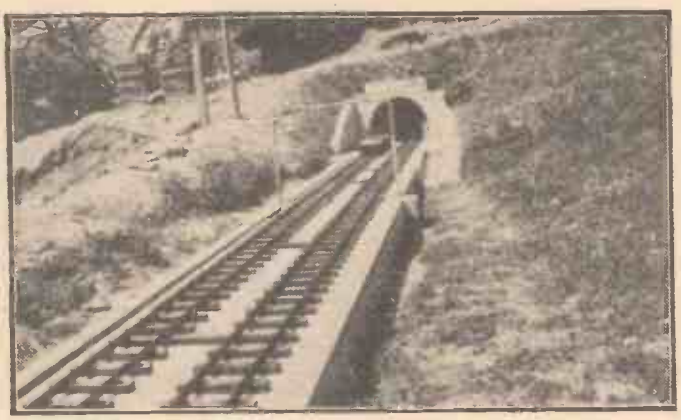


*Fig. 2.—The other entrance to the spiral tunnel on Dr. Oswald's model railway.*

### Model Gatehouse Approach

The name of Robin Hood, traditionally the philanthropic robber of Sherwood Forest, is also strongly linked in English legend with the City of Nottingham. Messrs. Cecil Howitt and Partners, Architects, of Nottingham, recently submitted to the Nottingham City Council a special model showing a proposed reconstruction of the historic gatehouse at the entrance to Nottingham Castle. The model is to a scale of ¼in. to 1ft., and incor-

*Fig. 3.—(Above) The Gatehouse to Nottingham Castle is shown here in model form, with the suggested improvement for the approach to this historic building. The formal garden includes a statue of Robin Hood. Model to a scale of ¼in. to 1ft.*

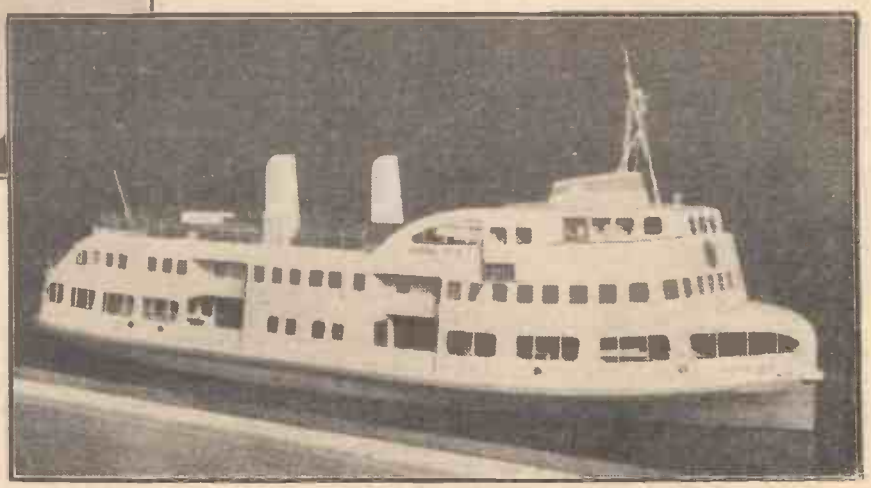


*Fig. 4.—A waterline model of the new ferry-boat,* Royal Iris, *built for the Wallasey Ferries. Model to a scale of ¼in. to 1ft.*

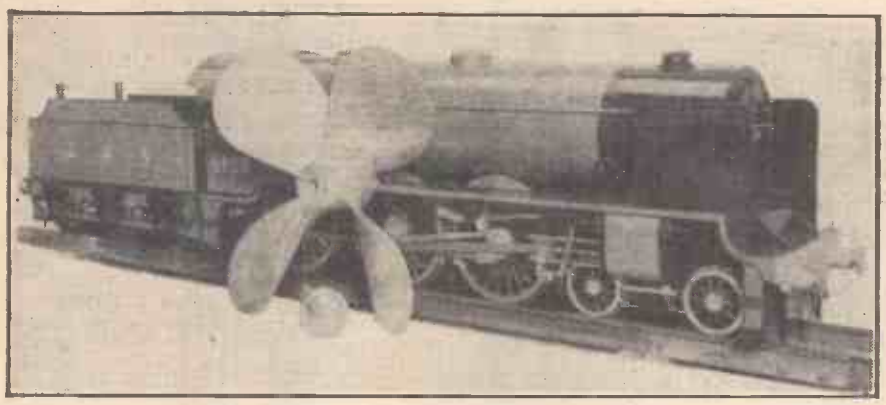


*Fig. 5.—The 7¼in. gauge (1½in. to 1ft. scale)* Royal Scot *locomotive built to the order of Mr. Pardoe of Peru. This locomotive is adapted for oil firing. As a comparison in size, the four-blade propeller in front of the* Royal Scot *is a model, built to the same scale as the locomotive, of a propeller of one of the latest Orient Line ships, the new* Orcades.

porates a statue of Robin Hood in an attractive setting of a formal garden, with realistic flowers and trees, laid out on the approaches to the gatehouse. I understand the scheme has been adopted by the council. The model, shown in the photograph reproduced here (Fig. 3), is the work of Mr. E. H. Clifton, of Northampton.

### Model Ferry Boat

The model boat illustrated this month is that of the very latest Mersey ferry boat, to be used for cross-river service during winter months and for short cruises in the summer. The boat, driven by diesel engines, has an unusual outline, as can be seen from the illustration, Fig. 4. She is the *Royal Iris*, but local shipbuilding circles know her as "The fish and chip boat"! This nickname arose because the boat has restaurant facilities for travellers, and these include a fish and chip saloon.

The *Royal Iris* has a green hull and yellow-buff superstructure. The model shown was built to the order of Messrs. Denny Bros., Ltd., who built the boat for the Wallasey Ferries.

Among popular locomotives running on British Railways, the *Royal Scot* holds a prominent position and is thus still a favourite with model railway enthusiasts. For garden railways a model of this locomotive, built to a scale of 1½in. to 1ft. (7¼in. gauge), is ideal and such models can be found operating in many parts of the world.

### A 7¼in. Gauge Model "Royal Scot"

One of the first models of this type to go out from England overseas was one built some years ago to the order of Mr. C. N. Rinek, of Easton, Pennsylvania. Mr. Rinek had a 7¼in. gauge model railway round his estate there, for the entertainment of his family and friends. The railway is still operating, and the *Royal Scot* locomotive model continues to give good service. Another American owner of a similar locomotive is Mr. David Rose of Hollywood who runs a model railway in his sub-tropical garden.

Regular readers will also recall the two brothers Brast, motor engineers of Lucerne, Switzerland, who built one of these locomotive models of the *Royal Scot* throughout, with the exception of small fittings. Afterwards they used the model on their passenger-carrying railway at Horw, a village near Lucerne. The model railway is a great attraction for Lucerne residents and their children during the summer season.

The latest of these *Royal Scot* models to go abroad is one specially built for Mr. Pardoe, of Peru, who ordered a locomotive and a large amount of vignols section rail, so that he might instal a passenger-carrying model railway in the grounds of his home.

In this model for Mr. Pardoe some modifications were made in various details. These included the addition of a hand pump in the cab, apparatus for oil firing, and the fitting of two injectors. Also, this model locomotive is the first 7¼in. gauge *Royal Scot* to be fitted with a spearhead type of superheater, instead of a grid pattern one.

The illustration, Fig. 5, shows the *Royal Scot* model ready for packing for dispatch to Peru.

### Gauge O Electric Motor Unit

Recently there has been a demand among builders of model gauge o railways for a permanent magnet motor bogie unit which can be used for all forms of motor coach trains. Messrs. Bassett-Lowke, Ltd., have produced this year what appears to be just the thing to suit these requirements. Their unit is fitted with the same high power motor as in the well-known electric mechanisms for locomotives. It is arranged for standard gauge o track, weighs 1¾lb., has a wheel base of 2½in., wheel diameter 13/16in., and the overall length is 4½in. The height from rail to the upper fixing plate at its lowest position is 2⅞in., and it can be raised by a further ¼in. It is for 12 v. D.C. with a minimum consumption of .6 amps and a maximum of 1.5 amps.

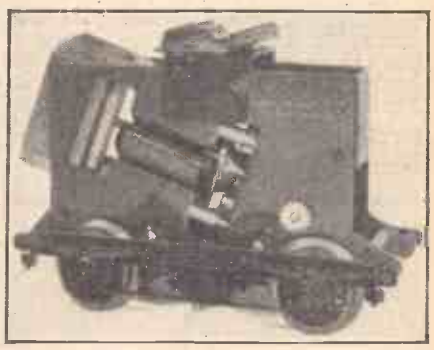


*Fig. 6.—The new permanent magnet motor bogie unit for gauge o model railways.*

I was glad to learn that another Northern Models Exhibition was held at Manchester last March. I hope to comment in a future article on some of the outstanding models displayed there.

# BOOKS RECEIVED

**The Story of the T.T. By G. S. Davison. Published by The T.T. Special. 216 pages. Price 9s. 6d. net.**

THIS is a book for motor cyclists and others interested in the sport of motor-cycle road racing. The author tells the story of the famous race from the first event in 1907, and gives many interesting records and statistics. The speed enthusiast will revel in the reminiscences of such pioneer riders as Jack Marshall, Freddy Dixon and Wal Handley. The book is a mine of T.T. information, and should appeal equally to old and young motor-cyclists.

**Junior Science. By Stuart Miall. Published by The Caxton Publishing Co., Ltd. Three volumes of 288, 350 and 270 pages respectively. Price £4 5s. 6d. cash price, or £4 10s. by instalments.**

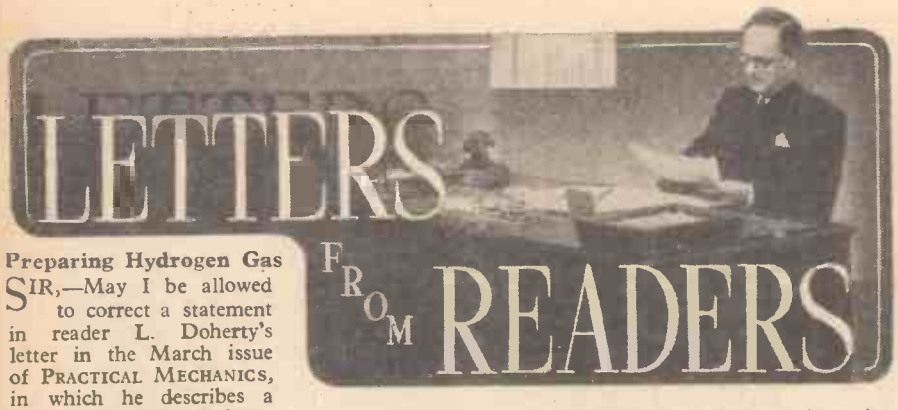
THOUGH not intended to form a text-book, these three volumes set out to show what learning will have to be undertaken at the outset by anyone who is seriously considering science as a career. Apart from students, however, the volumes will make interesting reading to anyone desiring a knowledge of the various sciences dealt with. Volume I is devoted in the main to engineering subjects. Volume II introduces the study of natural forces and materials under the headings of Mechanics, Acoustics, Heat, etc. The more important sections of Volume III cover Mathematics and Chemistry. Some chapters on Astronomy are also included in Volume I. The work is well illustrated throughout with line diagrams and half-tones, and there are several coloured full-page plates.

**Short Circuits. By G. S. Davison and Phil Heath. Published by The T.T. Special. 136 pages. Price 9s. 6d. net.**

BEFORE the war motor-cycle road racing took place at Brooklands track and Donington Park road circuit. Both are now gone, but in their place close upon a score of circuits on private ground are now used, and on these short circuits motor-cycle "road race" meetings are held almost every week-end from April to October. This book is a collection of reports of the leading park and aerodrome races, with a section on Brands Hatch by Derek S. Jordan. It makes fascinating reading for all interested in the sport.

