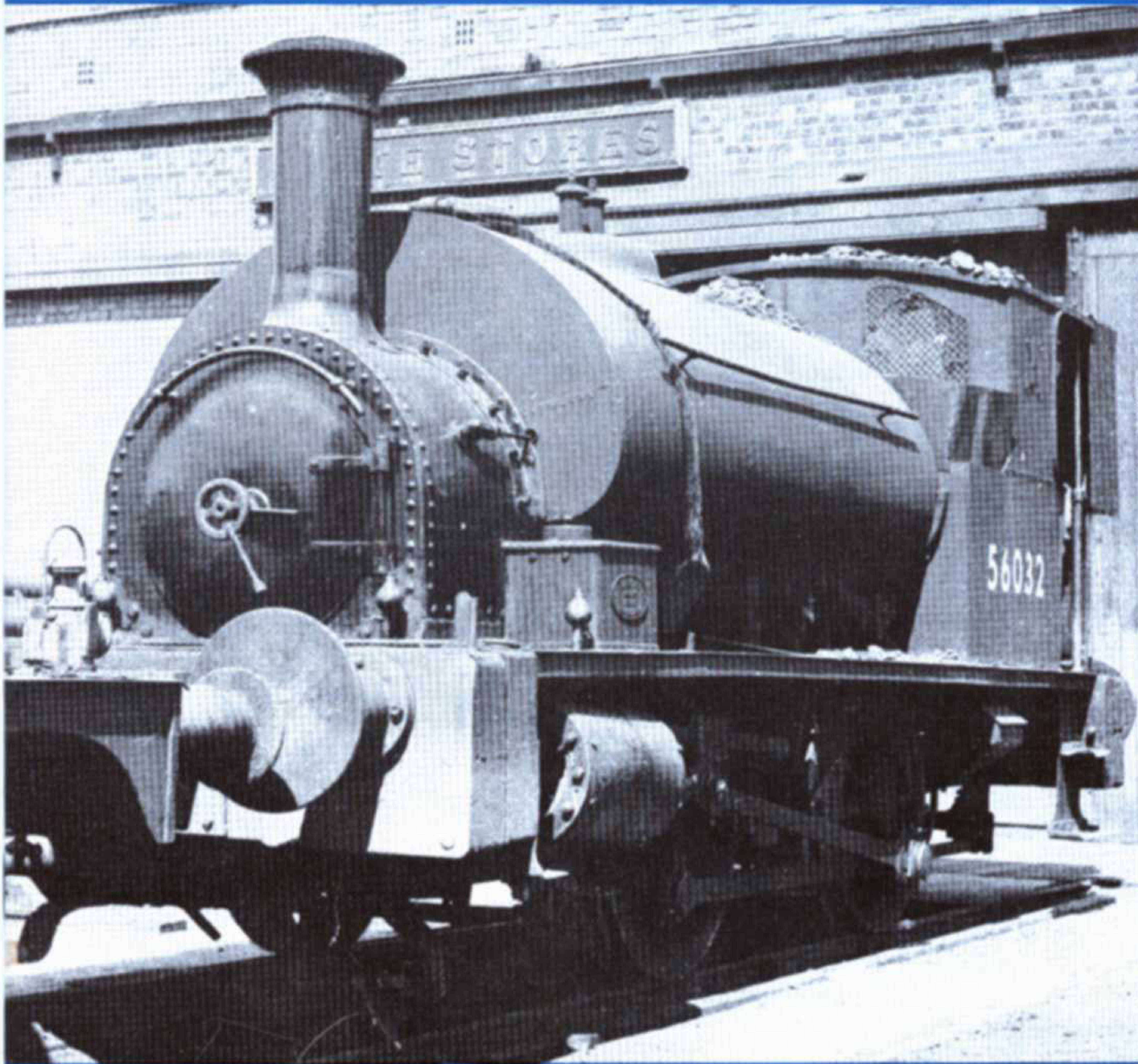
Model Engineer

THE MAGAZINE FOR THE MECHANICALLY MINDED



ONE SHILLING 13 APRIL 1961 VOL 124 NO 3118

Model Engineer

Incorporating Mechanics (Home Mechanics and English Mechanics) and Ships and Ship Models

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COVER PICTURE

A Caledonian Pug. In his Locomotive Library article this week Robin Orchard discusses this interesting class of railway engine.

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A WEEKLY COMMENTARY

Smoke Rings

By VULCAN

IN recognising the *Cutty Sark* as one of London's most popular sights, one is inclined to forget that she has other uses.

In fact she is doing valuable work in providing training for those interested in navigation and seafaring generally. Already there are over 300 students attending evening classes in subjects which include seamanship, coastal navigation (elementary and advanced), astronomical navigation, meteorology and signalling.

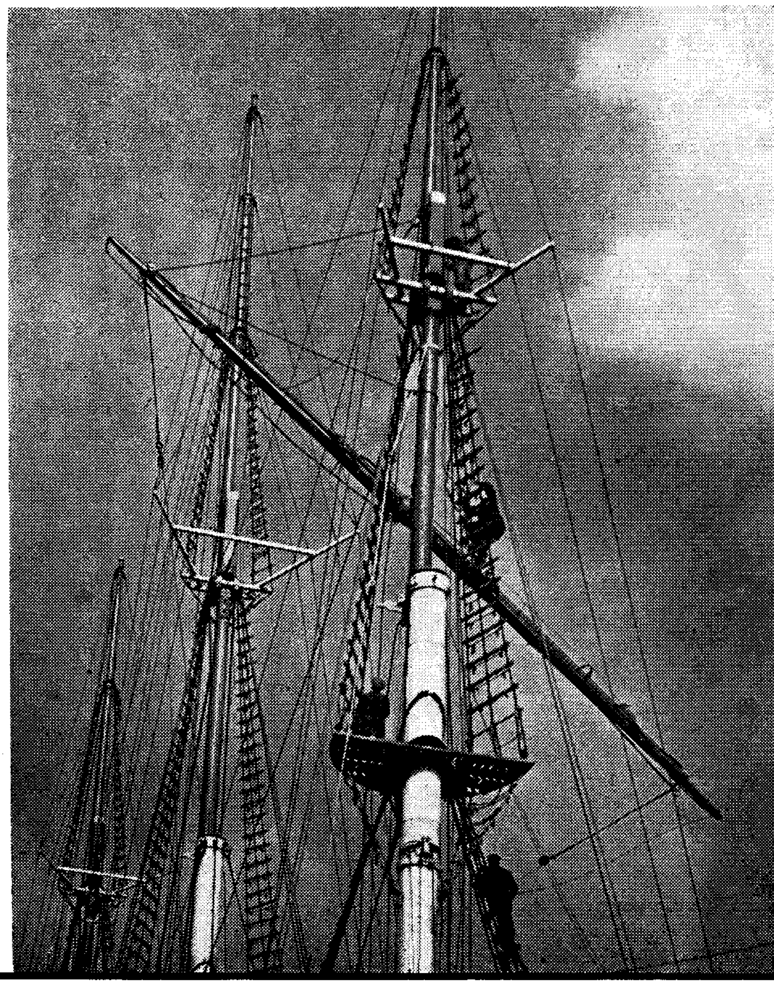
This is a valuable service for the ever-increasing numbers of yachtsmen and yachtswomen, so many of whom have all too few opportunities to study the technical side of their sport.

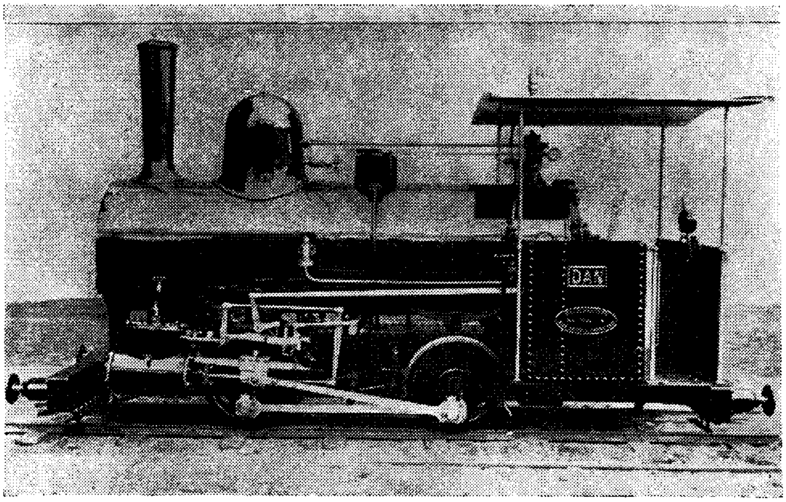
More than in most sports technique is of the greatest importance, and its study must be encouraged if we are to keep down the number of mishaps at sea which occur every summer, and which frequently involve the calling out of the local lifeboat.

The prize-giving for the past winter's session was held recently in the unusual setting of the Planetarium in Marylebone Road. To open the proceedings a "mystery" play of interest to yachtsmen was produced by Mr Leonard Clarke.

Mrs G. B. Rowe, wife of the captain of the Royal Naval College, Greenwich, presented the prizes, which took the form of pennants. These are copies of the *Cutty Sark's* house flag, and may be flown by the prize-winners in their boats. There was a special book prize for Mr H. G. Cundall, the first and only candidate to be successful in the new Coastal Yachtmaster's Certificate Examination

One of the spars being raised into position when the CUTTY SARK *was being reconditioned at her new home in Greenwich*





A Swedish contractor's locomotive fitted with the unusual Weidmark gear. The photograph was loaned to Vulcan by Mr Allan Andersson

> **Next week**
>
> *Robin Orchard tells of the progress made by a group of energetic enthusiasts in developing the once defunct Tal-y-llyn Railway.*

held by the Ministry of Transport in London last January.

Classes in practical seamanship will be held during the summer, and the next winter session will commence in September. Particulars may be obtained from Commander J. T. Hoddart, LCC Evening Institute Principal, c/o Clipper Ship *Cutty Sark*, Greenwich, SE10.

Bound for Boston

EDWARD BOWNESS is now almost fully recovered from his recent illness and articles of interest to the ship modeller are beginning to roll off his typewriter once more.

He has promised a further article on *Canberra*, discussing some of the problems which constructors have run up against, and if his doctor will permit the long journey he will be back at Poole in May with pen and camera ready to capture the important events.

Plans laid

But from then until September he will be missing at the regattas in Britain. He is leaving for a three-month visit to the United States at the invitation of a close relative in Boston.

The energetic Mr Bowness will not be idle. He has already made impressive plans to visit some of the maritime museums and centres of ship modelling activity.

Knowing how hospitable the Americans can be, I am sure that Mr Bowness will thoroughly enjoy himself. Our friends in the USA will find our maritime author a mine of information with a cultural slant which they may not suspect from his writings.

Reader from Sweden

MR ALLAN ANDERSSON, a Swedish reader of MODEL ENGINEER whose name is not unknown in Postbag, paid us a call recently while visiting Britain.

He came to invoke our aid in the purchase of a $3\frac{1}{2}$ in. gauge tank locomotive—something like *Juliet*—and though we telephoned several likely sources no one had a suitable engine for immediate sale.

Any constructor who would like to dispose of his tank engine to Mr Andersson should write to him at Amiralsgatan 85 G, Malmo S, Sweden. He is only interested in a locomotive in full working order and he is prepared to pay up to £100.

He may drive you!

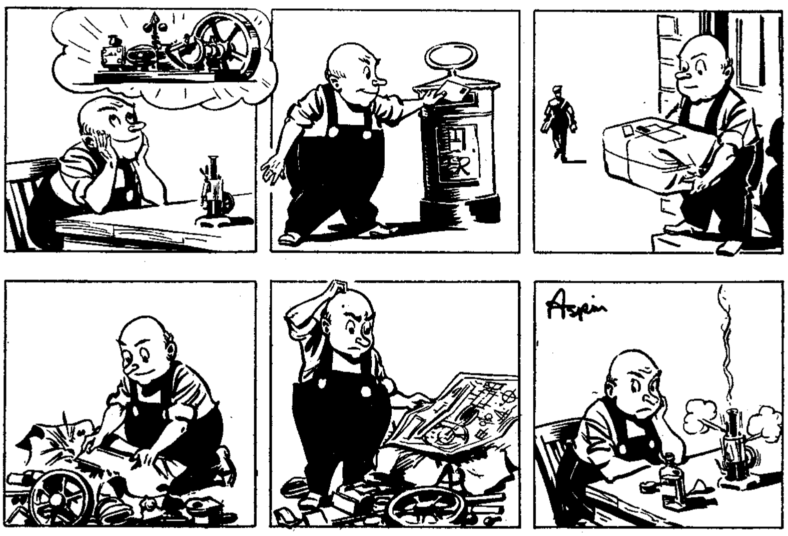
Mr Andersson is trying to encourage the growth of model engineering in Sweden, where he believes there is great scope for the hobby. He would like to see a better exchange of ideas with British model engineers.

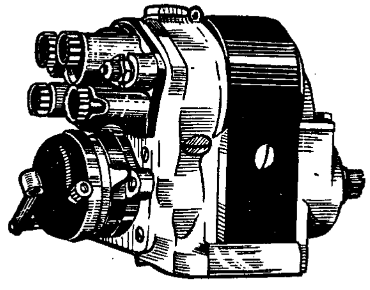
Sweden is gaining favour as a holiday land—in fact, *A Fortnight in Sweden*, by Mr C. E. Waller, has just been added to the Percival Marshall holiday guide series—and increasing numbers of British people are visiting this progressive country.

It might well be that if you visit Sweden and travel on the main line from Stockholm to Malmo, your engine driver will be Mr Andersson, for after 17 years on the Swedish Railways he is now a crack driver on this line.

He has a fine collection of photographs of unusual Swedish locomotives and he has promised us a short article about them.

CHUCK . . . . . . THE MUDDLE ENGINEER





MAGNETOS FOR ALL PURPOSES

***EDGAR T. WESTBURY** outlines a trend which began in the years of austerity*

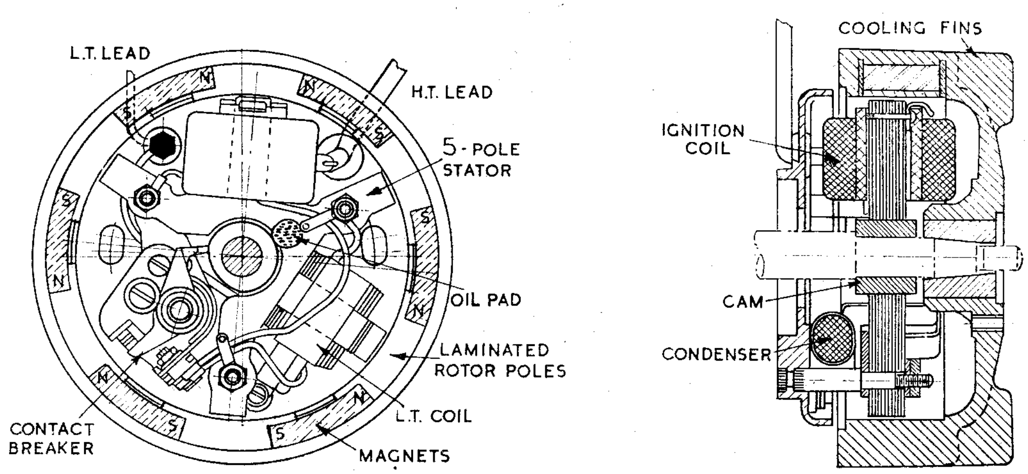
ONE of the most interesting developments in the commercial production of internal combustion engines is their increasing application in quite small sizes to both mobile and stationary duties. The possibilities of the small i.c. engine for use as a specially light and compact power plant have long been recognised (particularly by model engineers) but one deterrent to progress in their development has been the lack of suitable accessory equipment, such as carburettors and ignition gear, in more or less proportionate size and weight. I know from experience that several ventures in the production of small engines have been either still-born or strangled at birth by accessories entirely disproportionate in size and cost.

After the war, in the period of austerity and economy, a new emphasis was given to small engine developments, and a very important innovation was the use of engines of 50 c.c., or even less, for propelling pedal cycles. A small and compact ignition system was an absolute necessity, and one of the first magnetos to satisfy this demand was the Wico (now known as Wipac) Bantamag which, when it was first introduced, was the smallest and lightest magneto in commercial production. It has been manufactured in very large quantities for British and Continental auxiliary cycle engines, as well as for engines for many other purposes.

Wipac flywheel magnetos are now made in a variety of types and sizes, as they have to be adapatable to engines differing widely in design and methods of attachment. The basic principles on which they work are similar to those on the machines already described, but they embody ingenious variants of rotor and stator design, and also employ high-efficiency magnets to enable them to be reduced to the minimum size. Nearly always the flywheels are die-cast, with the magnets and pole pieces either riveted or inserted in the mould so as to form an integral part of the casting. The outside of the flywheel is sometimes provided with fins to form a centrifugal fan for forced air-cooling of the engine. Examples of these magnetos are shown in the photographs and line drawings.

The Bantamag has an overall diameter of approximately 4 in. and is made with different flywheel weights, the total weight of the magneto being up to 3½ lb. As most commonly used for auxiliary pedal cycle engines, it is fitted with a pressed sheet metal cover, attached by a spring clip; it can also be obtained with fins and other minor variations of design. It employs an asymmetrical or three-pole magnetic system, with two short Alcomax magnets and two laminated pole pieces, one short, and the other embracing more than half the circumference.

The stator consists simply of a



Wipac Migemag Series 90A magneto

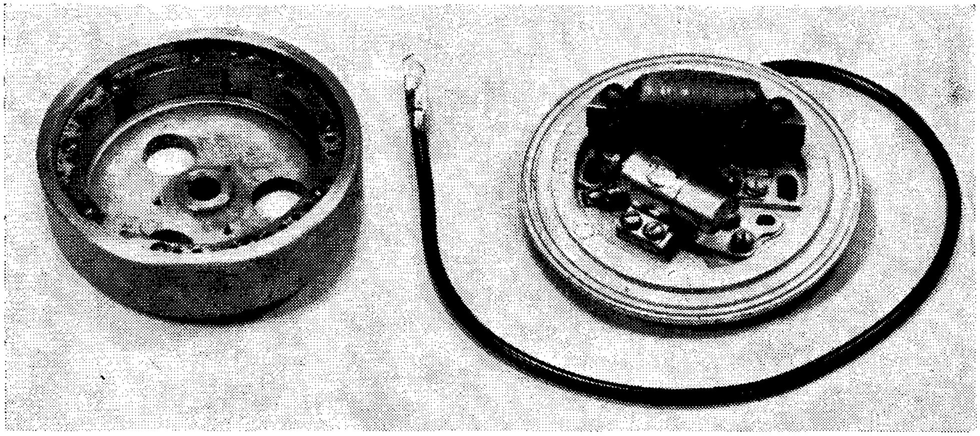
laminated core with integral pole pieces shaped into an arc at the ends to conform with the curvature of the rotor poles. Using a minimum amount of metal in the core helps to reduce hysteresis losses. The magneto is used for ignition only, and is, therefore, not suitable for low-tension coils. Although the popularity of the motor-assisted pedal cycle appears now to be very much on the decline, there is still a considerable demand for this type of magneto.

In a somewhat similar magneto known as Series 161, a different stator and coil arrangement enables a single short manget with two laminated pole pieces to be employed. These parts are cast into the flywheel, and so that the rotating system shall not be put out of balance a corresponding mass of metal is cast on the opposite side of the flywheel rim.