**Horseless Carriage. By L. T. C. Rolt. Published by Constable and Co., Ltd. 204 pages. Price 20s. net.**

THIS book is intended for men of all ages who are interested in the evolution of the motor-car in this country. The author, who is an engineer and a motor-car enthusiast, covers the growth of the English motor car from Trevithick's day right up to 1950. The early steam giants; the spidery Victorian petrol-driven ancients; the Edwardians (with their electric broughams, the White and Starley steamers, the first six-cylinder Napiers, and the prototype "Silver Ghost" Rolls Royce); the light cars and cycle cars of the 1920s; and the whole line of racing cars and sports cars—from the Wolseley Beetles to the spring "Specials," are all depicted in text and illustration. In a final chapter the author contrasts the current models of some of the famous makes with their 1939 predecessors.




### Preparing Hydrogen Gas

SIR,—May I be allowed to correct a statement in reader L. Doherty's letter in the March issue of PRACTICAL MECHANICS, in which he describes a method of making hydrogen.

The steam does not attack the copper, but the iron tube, according to the reversible reaction:

$3Fe+4H_2O=Fe_3O_4+4H_2$

The reaction

$CuO+H_2=Cu+H_2O$ is not reversible.

The only purpose served by the copper would be to slow down the steam and give it time to come into contact with the sides of the tube.

A more efficient method is to pack the tube with iron nails or coarse iron filings, heat to red-heat as before, and pass the steam through it.

If copper were attacked by steam it could obviously not be used for steam pipes, as it is extensively.—J. R. SMITH (Guiseley).

### "Teepol"

SIR,—We have seen in your issue for March, 1951, a reference to our product "Teepol" made in connection with a reader's enquiry about window cleaning.

We would like to mention, however, that "Teepol" is not sold in gallon lots but only in 4-gallon tins, and these are available for industrial use and not for domestic purposes such as suggested in your recommendations. The price is 10s. per gallon and the address of Shell Chemicals Limited is now 105/109, Strand.—SHELL CHEMICALS LIMITED (London, W.C.2).

### Autobiography of a Gadget Maniac

SIR,—With reference to the Autobiography of a Gadget Maniac, by the Marquis of Donegall, and in particular to his statement that "To bring the bath to the bed would I fear involve some form of elastic plumbing which is beyond my power of invention," may, I draw his attention to a quotation from Page 90 Vol. 1 of "A Dictionary of Arts Manufactures and Mines," by Andrew. Ure, M.D., F.R.S.: "Many copper and tin baths have lately been constructed in London with a little furnace attached to one end and surrounded with a case or jacket into which the water flows and circulates backwards and forwards till the whole mass in the bath gets heated to the due degree. One of the best of these is that constructed by Mr. Benham, of Wigmore Street. The bath must be placed near the fire grate and the smoke pipe of the attached furnace be conducted up the chimney a certain way to secure a sufficient draught to maintain combustion. The above bath well managed heats the water from 50 to 90 degs. in about twenty minutes. When the proper temperature is attained the fire must, of course, be extinguished." It would appear that gadgeteering was well to the fore in 1839.

Now to another subject—Velocity of Escape. Are your correspondents quite sure that the Law of Gravitation should not read: "Every substance in the universe *resists* every other substance with a force jointly proportional to the mass of the *resisting* and of the *resisted* body and varying inversely as to the square of the distance."?

The apple is well and truly resisted when it reaches the ground, and to resist and attract at the same time is impossible.—A. D. JOSEPH (Epsom).

### The Boomerang

SIR,—I have read with interest the article on this subject in the March issue. The author makes what is undoubtedly a correct exposition of the mechanics of boomerang flight: frequently the weapon returns with such precision that the thrower can catch it in his hand.

Nevertheless, your contributor is wrong in one respect. He speaks of it as "striking its quarry or object and returning faithfully to its thrower."

When in Australia some years ago I heard a question on these lines put to an expert, and the answer, as I expected, was negative. When the weapon strikes it is deflected and may go just anywhere. In a simple relation of the wonders of primitive weapons such as boomerangs, blow-pipes, bows and arrows, etc., the narrator can often fall into an exaggeration. Analogy: the squirrel-hunter with primitive bow and arrow would always get the creature in the eye to avoid damaging the pelt!—"RECOIL" (Northampton).

### Fire-alarm System

SIR,—I have studied the remarks of F. Slater, Spalding, under the above heading in the letters column of the March issue, but I fail to agree with him.

A certain amount of vagueness seems to exist over the correspondent's use of the word "polarity." Polarity, like potential, is only relative, so that no point can of itself possess it. A point may be positive with respect to a second point, and at the selfsame instant be negative to a third point. The arrowhead and the two ends of the bank of cells in question represent respectively three such points.

No amount of discussion, however, can alter the facts that those cells to the left of the arrowhead in themselves constitute a battery and that the klaxons, the overhead line, the bells and the earth form a continuous metallic circuit across it which is not under the control of the relay.

I therefore feel that the remarks made in my previous letter were justified.—JAMES W. ROBSON (Wallsend).

### "Modern Plastics"

SIR,—I read with interest the article by the Marquis of Donegall on plastics, but the statement that celluloid was probably the first plastic is to my mind entirely erroneous. The first modern type plastic, perhaps, but there were plastics very many years before the discovery of celluloid.

Glass seems to me to be the most common of many.—HUGH W. MCQUOIDE (Punchbowl, New South Wales, Australia).

## Club Reports

### Aylesbury and District Society of Model Engineers

THE society met as usual on the third Wednesday in February at its headquarters, Hampden Buildings, Temple Square. The evening was devoted to a model night, and was an overwhelming success, every member present bringing along some little work-piece he was making. The beginnings of two new locomotives were shown for the first time, as well as a rebuild of an "old faithful." The greater part of the work in the club seems to be on locomotives, though a very fine model caravan was on show.

The evening was also the occasion of an unexpected but welcome visit from Mr. H. D. Bond, Secretary of the Luton and District Society of Model Engineers.—Hon. secretary, E. H. SMITH, Mulberry Tree Cottage, Devonshire Avenue, Amersham, Bucks.

### Ilford and West Essex Model Railway Club

THE club's annual competition was held on March 7th, 1951, when Mr. G. R. Dow, Public Relations Officer, British Railways (London Midland Region), kindly undertook the task of judging the large number of models entered. Mr. Dow awarded the trophies as follows:

The club cup for locomotives: Mr. A. J. Hills for 00 gauge model of L.M.S. (ex L.N.W.) 0-8-0 loco. and tender.

The R.C. Nicholls cup for rolling stock: Mr. P. K. Stevenson for five EM gauge goods vehicles.

The West Essex cup for lineside accessories and the W. C. Hardy cup for the best model in the competition: Mr. D. E. H. Birse for 4 mm. scale model of Totnes Station Building.

The founders' inter-section trophy: The EM gauge section.

In view of Mr. Dow's long association with and interest in the club, he was unanimously elected an honorary member and duly presented with a club badge.

Other meetings during the winter season have been devoted to talks on various railway and model subjects, photography of models, the testing of power packs in conjunction with an oscilloscope, track nights, and alterations to the club layout.

Further particulars may be obtained from the hon. secretary, E. W. CORNELL, 42, Lincoln Road, Forest Gate, E.7.

### Cheltenham and District Live Steam Society

THE above society has been formed in the Cheltenham district. They have set themselves the task of building a portable track in 3½in. and 5in. gauge in time for the Hobbies Exhibition to be held in Cheltenham next September. Already outstanding progress has been made in this direction, leaving little doubt as to the completion in time for the exhibition.

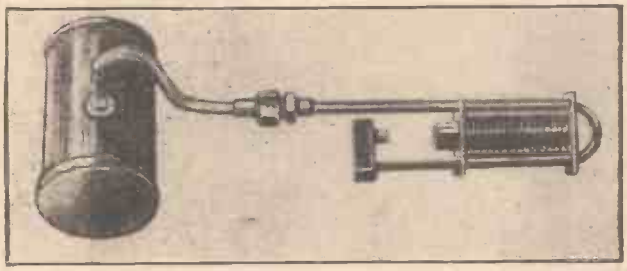
It is hoped that further news of the society's activities will be forthcoming for publication later in the year. Any interested reader in the district wishing to join should communicate with the hon. secretary, K. L. RICHARDSON, 4, St. Paul's Street North, Cheltenham.

# Trade Notes

A Review of the Latest Appliances, Tools and Accessories

### The Paraflame Burner

A USEFUL miniature blowlamp for model locomotive, marine, or stationary boiler firing has been introduced by Bassett-Lowke, Ltd., of Northampton. The length of the burner (excluding the fuel tube), is only 3½in., the width being 1in. and the height ⅞in. The venturi flame tube is 1½in. long, and the paraffin container measures 2½in. by 1½in. The operation of this burner is very simple. After putting in 1/12th pint of paraffin in the container the filler cap is screwed down firmly. The burner is then pre-heated and, after about three minutes a cycle pump is attached to the filler cap and about ½ stroke given to supply a little pressure. The burner will then ignite immediately. For large boilers two burners may be mounted in tandem or parallel, using one container. The burners are supplied complete with container, or as separate burners for individual fitting. The price of the blowlamp complete is £1 18s. 0d., and separate burners, £1 3s. 0d.



*The Paraflame Burner and fuel container, made by Bassett-Lowke, Ltd.*

*(Note the threaded fitting for attaching a cycle pump.)*

### British Motor-cycles of the Year 1951

STONE AND COX, LTD., 44, Fleet Street, London, E.C.4, recently issued a new publication bearing the above title, in which is described all motor-cycles, small and large, of British manufacture or British assembly, and also the popular power units for bicycles. There are about 150 different motor-cycles, but not all of these are illustrated, as some are variations of the basic models. However, there are illustrations of nearly 100 models in the book, which is divided into three sections: 1, Lightweights and Power Units; Standard Tourers (over 200 c.c.); 3, Racing and Competition Models. A supplement at the end of the book contains the current prices, as at March, 1951, and details of the latest new models. The book, which is priced at 3/6 net, is obtainable from any bookseller, cycle or motor-cycle trader, or direct from the publisher, 3/9 post free.

### Diesel Engine Starting Batteries

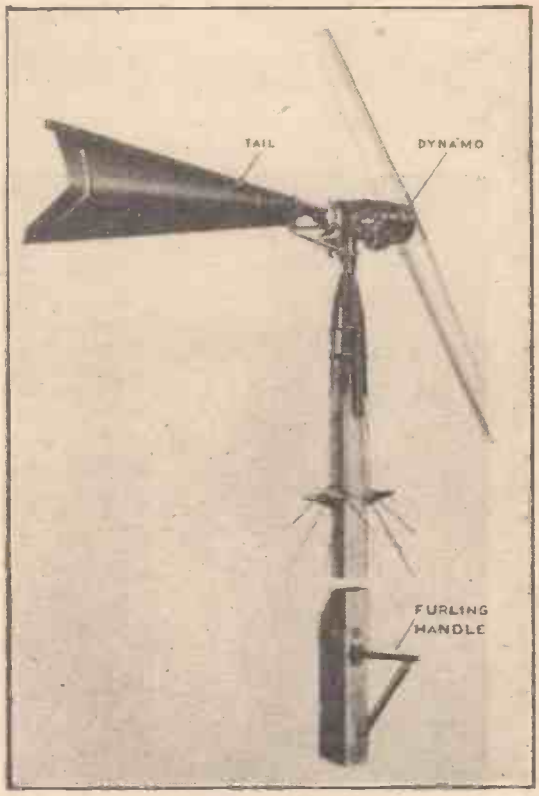
THE first edition of a new illustrated catalogue dealing with Exide batteries for diesel engine starting is now available from Chloride Batteries Ltd., of Clifton Junction, near Manchester.

These batteries have been designed primarily for use on main line and shunting locomotives and for large stationary engines. They are particularly suitable for use where very high rate discharge currents with minimum voltage drop are required in conjunction with robustness and long life. The existing range includes cells available in four different heights with capacities varying from 48 to 456 ampere-hours at the five-hour rate of discharge. Whatever the limitations in the floor area or height of the battery compartment, therefore, a suitable type for all requirements can be supplied.

### Lucas "Freelite" Wind-driven Generating Plant.

FOR several centuries man has harnessed the free breezes to provide the motive power for his grinding, milling and pumping machines. Lucas plant used for the generation of electricity in this way is known as "Freelite," and can be seen on the Lucas Stand at the British Industries Fair, Castle Bromwich. It provides the ideal solution to the lighting problems in bungalows, sports pavilions, farm buildings, small workshops, lodges, or, in fact, any buildings which are remote from an electric supply where the lighting and power demands are reasonable.

The plant comprises a dynamo directly coupled to a twin blade propeller which derives its power from the wind. It will operate even in a light breeze. Storage batteries are charged and they supply current for six or more lighting points. This is one of the cheapest methods of obtaining electric light. Initial cost is small and the running expenses are very low. Further details can be obtained from Joseph Lucas, Ltd., Great King Street, Birmingham, 19.




*The Lucas "Freelite" generator in its normal running position.*

### "Megger" Tester

A NEW "Megger" insulation tester having three voltage and six megohm ranges was exhibited at the Physical Society's Exhibition. In outward appearance the new instrument is very similar to the ordinary series 1 instrument. It includes, however, a six position range switch facilitating tests at pressures of 500 volts (ranges 0-50 and 3-10,000 megohms), 1,000 volts (0-100 and 5-20,000 megohms) and 2,500 volts (0-200 and 15-50,000 megohms). A new quick-response recorder having a maximum sensitivity of ± 1 millivolt A.C. or D.C. was also on view. It is made by Evershed & Vignoles, Ltd., Acton Lane Works, Chiswick, W.4.

### New "Bristol" Helicopter

DETAILS of the new twin-engined "Bristol" type 173 helicopter have recently been disclosed by the Bristol Aeroplane Company. The machine, which is shortly to undergo flight trials at Filton, was designed for short range transport work, carrying 13 passengers and luggage. It is stated that there are a number of military uses for the aircraft, which could also be converted to carry over a ton of cargo.

Powered by two Alvis Leonides 550 horse-power radial engines, the all-up weight is 10,600lb., but the machine can be overloaded and be still capable of hovering. With rotor blades folded, the helicopter is over 78ft. long, 17ft. wide, and 15ft. high. The rotors are 48ft. 6½in. diameter. Maximum speed is estimated at 142 miles an hour and the service "ceiling" is approximately 19,000ft.

The new aircraft has an important safety feature. If necessary, it can fly on only one of its 550 horse-power engines.

Britool 0-9 B.A. Tool sets. Chrome Alloy Steel, in steel boxes; 26/-.

Moving Coil Microphones with Pressel Switch, 6/-; Matched Transformer, 5/6.

Small 24 v. D.C. Multi-geared Motor with reversible clutch, 11/6.

Westinghouse F.W. Bridge. 1 mA. Meter Rectifiers, 8/6. 5 mA., 7/6.

Meters, M/c., 2in. C-300 v., 10/-; 0-1 mA., 11/6.

Multimeter Kit. 2½in. Meter. Reads volts D.C. 3-30-150-300-600. mA. 60 and ohms 5,000 with 1½ v. Battery—in black ebonite case 6in. x 4½in. x 1½in., 17/6.

250-watt Double Wound Transformers. 230/115 v. Made by G.E.C. With Steel Shroud. New. £2/7/6 each.

New P.V.C. Lighting Flex, 100 yds. 13/6. Syds. 9/6, 25 yds. 5/6.

Transformers 230/24 v. 1 a., 13/6.

New Ultra 12in. Elliptical Energised Speakers, 400 ohm Field with 10 watt. Output Transformer, 21/6.

Powerful Small Blower Motors, 24 v. A.C./D.C., 14/-. Transformer 230/24 v. 1 a., 13/6.

Army Carbon Microphone with switch, 4/6. Trans. to match, 3/6.

Admiralty 3½in. S.M. Dials, 100-1 with vernier. White Ivorine dial 0-100. Worm drive. New and Boxed, 8/6.

VCR138/ECR35 3½in. Scope Tubes. New and Boxed, 21/6.

U.S. Army Lightweight Headphones. Fit inside the ears. 8/6 per pair.

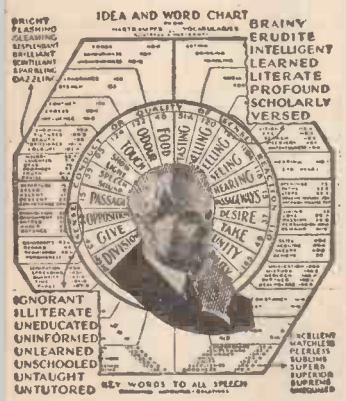
Signal Generator 200 mcs. Easily converted to 144 mcs. or T.V. Bands, 11/6, or with 6-volt Vibrator Pack, 32/-

All Carriage Paid. Money Back Guarantee from :

**THE RADIO & ELECTRICAL MART,**
**253, Portobello Road, London, W.11**
*Park 6026.*

## GREATEST INVENTION SINCE THE ALPHABET

Gives the **RIGHT** word at a glance !




Every man or woman, who uses words, will find this Idea and Word Chart a priceless boon. It's a godsend to all. It gives the word you want when you want it. It provides brilliant word-power. Gilbert Frankau, the Famous Author, says : ". . . *the best adjunct that I have so far discovered—it is not going to leave my desk.*"

**Send TO-DAY for a FREE specimen of the Idea and Word Chart embodied in a descriptive brochure.**

**PSYCHOLOGY PUBLISHING CO., LTD. (DEPT. PR/HV16), MARPLE, CHESHIRE**

## A COUPLE OF GOOD Tips

MASON MASTER 'S' DRILL — GLAZEMASTER GLASS DRILL

Slip a "MASON MASTER" into a wheel-brace and turn. No matter if it is brick, tile, concrete or marble the carbide tip penetrates easily and quickly and gives a clean round hole. Sizes from 5/32in. to ⅜in. The "GLAZEMASTER" bores holes in glass of any thickness without fear of splintering or breakage. You just let the drill do the work. Type B as illustrated for craftsmen. Type A for the handyman. Send for illustrated Booklet 'L.'

**JOHN M. PERKINS & SMITH LTD.**
**Braunston, Near Rugby.**
*Phone : Braunston 238.*

OBTAINABLE FROM ALL GOOD TOOL STOCKISTS

## THIS MONTH'S BARGAINS

**SPECIAL BUY ! ELECTRIC MOTORS,** ¼th horse-power, size 6in. long by 4in. diameter, with 5/16th shaft. 200 only in stock, price £2 5s. each, plus 5s. carriage.

**STILL IN STOCK,** the popular small motors for sewing machines, complete with fitted driving belt and on/off switch, 21/6d. inc. post.

**SPRING NIGHTS ARE COLD !** Treat yourself to an electric blanket for £9 10s. Or we can supply the infra-red heating unit which you can zig-zag and stitch into your own blanket ; unit is 6yds. long by 3/16in. thick, and comes complete with on/off switch and 2-pin mains plug. For 220-250v. AC/DC, price 19/6d. plus 9d. post

**FOR SPRING-CLEANING,** buy a Goblin spray-gun ; will fit to almost any type cylinder vacuum cleaner, and can be used for re-distempering walls, painting or varnishing doors, cellulosing furniture, or with soapy water for washing-down paintwork, shampooing carpets, etc. Manufacturer's list price now 13/6d., plus 9d. postage.

**MAGNETIC RECORDING ACCESSORIES** always in stock : EMI tape 25/- reel, GEC tape 30s. reel, ½-hour each ; spare reels 4/6d., all plus 6d. postage. 45 Kc. bias oscillator coils. 5/6d. +6d. postage. Constructional data on Magnetic Recording, 5s. Manual of Wire Recording, 2/6d.

**TAPE RECORDER DECKS,** complete with reel of tape and motor ; fast forward speeds and fast reverse, £14. Delivery approx. 3 weeks.

**PARK RADIO of MANOR PARK**
**676/8, ROMFORD RD., LONDON, E.12.**

## MACHINE TOOLS AND ACCESSORIES

**METAL LATHES, Etc.**

From 1¾in. to 5in., Bench Millers, Drilling Machines, Hand-Bench Shapers.
All Loose Tools and Equipment.

**WOOD LATHES, Etc.**

From 3in. to 5¼in., Ball Bearing Planers 4½in., 7in., 10½in. Ball Bearing Saw Benches 6in. and 12in. Sanders, Band Saws, Grinders, Jigsaws.
All Loose Tools and Equipment.
Write at once for details.

**NUTTALL'S (LATHES) LIMITED,**
**MANSFIELD, NOTTS.**

## REFILL YOUR OWN BALLPEN

*VISCOID REFILL KIT*

Post Free **3/8** Inc. tax

Complete with Tool and Illustrated Filling Instructions.
**CONTAINS SUFFICIENT INK FOR 15 LARGE REFILLS**
Available in Blue, Red and Green.
Trade Enquiries Invited.
**VISCOID INKS (P.M.)**
**6, Sherlock Mews, Baker St., London, W.1.**

**BOOKS :**

| | |
|---|---|
| "Planning & Layout" ... ... | 3/- |
| "Working Model Railways" ... | 3/- |
| "Electric Model Railways" ... | 3/- |
| "Make Your Own G.O. Motor" | 3/6 |
| "Model Railways Encyclopaedia" | 15/- |

**RAILWAY PARTS :**

| | 00 | 0 |
|---|---|---|
| Hedges, per 12in. length | 1/3 | 1/3 |
| Plastic Station Staff | 3/0½ | 4/8 |
| Plastic Passengers | 4/11 | 3/8 |
| Sitting Passengers | 4/11 | 7/4 |
| Water Cranes | 2/9 | 4/6 |
| Ex-R.A.F. 16 S.W. Boxes | 5/6 | 5/6 |
| X3. 12 v. D.C. Loco Motors | 21/- | — |
| 20 v. Bulbs for Hornby | — | 1/2½ |

Postage extra. "00" or "0" Parts List 3d.

**TYLDESLEY & HOLBROOK (M.E.T.A.), 109, DEANSGATE, MANCHESTER, 3.**

## DRILLS!!! DRILLS!!! DRILLS!!!

*Immediate Delivery*

**SET OF 10 HIGH SPEED DRILLS**
CONSISTING OF
1/16" 5/64" 3/32" 7/64" 1/8" 9/64" 5/32" 3/16" 7/32" 1/4" 13/9
**OR COMPLETE WITH ATTRACTIVE METAL DRILL STAND**
**15/6** POST PAID. *Satisfaction Guaranteed*
TRADE ENQUIRIES INVITED
**J. SIMBLE & SONS**
**76, QUEENSROAD, WATFORD, HERTS**

## *Plans and Kits* MODEL POWER BOATS *and* SAILING YACHTS

Sailing model yachts and power boats is a fascinating recreation, and if you build your own boat yourself you will learn a great deal about hull forms and design in the process. The Modelcraft List gives details of 14 different plans or kits from which you can choose in making a start on this hobby, and as it also gives details of nearly 200 other ship or boat models from 500 B.C. to the present day the whole subject is surveyed.