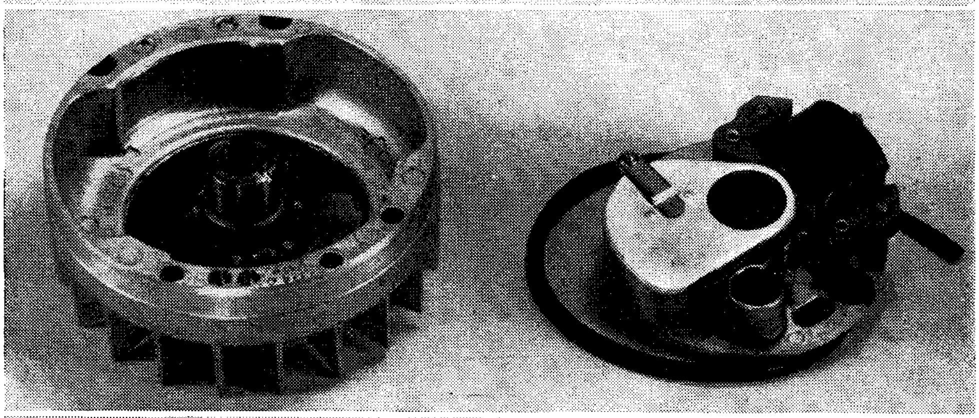
The stator is of "trident" form, with three arms, the centre one of which carries the ignition coil. This differs from the Bantamag coil; it is shorter in length and is encased in a plastic moulding. An enclosed contact breaker helps to provide protection from oil, dirt and water.

The magneto is $4\frac{1}{2}$ in. dia. and weighs only $2\frac{1}{2}$ lb.; like the Bantamag, it is suitable for ignition work only.

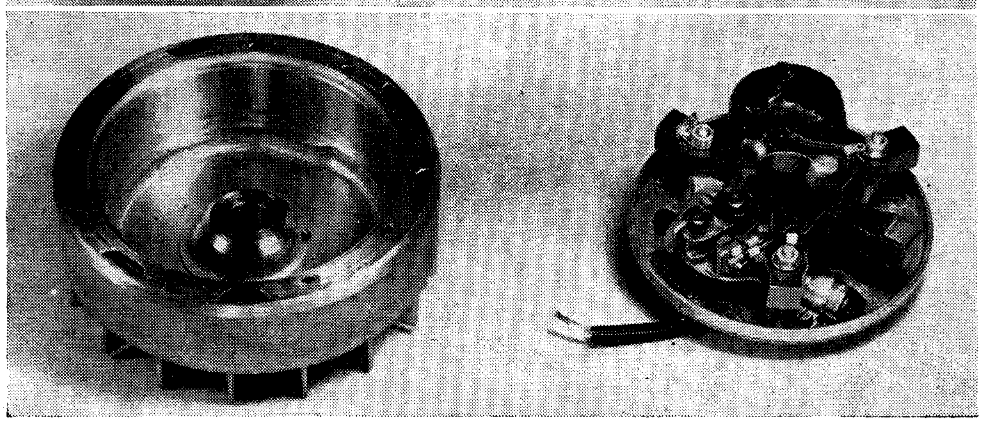
Series 90 and 90A Migemag magnetos are the smallest that I know of,



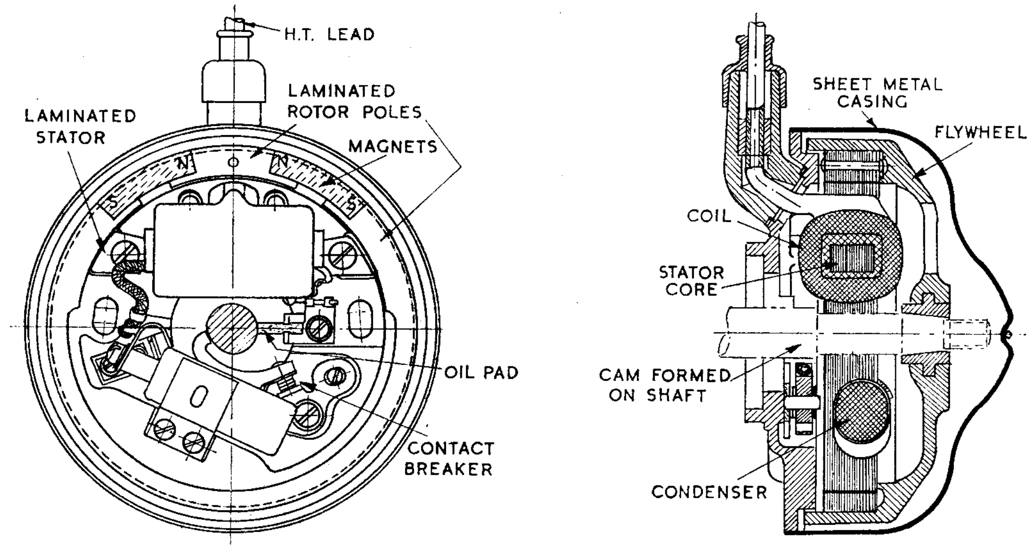
Rotor and stator of Wipac Bantamag for ignition purposes only



Rotor and stator of Wipac Series 161 *magneto for ignition only*

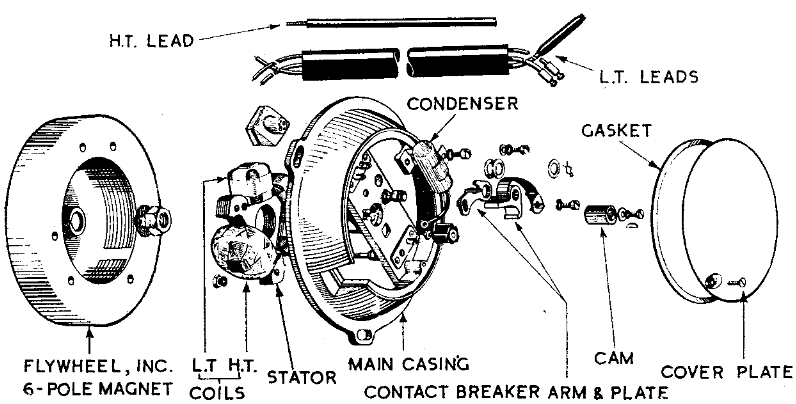


Rotor and stator of Wipac Series 90*A Migemag with low tension coil removed*



Inside the Bantamag

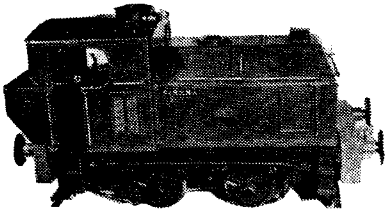
which are suitable for producing both ignition and low-tension current. They have six short magnets with laminated pole pieces cast into the rim. The stator has five limbs; it may be regarded as a six-pole stator, with one limb cut away to provide space for the contact breaker. One limb carries the ignition coil, and another the low-tension. In some other types, lighting coils can be fitted to more than one limb, according to the output of current called for in a particular case. This magneto is $4\frac{5}{8}$ in. dia., and weighs 3 lb. 2 oz. The low-tension output is 10 w. at about 6 volts.



Exploded view of the Wipac Genimag ignition and lighting generator

Where a greater output of low-tension current is required, the larger Genimag is generally used. It has a similar six-pole magnet system to the Migemag, but the flywheel is fitted to the shaft in the reverse position, the stator system being carried on an end-plate outside the flywheel. Its many advantages include much better accessibility of the contact breaker and other components, than in machines with these parts at the back, accessible only through apertures through the flywheel.

The Genimag has two low-tension coils, and is capable of generating current up to 30 w. It is fitted to several well-known makes of motor cycles. The frequency of the alternating current, generated will, of course, vary with the speed. It is relatively high at normal engine running speeds; for instance, at 2,000 r.p.m. the frequency will be 100 cycles. For battery charging, the current goes through a low-loss metal rectifier and is then fed directly to the battery, as the rectifier eliminates the need for the cut-out normally used with d.c. generators. ▣



SIRENA *Continued from 30 March 1961, pages 389, 390 and 391*

Now the WHISTLE VALVE

Work on the 5 in. gauge Sentinel goes forward several more stages in this sixth instalment by J. J. CONSTABLE

BEFORE continuing with the boiler fittings, I would like to suggest that standardisation of the hexagon rod used to make boiler fittings will be an advantage. Nothing is more irritating than to be unable to find the right spanner for the nut. For nearly all the nuts and fittings on small locomotives, a suitable size can generally be found in the BA range. Almost without exception the BA sizes have been used on *Sirena.*

I have often noticed unduly large hexagon fittings which invariably spoil the neat appearance of the pipe work. A piece of 4 BA hexagon rod ($\frac{1}{4}$ in. across the flats) makes the ideal gland nuts for $\frac{1}{8}$ in. and even 5/32 in. dia. pipes. It will take a 7/32 in. × 40 internal thread to screw on to a 7/32 in. × 40 nipple. As will be seen from the photographs, the appearance is neat.

For the larger pipes of $\frac{3}{16}$ in. dia. I use 2 BA, which is 0.324 in. across the flats and not $\frac{5}{16}$ in. If $\frac{5}{16}$ in. is used with a 2 BA spanner, not only will the spanner fit very loosely, but before long the nuts will suffer. Good sets of 0-9 BA spanners in a plastic case can be had at a reasonable price; with careful use they will last a lifetime.

Fig. 32 shows the parts for the whistle valve, a photograph of which accompanied my last article. The body is made from a $\frac{3}{4}$ in. length of $\frac{7}{16}$ in. dia. brass rod, and all the drilling and tapping is done at the same setting in the chuck. It is important to have the correct diameter for the hole through which the $\frac{1}{16}$ in. dia. push rod will operate the ball. If the hole is oversize a gush of steam will enter the cab when the valve is operated. You may find it better to drill the hole first with a No 54 drill and follow through with a $\frac{1}{16}$ in. The stainless steel push rod should be a good sliding fit in the completed hole.

Make the bottom nipple from 4 BA hexagon rod so that the completed valve can be screwed with a spanner into the rear of the safety valve block. The 2 BA hexagon cap to take the spring is straightforward; the hole for

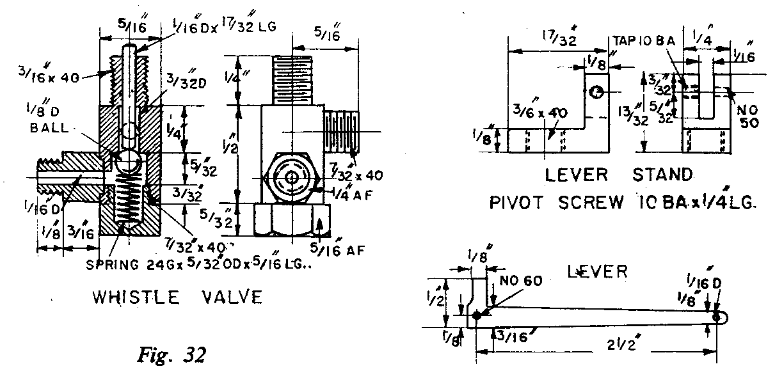
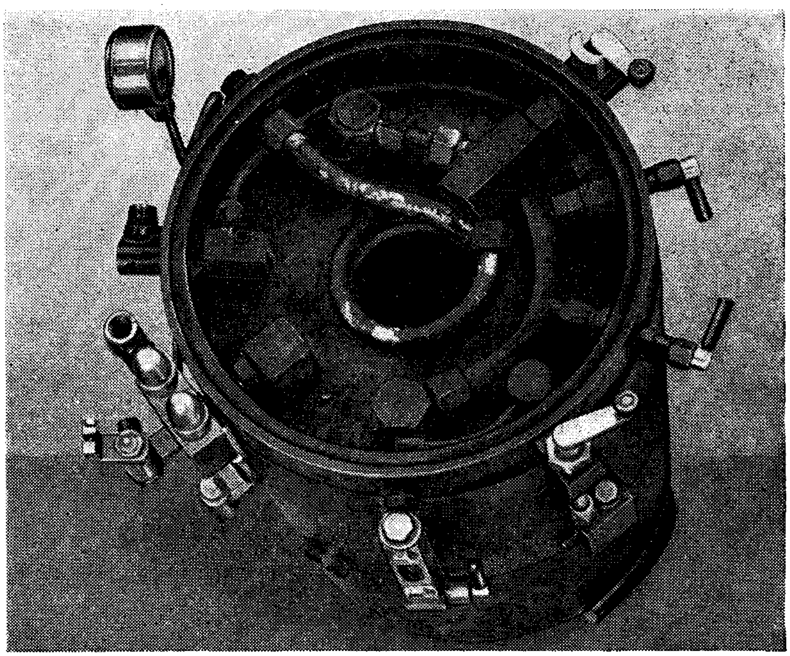


Fig. 32



Photograph No 15: This view of the boiler shows all the smokebox fittings

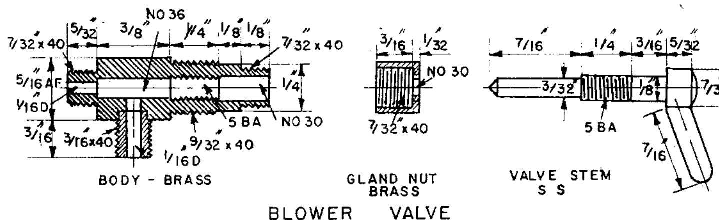


Fig. 33

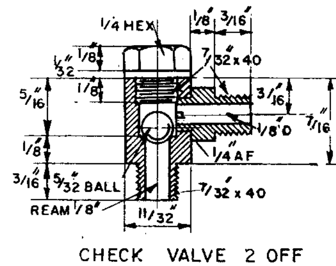


Fig. 35

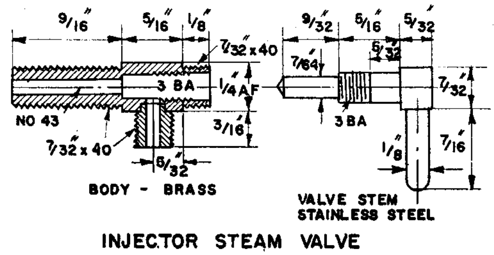


Fig. 34

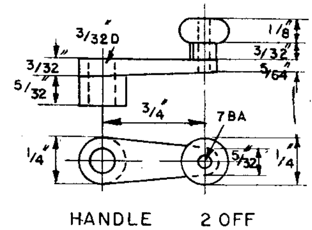


Fig. 37

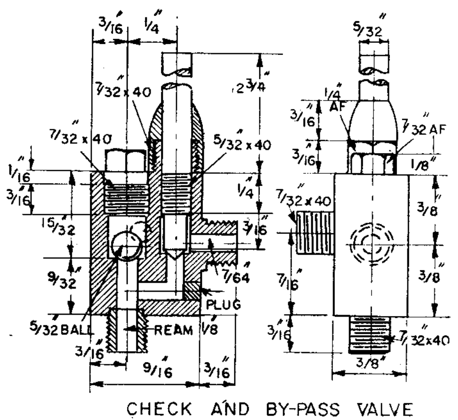


Fig. 36

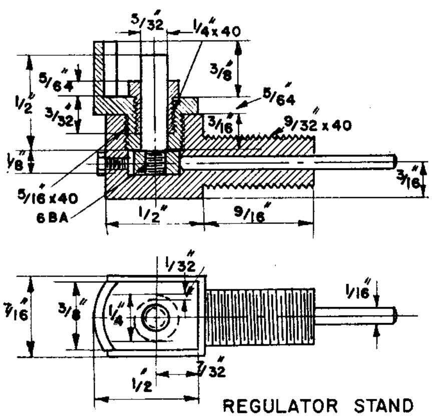


Fig. 38

the spring should hold it upright but without any binding when it is compressed. While the length of the push-rod is shown as 17/32 in., the length may vary slightly as a bare 1/32 in. should show above the top of the valve when it is in position. The lock-nut, made from 4 BA hexagon rod fixes the lever stand in the required position. You can cut the stand itself from a suitable piece of brass or make it from two parts silver soldered together. The $\frac{1}{16}$ in. slot should preferably be sawn with a cutter in the lathe to ensure that the finished slot is the right width to take the lever without any slop. Stainless or mild steel is used for the lever. It is sawn and filed to the shape shown; the part which presses on to the push-rod when the lever is pulled towards the driver is filed after fitting. This makes sure that the lever will be vertical, in the non-operated position.

Details of the blower valve are in Fig. 33. The body is made from 2 BA hexagon rod; apart from some careful drilling and tapping, it is not difficult to make. When it is screwed into the smokebox the outlet nipple ($\frac{3}{16}$ in. × 40) should be in the position seen in Photograph No 15, or it will not be possible to connect up the 3/32 in. dia. pipe to the blower. So that the nipple is in the right place, the valve body is first screwed into position in the smokebox, and then the flat to take the nipple is marked. Remove the body, silver solder the nipple in the flat marked; and when it is finally screwed into position, it will be in the right place.

Use 7/32 in. dia. stainless steel rod for the valve stem. After turning to the diameters shown and threading 5 BA for $\frac{1}{4}$ in. (do not exceed this) remove with a flat file any burr left at the end of the thread. If this is not done, there will be a tendency for the burr to tear into the packing which is held in position by the 4 BA gland nut. For obvious reasons, in all such fittings the threaded parts of valve stems should not enter the packing. I well remember when a locomotive at a fete failed because this precaution had not been taken and bits of packing had found their way down the blower pipe to the vital holes at the end.

The valve handle is made from a piece of black fibre. It is threaded 9 BA to screw on to the shot stub of 9 BA studding screwed into the valve stem.

Dimensions of the injector steam valve will be seen in Fig. 34. The body is made from 4 BA hexagon rod. It should be screwed into the smokebox so that the flat can be marked into which the 7/32 in. × 40 nipple can be silver soldered. The nipple should point downwards when the valve is in position; the location of the nipple is critical if the union nut for the pipe is not to foul the boiler lagging when the steam pipe to the injector is connected. The end of the valve stem should not exceed the diameter shown and should be turned to an obtuse angle so that it seats almost squarely on the seat.

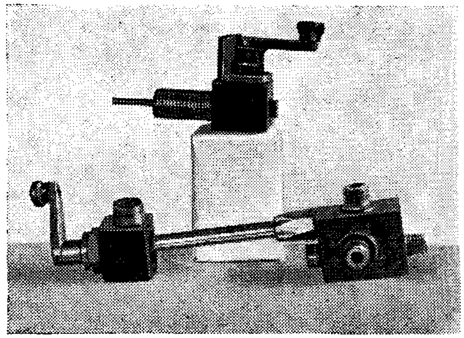
A frequent cause of slight leakage from this type of valve is a very pointed end which enters the seat for some distance and then seats on the side rather than on the edge. You should never need to close it so tightly that the seat is gradually enlarged with each successive operation of the valve.

The operations for making the valve are similar to those mentioned earlier. If you do not have a piece of suitable black fibre, an ideal substitute is the black material from an old teapot handle or non-heat iron handle. The location of both these valves in the smokebox can be clearly seen from Photograph 15 which shows all the fittings in the smokebox.

Two boiler clacks made to the dimensions in Fig. 35 will be required. One of them is for the hand pump feed and the other for the injector feed. A good way to make a neat cap either hexagon or square is to hold a piece of 11/32 in. dia. rod in the chuck, turn down a 5/32 in. length and thread 7/32 in. × 40 right up to the shoulder, leave a 1/32 in. width the full diameter, and then part off, with two bites at the cherry. At the first bite, the parting blade is entered nearly the full depth, say $\frac{1}{16}$ in., away from the centre. The second bite is taken at about the parting blade width away, and the piece is completely parted off. If all has gone well, we have an embryo cap with a small pip in the centre on which to locate the hexagon square where a spanner can be used.

A piece of suitable section rod is held in the chuck, the diameter of the pip is measured, and the rod is then drilled the same size. The ends are slightly chamfered and the piece is parted off to just over 3/32 in. width. This will now fit over the small spigot made on the cap and will hold the top in position when the silver soldering takes place. For small jobs the 1/32 in. dia. silver solder wire sold by ME advertisers is ideal. Too much silver solder will spoil the work and ruin the pocket.

The combined check valve and by-pass valve to which the feed from the mechanical pump is connected is illustrated in Fig. 36. Its final appearance is seen in Photograph 16. The body is made from a $\frac{3}{4}$ in. × $\frac{3}{8}$ in. × $\frac{9}{16}$ in. block of brass or bronze. Holes are needed in the block, and one of them is later plugged when the parts are silver soldered together. At $\frac{3}{16}$ in. from one side a No 31 hole is drilled right through the block and is opened out with a $\frac{3}{16}$ in. dia. endmill to a depth of $\frac{1}{2}$ in. to form the ball seat. While still in the chuck, it is tapped 7/32 in. × 40 for a depth of just over $\frac{1}{4}$ in. and is finally counterbored (taking out the 7/32 in. × 40 threads) for $\frac{1}{16}$ in. depth with a $\frac{1}{4}$ in. end mill. This is to form the seat for the ball cap.



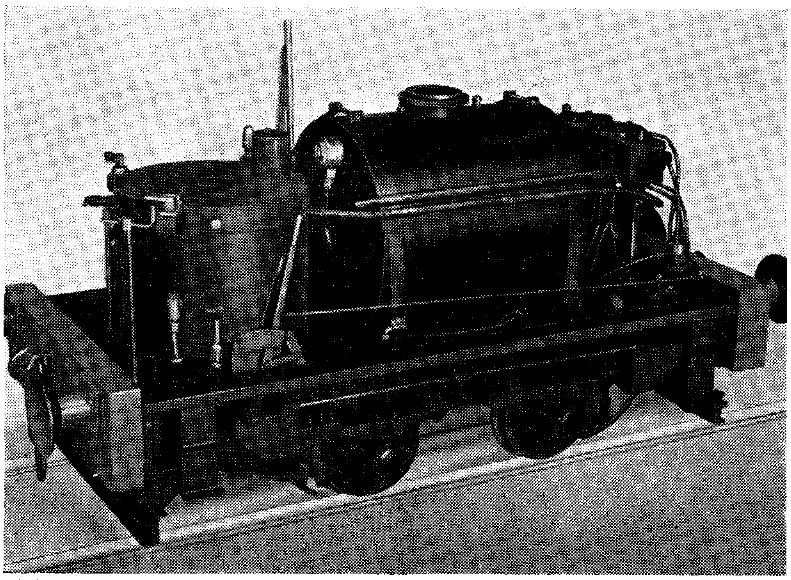
Photograph No 16: Check and by-pass valve

All the operations are done at the same setting in the chuck. The jaws are now loosened and the body is pushed over so that, at $\frac{3}{16}$ in. from the other side, the hole can be drilled for the valve rod. This hole does not go right through the block and should first be drilled with a No 38 to a depth of $\frac{5}{8}$ in. It is opened out with a $\frac{1}{8}$ in. dia. endmill to a depth of $\frac{7}{16}$ in., tapped 5/32 in. × 40 for $\frac{1}{4}$ in., and finally counterbored for $\frac{1}{16}$ in. with a $\frac{3}{16}$ in. dia. endmill to form the seat for the gland nipple.

A No 38 hole is drilled through the side at $\frac{1}{8}$ in. from the bottom to break through just below the ball seat with the No 31 hole. In the centre of what will be the back of the valve, and at $\frac{7}{16}$ in. from the bottom, a $\frac{1}{8}$ in. dia. hole is drilled to break through just above the ball seat. Care should be taken as the drill breaks through, as it is unsupported on one side and may break off. The hole will be oblong in the ball chamber; this ensures that water from the mechanical pump cannot force the ball so that it blocks the entry into the boiler.

While you are still at the chuck from drilling the hole, slightly counterbore with a $\frac{3}{16}$ in. dia. endmill to form a seat for silver soldering into place the 7/32 in. × 40 nipple which will later screw into the boiler and hold the completed valve in position.

● *Continued on page 459*



Photograph No 17: Offside view, without superstructure

SETTING and SUPPORTING LATHE TOOLS

WORKSHOP HINTS and TIPS

By GEOMETER

MANY factors influence success in a turning or boring operation; and a knowledge of the characteristics of the lathe, its response to adjustments, its reactions to certain handling, must always constitute a large part of a turner's skill.

It is knowledge that comes gradually of course, in the beginning often growing out of mistakes and mishaps. Deplorable as these may seem at the time, they often teach a delayed lesson when they indicate what should not be done on future occasions; or they may be positively beneficial in stimulating an analysis of factors by which those that are unfavourable can be eliminated.

Among unfavourable factors are inappropriate shape and setting of tools, and their inadequate support when they must take the thrust of broad or heavy cutting, or when a feature of the work calls for their considerable overhang, as in deep parting-off operations, or in machining the crankpin on a balanced crankshaft.

For heavy cutting, as in roughing out, a square or straight advancing edge on the tool gives the shortest length and the freest cutting. Tough material like steel can be stripped smoothly off in a cool flat ribbon, whereas, using a round-nosed tool for a correspondingly heavy cut, the metal is compressed as it is torn off, and is then broken into short rough lengths, or at times into hot blue fragments. This is hard on the job, the tool, and the lathe.

On the other hand, for finishing with light shallow cuts, a round-nosed tool, or one slightly flattened behind its rounded nose, gives an improved finish, as the length of its cutting edge equals or exceeds the advance per revolution. You thus avoid a markedly spiral finish—a shallow thread on the work.

For either operation, a combined lubricant and coolant is usually recommended; and various cutting oils and suds are to be obtained. A good home brew is made by flaking soap thinly from a bar, dissolving in boiling water and then mixing with car engine oil. Sufficient soap and oil give a mixture with plenty of finish-improving, lubricating body—but it is advisable to clean down the lathe after use.

For roughing and finishing cuts, height setting of a turning tool is an important factor. For heavy roughing cuts, endwise to the material, the tool edge can be fractionally above centre *A-S*, so that slight spring will tip the tool approximately to centre height. This is all right, but too high a setting, too much spring, deepens the cut; and by increasing unfavourable factors, the diameter of the work can be unexpectedly reduced—riskily so, if roughing is near to finished size.

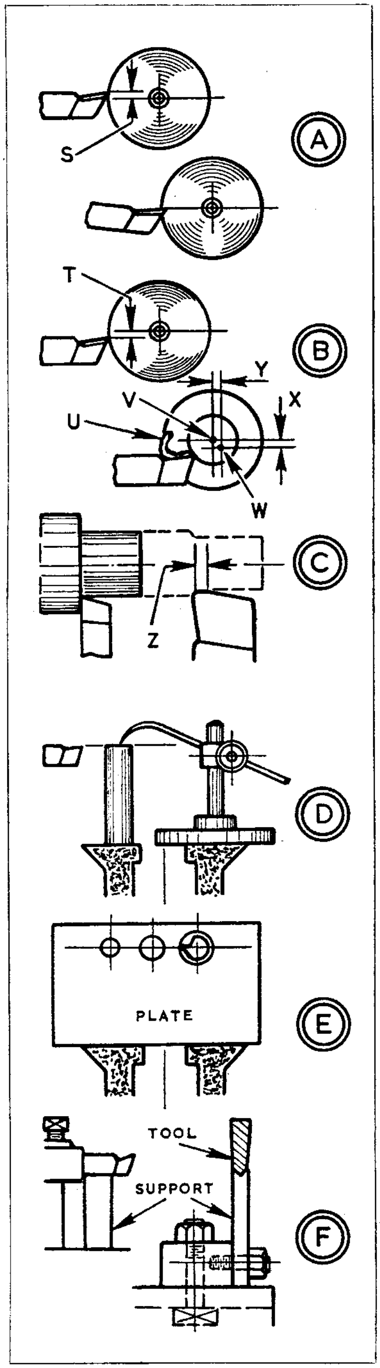
Other hazards occur with a low tool-setting, *B-T*, which may be exaggerated through the inherent down-spring. There is a reduction in effective rake on the cutting edge, and the pushing of the tool below centre tends to lift the work. It is particularly marked with a parting-off tool which is not cutting freely. Resistance of the chip *U*, combined with spring in the work, can move the centre of this *V* from that of the spindle *W*, upwards and towards the tool, with components *X* and *Y*. Jamming and tool breakage can speedily follow.

For most turning operations, then, a tool is advisedly set at centre height, or slightly above. For roughing cuts, its shape can be as *C*, left, and for finishing cuts as *C*, right, with a small honed flat *Z*.

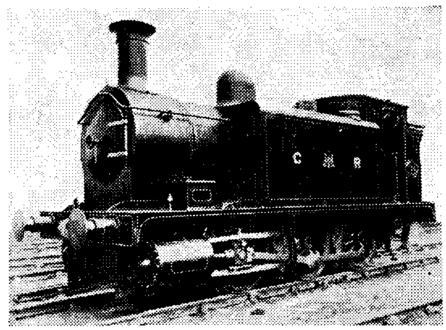
Height setting can be expedited with a surface gauge *D*, its pointer adjusted to a rod or block which has been machined to centre height. This initial adjustment can be performed optionally on lathe bed or surface plate.

For setting boring tools, a drilled sheet iron plate, *E*, can be used. As it can be moved along their shanks, it indicates clearance, and packing required, which is particularly useful for tools with forged shanks.

Support for a turning tool can often be arranged through packing, *F*, left; while a narrow tool can be supported by a steel strut studded to a block on the cross-slide, its top face veed to engage a ground vee on the tool. ■



COMPETITION for beginners



Newcomers to locomotive modelling are invited to enter Rob Roy at the 1962 ME Exhibition

Continued from March 16, pages 324, 325, 326 and 327

MARTIN EVANS comes to the eccentrics and cylinders of the $3\frac{1}{2}$ in. gauge Caledonian 0-6-0

BEFORE we can tackle the wheel quartering, the eccentrics should be turned up and put in place on the driving axle. They can be made from $1\frac{1}{4}$ in. dia. bright mild steel.

Chuck a suitable length in the three-jaw, turn down to $1\frac{3}{16}$ in. dia., and then put in the flange, using a stout parting tool, with the face ground off square. A fairly low speed should be used and plenty of cutting oil. On small lathes it is a good plan to support the bar with the tailstock, leaving enough metal to clean up the centre afterwards.

After parting off the eccentrics a little over-size in thickness, re-chuck each one in turn by the working face and skin the flange down to exactly 1/32 in. thick. Axle centres are now marked out. The centre of the eccentrics will be seen clearly by the turning lines, but great care should be taken to ensure that the throw of all the four is exactly the same. You can use the four-jaw chuck to hold the eccentrics for boring, but first make a split ring to hold the eccentrics in such a way that they cannot be scored by the chuck jaws.

The split ring can be made from a piece of brass tube, $1\frac{3}{16}$ in. o.d., and 1/32 in. thick. This is turned truly to a length of $\frac{1}{4}$ in., and a fine saw cut is made so that the ring can be slipped over the eccentric and the chuck jaws tightened down on it.

Manipulate the chuck jaws until the axle centre is running true (a wobbler is very useful here). Slightly release jaws 1 and 2 and then tighten down again. If the other three eccentrics are put in without moving jaws 3 and 4, and jaws 1 and 2 are tightened with the same force used on the first eccentric, all the eccentrics should come out with the same throw.

To start the axle hole, use a centre drill in the tailstock, running the lathe at full speed. Next put a drill about 5/32 in. dia. right through. Follow it with a $\frac{7}{16}$ in. drill at low speed, and then use a small boring tool to open out the bore to about 0.495 in. dia. Finish with a $\frac{1}{2}$ in. reamer put through dead slow with plenty of cutting oil.

The eccentrics are held to the axle by a 4 BA Allen type grubscrew which should be as long as possible without fouling the eccentric straps. These will bite into the axle and will not slip. Put the eccentrics on the driving axle and tackle the quartering next.

There are several ways of quartering the wheels. One good method, which I adopted from Mr A. W. Smith, was described fully in the *Jubilee* articles (ME 19 June 1958, page 779.) Another very accurate method was described in Readers' Queries (ME 29 December 1960, page 819); it calls for an accurate dial test indicator.

There is one point about quartering that I would like to emphasise. It does not matter (in a two-cylinder engine) if the angle between the cranks is not exactly 90 deg.; so long as each pair of wheels is exactly the same. If the angle was made 89 deg. or 91 deg. the locomotive would still work perfectly; but if there is any variation between the axles, no fiddling about with the coupling rods will ever put things right.

When you are quite satisfied with the quartering, you can press each pair of wheels partly home, not forgetting to put on the axleboxes and eccentrics. Carry out a final check. This is always advisable because it is possible for the wheels to shift very slightly during the actual pressing operation.

When all is well, pin the wheels by drilling No 43 half in the wheel and half in the axle, and pressing in a short length of 3/32 in. silver-steel.

Let us return to the coupling rods. They should now be at the stage of having the centre joint finished and be a nice fit on the driving crankpin; but the leading and trailing ends are drilled $\frac{3}{16}$ in. dia. only. Open out these holes with a letter D drill and ream them $\frac{1}{4}$ in. dia. Pack up the axleboxes to their running position and clamp them—easily done by inserting small pieces of metal between the bottom of each axlebox and its hornstay, and tightening the nuts on the spring pins.

The coupling rods are then tried in position. It will probably be found that they are a bit tight in certain positions. The side of each hole where the binding is taking place is marked, the rods are removed, and a half-round needle file is used to draw the hole over in the required direction. After you obtain a fit without any sign of binding, file out a shade more in the same direction—if, say, 0.005 in. had to be filed out to obtain clearance, file out a further 0.005 and then drill the hole out with a letter N, ream $\frac{5}{16}$ in. dia., and turn up and fit the bushes as shown in the drawing.

As the bushes should be bored a shade over $\frac{1}{4}$ in. dia. use a letter F drill before pressing them home in the rods. On no account take anything off the bushes on the driving crank-pins. They need to be a good fit to give smooth running, but a little play on the leading and trailing crank-pins is essential to enable the engine to run over rough tracks.

Now that the chassis is running smoothly, the next items for us to tackle are the cylinders. They will be gunmetal castings, and the machining problems involved need cause no trouble to anyone if they are tackled systematically. First of all, go over the whole of the castings with an old rough file to remove the sand and scale.

The ideal gadget to hold the cylinder block for boring is our old friend the Keats V-angleplate, which is bolted direct to the faceplate in the usual way. If you have one, make a start by filing the port face and one edge of the cylinder bolting flange, preferably the opposite side to the exhaust flange; get these two faces reasonably true and drop the cylinder block into the V of the angleplate. Clamp down, allowing about $\frac{3}{16}$ in. clearance between the left-hand end of the cylinder and the back of the angleplate. Shift the angleplate around on the faceplate until the cored-out bore of the cylinder is running true. Clamp up.

Before machining begins, the angleplate/cylinder block must be balanced. It can be done with any odd bolts and nuts put into slots in the faceplate; it is, of course, more important on the lighter lathes.

A high-speed round-nose tool can be used cross-wise in the tool-holder to face off the flange; take off enough metal to leave a similar amount to come off the other end and bring the overall length to $2\frac{1}{8}$ in.

Boring the block

You now carry out the boring, using as large a boring tool as the core-hole will allow. The tool should be arranged with just enough overhang to allow its tip to pass right through the casting. Use the self-act, set to give the slowest feed possible.

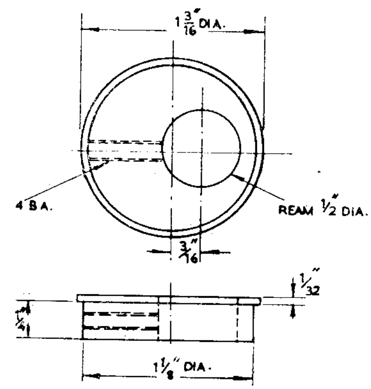
If you have a $\frac{15}{16}$ in. dia. reamer, finish the boring at about 0.932 in. dia., and put the reamer through at the lowest speed, holding it hard against the tailstock centre and moving the reamer, tailstock, and all steadily along the bed by hand. A large carrier should be put on the reamer shank to prevent rotation.

An important point to notice is that, owing to the lead of the reamer, this method of reaming leaves about $\frac{1}{2}$ in. at the left-hand end of the bore undersized. After the casting has been removed from the lathe, the reamer should therefore be put right through by hand. As there should only be about 0.005 in. to remove, I do not think anyone will have any difficulty.

If a $\frac{15}{16}$ in. reamer is not available it is not worth buying one just for this job. All you need to do is remove the boring tool for re-sharpening and stoning, and put it through again, setting it to remove not more than 0.005 in. Put the tool through once more without shifting the cross-slide and, if the tool is cutting as it should, you will have a bore quite smooth and accurate enough for all practical purposes. It is quite unnecessary to

ECCENTRIC

4 OFF B.M.S. 2 X F/S



lap, hone, or use any other special process in a model of this type.

If your lathe cannot swing the casting on the faceplate, mount the cylinder block in the four-jaw chuck and set it so that the previously filed port face is outwards and running reasonably true. Take a facing cut, just enough to clean it up, and remove the casting and mount it on the cross-slide on its turned face, packing it up until the core-hole is at lathe centre height (the top-slide is removed altogether, of course). Set the casting so that the flange overhangs the edge of the cross-slide by about $\frac{3}{16}$ in., and clamp it down, with a stout bar and two bolts, into the T-slots of the cross-slide.

Before you begin the boring operation, face off the flange of the left-hand side with a fly-cutter. Any type of cutter will do provided that it will sweep right across the flange of the cylinder block.

The boring bar should be as large in diameter as will conveniently pass through the core hole. The cut is put on by partly slackening off the clamping screw and lightly tapping the back of the cutter (for which $\frac{3}{16}$ in. round high-speed steel is ideal). If the back of the cutter does not protrude from the boring bar, it is easy to measure the diameter which the cutter will machine. Simply put the micrometer over the bar alone, and then put it over the bar and the cutter. Subtract the former from the latter, double this amount, and add it to the bar diameter.

Using the self-act

The self-act should be used with the finest feed. On the last cut pass the cutter through twice (or rather, the cylinder over the cutter) without altering the depth of cut.

To machine the other end of the block, a brass stub mandrel should be turned up, a hand push fit inside the cylinder bore. With cylinder blocks bored on the saddle, it is probable that the bores of the two cylinders may differ in diameter very slightly. Turn the brass mandrel to suit the larger one first; it can then be turned down again to suit the smaller. This is important and easily overlooked ! Finish the two blocks to an overall length of $2\frac{1}{8}$ in.

The port face should be finished next. Probably the best way is to mount the cylinder block on its end on an ordinary angleplate bolted to the faceplate; balance it before turning; and use a round nose tool set cross-wise.