**THE 1/- REFUND VOUCHER**

*The List, which costs 1/-, contains a refund voucher for 1/- for use in purchasing Modelcraft goods, whether by post or through your model shop. The List gives full details of over 600 items of interest to the Modelmaker — plans, planbooks, kits and accessories for houses, cars, railways, aircraft, etc.*

**MODELCRAFT LTD.**
**77 (L), Grosvenor Rd., London, S.W.1**

## LANGUAGE PROBLEM SOLVED

*by the Pelman Method*

THE problem of learning a Foreign Language in half the usual time has been solved. The Pelman method enables you to learn French, German, Italian and Spanish without translation.

By the Pelman method you learn French in French, German in German Spanish in Spanish, and Italian in Italian. English is not used at all. Yet the method is so simple that even a child can follow it.

*Specially reduced fees for serving and ex-Service members of H.M. Forces.*

Grammatical complexities are eliminated. You pick up the grammar almost unconsciously as you go along. There are no classes to attend. The whole of the instruction is given through the post.

The Pelman method of learning languages, which has now been used for over 25 years with such success, is explained in four little books, one for each language :

**FRENCH, SPANISH, GERMAN, ITALIAN**

(*Also Courses in Afrikaans and Urdu*)

You can have a copy of any one of these books, together with a specimen lesson, gratis and post free, by writing for it to-day.

POST THIS FREE COUPON TO-DAY

*To the* Pelman Languages Institute, 130, Norfolk Mansions, Wigmore St., London, W.1.

Please send details of Pelman method of learning :
French, German, Spanish, Italian.
(*Cross out three of these*)

Name .....

Address .....

.....

THE Cyclist
Editor: F. J. CAMM
VOL. XIX MAY, 1951 No. 348

*All letters should be addressed to the Editor, "THE CYCLIST," George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.*

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

# Comments of the Month

## Festival of Cycling

By F. J. C.

WE have already drawn attention to the Festival of Cycling which is to be held on the Dunlop Sports Field, Erdington, Birmingham, on June 23rd and 24th. It is cycling's contribution to the Festival of Britain, and, since our announcement, plans have made considerable headway.

The Festival is sponsored by the Gaumont-Odeon Theatre Organisation, the Cyclists' Touring Club, the National Clarion C.C., the National Cyclists' Union, and the Association of Cycle Traders. The R.T.T.C. at the moment of going to press has not been invited to support, and neither has the National Committee on Cycling.

Night riders wishing to partake of the free breakfast which will be served prior to the opening of the Festival must register in advance. This may be done by sending a postal order for 1s. 6d., made payable to the Festival of Cycling, together with a large envelope or label containing the applicant's name and address and a 2½d. stamp, to the Organiser, Festival of Cycling, Gaumont-Odeon Theatres, New Gallery House, Regent Street, London, W.1. The charge will include a Souvenir Programme, admission to the Festival ground, entry to competitive events, and use of the ground facilities. The programme provides admission to the ground on both days. Club secretaries have made bulk registrations. The breakfast will be served on the Dunlop Sports Ground between 6 a.m. and 10.30 a.m.

There is to be a mass firework display on the first day of the Festival, and a well-known artist is to be the official artist to make sketches of Festival scenes and will give an exhibition of his drawings. Accommodation is urgently needed for the thousands of cyclists who will attend, and residents within two miles of Birmingham who can offer temporary accommodation should get in touch with the Festival Organiser.

Members of the Women's League of Health and Beauty, Birmingham Branch, will give a demonstration of health exercises to music on June 23rd.

The B.L.R.C. are staging in connection with the Festival of Great Britain the London-Holyhead Massed-start Race on Saturday, June 9th—Britain's longest single-day cycle race.

There can be no doubt that this event will be a great success, and just preceding the Festival will help to draw attention to it. The recent announcement by the National Committee on Cycling that it has reaffirmed its previous decision that massed-start racing should not be encouraged on roads which are not closed to other vehicular traffic, "as this type of enterprise is likely to be extremely harmful to the interests of cycling as a whole," is merely fanning the wind.

This curious committee has been saying the same thing for years, but none of its gloomy forebodings has materialised. Its judgment; in fact, has been proved to be thoroughly unsound, a fact which has not passed unnoticed by the police or the Ministry of Transport. It will be presumed that its judgment on other matters is equally unsound.

We think that the arguments about road safety and damage to the interests of cycling are false arguments raised to obscure the real motive of the opposition, which is that the N.C.U. and other bodies fear the competition of massed-start racing and the great support it is receiving, even from members of the opposing bodies.

### Memorandum on Rear Warnings

THE following are extracts submitted by the National Committee on Cycling, representing all the organised cyclists of Great Britain, to the Minister of Transport on cyclists' rear warnings:

"Under the Road Transport Lighting (Cycles) Act of 1945 cyclists are compelled to carry during the hours of darkness a lighted rear lamp, an unobscured and efficient reflector, and a white surface.

Owing to the shortage of materials, the operation of the provisions concerning reflectors and white surfaces has been suspended, but the Minister is empowered at his discretion to name the day when all sections of the Act shall come into force.

The National Committee on Cycling are opposed in principle to the carrying of rear warnings on cycles, believing that the driver of an overtaking vehicle should himself illuminate his path sufficiently to enable him to avoid a collision with both moving and stationary objects, and should accept the responsibility of overtaking other road users without causing injury or inconvenience to them.

Nevertheless, organised cyclists did, by way of compromise, agree to the terms of the Road Transport Lighting Act, 1927, under which they were compelled to carry, at their option, either a lighted rear lamp or a reflector (a later Act made a white surface an additional requirement). Naturally, the majority elected to adopt the latter alternative, and bicycles were usually supplied by the manufacturers with reflectors and white mudguards, or white-tailed mudguards, as part of the standard equipment. This arrangement proved generally satisfactory, and it can hardly be doubted that the 1927 Act would have continued to operate smoothly had not the war occurred.

Upon the outbreak of war all cyclists were compelled to carry lighted rear lamps, as the forward illumination permitted on vehicles was greatly reduced; but it was assumed, as in the 1914-18 war, that upon the conclusion of hostilities there would be an immediate reversion to the previous lighting law.

Instead, a Bill was hastily drawn up compelling cyclists to continue using a lighted rear lamp and also to carry a reflector and white surface. British cyclists were placed under the obligation to exhibit three different types of rear warning at the same time—a requirement to which no other cyclists in the world are subject. The 1945 Bill was presented to Parliament without any preliminary consultation with the cyclists' representative bodies, and it met with considerable opposition, although ultimately passing into law with the proviso that the reflector and white surface should not immediately become obligatory.

In the opinion of the National Committee on Cycling, three separate rear warnings are of no more value than one, even assuming that a rear warning is necessary at all. But an obligation to carry three different devices places the cyclist at a serious disadvantage if he is run down from behind in the dark. The impact will almost certainly damage one or other of his warning instruments and, as it may be impossible for him to prove that all were properly fitted and in working order before the accident, the question of contributory negligence may arise in any action for damages.

The cyclist will also be liable to prosecution should any one of the three warning devices fall short of the legal requirements, even though the other two are in perfect order; and in the opinion of the Committee it is grossly unfair that one section of road users should be singled out for this treatment. Motorists are not, of course, required to triplicate their rear warnings.

Now that motor vehicles are again adequately lighted, and drivers are able to pick out not only the cyclists whom they are overtaking but also slower-moving pedestrians and such occasional unlighted obstructions as may be encountered, the need for any rear warning on cycles is not apparent. (Drivers are told in the Highway Code: "At night always drive well within the limits of your lights.")

The National Committee, however, consider that the present situation will be met to everybody's satisfaction by a reversion to the pre-war lighting law under which the cyclist was given the alternative of carrying either a lighted rear lamp or the combination of a reflector and white surface. The committee put forward this suggestion while the 1945 Act is still only in partial operation and before its full injustice has been felt.

It should not be forgotten that the only purpose of a cyclist's rear warning is to protect him from road users who are themselves breaking the law by driving at an excessive pace in relation to the conditions of visibility. A close parallel to the requirement of a triple rear warning on cycles would be to compel householders to lock, bolt, and bar their doors against burglars, under the penalty of a fine for neglecting any one of these precautions. Would not most people consider it better to penalise the law-breaker rather than his victim?"


Bluebell time in Surrey.
MOSSES WOOD.
A Surrey beauty spot preserved by the National Trust. This wood lays beneath Leith Hill on the little road to Coldharbour and at bluebell time is one blue carpet to the trees and beyond.

# Paragrams.

### *U.N. Road Signs*

ONE of the less sensational activities of the United Nations Organisation, that of arranging the standardisation of road signs in the various countries of the world, appears likely to show some results. It is proposed that every country shall have the same pictorial road sign for every purpose, instead of a multiplicity of different signs, so that a traveller in any country, without knowing anything of the language of that country, will be able to understand the signs.

### *Thriving Club*

THE plans for the considerable expansion of the Northamptonshire steel town of Corby will, it is hoped, result in an even greater support for the six-months-old Rockingham Forest Wheelers, whose headquarters are at Corby. Since its formation many riders from Corby and district have joined the club, and in the first three months the membership rose to 68. It is young in the age of its members also, for not more than a dozen of the members are over 20 years of age.

### *Roller-Racing On Stage*

AUDIENCES at a Grimsby theatre recently were able to see, for what was described as being the first time on any stage, a demonstration of cycle roller-racing. The demonstration was given by track and road expert, Eddie Wingrave, who on his 20lb. lightweight cycle clocked up speeds of between 60 and 70 miles an hour. Dials showing the speeds reached were visible to every member of the audience. There were also competitions between four local riders, riding fixed machines on four sets of rollers. Wingrave's machine was free on the rollers, with only some 6 inches of roller to spare on either side of his narrow tyres.

### *Smart Work*

AT the hearing of a charge against a man at Huntingdon Divisional Court of stealing a bicycle left outside a house, it was stated that a police officer in a radio car was informed of the theft and arrested the thief before he had gone more than about a mile. The man told the Court that he had been given permission to borrow the cycle by someone he did not know, but he was stated to have had three previous convictions for theft and he was sent to prison for three months.

### *New Leicester Speedway Track*

LUTTERWORTH Rural District Council have agreed to lease about three-quarters of an acre of land on Leicester Road, Lutterworth, to the local cycle speedway club at a rent of £3 a year. The Council reserves the right to bring the letting to an end if there should be serious objections raised by people living nearby.

### *To Ease Doncaster Congestion*

AS there seems no possibility of the proposed by-pass scheme for Doncaster, estimated to cost several million pounds, being carried through for years to come, the Corporation is now considering a minor scheme which will cost some £90,000. It is proposed that, to ease the congestion of the traffic on the Great North Road, that southbound traffic shall pass through the centre of the town, while north-bound traffic is diverted through one-way streets. The scheme is, however, subject to the making of a 75 per cent. grant by the Ministry of Transport.

### *Link With Early Days*

MR. GEORGE EDWIN WHITE, of Mount Road, Hinckley, who has died at the age of 64, was the son of one of the early cycling enthusiasts, the late Mr. Reuben White, of Castle Street, Hinckley. Mr. Reuben White was one of the pioneers of cycling in South Leicestershire and his son shared his enthusiasm, but later turned to motor-cycling, and was a former T.T. rider.

### *Double-Decker Roads Suggested*

REFERRING in his annual report to the fact that present-day traffic on trunk roads is just about as much as the roads can cope with, the Kesteven County Surveyor suggests that the time will come when we shall have to think in terms of two-tier roads. He thinks that when new dual carriageway roads are built in years to come the only way to enable them to carry all the traffic required, without taking up too much land, will be to build a second carriageway on supports above the first. The surveyor, however, does not dare to estimate how many millions of pounds even a short length of road of this type would cost.

### *They Want Cycle Track*

PROVISION has been made for the laying out of a running track on a new estate that is being developed at Wellingborough, and Wellingborough Cycling Club members have suggested to the Urban District Council that a cycle track should also be provided. The Council has the suggestion under consideration.

### *New Yorkshire Club*

A NEW Yorkshire club, the Arksey Wheelers, has been started at Arksey, Yorks., by a number of enthusiastic riders who are hoping to receive support from those local riders who are not yet members of any club. The first run had to be abandoned because of the appalling weather. About 28 cyclists attended an open meeting of the club at which the officials were appointed for the coming year.

### *Cyclists Awarded Damages*

TELLING a former Loughborough town councillor that he felt his evidence was not truthful, the Judge at Loughborough County Court gave judgment for four cyclists, members of the Soar Valley Cycling Club, against the man. The defendant was Mr. Ernest E. Cumberland, of Holt Drive, Loughborough, and the claim arose out of a collision between his car and one of the cyclists, which caused the remaining cyclists to fall off in a heap; the damages awarded totalled £83 13s. 5d. At the time of the accident the cyclists were returning home after a run, and the Judge commented that the accident was the result of "a particularly disgraceful piece of driving."

### *Other Counties Please Copy!*

AS part of their Festival of Britain celebrations, edfordshire County Council propose to provide name signs for all the villages in the county which, like so many villages in so many other counties, are anonymous. There are to be 138 of these signs, and each will cost £10. The signs will be in the form of a white board bearing the village name in black letters, and will be mounted on two concrete posts. The signs will also bear the Festival of Britain emblem and a coat-of-arms, the design of which latter is still being considered. The County Council are also planting trees along the county's main roads to improve the appearance of the roads, and about 1,000 are due to be planted up to the end of the planting season.

### *National Race for Harworth*

PLANS have been made for the holding at Harworth Colliery Sports at Harworth, Yorks., on July 21 of the women's national 880-yards track cycling championship. Doncaster rider, Mrs. Mary Martin, won the championship at Harworth in 1947, and in 1948 and 1949 Mrs. Majorie Padley, of Brodsworth C.C., was the winner, but Mrs. Padley lost last year when the event was held in Leicestershire.

### *Another Thriving Club*

THE membership of Leicestershire Road Club, founded in 1909, has reached an all-time record figure of 175. The club was the first of its kind to be founded in Leicester, and at this year's annual dinner the president, Mr. F. A. Beardsmore, paid tribute to the enthusiasm of the members. He also complimented Derek Lewin, holder of the club records for the 10, 25, 30 and 50 mile events. Lewin's best effort was a time of 1hr. 12mins. 32secs. for the 30-mile event.

### *In Never-Never Land*

DONCASTER Town Council have now been told by the Ministry of Transport that there is no hope of a by-pass being built to take the Great North Road away from the town for a long time, and that the whole scheme must be considered to be a "long-term plan." The borough surveyor has been instructed to prepare an alternative scheme for re-routing the traffic, and it is suggested that only northbound traffic shall be affected, leaving the southbound flow to continue.

# Around the Wheelworld

By ICARUS

## The "National" Committee

I SEE that the "National" Committee on Cycling has spilled its usual dose of venom against massed-start racing. In a recent statement to the Press it reaffirmed its previous decision that in its opinion cycle racing on the road is dangerous. This self-appointed body is composed of representatives of the C.T.C., the N.C.U., the R.T.T.C., the manufacturers, but not B.L.R.C. I am suggesting that it is allowing itself to be made use of by those of its members who have every reason to require massed-start racing to be banned, and which has tried every method overt and covert during the past ten years to bring this about, but unsuccessfully.

It is my belief that the N.C.U., with its usual blundering and blunderbuss methods, is behind this latest move. The "National" committee cannot have given the subject proper consideration. For one thing there is no member of the League on the committee, and as the League is undoubtedly now a national body the matter savours very much of trying a man and sentencing him in his absence.

How many, for example, of the members of this specious committee have witnessed a massed race from start to finish? Have they compared the accident figures for road racing, time-trialing, and circuit racing, in relation to the numbers participating? Have they consulted local authorities? They could not find a tittle of evidence to support their statement that massed-start racing is dangerous. It is for other reasons that they oppose it.

## Reg. Harris—Sportsman of the Year

REG. HARRIS, for the second year in succession, has been elected Sportsman of the Year in the national ballot organised annually by the Sporting Record. This ballot endeavours to ascertain the public's choice of the sportsman considered to have done most during the year to raise the prestige of British sport. This year 12 of the leaders of sporting activities not previously represented were at the head of the poll. No less than 244,018 votes were received—a record, exceeding by 78,000 votes last year's figure. The runner up to Harris in the ballot was Jack Holden, Britain's marathon runner.

The Silver Trophy, with replica, was presented to Harris at the Savoy Hotel by the Rt. Hon. Hilary Marquand, M.P., on April 2nd.

## Meatless Energy Demonstration

I AM not a supporter of vegetarianism, believing that man was born a carnivor. Some vegetarians that I have known have seemed very pasty-faced, lack-lustre, wayside woodland weeds. I was, therefore, amused to learn from a recent statement of the London Vegetarian Society that, "in view of the present-day national interest in meat alternatives, and in diets from which meat is excluded owing to the meat shortage," the Society arranged a free demonstration at Conway Hall during March, the demonstration including weight-lifting, cycling on rollers, and Margaret Morris movement dancing. What can such a demonstration have proved? Precisely nothing. The only fair test would be to take a particular person who is a meat eater and put him through a test, then to put him through a one year's vegetarian course and test him again under the same conditions. Even that, however, would prove little.

No vegetarian has ever achieved anything which has not been equalled at least by carnivors. The last time I attended a vegetarian dinner I was nearly sick, and had to adjourn to a local for a glass of beer and a plate of corned beef.

## "Go Slow" Illegal in Paris "6"

THE Paris Six-day Cycle Race was a grand circus for all keen students of the finer points of cycling skill at speed. As a pure race it had nothing in common with the most humble 25-mile time trial. Yet the crowds who attend these ten-lap-to-the-mile six-day rides to nowhere always manage to overlook this factor in the heat of sensationalism, which is the life blood of these affairs. How they cheered, booed and threw bottles!

The Dutch team, Adriaessens-Bruylandt, winners of the recent Ghent Six, covered 3,173½ kilometres (nearly 2,000 miles) to win by a lap from Bruneel-De Beuckelaer, the latter team, however, being vastly superior on points.

But the true course of the race was broken when on the final afternoon the two Gerits—Gerit Schulte (the Pedalling Fool of pre-war days) and his partner, Gerit Peters, of Holland, decided to stage a spot of "go slow," they being some seven or eight laps up on most of the field of some 14 teams. The other leading team, Lapebie-Terruzzi, followed suit, and so developed the extraordinary picture of the fastest men in the race dawdling round the track while the rest "jammed" away to their heart's content to gain as many laps as possible.

Soon the "heads" were seven and eight laps down respectively, and then Schulte decided that he had rested long enough and would help his countrymen, Adriaessens-Bruylandt to some laps. The judges then took a hand, withdrawing Schulte and Peters, the ringleaders in these go-slow tactics, from the race.

Three other teams retired for various reasons, including the Australian pair, Arnold and Strom. They fell heavily in a change-over and were too shaken up to restart so near the final lap.

Robic, crash-helmeted hero of the Tour de France and many other long distance road races, retired from soreness — of throat, not saddle — while Carrara, who had terminated a previous partnership with Goussot to pair up with Lapebie in order to "ensure" an all-French team win, had to drop out with suspected appendicitis. Lapebie then joined forces with the Italian Terruzzi.

It was good to see evergreen Arnie van Vliet, Reg Harris's greatest rival, beating them all in the big money sprints, one of these being for 100,000 francs (£100).

## The "Claytonrite" Pramcar

THE pramcar shown in the illustration solves the transport problem for married women. It may be attached or disconnected to a bicycle within 30 seconds. It is marketed by Howard Clayton-Wright, Ltd.

## Cycle Show—King and Queen as Patrons

THE King and Queen have agreed to be Patrons, and Princess Elizabeth and the Duke of Edinburgh Vice Patrons, of the Cycle and Motor Show at Earls Court, which takes place from November 10th to 17th.

## N.C.U. 1951 Touring Handbook

I HAVE just received in a handy touring wallet sections 1 and sections 2 of the N.C.U. Touring Handbook for 1951. Section 1 gives touring information and section 2 recommended appointments. They are, of course, available to members only, at 1s. 9d., post free. The wallet has a pocket in which may be kept membership card, identity card, N.H.I medical card, and the W.H.A. card. I do not know why we should still have to carry identity cards, since the particular section of the Emergency Powers Act, which made its production at the request of a policeman compulsory, was repealed over a year ago.

## Isle of Man International

THE Isle of Man Bicycle Week promises to be the biggest event of this year. At the head of the list of events announced by the Isle of Man authorities is a statement that the roads of the islands will be closed for 6½ hours to permit three massed-start events to be run. Hitherto there were only two such events.

Another important change is that the course is increased in distance, and the event, dated for Thursday, June 21st, will be for three laps of the mountain circuit, or just over 113 miles.

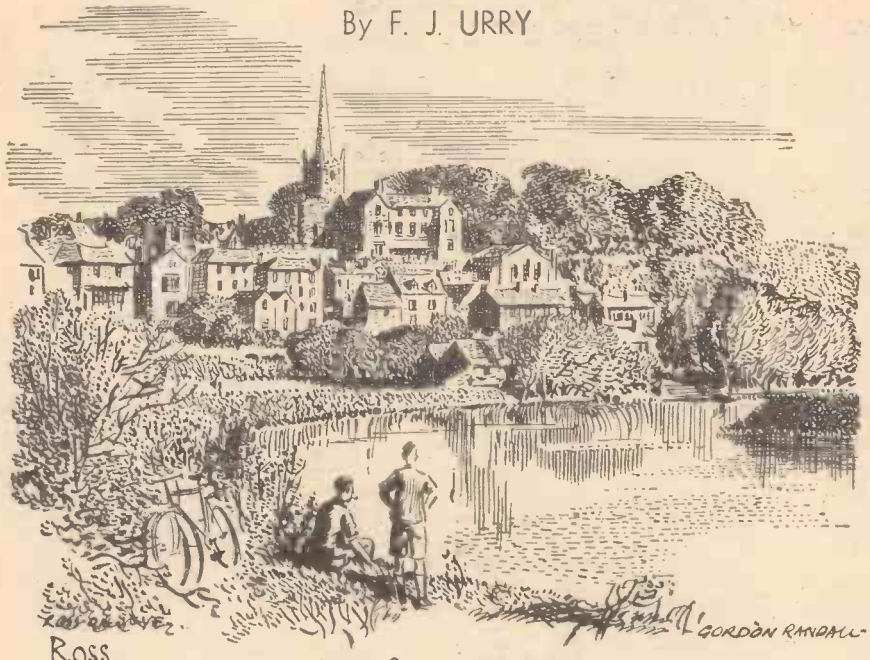
The third massed-start race is a two-lap event and, of course, there will be the usual one-lap event making three in all.

During the week the Isle of Man Mountain Time Trial promoted by the Manx Viking Wheelers will be run off.

*The "Claytonrite" Pramcar.*

# Wayside Thoughts

By F. J. URRY




Ross,
The famous horse-shoe bend of the lovely River Wye with the old town above.