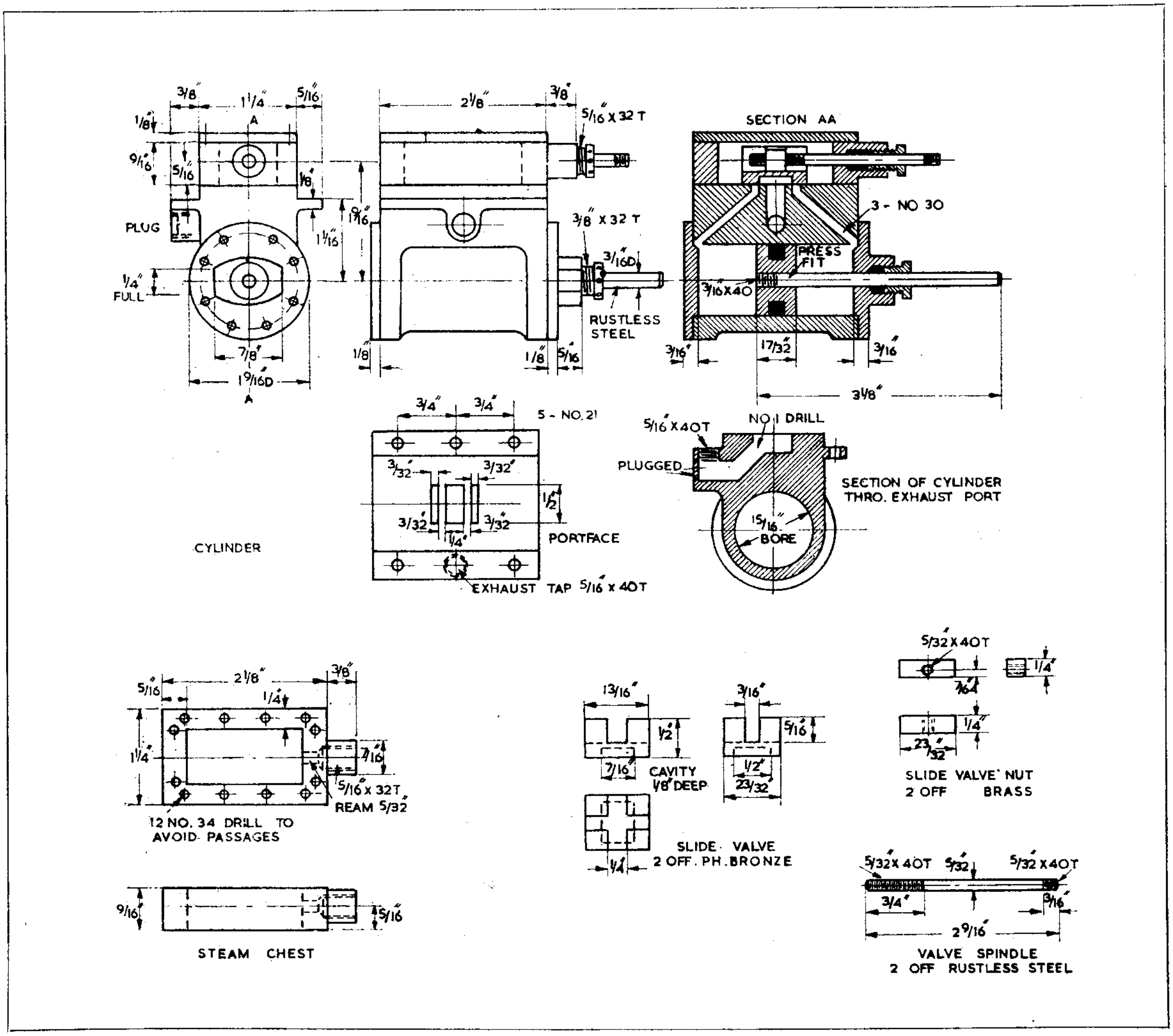
Another method is to bolt it on an angleplate bolted to the vertical slide and use an endmill about $\frac{3}{8}$ in. dia. in the chuck or collet. At the same time as this is done, you can endmill the bolting flange, checking the width of the port face against the slot already made in the frames. The whole of this flange can be traversed over the cutter by careful manipulation of the saddle and cross-slide controls.

The covers

The four cylinder covers can now be put in hand. The front covers, which will have a chucking spigot on their outsides should first be chucked by their rims and the spigot trued up. Reverse in the chuck and machine the inner face, making the bore register a close fit in the cylinder block. Saw off the spigot. To finish the outsides, I always use a split ring. It is made from a brass blank 2 in. dia. × $\frac{1}{4}$ in. thick. Set the blank up in the lathe to run as true as possible, face right across, centre and drill $\frac{3}{8}$ in. dia. A

$\frac{3}{8}$ in. bolt is put through it and nutted up tightly; the outside edges and the other rough side can then be turned, the blank being chucked by this bolt. Finally, the blank is chucked by its outside edge (the bolt being removed), is bored right through a shade over the diameter of the cylinder bores, and is counterbored to suit the o.d. of are drilled and reamed $\frac{3}{16}$ in. dia. and the outside is machined to the exact size. They are reversed and held in the chucking ring. The gland boss is faced off and a $\frac{5}{16}$ in. dia. pin-drill with $\frac{3}{16}$ in. dia. guide pin is used to open out to make the stuffing boxes.

If your only $\frac{5}{16}$ in. pin-drill has a $\frac{1}{8}$ in. dia. guide pin, drill and ream mark the flats for the slide bars from the centre of the plug. The covers are bolted to the vertical slide by a 2 BA Allen screw through the piston rod hole, and are traversed across a small endmill in the chuck. This completes the covers for the time being. Drilling for the securing bolts can be done later.



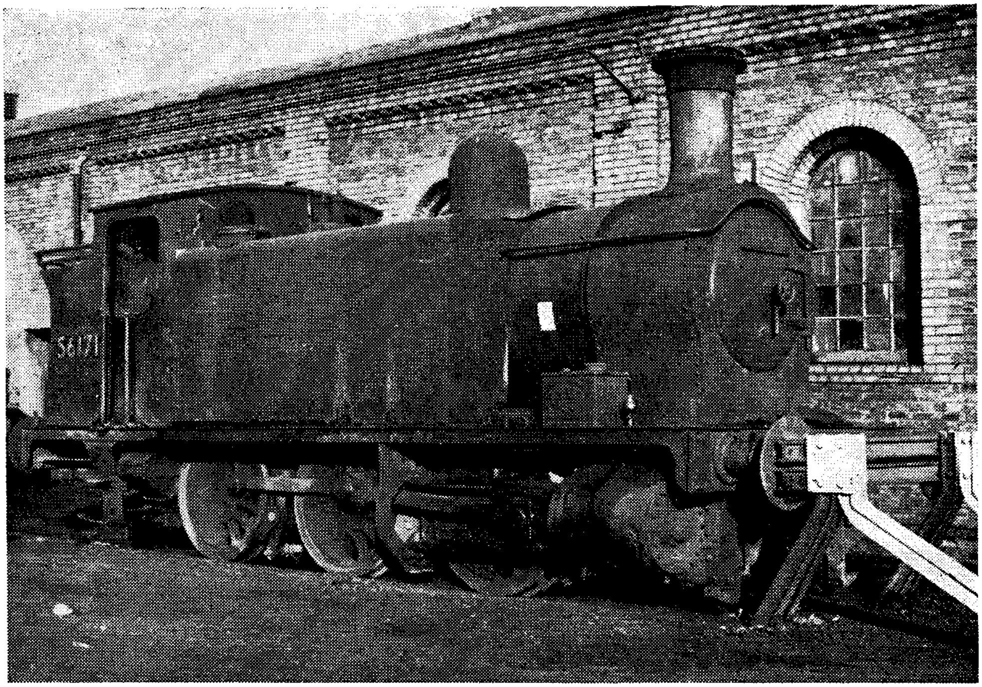
the covers to a depth of 7/64 in. Mark where No 1 jaw of the chuck gripped the blank; remove, and split with a fine saw. You now have a suitable chucking ring to hold the covers in turn for machining the outsides.

The rear covers are dealt with similarly, but after the inside and the bore register have been machined they $\frac{1}{8}$ in. only at the first operation, and then open out again after tapping the stuffing box. This is tapped $\frac{3}{8}$ in. × 32 t.; the tapping size drill is 21/64 in. Use a pilot tap if possible.

The two steps on the rear covers which carry the slide bars are machined next. To do this, temporarily fit a turned plug into the stuffing boxes, and

Mark out the steam and exhaust ports on the port face and colour them with a marking out fluid so that they stand out well against it. The cylinder blocks are bolted to an angleplate on the vertical slide with the port face facing the lathe mandrel.

A 3/32 in. dia. slot-drill is put in the collet or chuck, and the saddle is



Still at work: No 56171 *of the Caledonian was out shedded from St Rollox in* 1920

fed in by the leadscrew handwheel. By this means the exact depth of port can be checked. The cutter should run at medium speed and the leadscrew handwheel moved 0.005 in. at a time. By manipulating the cross-slide handle the exact length of ports can be determined, while use of the vertical slide handwheel will settle the exact spacing of the ports and the width of the exhaust port. The colouring of the ports makes an error much less likely. Cut the steam ports about 7/32 in. deep and the exhaust ports about $\frac{5}{16}$ in. deep.

The steam passages

The passages consist of three No 30 holes between the ends of the bores and the ports. Chamfer the edges of the bores and then centre punch the three positions for the passages a full $\frac{1}{8}$ in. apart. Use a 3/32 in. dia. drill first, setting the block up at a suitable angle on the drilling machine table and sighting the drill to ensure that it will break through in the right place. The drill should be withdrawn frequently to release the chippings, and should be taken very easily as it breaks through into the port; then there will be no breakages. Complete by putting the No 30 drill through the three holes.

To make the exhaust passages, drill a 9/32 in. hole straight down the centre of the exhaust boss. Do not go too deep, or the drill will come dangerously near to the bore. About $\frac{9}{16}$ in. should be sufficient.

Tap the hole $\frac{5}{16}$ in. × 40 t. to a depth of $\frac{3}{16}$ in. Drill $\frac{1}{8}$ in. from the exhaust port into the exhaust passage at about 45 deg. (see section of cylinder) keeping the drill exactly on the centre-line of the exhaust port and clear of its right-hand end. Open the hole out by easy stages to as near to $\frac{1}{4}$ in. dia. as you can without the drill catching the sides of the port; No 1 drill would be all right.

Finally, drill 9/32 in. dia. and tap $\frac{5}{16}$ in. × 40 t. square to the port face to make the exhaust connection as shown in the section drawing. The first tapped hole is tightly plugged; the threads of the plug are given a smear of plumber's jointing.

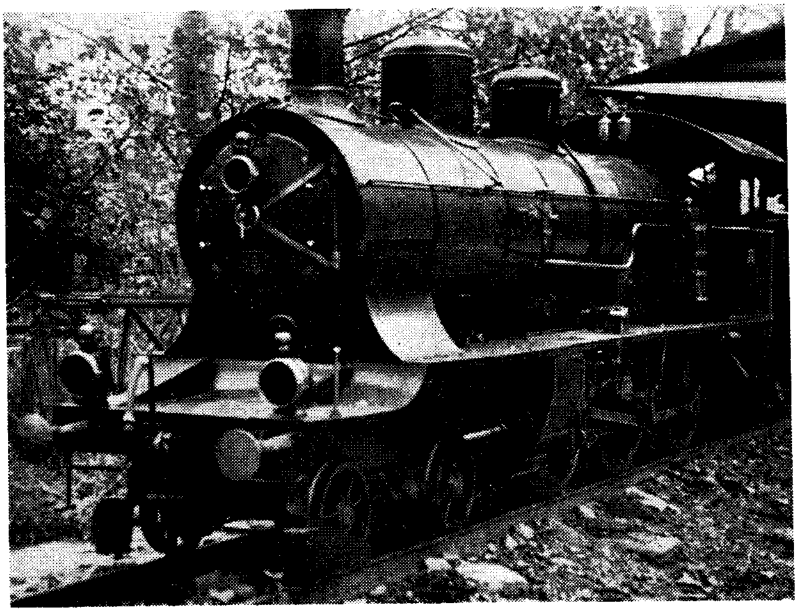
Well, that is all for this month. The May instalment should see us safely through the remaining work on the cylinders and to the beginning of work on the crossheads and slide bars.

★ *To be continued next month*

NEW ENGINE FOR LUCERNE

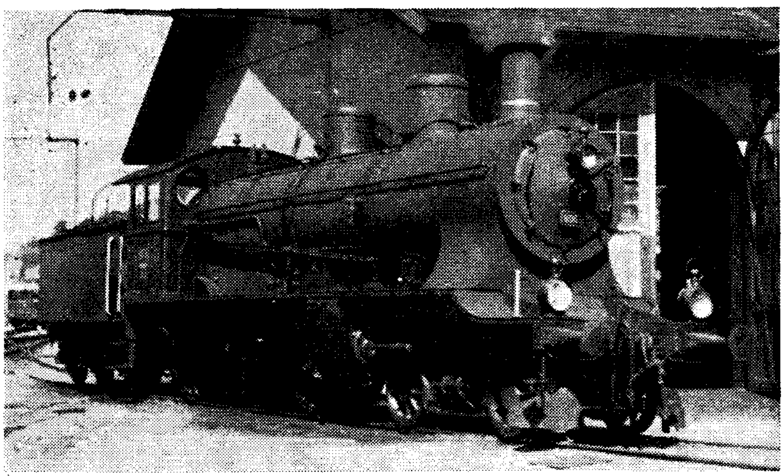
When I photographed the $7\frac{1}{2}$ in. gauge railway at Lucerne for MODEL ENGINEER [26 May, 1960], I was shown—as one of the captions mentioned—a new locomotive in course of being constructed by the Brast Brothers.

Later last year, the Railway Correspondence Travel Society spent two weeks in Switzerland. After visiting the Transport and Communications Museum at Lucerne, I went with a friend to see how the construction of the 15 in. gauge quarter-scale model had progressed. We were made welcome and taken to a large shed in which the engine, now complete, was housed. About 500 metres of track had been laid down alongside part of the extensive $7\frac{1}{2}$ in. circuit. As the engine was out of steam, it needed the combined efforts of one of the Brast brothers and the two of us, heaving and pushing vigorously, to move the two tons of scale model into the open. The attention to detail and the polished black finish of the engine were superb. What we saw



A/35 No 791 on the Brast Brüder Bahn

Since last spring the Brast Brothers have completed a model in 15 in. gauge which E. A. S. COTTON says may be the only memorial to a fine steam class



A/35 No 806 of Swiss Federal Railways on stand-by duty at Lucerne

was a perfect scale model of a 4-6-0, series A3/5, the sole remaining class of passenger tender engine in service on the Swiss Federal Railways.

The 4-6-0 de Glehn four-cylinder compounds, with the low pressure cylinders inside the frames, are well proportioned and handsome engines with two domes and shapely funnels. They are free from unsightly external piping, a commendable feature of Swiss steam locomotive practice.

When a picture of the Brast Brothers's quarter-scale model is compared with a picture of a full size A3/5, it is extremely difficult to tell which is which. The model may, perhaps, be the only exact copy at quarter-scale on 15 in. gauge of an original type still in service. In 1960 there were still ten A3/5s in operation, Nos 715, 751, 761, 778, 783, 788, 793, 795, 806 and 808, all except No 778 shedded at Biel and Lausanne.

Works breakdown train

When the RCTS party visited Zurich depot, No 778 (built by SL Min. 1908) was in steam. It had been maintained to work the breakdown train kept in readiness for calls within the Zurich traffic zone.

If one of these fine 4-6-0s, built between 1904 and 1909, is not finally preserved (all steam locomotives in

Switzerland will in due course be withdrawn) the model of No 781, built with painstaking and loving care by the Brast Brothers, will be a fitting memorial to the A3/5 series.

To simplify construction and maintenance, the Brast Brothers decided to operate No 781 as a two-cylinder simple with normal Walschaerts valve gear. The front driving axle is cranked, and the Joy valve gear works two small inside cylinders for the air brake and lubrication systems.

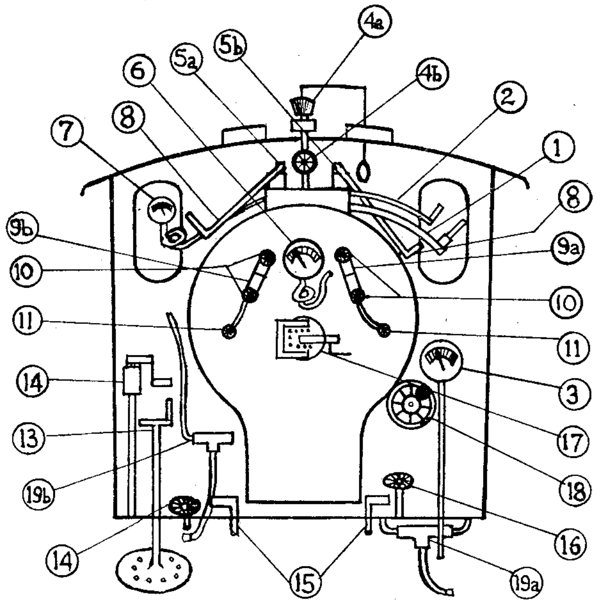
The time taken on construction by the Brast Brothers was 10,000 man hours, or, with both working an eight-hour day continuously, one year and eight months.

Their model weighs nearly two tons—1 ton 19 cwt 41 lb. Its height is 3 ft 8 in. and its length 9 ft 6 in.—15 ft $6\frac{1}{4}$ in with tender.

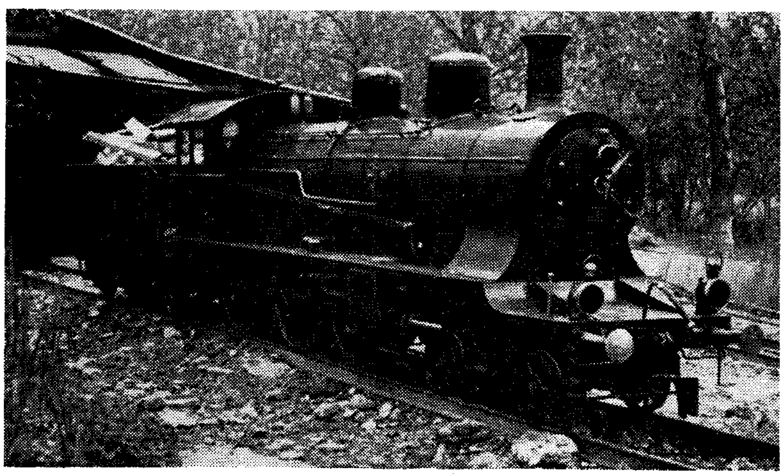
The haulage capacity in dead weight is 12 tons, or 120 passengers. So far 500 metres (1,640 ft) of track have been constructed. The maximum speed limitation at the present is 25 k.p.h. (15.6 m.p.h.).

Boiler and firebox are of steel. The boiler has 15 tubes, 3 ft $11\frac{1}{4}$ in. long and $1\frac{3}{16}$ in. dia. with four superheater tubes of 1 31/32 in. Its pressure is 112 p.s.i.

The firebox is $11\frac{13}{16}$ in. wide, $27\frac{1}{2}$ in. long and 13 in. high; the grate area is $2\frac{1}{4}$ sq. ft.



1. *Regulator*
2. *Sand valve*
3. *Tachometer and Km. recorder*
4a. *Whistle*
4b. *Whistle stopcock*
5a. *Steam valves for injector*
5b. *Steam valve for injector*
6. *Steam pressure gauge*
7. *Air pressure gauge*
8a. *Blower valves*
8b. *Blower valves*
9a. *Water gauges*
9b. *Water gauges*
10. *Water gauge stopcocks*
11. *Water gauge draincocks*
12. *Control valve for air brake*
13. *Hand brake for tender*
14. *Draincock for cylinders*
15. *Air regulators for ashbox*
16. *Water cock for lower injector*
17. *Firebox door*
18. *Valve gear control wheel*
19a. *Injectors*
19b. *Injectors*



No 791 in September last year

The outside driving cylinders have a bore of 3 29/32 in., and the inside ones for the air and oiling requirements are of 2 23/64 in. dia. for air, and $1\frac{3}{16}$ in. for oil. A common stroke of 6 19/64 in. is employed. Walschaerts valve gear is adopted for the outside cylinders and Joy motion for those inside.