**How it Started**

DOUBTLESS you have read of the Festival of Britain Cycle Rally to be held at the Dunlop Sports Ground on Saturday, June 23rd. If not, here is the news in brief. The Rally will start on the Friday evening and continue into the Sunday morning. The secretary to the promotion committee is E. T. Bannister, of the C.T.C. Offices, 3, Craven Hill, London, W.2. Now how has all this happened? Naturally, every cycling organisation had visions of stirring interest in the sport and pastime in this special year of grace, and all of them had some kind of programme in hand. With others, I could foresee these fixtures not only clashing, but endeavouring to serve a great movement haphazardly and in competition with each other. To avoid this, between us we worked a little miracle. The industry came into the picture, and so did the Odeon film interests, but greatest of all the successes was the consolidation of the aims and activities of the N.C.U., the C.T.C. and the Clarion. For the first time in the history of the sport, pastime and trade a great consolidated movement has been formed to put the bicycle story over to the public with an outdoor show infinitely greater than anything yet attempted by separate bodies; and this story will go round the world by way of Odeon films. Naturally, the allied interests have each given up some pet notion of their own to merge it into the general well-being of the Festival Rally, and I suppose the greatest gesture in this respect has come from the N.C.U., who are forgoing their very successful Leamington Rally to bring complete cohesion of form and feature to the affair of June 23rd. There then is the story of this miracle of mingling the interests of all the folk concerned with cycling, and the names of the individuals possessing the forensic nbility to work the miracle can be left until after the performance.

**The Right Place**

THE choice of the venue seems to me excellent, and it is almost a guarantee of success in itself, for without J. B. Dunlop and his tyre, and people like the du Cros family to make it famous and market it, cycling, and all other modern forms of transport, would have been sadly delayed. The world without the pneumatic tyre to-day is unthinkable, yet I knew it not in my youth, and, because of that fact, can properly appraise it. I know the Dunlop people will make everyone welcome; they will find it a pleasure as well as a duty. Yes, the Dunlop Sports ground is a sound foundation to the success of the Rally. This good start will be backed by the whole of the cycle manufacturing industry, and indeed I hope by all the big firms in the trade and dozens of others who make for us so multitudinal an assortment of goods. The industry will provide invitation breakfasts to all the cyclists arriving on the Friday evening, and every effort is being made to obtain suitable overnight accommodation—a problem, as you can imagine—and the wise riders intending to visit this Rally of Rallies will endeavour to book well in advance of the date. The programme itself is only in outline at the moment, but I know it will include historic displays, trick cycling, a pageant of colour suggesting the joy of the game, a display of country pursuits and crafts, fireworks, and, on the Sunday morning before the break-up, a Church parade and service. Fortunately, I believe the man who will be mainly responsible for running the show, E. T. Bannister, is the right one for the job; his heart is in it and the strength of youth to help, with not too much interference by the management committee, will result in a real triumph. I hope so, for I want our Festival folk, and particularly our overseas friends, to understand what cycling means to the British public, world leaders in the game as well as in the design and making of bicycles.

**The Real Stuff**

NOW, when the organised sport and pastime, and the industry they have created, spend their time, energy and money on a project of this kind, it surely calls for the support of every rider, and especially the enthusiasts who have found the game so satisfying. Here is the chance to prove to the world what we mean when we breathe the word "cycling," for remember the film record of this gigantic fête will go round the land and the world; the Odeon interests will see to that. If 12,000,000 bicycle riders cannot make a huge success of this pageant then I shall be astoundingly disappointed, and come to the reluctant conclusion they are not worth fighting for; but that won't happen—the organised cycle associations will see to that. Still, I want to interest the outside public, I want to see the lads and lassies with the colourful display of interesting events backing them, make the non-rider and the utilitarian cyclist realise the gift of beauty, the variegation of silent travel and the sweet reasonableness of health and exercise are inherent gifts that cycling presents so freely to all sorts and conditions of men and women. No similar opportunity of doing a complete picture of the cycling syllabus has ever been offered. The scale of it will be tremendous, the gay beauty of it a revelation, and the atmosphere dramatic with the decision that this game of cycling is the King of games. The Festival Rally needs your aid, and it should be a pleasure for you to give it in the certainty you will be enjoying a function the like of which has never been seen before. Book the date, organise your party, fix your accommodation and add your quota of publicity to the Festival of Britain and especially to this cycling part of it. I scribble these lines with enthusiasm in the hope that a sense of elation will permeate thousands of riders, for I believe in cycling, it is my happiness and joy.

**Get On With It**

NOW go out and get the sun tan on your faces and the merry miles in your legs, for there are good times to come to us between now and mid-June. How good none of us can say, but surely we are due for an English summer, long days on the road with those shady breaks where the land falls away to disclose a valley full of the richness of the countryside, up which the quiet air moves with the tang of the sea on its breath. What visions such thoughts conjure and what moments of ecstasy. When the days are dull and people grumble at the frown of the weather I often remind them that its mixture is bringing along such times, and that without the contrasts this climate produces we should not appreciate our summers, or the pastime that improves their loveliness. One of the enormous values of being an old cyclist and still capable of a day's fair mileage is the memory of such times along the road, their splendid beauty enjoyed in so many lovely places, and the dozens of companions who have shared them. "Do you remember?" is a frequent phrase on my lips when in the company of numerous elderly riders who have shared my simple pleasures, and be assured if you carry on into the seventies and beyond, that record of memory will be yours to share with many people. So, I say, get out and about as often and for as long as you can; I shall, for to-day I take much more notice of the Chinese philosophy to "enjoy yourself, it may be later than you think." I have no intention of lolling if I can lope, and the power to accomplish the latter is still mine, and the way to hold it for many a year is undoubtedly to practise regularly and make the practice a little paradise of quiet travel. "He tires betimes who rides too fast"; it may not suit the young and nimble to think there is truth in that statement, and good luck to them for their disbelief; but I and my like are very content to be happily fit and conscious what cycling means to us.

# CYCLORAMA

By H. W. ELEY

SLYFIELD MANOR, SURREY.

A fragment of the Jacobean house in its picturesque setting by the River Mole. The Slyfields and the Shiers great families of the past lived here and are buried in Gt. Bookham Church . . .

## Treasures of the Inn

NO institution is more closely woven into English life than the inn . . . whether it be in a green hamlet, a market-town, or a great city. The inn is a piece of English history; like a thread, it runs through the story of our wars, our sports and pastimes, our rural and urban occupations . . . and in a changing world, the English inn remains true to its old traditions . . . a place for the traveller to greet with joy at the end of his journey, a place for men to congregate and talk, a place for the quiet game of dominoes or "shove-halfpenny"; a place where one may drink ale and smoke a pipe and forget for a while the frets and furies of this modern world. But I wanted to say something about inn treasures: some are rich in old pewter tankards; some have fine collections of "horse brasses"; some have monster pike and bream and chub in glass cases in little bar parlours; others have good collections of old sporting prints on the walls of rooms where the ceilings are blackened with the smoke of innumerable pipes-rooms whose rafters have rung with the rollicking choruses of old English songs. In my retirement, I have discovered an inn where the collection of horse brasses is particularly fine, and I find joy in chatting to the man who made the collection . . . for he is a "horsey" soul, a son of the stable and harness-room. Yes! there are treasures in the inn. . . .

## "Mind How You Go"

I THINK that the present Ministry of Transport Press advertising campaign is, in many ways, a great improvement on some past efforts. The "copy" used in the advertisements is more reasonable, and as far as the cyclist is concerned, he is treated as a responsible road-user, with established rights, and it is not inferred that he is the "villain of the piece" as regards road accidents. Too long, in many motoring circles, we have heard of the crimes of the poor cyclist! I travel the roads a good deal, and have good opportunities of observing the behaviour of riders from towns and villages. I think the general standard is good . . . but of course, nobody suggests that we have not a great task ahead of us in bringing down those ghastly figures of road deaths and injuries. Friendliness among ALL classes of road users, an understanding of the problems of the "other fellow" . . . these are the remedies!

## Advice on Touring

I SUPPOSE it is because I have been writing these rambling "Cyclorama" notes for a good number of years that I am indebted to many good readers for interesting letters on cycling subjects. I love to receive them. Many contain tips about touring areas, English scenes, and places I should visit. Others tell me of old inns discovered and loved; of ancient churches and castle fragments. One, received the other day, was from a rider who had fallen in love with Norfolk. Now, I am not surprised that any man should fall in love with Norfolk . . . it is a county of varied charm and loveliness, and I share my good correspondent's enthusiasm for Norwich . . . that medley of the old and the new; that city of fine churches and ancient alley ways . . . and busy factories. Norwich, to me, is lovable because it is unplanned. I like the old and the new to jostle together. I like to turn a corner and find myself in a narrow little backwater, then turn to another and see a great factory where industry hums, and skilled workers make goods which will help old England to overcome her troubles and regain her industrial greatness. As for the county generally, it is as good as the rest of ancient East Anglia; the undulating well-wooded country, the stately park-lands, the big farms . . . they all go to make a picture which is essentially English. And, if you care for old churches, then Norfolk is rich in them indeed. I recall one—Dereham, with its two towers and memorial window to the gentle poet, Cowper; the window show him with his beloved dogs and tame hares. At Dumpling Green, near to East Dereham, George Borrow was born. Norfolk is rich in the glories of literature and painting . . . and on heather-covered Mousehold Heath, not far from Norwich, there still stands the old mill which Crome painted. My correspondent wrote much of the beauty of the Broads . . . but that is another story. Sufficient that I agree with all my letter-writing rider said . . . and some day I will go to Norfolk again and browse along her crumbling cliffs, and revel in the colour of "Poppyland" . . . .

## Debate on Diet

ONE day recently, in a little inn, I fell to chatting with some cyclists, when the talk turned on to diet, and the best food for a longish ride, and there followed much expert discussion on calories . . . about which I know little or nothing. One of the riders was by way of being a dietitian, and he quickly got me out of my depth when he discussed food values. But we agreed on one or two points: all of us had proved that chocolate—and cheese—were good things to ride on. We were divided as to the respective virtues of tea and coffee . . . but we agreed that on a hot day, after a long "pull," it was good to come across an inn, and drink cool beer out of a tankard. As for the ideal "snack" . . . well, I shall stick to chocolate, cheese, and apples! About their calorific values, I do not much care!

## Linking Up With the Festival of Britain

ONE always expects enterprise from the Raleigh group, and I was interested to note that in their current advertising, they are featuring "Festival of Britain" models. The advertisement suggested to my mind that the Festival provides good opportunities for retailers to "tie up"—in their window displays, and in their local Press advertising. A recent little tour of inspection of cycle dealers' shop windows did bring home to me that many dealers seem to lack window display "sense" . . . it is one thing to put cycles and accessories in the window, and quite another to *display* them! I fancy that if some cycle dealers studied the window displays of other traders, they might glean a lot of useful hints and tips. There may be a world of difference between cycles and chemists' goods . . . but the basic principles of window display remain the same, and can be applied to any retail trade.

## My Memories of Bob Carlisle

THEY go a long way . . . to 1912 days at the Dunlop Works at Aston Cross, when "Bob" was working on ledgers, and when his memory was keen and clear about those epic days in 1889, when he rode in the historic race at Queen's Park, Belfast, when the superiority of the pneumatic tyre was vindicated. "Bob" was a lovable character, and was in harness almost right to the end. His recent passing severs a link with John Boyd Dunlop, the Du Cros family, and removes from the scene a grand old sportsman and friend.

## Weather Wisdom

ALL through these last months of rain, and snow, and sleet, and dark gloomy days, I have been heartened by the optimism of some of the "old 'uns" of my village . . . who refuse to believe that we shall have a bad year, or that crops will fail, or that gardens will not yield their increase. These old men, who read the weather signs by some strange sort of instinct, refuse to be dismal jimmies: they have known late springs before; they have known when Farmer Huggett was "woeful late with his wheat sowings"—and yet had bumper crops. So, as I chat with them in the village inn, I take heart . . . and imbibe their optimism, and look forward to lots of sunshine when, as I hope to do, I journey into the West Country, and ride idly and happily through Drake's Devon. . . .

---

Mol's Coffee House Exeter.

A charming Elizabethan house standing in the Cathedral Close It was opened by Mol in 1596, and in the days of the Armada part of the building was used as a meeting place for naval and military officers. . .

GORDON RANDALL

# My Point of View

By "WAYFARER"

### *Road Accidents*

ONE often has cause to wish that the chief factors in connection with road accidents could be looked in the face, and that less attention should be paid to alleged contributory factors. "Road Badly Lit" is the caption of a recent newspaper report of a collision between a motor-cyclist and a pedestrian, resulting in the death of the latter. "One of the factors leading to this accident," it was stated at the inquest, was "the defective lighting of the road." Possibly so; but the prime factor (or factors) must be sought elsewhere. Darkness at night is no novelty—no surprise packet—even in suburban streets. It is true that faulty lighting accentuates that darkness, by the creation of black spots, but I, for my part, cannot see any connection between these features and the running down of a pedestrian. The unsatisfactory lighting is not something which arises suddenly, as is the case with patches of fog. It is there for all and sundry to see—in the vernacular, it screams at one—and surely it is the duty of wheeled road-users, whether on cycles or in motor-vehicles, to take precautions by adjusting their speed to match the temporary conditions of visibility, just as one automatically "goes slow" in a fog. That, at any rate, is the impression on my mind, and I am quite convinced as to which is the safe way to travel.

Since writing the foregoing, another case of bad visibility causing (or contributing to) a fatal accident has come to my notice. In this instance a street lamp which was almost out caused a black spot and was said to be "mainly responsible" for the accident, which resulted in the death of two women. The driver of the car did not see either of his victims, and the first thing he knew about the event was a sudden bump. Police evidence suggested that "reflections from the wet road made visibility difficult." Moreover—and this is a damning fact—both the women were dressed in dark clothes! It is a great pity that this matter of dark clothing should be dragged in on so many occasions: it is about as fatuous as the dark night inanity. I feel tolerably certain that none of these three fatalities would have occurred had the motorist been "minding his step"—driving in accordance with the current conditions. To my essentially simple mind, poor visibility, whether arising from a badly-lit road or otherwise, demands much greater care (combined with a lower speed) in the case of every wheeled traveller. The wise cyclist accepts that gospel: will the motorists not follow suit?

### *It's Saturday*

THERE is one week-day which stands out among its five "brothers." It is an occasion which helps to make life worth living in the case of cyclists and other devotees to the outdoor life. On your way to business you probably see folks carrying the insignia which marks their leisure hours. Here is a girl with a hockey stick: there is a man carrying a bag of golf clubs or a case containing his cricket or tennis kit. A laden cyclist streaks by, obviously with the intention of dashing off into the country for a week-end jaunt the very moment the office clock says "Go." When you go into the bank you find the dark suit of the cashier has given place to a sports jacket and grey flannel trousers. He, too, "has a date" when work is finished.

The atmosphere of Saturday is different from that of any other week-day. There is a strong flavour of liberty and freedom about it, and all these enthusiasts of outdoor exercise know it, the cyclist particularly. Already, as he works at desk or counter, the open road obtrudes itself. The ledger or the order book is momentarily obscured by a thin haze, out of which appears a stretch of highway or a crooked lane along which he will soon listen to the musical hum of his whirring wheels. He sees the distant hills—his goal—ever coming nearer. He is fascinated by the grey ribbon of road beneath his tyres and by the telegraph poles which are his constant companions. He visualises that wayside cottage which will provide him with tea, and his mind stretches out gleefully to the resumption of his journey, probably under cover of darkness, until, with the lifting at the roadside of a familiar house or inn, he comes to journey's end.

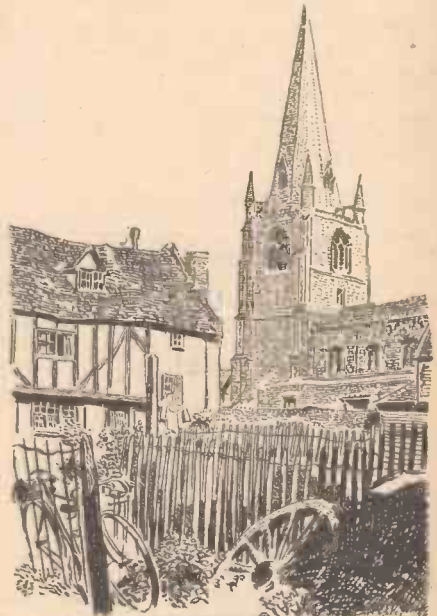
It's Saturday too with that other section of the public which operates a five-day week. Some of its members are not on view. They are far away, having taken advantage of their prowess in the way of piling 40 or 50 miles into an evening to start their week-end excursion immediately after close of work on Friday. Very definitely it is Saturday for them, with two full days at their disposal after their "flying start, just as it is Saturday indeed for those who, not able to get away on Friday evening, still have two days' leisure.

### *Indulgence!*

I AM awaiting the arrival of two new bicycles, one from a small maker with specialised attention to detail, and the other from a big manufacturer, who tells me nothing on wheels will be better than the specimen I obtain. When they come home, my little collection will mount up (I won't tell you to how many but five of them will be of no later vintage than '49) and I shall have enough to accommodate my friends when they visit me from distant places without the means to roam on two wheels. Why do I need so many machines? They are not necessary, but I like them; and, as I tell my wife when she asks the same question, all my bicycles do not cost a tenth in price outlay or upkeep as her car, and since we are both satisfied why worry? Some people collect golf clubs, some stamps or china, I like bicycles and I ride them; I should not know the difference between makes and shapes, gears and brakes, without having an assortment. Doubtless they will wear me out rather than the other way about, but I shall have gained a lot of pleasure from their possession.

### *Retires from Racing*

HOLDER of 50 cups, 100 other prizes and two N.C.U. medals for county championships, 43-year-old J. L. C. Aveling, member of Kettering Amateur Cycling Club, has decided to retire after 21 years as a racing cyclist. He has been a member of the club since 1929, and although he will do no more racing himself he will continue to help other riders in an advisory capacity. The 100-mile and 30-mile club records which he set up in 1937 still stand unbroken, and he has been four times track champion of the club and six times road champion. Last year he won the club's 25-, 50- and 100-mile time trials and was awarded the R.A. Luck Cup.



GORDON RANDALL.

Ely, Cambridgeshire.

The lovely church of St. Mary's standing in the shadow of the cathedral. It dates from 1198, the graceful spire and tower from the 14th century. . .



Published about the 30th of each month by GEORGE NEWNES, LIMITED, Tower House, Southampton Street, Strand, London, W.C.2, and Printed in England by W. Speaight & Sons Ltd., Exmoor Street, London, W.10. Sole Agents for Australia and New Zealand—Gordon & Gotch (A/sia), Ltd. Sole Agents for South Africa—Central News Agency, Ltd. Subscription Rate (including postage): For one year, Inland and Abroad 14s. (Canada 13s.). Registered at the G.P.O. for transmission by Canadian Magazine Post.

NOW AVAILABLE

## GERMANIUM CRYSTAL DIODES

LATEST, SMALLEST, SUPREME CRYSTAL DETECTOR.

Midget Size, 5/16in. x 3/16in. Wire Ends for Easy Fixing. 4/6 each, postage 2½d.

Wiring instructions for a cheap, simple but high quality Crystal Set included. Technical Details and Selected Types available.

**SILICON CRYSTAL VALVE**
3/6 each, postage 2½d.
Fixing Brackets 3d. Extra

**COPPER INSTRUMENT WIRE**
ENAMELLED, TINNED, LITZ. COTTON AND SILK COVERED.
Most gauges available.

B.A. SCREWS, NUTS, WASHERS, soldering tags, eyelets and rivets.

EBONITE AND BAKELITE PANELS, TUFNOL ROD, PAXOLIN TYPE COIL FORMERS AND TUBES.
ALL DIAMETERS.

Latest Radio Publications.

SEND STAMP FOR LISTS.

## CRYSTAL SET

INCORPORATING THE SILICON CRYSTAL VALVE

Adjustable Iron Cored Coil.

**RECEPTION GUARANTEED**

Polished wood cabinet, 15/-, post 9d. A REAL CRYSTAL SET, NOT A TOY.

**POST RADIO SUPPLIES**
**33 Bourne Gardens, London, E.4**

---

# SECTIONAL STEEL MASTS

Ex-Government Surplus Steel Tubing, made into Sectional Masts. Ideal for Television, Radio, Flag Staffs, etc. Each Section approx. 2in. dia. and 5ft. 6in. long.

**11ft. Mast (2 sections), 12/6d.**
(Carr. 2/6d.)

**22ft. Mast (4 sections), 22/6d.**
(Carr. 3/6d.)

*AT THESE PRICES THEY CANNOT LAST LONG.*

Send S.A.E. for our latest Clearance List of Radio and other Equipment.

**WALTON'S WIRELESS STORES,**
**203, STAVELEY ROAD, WOLVERHAMPTON**

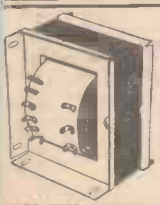
---

**CIRCULAR-SAW BENCHES**

6in. Saw Benches equipped for drilling, grinding and polishing. ½in. Cap. Chuck, Fast and Loose Pulleys, 92/6. Circular-Saw Blades, 4in., 7/6; 6in., 12/-; 8in., 16/6. Endless Vee Belts, ¼in., ½in., 1in. wide, all sizes. Round Leather Belting, ½in. to 1in. dia. from 4d. ft. Shafting Collars, ½in. to 1in. *Send 6d. for illustrated Catalogue D27.*

**BEVERLEY PRODUCTS,**
**28, OAKWOOD AVENUE, LEEDS, 8**

---



**Mains Transformers UPRIGHT — DROP THROUGH AS ILLUSTRATED.**
**Two Types Only. Guaranteed.**
No. 1: 250-0-250v., 80 mA., 0-4-6.3v., 5 amp. 0-4-5v., 2 amp. No. 2: Same, but 350v. Both 17/-, post 1/- for 1 to 3.

**HILLFIELDS RADIO,**
**8, Burnham Road, Whitley, Coventry**

---

**WEBLEY AIR PISTOLS**

Marvellously accurate for target practice.

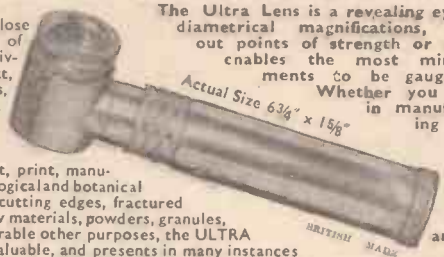
No licence required to purchase for use on enclosed premises.

Senior. Mark I
Junior. Webley Air Rifle

*Write for List.* WEBLEY & SCOTT, LTD., 106, Weaman Street, Birmingham, Enz.

---

# NO MAN CAN KNOW TOO MUCH OF HIS PRODUCT




For the close scrutiny of every conceivable object, metals, tools, fabrics, fibres, minerals, precious stones, paint, print, manuscripts, biological and botanical specimens, cutting edges, fractured surfaces, raw materials, powders, granules, and innumerable other purposes, the ULTRA LENS is invaluable, and presents in many instances hitherto unsuspected data which can be used to advantage.

The Ultra Lens is a revealing eye of six actual diametrical magnifications, which brings out points of strength or weakness, and enables the most minute measurements to be gauged accurately. Whether you are engaged in manufacturing, buying or selling, it is an ally of real value. No instrument you can buy will more quickly justify and pay for itself.