Wheel diameters are: bogie, $7\frac{7}{8}$ in.; driving, 1 ft $5\frac{3}{4}$ in.; tender, $9\frac{7}{8}$ in. The tender capacity is $54\frac{1}{2}$ gallons of water with a hundredweight of coal.

Two feed water injectors are provided for the boiler.

The engine has air brakes operating at 58.8 p.s.i.; the tender wheels are hand-braked.

Boiler and air pressure gauges and two water level indicators are provided on the footplate. The driver has plenty of room and a comfortable seat, and the controls come easy to hand. ▣

Continued from 30 March 1961, pages 392 and 393

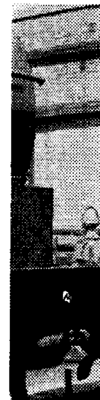
LIBRARY OF LOCOMOTIVES

Soon the last three will have vanished

An ME Staff feature

By ROBIN ORCHARD

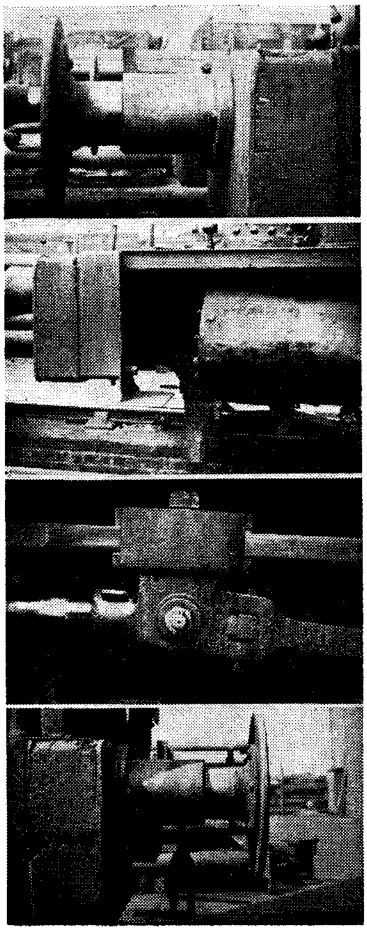
Pictures by Brian Western



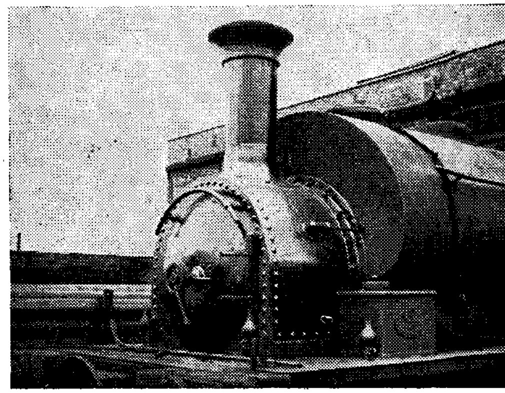
DRUMMOND'S original engines had wheels 3 ft 8 in. in diameter, and two outside cylinders of 14 in. bore and 20 in. stroke. The little boiler was 3 ft $7\frac{3}{4}$ in. in diameter and was pitched only 5 ft $4\frac{1}{2}$ in. above the rail level. It was fitted with 138 tubes, giving a heating surface of 632 sq. ft. The firebox had a grate area of 10.23 sq. ft. and a heating surface of 52. The boiler pressure was 140 p.s.i. and at 85 per cent of the pressure the tractive effort was 10,620 lb. Later engines were pressed to 160 p.s.i. and the tractive effort raised to 12,115.

The slide valves were inside-operated through Stephenson link motion. Coal capacity was always a problem because the size of the engines made it impossible for more than a ton of coal to be carried in the bunkers. Various ways of carrying more were adopted. Some engines carried it on the footplate, an arrangement which must have caused chaos when both the driver and fireman were aboard. Another way, and one often used, was to fit extensions to the bunker tops and then pile the coal up over the saddle. The only disadvantage was that the cab windows sometimes became obscured; which is why coal can be seen on the roof of 56032. One other method, common in Scotland, was to attach small four-wheel tenders to carry $1\frac{1}{2}$ tons of coal. My illustrations show 56035 with one of these tenders. I believe that this is the last of the Caledonian tenders attached to a Pug. The only other Pug I know with a tender is 56029, but the tender is an LNER one and not a Caley. At the back of St Rollox shed, is a tender which seems to be from a Pug. It is painted blue and lettered *Yoker MPD* and is a railway enthusiast's delight as all the buffers and axlebox covers are lettered CR.

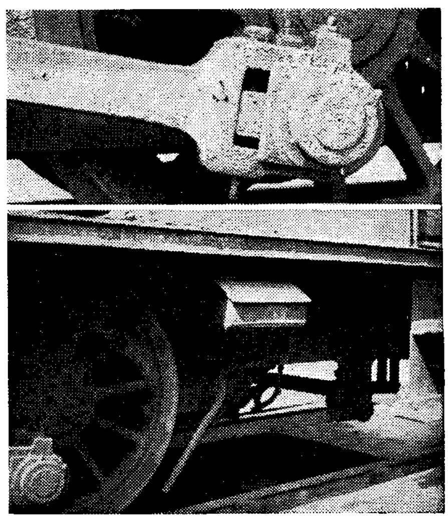
In 1890 Drummond left St Rollox. Hugh Smellie of the Maryport and



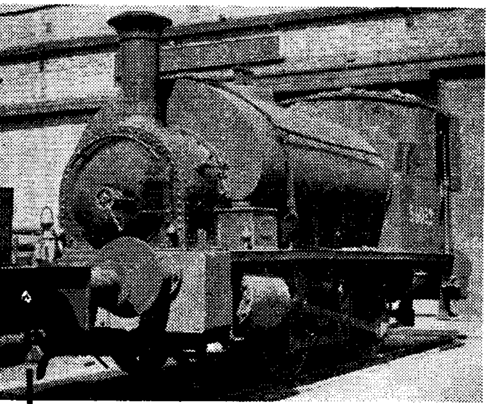
Top to bottom: Front buffer on 56032 attached to the usual Pug dumb buffer. Front footplate step bolted on to the big wood buffer beam. Note guard iron. Pug's crosshead and single guide bar. Rear buffer. Note dumb buffer of wood



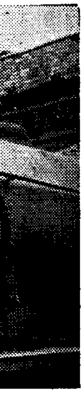
A handsome chimney but some Pugs had stovepipes



Above: Grease on the connecting rod end shows up white in the sun. Below: Here is the rear sandbox on No 56032

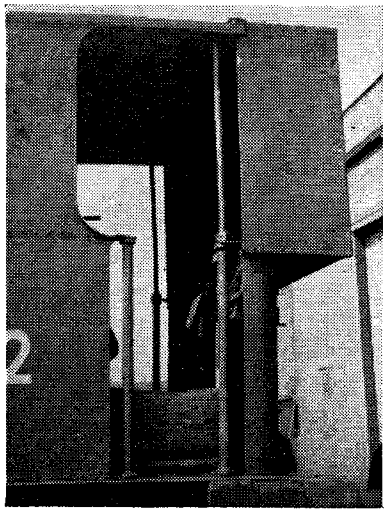


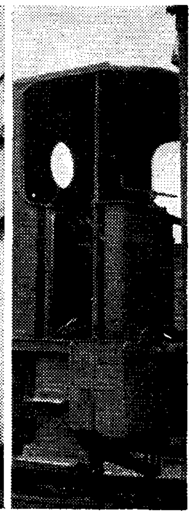
Cab windows on No 56032 *are different from those on No* 56035 (*last article*)



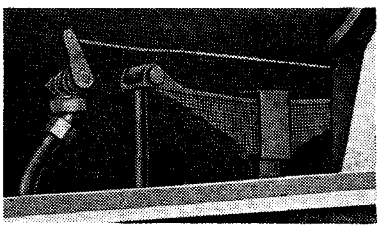
Carlisle and the Glasgow and South Western took over, but his stay was brief. In the same year J. F. Lambie succeeded him. He remained for five years before the arrival of the great John Farquharson McIntosh who produced some of the finest locomotives that Britain has ever seen.

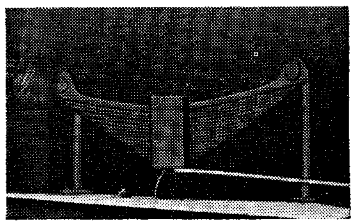
The Pugs continued to be built by the Caledonian and remained basically the same as the original Drummond engines. Pickersgill later replaced the Ramsbottom safety valves by Ross pops and carried out other modifications, including the re-positioning of the springs above the footplate and the fitting of new sandboxes at the rear. The later locomotives also had a different shape of cab window as can be seen on 56032.





First right: Closed-in rear of cab on 56032. *Second right: Open rear on* 56039





Rear spring (*left*) *and front spring of* 56032

Altogether 40 of the class were handed over to the LMS at the grouping. They were (Caley numbers in brackets): 16000 (1781), 16001/2 (1162/3), 16003 (1503), 16004 (1505), 16005 (1529), 16006 (1532), 16007 (1534), 16008-10 (266-8), 16011 (270), 16012/3 (1264/5), 16014 (1271), 16015-18 (615-8), 16019 (620), 16020-25 (1510-15), 16026-9 (611-14), 16030-7 (621-28), 16038 (265), and 16039 (269).

Of these engines the following survived into nationalisation (LMS numbers in brackets): 56010 (16010), 56011 (16011), 56020 (16020), 56025 (16025), 56027-9/30-2 (16027-9/30-2), 56035 (16035), 56038 (16038) and 56039 (16039).

Today but three remain, Nos 56029, 56031 and 56039, and within months they, too, will probably have disappeared. It is a pity that no example of the Pug has been preserved or is listed for preservation. Will someone please save one?

The Pugs have spent most of their lives working in dockyards and places where sharp radius curves prevent the use of larger locomotives. Many of them were displaced by the McIntosh and Pickersgill 2F 0-6-0Ts (like *Rob Roy*) which appeared in 1911. Of recent years the Pugs were used considerably as shed pilots. In 1951, 12 of them were in existence—two at Inverness, three at Greenock, one at Dawsholm, two at Yoker and one at St Rollox Works. Three others were shedded out of Scotland, at Crewe Works, Burton and Preston. The last three are stationed at Yoker, Kipps and Corkerhill, but they seem not to be attached to these sheds. In February No 56029, reputed to be attached to Yoker, was on shed at Motherwell; 56039, supposed to be attached to Corkerhill, was on shed at St Rollox; and there are only NBR Y9 pugs at Kipps.

When the engines were originally built they must have looked very smart with the standard CR livery of goods black lined in vermilion and white. The sandboxes, cabsides, saddle tanks and cylinders had the vermilion line outside the white line, thus forming panels. The initials CR were on the tank, the number plates of brass on the cabsides, and the works plates on the sandboxes. In LMS days the old works plates were removed and replaced by plates reading *LMS built* 1900 *St Rollox*. This practice of replacing the old works plates after the grouping has always struck me as stupid and regrettable.

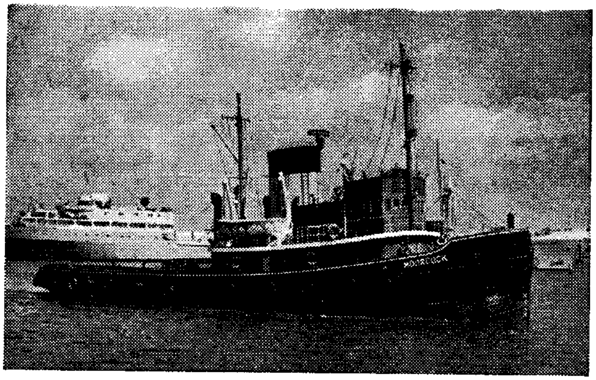
After the grouping, the locomotives were turned out in unlined black with *LMS* on the saddle tank and the figures on the cab side. They remained black after nationalisation but were, of course, adorned with the lion crest. The present crest has not been seen on the class.

My thanks are due to the public relations departments of the Scottish and Midland Regions, the motive power superintendents of the Midland and Scottish regions, the works managers at Crewe and St Rollox and the shed masters at Motherwell and St Rollox for their kind co-operation.

My next article will concern the North British Railway Glen class 4-4-0s, and in particular No 256 *Glen Douglas* which has been preserved. ■

Modelling the tug MOORCOCK

Continued from 30 March 1961, pages 400, 401, 402 and 407



LOVERS OF DETAIL WILL LIKE THE FLYING BRIDGE

An ME Staff feature

By OLIVER SMITH

MANY will find the flying bridge the most interesting and rewarding section of the superstructure because of the amount of equipment which is installed or fitted there. It is all visible to the eye and will delight those who love small detail.

Before we go into the detail let us first take a look at the more essential part, the wooden sides of the bridge. This final section of the superstructure should closely resemble a four-sided box, shaped to a push fit to the top edges of the wheel house.

Use the same kind of wood as you used for the sliding doors on the side of the wheel-house, so that the colour will then be uniform.

As the work of making and assembling the sides is straightforward, I will leave you to your own favourite methods. But there are a few points concerning detail on which you might like a little guidance. After a careful study of the drawing some of you may prefer the door to be in an open position, and others may like to go as far as making it workable.

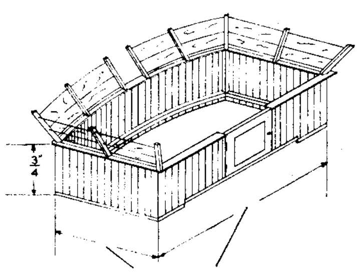
Simulating boards

Whatever you intend, you should first cut and shape the pieces of wood to form the box. The front will, of course, be slightly bowed to fit the top front edge of the wheel-house.

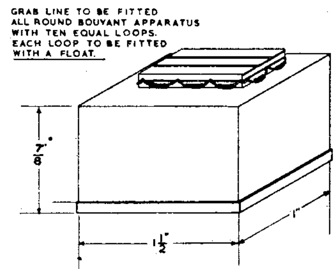
Before the pieces are glued together some imitation is needed to create the effect of separate boards. It can be provided either by scribing lines into the wood, evenly spaced, or by drawing the lines on the surface of the wood with a pen and some indian ink. For the more realistic appearance, the scribing method is to be recommended. But be careful that the lines are not taken so deeply that they cause the wood to split. This could easily happen with some woods, especially if you intend to represent the boards on both sides of the piece of work. When you remember that the thickness of the material should be kept at about $\frac{1}{16}$ in. if the finished article is not to look too clumsy, there should be no need for me to say more about being careful.

The rail around the top is made from the same wood, with a small overlap on both sides, but is not fitted to the top of the door. The supports for the glass wind-breaker, or dodger, can be fitted at this stage or left until the unit has been fastened to the main superstructure. Two pieces of glass are needed for each section of the dodger, and the Polyglaze mentioned in the previous article will meet the need admirably.

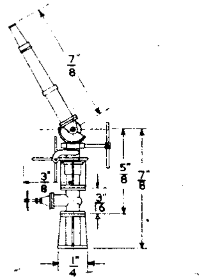
For those who want to make the small door so that it is in a partly or fully opened position, or want to fit small working hinges so that it can swing in the proper manner, the first job is to remove the piece of wood which represents the closed door. It will be found better to do this when the sides are fixed to the superstructure, because there is then more rigidity. In removing the piece of wood, there is no need to take it



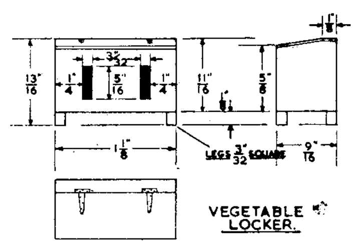
FIT TO TOP OF WHEEL HOUSE.



SERVICE WATER TANK.



FIRE FIGHTING MONITOR.



VEGETABLE LOCKER.

right down to deck level. Leave a small strap at the bottom. The door can then be made and fitted by the method preferred.

In fitting out the bridge a question which the builder will have to decide for himself is how much of this detail he can make without spoiling his model. If the beginner has any doubts of his ability, is wary of spoiling a first-class job, he can, of course, buy the fittings. All of them, with their locations, were shown on the general arrangement drawing; keep it at hand to refresh the old memory.

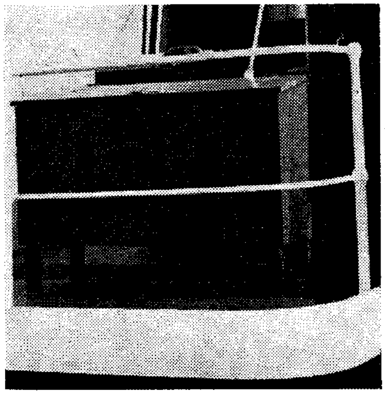
Steering controls

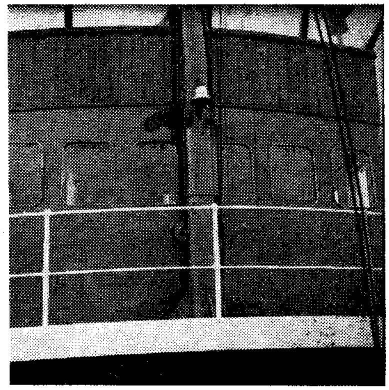
Between *Moorcock* and *Dhulia*, there is an outstanding difference between the sizes of the steering wheels and the ways that they are mounted on the flying bridges. Both tugs have the same type of steering mechanism and wheel-house control. The only difference is in the gear used to operate the main control unit in the wheel-house from the flying bridge. *Dhulia* has a purely mechanical control with the conventional column—which I think will be favoured by most modellers for its simplicity; *Moorcock* has a form of hydraulic gear, which is being tried out experimentally. The idea is that the tug can be manoeuvred with the utmost ease by only a small wheel. My two illustrations show the two types, and the close-up of *Moorcock's* gear reveals that it is a little more complicated to model than the round column on *Dhulia*.

A Kelvin compass is fitted and there is a Chadburn engine room telegraph on the starboard side only. A rudder indicator is positioned between the compass and ERT just below the dodger. The square box-looking object shown on the GA on the port side is the radar screen. Between it and the compass are the two speaking tubes. At the forward port corner and the after starboard corner is a pedestal mounting for the searchlights.

The wooden grating is a simple affair made up of straight boards. It comprises a number of sections that can be easily removed. When the steering wheel on *Dhulia* was photographed, the deck was receiving a coat of paint—which is why no grating can be seen in this illustration.

The fire-fighting monitor is usually covered over, and the nozzle is fitted only when the monitor is about to be put into action. This may ease matters for those who feel that to make a monitor like the one in the drawing is beyond them. The dimensions shown are for $\frac{1}{4}$ in. scale, and





Top to bottom: On the after end of the boat deck, on the port side, is an important locker—for vegetables

Wheel-house and flying bridge. Note the shape of the windows. The frames are just proud of the wheel-house

Inflatable life raft on the port side. A strap keeps it screwed to its base

so the task on the larger model is not quite so delicate.

If you attempt to make this detail for *Moorcock* you will have to fabricate it either in wood or metal; if you give a little study to the drawing and the photographs, it will not be quite so difficult to make as it first appears.

To clear up some further details for the model this week I am going back to the boat deck.

On the after end of this deck are the domestic water-tanks. They do not present any difficulty. As they are lagged and are neatly finished off with a wooden casing, all that is required is a wooden block shaped to the sizes shown and then fastened to the deck with an adhesive. Its position is roughly central with the sides of the deck and a little over $\frac{5}{8}$ in. from the after end to allow for the base of the main mast, which has yet to be added.

On the top of the casing of the water tank is the buoyant apparatus, a metal air-tight tank in a wooden frame with a grab line fitted all round. The apparatus is made to support ten persons, and therefore has ten loops. This is important because if more loops are added they will not be correct for the size. Each loop should be fitted out so that it looks as if it has a cork or wooden float like the real thing.

Dash of colour

When I last saw the apparatus on *Dhulia*, the floats had been painted red and yellow alternately; some may like to paint them in this way for the sake of the extra colour. The full-size apparatus just sits on the tank. But this may be inconvenient on a small model, and a spot of adhesive may be used to save it from being lost.

The last item on the drawing is the vegetable locker, an important part of the ship if you respect your stomach ! It is made of wood, and you should not find it difficult to make in miniature. The leading dimensions are provided; the two ventilating slits which are shown in the front of the locker are duplicated at the back. They can be painted or drawn on, or small slots can be chiselled out and a piece of fine mesh gauge inserted as on the real ship.

The locker is fastened to the deck by fitting each leg between two metal plates which are welded to the deck; then a bolt is pushed right through them. A little Araldite on the bottom of each leg will do well enough on the model.

Also on the port side, close to the vegetable locker, is the inflatable life raft. I have not given a drawing for this item because I feel that the photograph adequately meets our needs.

It will be seen that in its stowed condition it has a neatness which makes it easy to reproduce in a small scale. The shape is similar to a barrel with each end rounded off.

When an emergency arises the raft must be released in the shortest possible time, and the type of installation used to fulfill these requirements is also to our advantage.

The raft is supported between two iron frames and shaped so that half of it nestles in the top of the frame. It is held down by a strap across the top from one side of the frame to the other.

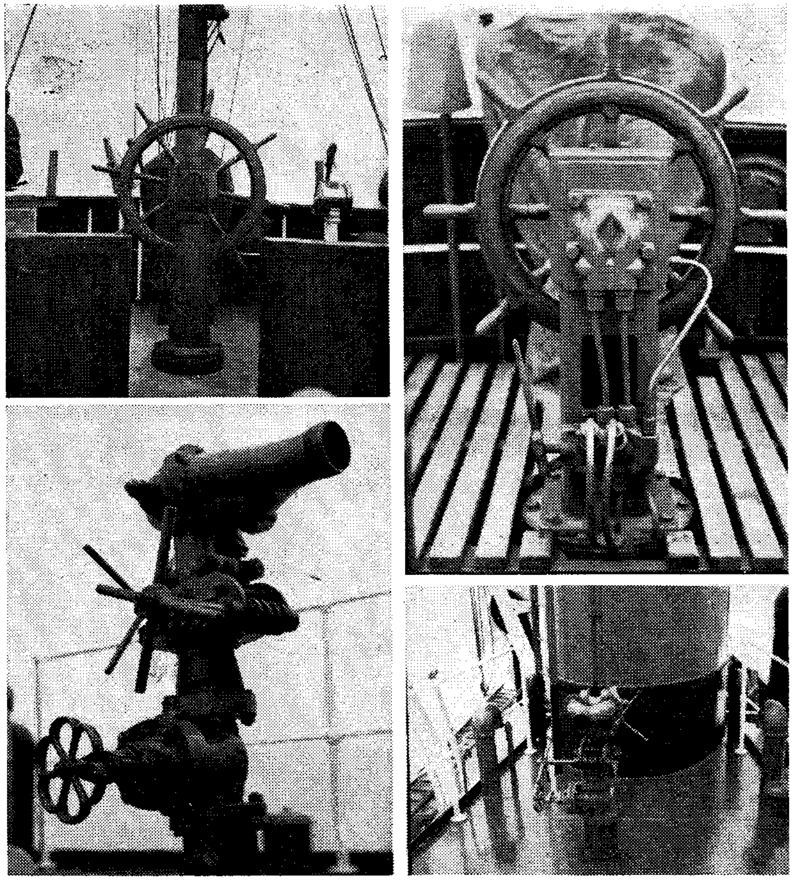
The model raft and its supports can be made quite easily from wood.

The life raft itself should not present any difficulties in its shaping and the supports can either be made from wood or metal, whichever is preferred. On the full size tug the frames are welded to the boat deck so that if the wooden or metal counterparts on the model are glued or soldered leaving a small fillet along the join, it will be as near to the real thing as makes no odds.

Those who want to paint the inflatable raft as soon as it is completed should give it a couple of coats of a flat white paint. Glossy paint can be used on the grounds that it is easier to keep clean, but it will be at the expense of a more realistic appearance.

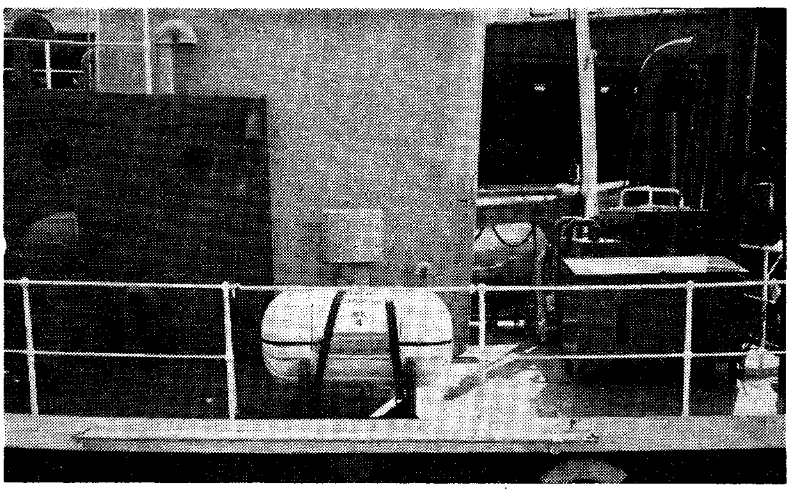
Its supporting frames are painted the same colour as the deck which will be dealt with next time.

★ *To be concluded*



Top left: Steering wheel on DHULIA; *the grating has been removed. Right:* MOORCOCK'S *steering wheel is fitted to the hydraulic control gear. It is smaller than* DHULIA'S. *Note the rudder indicator to the right. Above, left: Fire-fighting monitor without the nozzle. Right: Monitor on flying bridge*

Below: General view of the boat deck on the port side, with the inflatable life raft, the vegetable locker and the water tank-buoyant apparatus on top



LATEST LOCOMOTIVE NEWS

A FEW months after the news that the Schools class 4-4-0 No 30909 *St Paul's* had been reprieved—following a lengthy examination when it seemed likely it would become the first Schools to go for scrap—comes rumour that two of this class have been withdrawn. The locomotives in question are No 30919 *Harrow* and 30932 *Blundells.* Are these to be the first Schools to be broken up ?

I have heard that the T9 class locomotive to be preserved is No 30288—one of the batch with small coupling rod splashers and the famous Drummond water-cart tenders. It is also rumoured that this locomotive is to be restored to its LSWR livery and used for hauling railway enthusiasts specials. By the way one of the class No 30707 is still regularly in steam.—R.D.

SIRENA

Continued from page 446

An outlet hole is needed for the by-pass to the water tank, and a 7/64 in. dia. hole is drilled at $\frac{3}{8}$ in. from the bottom to break into the $\frac{1}{8}$ in. hole drilled for the valve stem. It should be slightly counterbored to take the 7/32 in. × 40 nipple to which the pipe to the tank is later connected. Another 7/32 in. × 40 nipple is needed at the bottom to take the pipe from the mechanical pump. The hole for it has already been drilled, but the silver soldering is simplified if it is slightly counterbored, providing a location for the nipple.

The valve stem

The three nipples and the small plug in the drawing can be silver soldered into position; if the seats for the nipples are a nice fit no difficulty should arise. Details are given of the ball cap and packing gland. The valve stem is a piece of 5/32 in. dia. stainless steel rod. One end is turned down to $\frac{1}{8}$ in. dia. and threaded 5/32 in. × 40 for $\frac{1}{4}$ in. The eventual length should be checked from the job after the stand to screw into the smokebox has been made. This can be seen from the photograph; it is similar to the stand for the regulator which is described later.

Fig. 37 gives details of the two tram handles which will be required. I found it easier to make them in two parts. The flat part of 3/32 in. brass is silver soldered to the $\frac{1}{4}$ in. dia. boss into which the spindle is later pinned The smaller end of the handle is tapped 7 BA to take a small piece of screwed rod on which the non-heat knob is later threaded and slightly riveted over to prevent it from turning off. A small regulator like this will get very hot and the fibre knob is essential both for appearance and for practical use.

Details of the regulator stand made from a piece of $\frac{7}{16}$ in. square bar are given in Fig. 38. The handle stop may look a little tricky. It is made from a piece of $\frac{1}{2}$ in. dia. brass rod, held in the chuck and faced off. At 1/32 in. away from the centre indicated by the tool marks a centre pop is made. The piece is set over in the four-jaw so that the pop mark runs centrally. The block is drilled with a No 24 to a depth of $\frac{5}{8}$ in. Changing to a $\frac{7}{16}$ in. dia. endmill, remove the brass to form the handle stops. The milling is done without taking the piece of $\frac{1}{2}$ in. rod out from the chuck.

Tap the centre hole $\frac{1}{4}$ in. × 40 to nearly $\frac{1}{4}$ in. depth and part off the $\frac{1}{2}$ in. rod to a length of $\frac{9}{16}$ in. With the aid of a $\frac{1}{4}$ in. × 40 stub held in the chuck, the $\frac{5}{16}$ in. × 40 part which will screw into the stand is threaded, and the 5/32 in. reamer is put through the hole and the stop is filed up to shape.

Operation of the cam

The small $\frac{1}{4}$ in. dia. cam is made from stainless steel. Some careful filing will be needed so that the maximum diameter is reached in half a turn and the push rod will be progressively operated as the tram handle is moved in an anti-clockwise direction. The 6 BA thread on the short stainless steel spindle should fit the cam tightly; if needed, it can be silver soldered to the cam.

To hold the regulator handle in any desired position a small amount of packing is held in position by the $\frac{1}{4}$ in. × 40 packing gland. The other small stud made from 8 BA hexagon rod, and threaded 7 BA, screws into the end of the stand and is removed for oiling the cam and push rod. The tram handle is pinned to the 5/32 in. dia. rod in such a position that with the regulator in the closed position the push rod is retracted to the maximum. It is also important that the end of the push rod is just clear of the step in the cam. The regulator stand and tram handle in the closed position can be seen in Photograph 17.

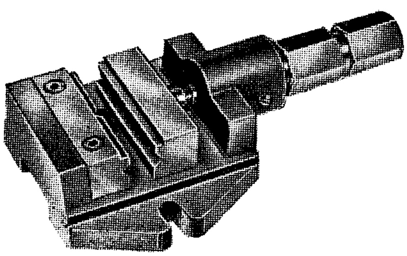
★ *To be continued on April* 27

AROUND THE TRADE

Handy machine vice

THE Murenco machine vice, manufactured by Murray's Pretoria Engineering Co. Ltd, 26-28 Pretoria Road, Romford, Essex, is extremely useful for many purposes in the small workshop. It is of a very handy size, and its low height enables it to be used to advantage on the lathe cross-slide or a small drilling machine table. The jaws are of hardened and ground steel, provided with a horizontal V-groove to hold round bars, and a vertical V-groove in one jaw only. The body of the vice is a meehanite casting, with the underside surface and the jaw seating accurately machined.

A unique feature of the design is the use of a non-rotating square thread screw attached to the moving jaw in such a way as to form a rigid guide, keeping it square and true, with no tendency to tilt or lift. The internal thread is formed in a long hexagonal extension, which has a groove at the inner end located in the cast housing by a split bronze thrust ring, held in place by two grubscrews. This provides positive motion both ways, with a large thrust bearing area.

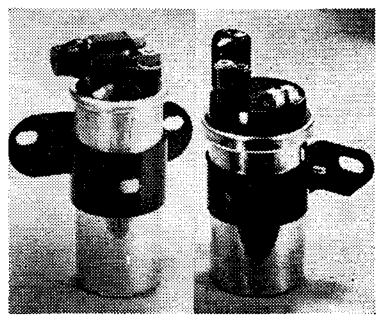


The rear jaw is held in place by sunk socket-head screws, and is easily removable to enable the capacity to be increased, or special forms of jaws to be fitted. It would be possible to adapt the vice in this way to serve as a production jig for drilling, milling and other operations. The normal working capacity is 2 in. width of jaws, $\frac{5}{8}$ in. depth, and $\frac{7}{8}$ in. maximum opening. On test in the ME workshop, the appliance was found rigid and accurate, and despite its small size, capable of dealing with many jobs for which much heavier appliances are usually necessary. The manufacturers produce many other items of workshop equipment, including T-bolts, clamps and other machining fixtures.

Ignition and lighting

THE Wipac Group of electrical manufacturers (formerly known as Wico-Pacy Ltd) have recently established a new and enlarged factory at Buckingham equipped with the latest machinery for the production of their well-known magnetos, headlamps and other electrical accessories. Visit to the factory recently, ME was shown all the finished products and all the stages in their production.

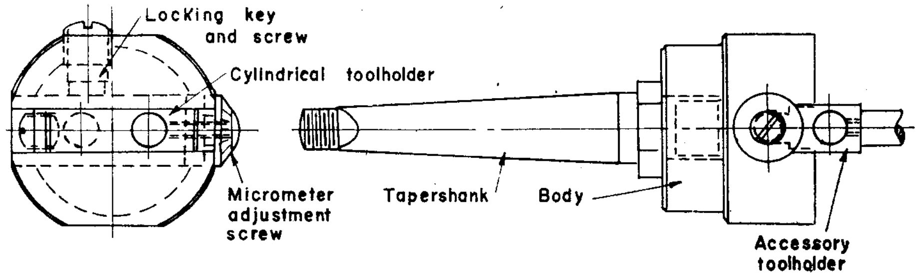
Wipac has a new range of ignition coils for either 6 v. or 12 v. battery ignition. To maintain batteries at full efficiency, a specially compact trickle charger, which can be carried on the vehicle and plugged into the mains, has been introduced. It has an output of $\frac{1}{2}$ amp. at either 6 or 12 v. (plus), and its general utility for charging accumulators of all kinds will appeal to many readers.



For high efficiency in small space, alternators have many advantages over the conventional type of d.c. dynamo, and are becoming increasingly popular for use on motor vehicles. They can be employed to charge accumulators by the addition of a compact, enclosed metal rectifier; the speed range and voltage control have a wide latitude. Alternators of various output and frequency are made by Wipac, and can be built into the integral design of engines so that they do not need to be fitted with gear, chain or belt drive.

Users of Wipac equiipment will find the service manuals, which list and illustrate all the various classes of products, very helpful. They include details and lists of spare parts, wiring diagrams, and instructions for tracing faults and general maintenance; No 1, dealing with lighting equipment, and No 2, dealing with magnetos, are obtainable at 2s. 6d. each.

When boring is awkward

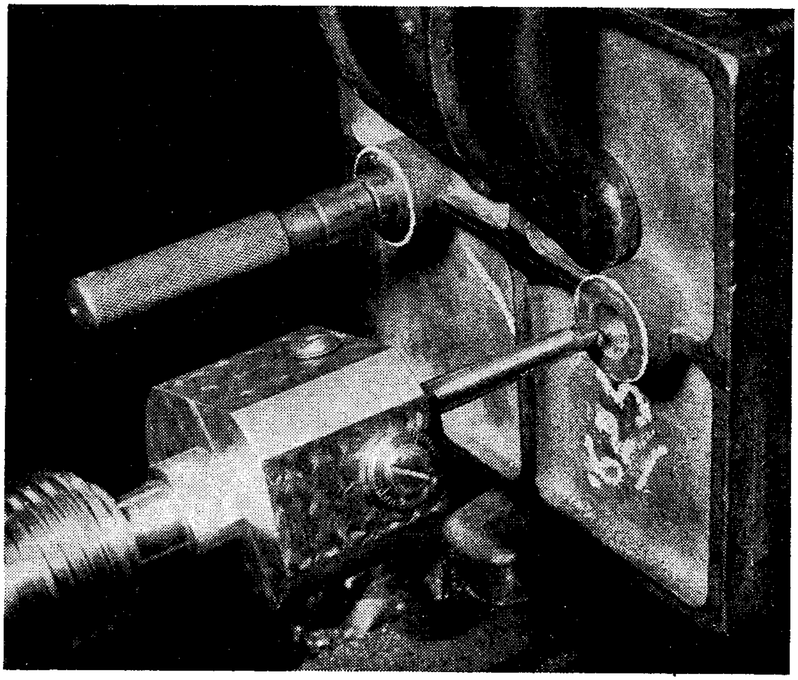


In the first of two articles, D. H. DOWNIE describes a micrometer device for the small workshop

HAVE you ever had to mount an awkward boring job on the saddle of your lathe or on an angle plate? The holes differ in diameter and situation.

A boring head with micrometer graduations would be useful. It would be cheap to make. From odd pieces around the workshop, enthusiasm and careful workmanship would produce an accurate and long-lasting workshop accessory.

The material needed for the body is $2\frac{1}{2}$ in. dia. × $1\frac{7}{8}$ in. thick; from my design you can adapt the size to suit your own type of work. Chuck in the lathe facing parallel and to a thickness of $1\frac{13}{16}$ in. Drill, bore and screw one side to $\frac{5}{8}$ in. BSF. Cut away about $\frac{1}{4}$ in. of the front threads. This will allow the collar on the taper shank to screw up tightly face to face when you assemble.



Micrometer boring head in use on Little John lathe, boring two $\frac{5}{8}$ in. holes at 4 in. centres to $\frac{5}{8}$ in plus-and-minus gauge for the motor mounting plate on a drilling machine which the author has designed and is now building

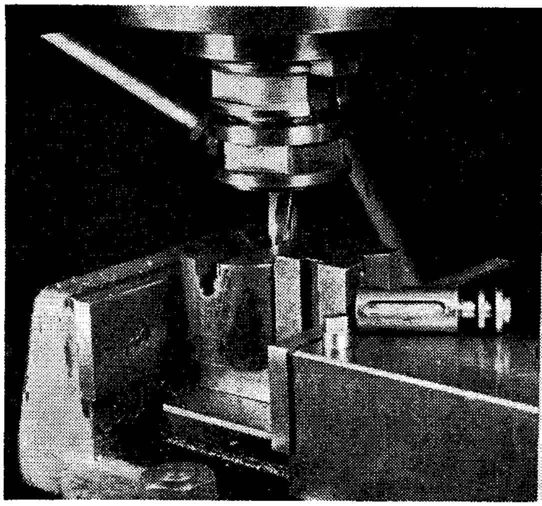
FOR THE SCHOOLS

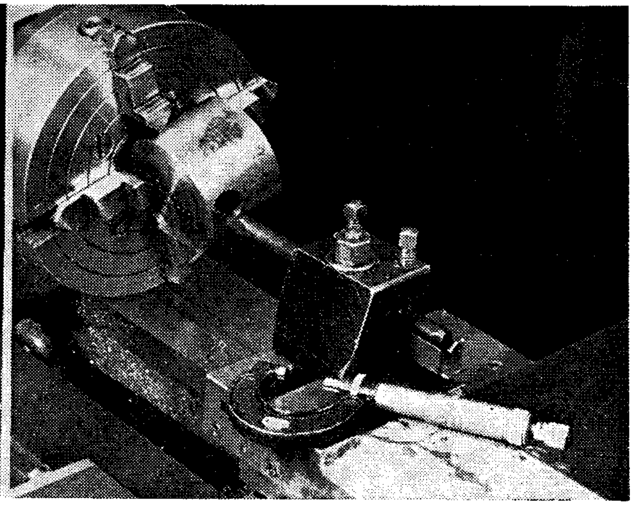
Take it now to the surface plate, blue or copper sulphate the face and sides, and mounting it on a V-block mark off as in the drawing for machining. Set the body in a four-jaw chuck, lining up carefully with your marked centre, and taking care that the body faces are square with the chuck and the centre line you have marked across the body. If you have an angle plate it would be quite convenient to mount the work on this for boring.