*Full particulars on request.*

PRICE £4 15s. 0d., complete in case with spare bulb, battery and transparent measuring scale. ADAPTOR, A.C. Mains, 27/-. Transformer, if required, 6/6.

**THE ULTRA LENS COMPANY,**
**75, Finsbury Court, Finsbury Pavement, London, E.C.2.**

---

"KARLENITE"

# PLASTIC MARBLE

The entirely new Artificial Stone for casting Bookends; Ashtrays; Wall-vases; Statuettes, etc. "Karlenite" sets granite-hard with a scintillating crystalline structure which very closely resembles marble or alabaster. It is enormously strong; highly resistant to heat and impervious to water. Literally any type of natural "veining" can be simulated in any colour and a range of pigments is available for this purpose.

●

MAKE YOUR OWN

# FLEXIBLE MOULDS

IN "ELASTOMOULD" SYNTHETIC RUBBER

Prepared in liquid form for making permanent elastic moulds. Ideal for repetition-casting Plaques, Bookends, etc., in plaster, cement or "Karlenite." It will faithfully reproduce even the most minute details of ornamentation and surface texture. "Elastomould" is incredibly simple to use and moulds can be taken from any type of pattern, including wood, metal, plaster, stone, glass, ivory, etc.

●

Send 1s. for full details of this easy, fascinating and profitable hobby. Money refunded to bona fide enquirers.

**KARLENA ART STONE CO. LTD.**
**(Dept. PM3), 55, Deansgate Arcade, Deansgate, MANCHESTER, 3**

---

# AMATEUR LENS WORKERS

*All Supplies!*

GLASS — EMERIES — ROUGES
CLOTHS — PITCH
LAPS and LATHES

*Lists on Request.*

**MASON & GANTLETT**
**LIMITED**
**3, ORFORD PLACE, NORWICH**

---

# Jubilee

PATENTED WORM DRIVE **CLIP**

Absolutely leakproof joints on Air, Water, and Oil lines are swiftly and easily made by using "Jubilee" Worm Drive Clips. They stand up to any pressure.

★ Write for instr' quoting reference RP/12.

THE FINEST CLIP IN THE WORLD.

**L. ROBINSON & CO. (GILLINGHAM) LTD.**
*Gillingham Kent*

---

# ADANA PRINTING MACHINES

Print in the odd hours with an Adana—still the most absorbing of crafts. **No. 1 H/S Machine £4.10.0**
**No. 2 H/S Machine £9.15.0.** W i l l quickly pay for itself.
*Send for illustrated folder to Dept. P.M. 43*

**ADANA (Printing Machines) Ltd., Twickenham, or call 8, Grays Inn Rd., London, W.C.1.**

---

"THAMES VALLEY"

# BATTERY CHARGERS

**2-6-12 VOLTS 1 AMP. 52/6**
*(Post Free)*

These are brand new and are in enamelled steel cases with ammeters. Suitable for 200-250 volt A.C. mains.

**Thames Valley Products (P),**
**28, Camden Ave., Feltham, Middx.**

---

# VENT AXIA EXHAUST FANS

Standard bakelite model. 24v. D.C. or 30v. A.C. in metal wall-fixing case, fitted adjustable louvres. Fits 9in. square hole. New, in cartons. Weight 22lbs. Price 45/-, transformer to suit £1 extra. Carriage 6/6. Many other bargains. Send S.A.E. for List.

**L. C. NORTHALL**
**16 Holly Rd., Quinton, Birmingham, 32**
Phone: Woo 3166.

---

# RATCHET & REVOLUTION COUNTERS

*Ask for Leaflet No. 18/6*
Speed up to 6,000 r.p.m.

**B. & F. CARTER & Co., Ltd., Bolton 5**
*Members of B.E.S.T.E.C. Organisation.*

---

Price £8 5s. 0d. Carr. Extra.

**The 'Adept' Bench Hand Shaper**

Length of stroke of ram, 3¼ins.
No. 2B. H.Shaper, 6¼in. stroke.
Price £15 0s. 0d.

*Ask your dealer. Manufactured by*

Machine Vice 23/-

Price £5-0-0d.
Postage and Packing, 2s. 6d.

**The SUPER 'ADEPT' LATHE**
11in. centres, 6in. between centres.
The "Adept" 2½ in. 4-Jaw Independent Chuck. Reversible Jaws, 35/- A Good Range of Accessories is available.

**F. W. PORTASS,**
**ADEPT WORKS, SELLERS STREET, SHEFFIELD, 8**

---

# SPARKS' DATA SHEETS

Now recognised as the Safest, the Simplest and the Finest Radio Constructional Sheets obtainable. All my Designs being Fully Tested and Guaranteed, you are sure of

**COMPLETE SATISFACTION.**

GOOD LISTENING WITH ECONOMY

**Four more of my TESTED and PROVED All-dry Battery Designs**

**THE POCKET PAK.** The finest little self-contained Pocket Portable One-valver obtainable. Med. waves. Good 'phone sigs. Most widely used and always praised ... ... ... 3/-

**THE JUNIOR.** A very efficient one-valver for use with short aerial. Med./Long waves. Good range and an ideal "stand-by" ... ... ... 3/-

**THE CRUISER.** A three-valve T.R.F. High-gain Set. Specially designed for use where only a short aerial can be used. Ideal for Caravans, Camping, Yachts, etc. M./L. Waves ... 3/-

**THE CORVETTE.** A compact all-wave Superhet. Good results anywhere with "hook-up" aerial, or a good Portable with self-contained aerial. Chassis size 5½ x 4½ x 2in. ... 3/-

The above are only 4 of the 10 designs available.

SEND STAMP FOR COMPLETE LIST.

**COMPONENTS SUPPLIED.**

**L. ORMOND SPARKS (M)**
**48A, HIGH STREET, SWANAGE, DORSET.**

---

# PRECISION TOOLS FOR PRACTICAL MECHANICS

**FOR IMMEDIATE DELIVERY!**

**JAGROSE 3" LATHE**

Surfacing, Screw-cutting, Set-over Tailstock, Hollow Mandrel, Complete with set of Screw-cutting Gears.

**£28-10-0**

E.P. Terms £7-10-0 deposit, 7 monthly payments of 69/-.

| | |
|---|---|
| 3½in. Dreadnought II Model | £49-10-0 |
| 3½ Heavy Duty Model | £65-0-0 |
| 4½in. Dreadnought Model | £72-10-0 |

or on Easy Payment Terms.

*TRADE ENQUIRIES INVITED*

Send for particulars P.M.2.

**JAMES GROSE LTD.,**
**379-381, EUSTON ROAD, LONDON N.W.1.** EUS 5231

---

**TALK on your Own Radio -SING**
**RADIOMICROPHONE**
**HOME BROADCASTER**

Only 12/6. (Note the price; worth more than double.) Connects to your radio pick-up or gram sockets. Talk or sing over your own radio from one room to another. Easy to fix. You can order 2 Microphones and fix a 2-station house-phone in your own home. Order right away. P.O. or cheque.


**J. BULL (PM5),**
**246 High Street, Harlesden, London, N.W.10**

# Free Guide – "Success in Engineering"

*One of the following Courses taken at home in your spare time can definitely be the means of securing substantial promotion in your present calling, or entry into a more congenial career with better prospects.*

## ENGINEERING, AERO, ETC.

**Plastic — Radio — Aero Engines — Aircraft Design — Welding—Aerodynamics—Electrical Engineering—Television—Electric Wiring—Diesel Engineering——Generation and Supply—Works Management—Metallurgy—Refrigeration—Planning. Estimating. Rate-fixing—Time and Motion Study—Aero Inspection—Automobile Engineering—Sheet-metal Work—Engineering Draughtsmanship—Aero Draughtsmanship—Jig and Tool Draughtsmanship—Press Tool and Die Draughtsmanship—Structural or R/F Concrete Draughtsmanship—Sanitary Engineering.**

## GENERAL

**Gen. Cert. of Educ.,—College of Preceptors—A.C.C.S.—A.C.I.S.—Aircraft Apprentice.**

## MUNICIPAL SERVICE

**School Attendance Officer—Handicraft Teacher—Registrar—Housing Manager—Sanitary Inspector—Weights and Measures Inspector—Inst. of Mun. Engineers—A.R.I.C.S.—L.A.B.S.S.**

"PRACTICAL ENGINEERING" said—

*We recommend all readers interested in improving their position to apply for a copy of this valuable book. "Success in Engineering" is not a pamphlet. It is a 132-page book, containing valuable and vital information on all branches of engineering. . . . There are many engaged in engineering who owe their success to The National Institute of Engineering.*

**The FREE GUIDE explains :**

- Openings, prospects, salaries, etc., in Draughtsmanship, Inspection, and opportunities in all other branches of Engineering and Building.
- How to obtain money-making technical qualifications through special RAPID FULLY-GUARANTEED COURSES.

Write now for your copy of this remarkable publication.

**A.M.I.Mech.E., A.M.I.M.I., A.M.Brit.I.R.E., A.M.I.P.E., A.M.I.C.E., A.M.I.Struct.E., A.M.I.Mun.E., M.R.San.I., A.M.I.E.D., A.F.R.Ae.S., London B.Sc., Degrees.**

*Fully guaranteed postal courses for all the above and many other examinations. Fully described in the Free Guide.*


### THE BUILDING BOOM— SECURE YOUR SHARE!

The Free Guide also gives particulars of our extensive range of modern Building and Structural Courses, Building Draughtsmanship, etc. The great post-war Building programme offers unlimited prospects to technically trained men.

### BECOME A DRAUGHTSMAN QUALIFY AT HOME AND EARN BIG MONEY

Men and Youths urgently wanted for well paid positions as Draughtsmen, Inspectors, etc., in **Aero, Jig and Tool, Press Tool, Electrical, Mechanical** and other Branches of Engineering. Practical experience is unnecessary for those who are willing to learn—**our Guaranteed "Home Study" courses will get you in.** Those already engaged in the General Drawing Office should study some specialised Branch such as Jig and Tool or Press Tool Work and so considerably increase their scope and earning capacity.

## THE ACID TEST OF TUTORIAL EFFICIENCY

### *SUCCESS—OR NO FEE*

We definitely guarantee that if you fail to pass the examination for which you are preparing under our guidance, or if you are not satisfied in every way with our tutorial service—**then your Tuition Fee will be returned** in full and without question. This is surely the acid test of tutorial efficiency.

**If you have ambition you must investigate the Tutorial and Employment services we are able to offer. Founded in 1885, our success record is unapproachable.**

*Why not fill in and post the attached Coupon NOW for further details and Free Authoritative Guide to openings in Engineering and Building? This book contains a mine of valuable and exclusive information and may well prove to be the turning point in your career.*

**PROMPT TUTORIAL SERVICE GUARANTEED**

## FREE COUPON

*To* **NATIONAL INSTITUTE OF ENGINEERING**
**(Dept. 29), 148, Holborn, London, E.C.1.**

Please Forward your Free Guide to

NAME.....

ADDRESS.....

.....

My general interest is in : (1) ENGINEERING (2) AERO (3) RADIO (4) BUILDING (5) MUNICIPAL WORK *(Place a cross against the branches in which you are interested.)*

The subject or examination in which I am especially interested is

.....

*To be filled in where you already have a special preference.*
*(1d. stamp only required if unsealed envelope used.)*

## NATIONAL INSTITUTE OF ENGINEERING

**(Dept. 29)**

**148, HOLBORN, LONDON, E.C.1**

**OVER SIXTY YEARS OF CONTINUOUS SUCCESS**

*SOUTH AFRICA: E.C.S.A. P.O. BOX 8417 JOHANNESBURG.*

FOUNDED 1885—FOREMOST TODAY—OVER 100,000 SUCCESSES