Begin the hole with a centre drill, which is always more accurate, and cut to the required depth with an $\frac{11}{16}$ in. drill. Then cut through the metal left with a 19/64 in. drill, to take the bearing part of the micrometer screw.

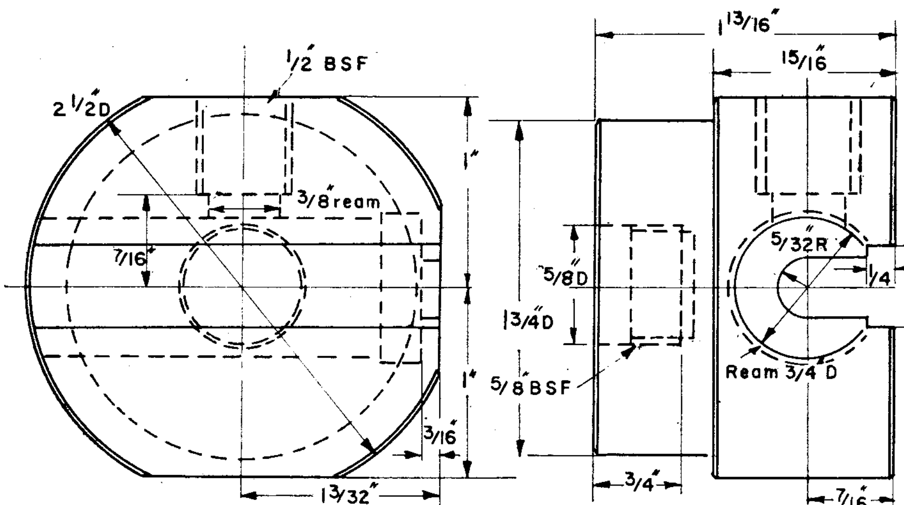
With a boring tool, carefully bore the $\frac{3}{4}$ in. hole plug-size. You can use a piece of $\frac{3}{4}$ in. stock or silver steel as a plug gauge. It must slide in with a minimum clearance. Using care, face the bottom of the hole perfectly flat. Your earlier drilling of the smaller hole for the neck of the micrometer screw will mean less to face and will help to give added clearance to the tool.

Turn a $\frac{3}{4}$ in. dia. stub mandrel in tne chuck, tap the body on to it lightly, and face off to size, leaving the bearing part for the micrometer screw $\frac{3}{16}$ in. thick. With a small tool, bore this hole to $\frac{1}{16}$ in. dia. All internal machining is now in alignment.





Left: Cutting the ½ in. keyway on the body. Right: Set-up for boring the ¾ in. hole through the body after marking



BODY B M S

Remove from the mandrel, chuck again and face the other two flats on the body. The flats improve the appearance, and help to preserve the balance of the head when it is revolving. Drill and tap the side of the body ½ in. BSF, taking care that the centre is over the centre line of the ⅜ in. bore. This is for the locking key and screw.

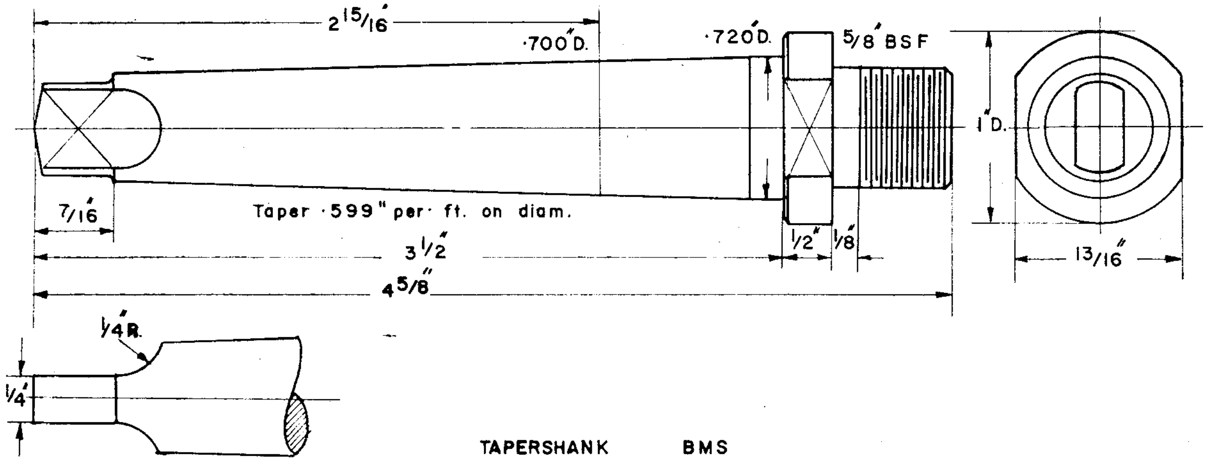
Mill the ½ in. slot across the face. It could be sawn out then carefully filed to ½ in. using ½ in. thick stock or a piece of half-round as a gauge. Where the slot comes over the $\frac{5}{16}$ in. hole, saw through and file carefully to $\frac{5}{16}$ in. wide, meeting the diameter of the hole. The slot is to allow the neck of the micrometer screw to drop neatly into its position.

Clean up and smooth and remove all small burrs with the point of a fine file and old emery paper. On a machine tool accessory all parts deserve a fine finish. The least burr or abrasion on close mating parts will cause binding and interfere with smooth working.

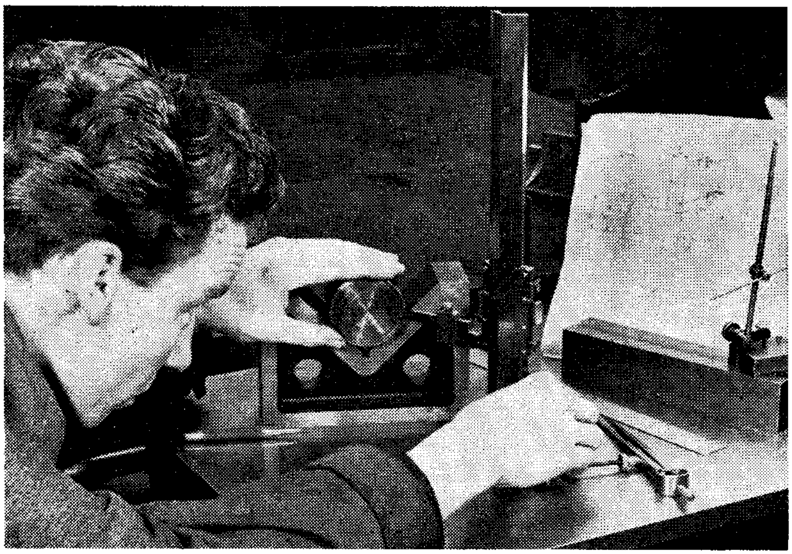
If you wish to use the head directly held in the chuck, a ⅞ in. deep × 1¾ in. dia. spigot can be turned on the body for that purpose.

For the taper shank, cut the material face and centre one end. Using a short grip in the chuck, and supporting the other end with the tailstock centre, set your top slide to barely 1½ deg. and rough out the taper. Slip the centre from your tailstock, chalk or blue the taper, bring up the tailstock and, using the centre bore of it as a gauge, test your turning for accuracy. Make any slight adjustment to your top slide to get full bearing accuracy and then go ahead; finish to correct diameter and polish.

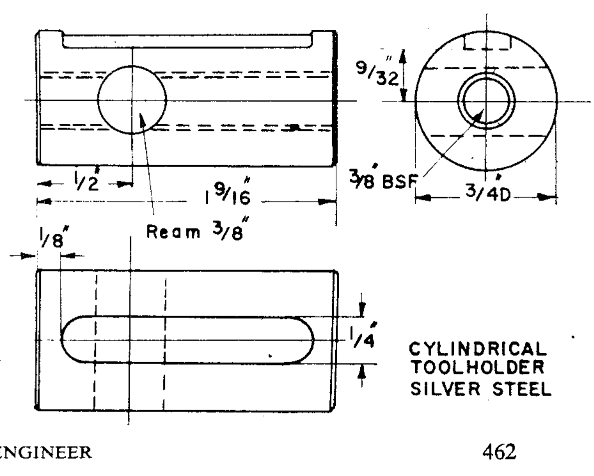
Undercut the end for the length of the tang and file the two flats on it.



TAPERSHANK BMS



Technician student marks off body to drawing after preliminary facing-up



CYLINDRICAL TOOLHOLDER SILVER STEEL

The tang can be useful if the head is employed in a drilling machine. Remove from the lathe chuck, see that the taper hole in the mandrel is quite clean, drive your taper shank in with a soft hammer, and you are ready to turn and screw the end to fit the body. Turn the collar size and then the threaded portion to $\frac{5}{8}$ in. dia. Screwcut it to $\frac{5}{8}$ in. BSF a good tight fit, using the body as a gauge. File two flats on the collar for a suitable spanner, and screw the body on. With these methods you will find that the whole assembly will run perfectly true when it is in use.

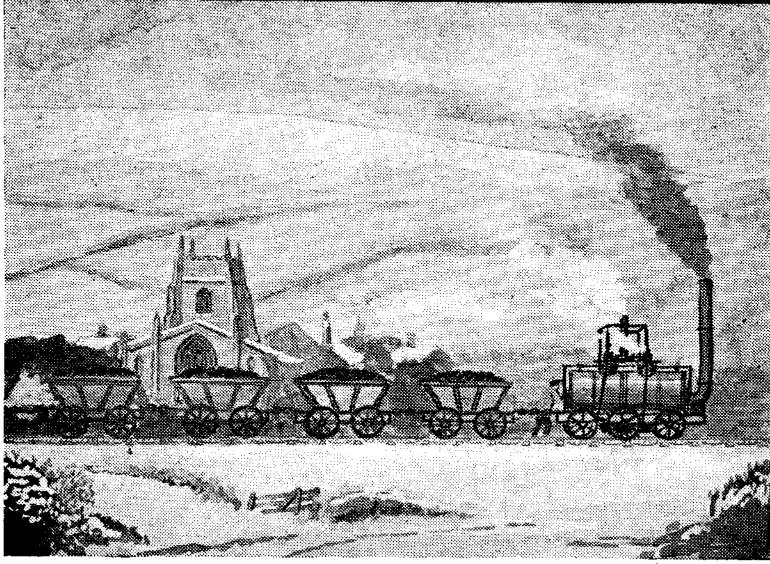
Ensuring concentricity

Do not use stock size bar for the cylindrical toolholder. It must be machined all over for truth and concentricity with the tapped hole for the micrometer adjustment screw. I used $\frac{7}{8}$ in. dia. silver steel, turning and polishing it to a close plug fit into the $\frac{3}{4}$ in. hole in the body.

Centre drill the end and drill right through $\frac{3}{8}$ in. tapping size BSF. Rough out the thread 20 per 1 in. with a small screwing tool before sizing the thread with a tap. This procedure is important. Any error in concentricity of the threaded hole with the body will interfere with smooth working of the micrometer screw when all is assembled.

Remove from the chuck and cut the keyway. You can do it by clamping in the tool rest and using an end mill, or short end of a drill, ground flat and backed off to cut. I stopped the keyway a little from each end, but there is no objection to cutting it right through the length if you wish. Back to the chuck, cut off and face to length.

★ *To be continued*



Behind the Yorkshire horse hangs a tale . . .

Some of it is told here by Donald G. Slater

As the reproduction in MODEL ENGINEER of the Christmas card sent by Wigan MES has given rise to correspondence, readers may like to know more about it.

The quotation printed with the picture is an extract from one of two holograph letters preserved in Wigan Public Library.

Robert Daglish, who built the locomotive known as the *Yorkshire Horse*, came to Wigan from North-east England in 1804 as engineer to the Earl of Crawford, and was given charge of the Haigh Foundry and Brock Mill Forge, where the engine was built. His son, another Robert, was the one more particularly associated with St Helens; he went to take up an interest in a foundry in 1830.

Daglish lived at Orrell, near Wigan. He seems to have been overlooked by recorders of engineering history. Some idea of his stature can be gained from the fact that his advice was sought by railway companies in Britain and abroad, and by mine-owners throughout Lancashire and North Wales.

In 1825 he made a survey for the Bolton and Leigh Railway, and in 1834 he won a premium of £100 in competition with over 70 other entrants (including almost every other engineer of eminence) for designing the best form of "parallel rails and pedestals" for the London and Birmingham Railway. He held strong views on the subject of the permanent way. Foreseeing more clearly than most of his contemporaries the rapid increase in the weight and speed of trains, he gave much attention to rail joints. All this was in addition to his work in the coal-fields, for which he built many winding, pumping and blast engines highly esteemed in their day.

His *Yorkshire Horse* was of the Murray-Blenkinsop type, by arrangement with the patentee, but was probably rather larger than the Yorkshire-built examples. Benjamin Hick, of the Union Foundry, Bolton, writing in 1822, gave its weight as $6\frac{1}{2}$ tons.

Another observer, writing in the same year, said that the locomotive "regularly draws nine wagons of coal at the rate of $2\frac{1}{2}$ miles an hour," each wagon holding two tons of coal and having a tare weight of a ton.

Daglish tells us that by 1816 he had two more engines at work, and that they remained in service "upwards of 36 years."

Much more remains to be discovered concerning Robert Daglish and his work, but documentary evidence is sadly lacking. Perhaps MODEL ENGINEER—congratulations on its continuing excellence—will reach someone who can add to the story?

Here is a letter written by Daglish from Orrell Cottage on 1 April 1856 to Mr Jones, Plasterer etc., 34 Mount Pleasant, Liverpool.

Dear Sir,

I only returned from the North of England last night, when I found your letter of the 25th ult. with not a few of others, on important business which is the reason of my not replying to yours ere this respecting the first application of Locomotive Engines in Lancashire.

I made the first in this Country in 1812, *and put it on an extensive colliery, under my direction, into full action at the beginning of* 1813, *which was nearly two years before Mr Geo. Stephenson made a Locomotive Engine in Northumberland.*

The first Do Do were not put into full action on the Liverpool and Manchester Railway until the year of 1829 *and* 1830, *which was upwards of* 16 *years after I made the first in this district, and on being found to answer so well and caused a saving of nearly* £500 *p. Anm compared with the use of horses—drivers, etc., so that I had other two at work before the end of* 1816 *and had them in use for upwards of* 36 *years, when I finished the colliery on which they were applied, so I think you fully entitled to any wager (or bet) you may have ventured on that affair.*

After signing off with: "I am, My Dear Sir, Yours cordially," Daglish adds a postscript:

I worked two of my Locomotive Engines on a cog railway by which resistance was obtained and one of them by adhesion produced between the surface of the rail and the periphery of the driving wheels.

A second letter, from which comes the quotation on the Christmas card sent by Wigan MES to Model Engineer:

Orrell Cottage,
Near Wigan,
Lancashire,
April 1st, 1856

TO ALL WHOM IT MAY CONCERN

This is to certify that I made the first locomotive engine in Lancashire in the year of 1812, and put it into action at the beginning of 1813 on an extensive colliery under my direction, belonging to the late John Clarke, Esquire, in the township of Orrell, near Wigan, for the conveyance, &c., by trains of waggons from his colliery near Orrell Mount, to the Leeds and Liverpool Canal, which was upwards of 16 years before any locomotive engines were put fairly into action on the Liverpool and Manchester Railway.

Robt. Daglish Senr., M.S.C.E.

READERS' QUERIES

This free advice service is open to all readers. Queries must be within the scope of this journal and restricted to one problem. The replies published are extracts from fuller replies sent through the post: queries must not be sent with any other communications: valuations of models, or advice on selling cannot be given: stamped addressed envelope with each query. Mark envelope clearly "Query," Model Engineer, 19-20 Noel Street, London W1.

DO NOT FORGET THE QUERY COUPON ON THE LAST PAGE OF THIS ISSUE

Centre-flue boiler

I want to construct a centre-flue boiler similar to the *Trident Major*. I have a piece of hard drawn steel tube, 16 s.w.g. The working pressure is to be 60 p.s.i. Do you consider the tube to be suitable ?—H.F., Folkestone, Kent.

▲*Steel tube of* 16 *s.w.g. would not provide a sufficiently high margin of safety for a boiler intended to work at* 60 *p.s.i., and of external dimensions similar to those of the* TRIDENT MAJOR.

Although the tensile strength of steel tube is substantially greater than that of copper tube, it is liable to more rapid deterioration through scaling and corrosion. Ample safety margins should be allowed.

Model destroyer

I shall be glad if you will let me know what plans you can supply for building a model destroyer, and whether they can be had with working drawings and a list of materials.—G.G.A., Orpington, Kent.

▲ *PM Plans Service can supply plans (PB23) for HMS* GRENVILLE, *an anti-submarine frigate which was built as a fleet destroyer during World War II and was later converted for anti-submarine work.*

There are two sheets; hull lines, sideview and plan elevation on sheet 1, 7*s.* 6*d., and superstructure details on sheet* 2, 3*s.* 6*d. The complete set costs* 10*s.* 6*d., post paid.*

The scale is ⅛ *in. to* 1 *ft and the finished model is* 45 *in. long. Back numbers covering the series are obtainable.*

Full particulars of Harold A. Underhill's R Class destroyer may be had from Underhill Plans, Baltonborough, Glastonbury, Somerset.

Three societies

Could you kindly give me the addresses of Andover, Salisbury and Southampton model engineering societies ?—S.J., Fordingbridge, Hampshire.

▲ *The addresses are: Andover and District MES, hon. secretary Mr R. Pemble of* 14 *Weyhill Road, Andover, Tel.: ANDover* 3987; *Salisbury and District MES, hon secretary Mr R. A. Read of* 90 *Woodside Road, Salisbury, Wilts; Southampton and District SME, hon.. secretary Mr P. Vosper of* 97 *Wilton Road, Shirley, Southampton (Tel.: Southampton* 71196).

Back numbers

The first of four articles by George B. Round on the construction of a 3½ in. lathe was published in ME on 22 October 1959 and I shall be grateful if you will let me know the dates of the further three articles.

I should also be pleased to know if copies can be had from the Back Numbers Department.—R.S.A., Northampton.

▲ *The articles by George B. Round on the* 3½ *in. lathe were published on October* 22, *November* 5 *and* 19, *and December* 3, 17 *and* 24. *Copies may be had from ME Back Numbers Department at* 1*s. each, with the exception of the November* 19, *copy of which is no longer in stock.*

LBSC colours

Could you please tell me the colours of the LB & SCR locomotives ?—N.H.M., Kingston-upon-Thames, Surrey.

▲ *During Stroudley's regime LBSCR passenger engines were painted a slightly greenish yellow-ochre (approximately Parson's shade No* 33). *The bordering and panelling were dark olive green, Parson's shade No* 4; *boiler bands were black with a red line on each edge, together with an olive-green stripe with a white outside, next to the body colour.*

Wheels were yellow-ochre with black tyres and olive-green axle ends; frames, solebars and footsteps were painted dark claret (Parson's shade No 28) *edged with a black band having a fine yellow-ochre line on the outer side and a fine red line on the inner. Names were in gold, plain sans-serif letters shaded to left in green picked out in white, and to the right in black.*

Buffer beams were dark claret with a vermilion panel in the centre. Coupling rods were claret. Number plates were polished brass. Chimneys had copper tops, cab windows brass beading.

Non-fitted goods engines were painted dark olive-green. From about 1905, *express engines were painted in umber, Parson's shade No* 35, *lined with twin gold lines. Goods engines were later painted black.*

Air compressor

I have just bought an air compressor in our local variety market for the very modest sum of half-a-crown. It is described as a Maxfield Tyre Pump manufactured by Smith Bros. The bore is 2¼ in. and the stroke 3 in. Some kind of gear drive is fitted and I would want to discard it.

I have always had a notion of constructing a compressed air plant for home workshop use with an air line for cleaning, a paint spray and possibly a tyre inflator. I have dismantled the compressor and it seems to be in perfect order and brand new. I should like to know if it will be suitable for the purpose which I have in mind. What speed could it be driven at and what h.p. motor would be required ? I should have to modify the drive, discarding the gears, and I would like to know if a ½ in. V-belt be sufficient ?—T.D.F., Limerick, Eire.

▲ *This machine is apparently identical, or at least similar, to one which was adapted by the ME workshop, and described in* MODEL ENGINEER *in* 1958 *on March* 13*, *March* 20 *and March* 27*. *The issues marked with an asterisk may be had from the Sales Department at* 1*s. each.*

For operating a compressor at a speed of 700 *to* 800 *r.p.m., at a pressure not exceeding* 50 *lb., a* ¼ *h.p. motor would be suitable, but for higher pressures a proportionately*

QUERIES SERVICE

The Queries Service run by this magazine is designed primarily to aid constructors who run into difficulty in building a model or piece of workshop equipment, though we do our best to help readers with other problems.

In the nature of things, replies can only be brief, and querists who expect a long treatise should consult other sources, such as the technical section of the local reference library.

An enormous amount of correspondence is handled by the Queries Service and to help expedite the work enquirers are asked to restrict themselves to one problem at a time.

higher motor power would be required. A fairly heavy fly-wheel is essential for smooth working of a single cylinder compressor, and one not less than 8 in. dia. could be grooved on the rim to take a ½ in. V-belt. These points are described in detail in the articles.

Magnet for electric clock

I have almost completed an electric clock which was described in ME in 1921. I have modified the outline design but I have retained the fundamental working parts.

To complete the working mechanism I must have a bar magnet 5½ in. × ⅜ in. × ¼ in., of good quality. I was under the impression that I could obtain one in Liverpool, but I have had no success and the Eclipse people cannot help.

I am writing to you almost in desperation.—H.J.R., Birkenhead, Cheshire.

▲ *It would be possible to make a suitable magnet from carbon or silver steel or better still, tungsten steel. You would probably be able to obtain a piece of tungsten steel from Messrs Darwins Ltd, Fitzwilliam Works, Tinsley, Sheffield 9, who specialise in this material.*

After any finishing or drilling which may be required, the bar should be hardened by heating to bright red and quenching in oil, and should then be magnetised by contact with a larger, powerful magnet, or by winding two or three hundred turns of insulated wire around it and passing a heavy current through the coil.

Chart for American readers

Perhaps you could help me on the use of sheet metal and wire gauges in the UK. I am trying to compile a conversion chart for use over here by American readers when they are working from instructions given in ME. The only problem I have is brass sheet. Is the Birmingham Metal Gauge still in use over there for brass sheet or does brass sheet now conform to s.w.g.? If the BMG is still used will you be able to let me have a copy of it or tell me where I can obtain one? How about copper sheet and tube?

In compiling this chart, nine different gauging systems will be involved. It may become somewhat unwieldy, but I think that should prove quite useful. A previous chart covering screw threads was quite popular. In the gauges there are five American and four British (including BMG). The American systems are even more involved than Britain's, and sometimes a particular system will be known by a number of different names.

The only system I cannot find tabulated is the BMG, which leads me to believe that it may have been discarded. To add to the confusion, three of the nine gauges involved have the word Birmingham in them. These are the Birmingham Wire Gauge (pre-1914) also known as the Stubs, the Birmingham Gauge (1914) used on your side for iron and steel sheets and hoops, and the BMG already mentioned. This speaks well for Birmingham as a metal-working centre. —B.C., Sunnyvale, California.

▲ *A full list is given in the* ME Handbook *which also has a good deal of statistical information on other workshop matters.*

The standard commonly employed for sheet brass is the Imperial Standard Wire Gauge (s.w.g.). Birmingham wire gauge is generally denoted by the letters BWG.

For full authoritative information on engineering standards of all kinds, it would be advisable to consult the British Standards Institution, 2 Park Street, London W1. There is a confusing number of standards and gauging systems, but unfortunately any attempt to clear things up by a unified or universal standard only adds one more to the list.

MODEL ENGINEER EXHIBITION

The next Model Engineer Exhibition will be held at the Central Hall, Westminster, opposite Westminster Abbey, from 16-26 August 1961, excluding Sunday. An announcement about entry forms will be made later.

Model racing car

Two of our members are keen to build a model racing car with either a 5 or 2.5 c.c. model aeroplane engine.

We have studied your catalogue of working drawings, and would be glad of your advice on the selection of a suitable plan.—R.H., Aylesham, Kent

▲ *You do not state whether you wish to build a car suited for round-the-pole racing or for rail-track racing. Round-the-pole cars are capable of the highest speeds and are made in sizes with engines up to 10 c.c.*

The MCN special (MO.5 in the PM list) is intended for r.t.p. racing, but the size is larger than is required for a 5 or 2.5 c.c. engine, though it could be suitably reduced. This drawing would be useful for showing the arrangement of the transmission, including the clutch and bevel final drive.

MCN Grand Prix Special (MC.20), is more suitable for rail-track racing, and is of a size for engines not larger than 2.5 c.c. Other plans listed on page 20 are accurate scale drawings of well-known types of cars, but do not give any information regarding the arrangements of the drive or the engine.

Paddle engine model in Alberta

I have practically completed a model of a side-lever paddle engine, based on a drawing in *Tredgold on the Steam Engine*. I have her stripped down now before the fiinal assembly, and I am wondering about painting. There is so much I do not know about this period.

Can you tell me, please, which parts should be painted and which left natural? The problem is complicated by the fact that the entire engine is fabricated—no castings are used anywhere. For example, the main standards are built up from ½ in. hexagon bar and flat stock, brazed. The beams are fabricated from 1½ in. × ⅛ in. flat stock (double) and so on. I shall naturally leave the parallel motion, in fact all the motion work, bright. The cylinder is lagged with mahogany, but I would like to hide the fact that castings have not been used where they should. I would much appreciate your advice.

I have fitted a second feed pump driven off the air-pump crosshead, similar to the boiler feed pump, to supply pressure for the condenser jet spray. It discharges into a tank between the engine bearers to smooth out the pulses. Is this according to Hoyle? I do not want to have to hook up to the domestic supply.

I would like to build one of the Crampton engines, but on such detail as the double framing, just for one example, I am the veriest ignoramus. Keep up the good work.—R.N.S., Ralston, Alberta.

▲ *It is difficult to find an authoritative source of information on this type of engine. Generally speaking, you will be fairly safe if you paint all the structural parts of the engine, including the standards and other attachments, and also the beam and connecting rod. Other working parts of the parallel motion should be left bright. The visible parts of the cylinder which would normally have been machined in full-size may be left bright, but cylinder covers on early engines were often left in the rough and should, therefore, be painted.*

The fitting of a second feed pump would be optional. As Mr E. W. Twining is now dead, we cannot inform you where the information on the Crampton locomotives can be obtained.

POSTBAG

The Editor welcomes letters for these columns. A PM Book Voucher for 10s. 6d. will be paid for each picture printed. Letters may be condensed or edited

CALEY JUMBO

SIR,—I was interested in Robin Orchard's "These Will be Saved" on March 9. While I agree that a Caledonian 4-4-0 or 0-4-0ST would make a good addition to the list of locomotives to be preserved by British Railways, I feel that the strongest claim for this is held by the redoubtable Caley Jumbo 0-6-0 which, as the 294 class standard goods, was Dugald Drummond's first design for the Caledonian. It was intended to replace the obsolete four-coupled and long boiler 0-6-0 on goods and mineral work.

The engines had 5 ft wheels, 18 in. × 26 in. cylinders and 150 lb. pressure. They were larger and more powerful than anything previously owned by the company, and were a development of Drummond's earlier designs for the North British Railway. The first, Nos 294-308 and 349-352, were turned out by Neilson and Co. and St Rollox works respectively in 1883. Another 20 came from Neilson in the following year.

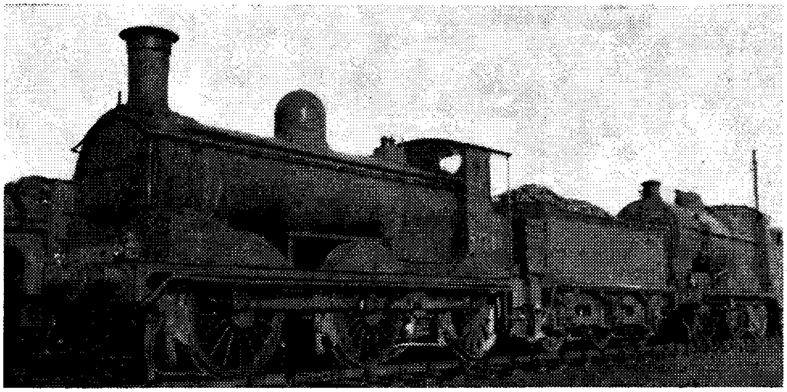
Thereafter all were of railway construction. The class was further multiplied during the Smellie, Lambie and McIntosh regimes to total 244 engines by 1897 (after which construction began of the enlarged, $18\frac{1}{2}$ in. version). The later batches were fitted with the Westinghouse brake, and were painted passenger blue. With their light axle load they proved a useful mixed traffic class. Five were equipped for a time with condensing apparatus for working on the underground section of the Glasgow Central low level line.

Under the LMS, they were renumbered 17230-17473 and classified 2F. Ross pop safety valves were fitted and some reboilering was done. Since 1944 some have been disfigured by stovepipe chimneys.

Six were withdrawn after the second world war, and of the 238 handed over to British Railways in 1948, 115 remain in service all over the former Caledonian and G & SW systems although, with the closure or dieselisation of branch lines, they are not now much seen on passenger work.

The pioneer engine, No 57249, a veteran of overseas service in the 1914-18 war, is still active from Corkerhill shed in Glasgow. Many enthusiasts feel that it is worthy of preservation as an example of the numerically largest, longest-lived and perhaps, most typical of all Scottish locomotive classes.

W. A. C. SMITH.
Scottish Area Secretary,
The Stephenson Locomotive Society.



The Caley Jumbo should be preserved, says Mr W. A. C. Smith

GAUGE 1

SIR,—In your reply to D.G.J. [Readers' Queries, February 23] you state that gauge 1 track is $1\frac{3}{4}$ in. wide. But perhaps it should be noted that in 1950 the British Railway Modelling Standards Bureau fixed the gauge at 45 mm. (1.722 in.). At about this time Greenly's original standard dimension drawing (P.91) for gauge 1 was revised to conform to the new standard. In its preparation the late Victor Harrison rendered valuable advice. For fine-scale work gauge O rail section was also specified for gauge 1 track.

In view of your own recommendation, it would appear to be splitting hairs to make a distinction between 1.750 in. and 1.772 in., but somebody is going to point out that the difference (0.022 in.) when translated to a full-size track is 0.67 in. However, such an error for a model is permissible, particularly on curves.

Curiously enough, Mr Harrison's gauge 1 outdoor railway at Bishop's Stortford was set out to a scale of $\frac{3}{8}$ in. to the foot. This caused not a little confusion when Henry Greenly designed, and had made in his own workshop, a tank locomotive to the standard 10 mm. scale—an error of 5 per cent. linear.

Aylesbury, Bucks. ERNEST A. STEEL.

TIME REGAINED

SIR,—A Merryweather fire engine on view in the window of an insurance agency here in Vancouver took me back to England before the first world war, when manuals and steamers were in their prime.

I remembered a Saturday night at the Euston Music Hall, where a scene in a ship's dining saloon was made realistic by rocking the whole stage. I discovered that several LFB steamer-pumps outside the stage door were connected to floats, tanks and cylinders before the stage. First a pair would pump into one tank, and then another pair would take over and pump it back.

Maybe some of the old Cockneys can give more information.

The Merryweather also brings back the Lyceum with its revolving stage, the Hippodrome with its sinking stage floor and a lighted gala-regatta to the ragtime *Waiting for the Robert E. Lee*.

Vancouver. ROBT. C. FAIRALL.

CITY OF TRURO

SIR,—For some years now we have been told that a 5 in. *City of Truro* would indeed be a magnificent locomotive, but there are difficulties to be overcome which would make the project more suitable for model engineers with experience.

I agree. I would have thought that the obvious answer would have been a constructional series for this engine written especially for the experienced model engineer.

There are about 50 or 60 designs for the beginner and the average modeller, but I can only recall one design for advanced engineers (with all the little details in, and as true to scale as possible). This is *Twin Sisters*, which of course is not an express passenger engine like the *City*.

Why should ME *always* cater for the beginners ? I could not feel more strongly that he should receive far more attention than the older hands; let there be no doubt of that. But a ratio of up to 50 to 1 seems a little excessive !

It is noticeable that no other locomotive or class has been requested so many times in Postbag and Queries.

Although the sources of opinion which I have mentioned do not necessarily reflect complete "public opinion" on the matter, the simple fact that one particular locomotive has been so often asked for should leave no doubt that a series on its construction would be very well received, although possibly by a more limited section of readers than would normally build a locomotive to published instructions.

Southall, Middlesex. A. W. DAVIS.

ME does not cater for the beginner only. The drawings and descriptions of such locomotives as Springbok, Jubilee, Pansy, *and* Molly, *to mention only a few, are quite suitable for the more advanced worker, and sufficient details are included for the builder to make not only an accurate model but a detailed one. At the same time these models, given reasonable workmanship, make excellent workers on the track.* —EDITOR.

STEAM CYCLES

SIR,—The great pleasure which the reading of MODEL ENGINEER gives me needs no emphasis.

Cliff Blackstaffe's comments re H. E. Rendall's proposed steam bicycle are very interesting. The design has much to commend it, but the use of D-slide valves for pressures of more than 200 p.s.i., is, in my opinion, not to be recommended.

In Cliff Blackstaffe's suggestions for a steam bicycle, a "five-foot square" steam boiler is mentioned. Evidently "five-square foot" was intended.

There are some "vertical twin" motor bikes with provision for setting the cranks at 180 deg. to each other. This would simplify conversion to steam, and make a better balanced engine. Both the cylinder head and camshaft would need modifying, and Cliff Blackstaffe's suggestion for driving the pump by an eccentric on the rear wheel hub is a good idea. A Stanley pattern two-ram pump needs only one eccentric.

Water hammer is likely to be encountered. I suggest valves of maximum area, minimum lift and fairly hard rubber seats. I have used flat disc valves, but I am not aware of the composition. We had some trouble with these valves at about 200 deg. F.

A separate foot, or hand-operated pump is essential for priming purposes.

On the size and type of steam generator to be used, I would like to ask the advice of Mr Blackstaffe, in whom I have every confidence.

My suggestions are not intended to supersede Mr Blackstaffe's excellent idea, but merely to provide alternative for those who may have a suitable unit.

Osborneville, South Australia. CYRIL G. KNIPE.

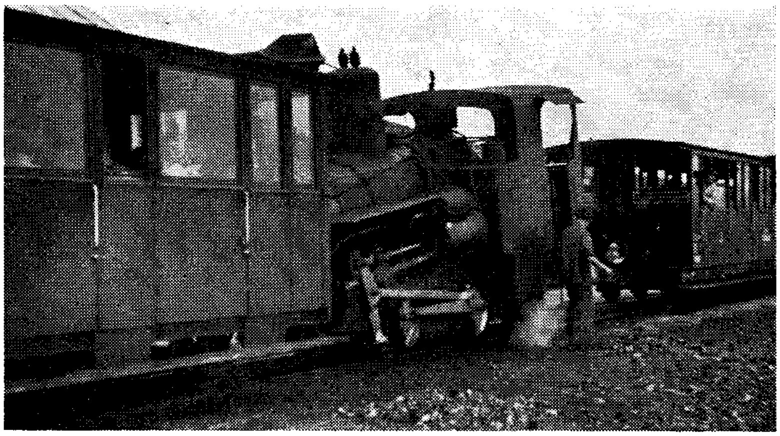
KNEELING COWS

SIR,—Peter Scott in his "Steam on the Mountain" says that the Achensee Bahn and the Brienzer Rothorn Bahn are "the two remaining steam-driven rack railways in Continental Europe."

No so, Mr Scott ! Go and visit the Scharfberg Bahn near St Wolfgang in Austria's Canton of Salzkammergut. Here "kneeling-cow" locomotives will take you up the famous Scharfberg to a height of some 5,300 ft, and in a snow-storm or a thunderstorm this experience will knock the other two railways into a cocked-hat (much as I admire them both).

I telephoned the Austrian State Tourist office today and they confirmed that the Scharfberg Bahn is still in existence and still steam-hauled.

London SW15. R. M. TYRRELL.



Kneeling cow locomotive of the Austrian Scharfberg-Bahn

READER'S PATENT

SIR,—I was greatly interested to read the article "Make this Magnetic T-square" in ME of 17 November 1960.

You may be interested to hear that a magnetic T-square is a registered patent in my name, No 209 in South Africa.

I find your magazine very useful.

Cape Town. ERNEST S. de WEB.

NEW YORK RECORDS

SIR,—ME of January 26 reproduced one of my photographs in the series of articles by Mr Edgar T. Westbury on model hydroplane hulls. The caption stated that the boat in the picture was "the fastest boat in the world using a home-made model engine."

When the photograph was originally published in ME of 5 January 1956, the statement I made was true, as the record had been made at a Toronto regatta in August 1955. But the record has been changed several times since.

On August 1960 regatta an official world record of 94.74 m.p.h. was made by the boat belonging to Joseph Horvath of the New York Model Power Boat Club. The engine was a home-made 15 c.c. two-cycle (glow plug) designed and made by Mr Horvath.

At the same regatta a new official record in the "over 30 c.c." class was made by Henry Parohl of the same club. His engine was also home-designed and was made by Mr Parohl. The speed was 87.13 m.p.h.
Jersey City, USA. Bob Graham.

Mr Graham has misquoted the caption. As we knew that the record had been broken, we took care to use the past tense. The caption read: "An official speed of 83.33 *m.p.h. at Toronto* made *this boat the fastest in the world driven by a home-made engine*"; *in other words, it was the fastest at that time. Nevertheless we are glad to hear from Mr Graham in New Jersey.*—EDITOR.

YOUNGHUSBAND

SIR—I wonder if any reader can give me a detailed description of the Younghusband valve gear. I have been trying for a long time to obtain information about it, with a complete lack of success. In *The Locomotive Engineer's Pocket Book*, 41st edition, the following particulars are given in the section on valve gears (p. 214): "*Younghusband* (1897). A double eccentric motion with cross rods. It has a straight link with shifting valve rod. It is stated to give quick openings and a constant lead. It was tested on five NE railway passenger engines for three years with a reported saving of 14.8 per cent. of coal."

The Younghusband gear would appear to have certain affinities with the Allan, but nothing is said about the suspension of the link, whether it is fixed or shifting.

Any information would be welcome to fill a gap in my data on locomotive valve gears (which cover well over 100 types, exclusive of poppet valve apparatus.)

Possibly some of our Northern friends familiar with the old NER can help, if they can they have my thanks in anticipation.
Rustington, West Sussex. K. N. HARRIS.

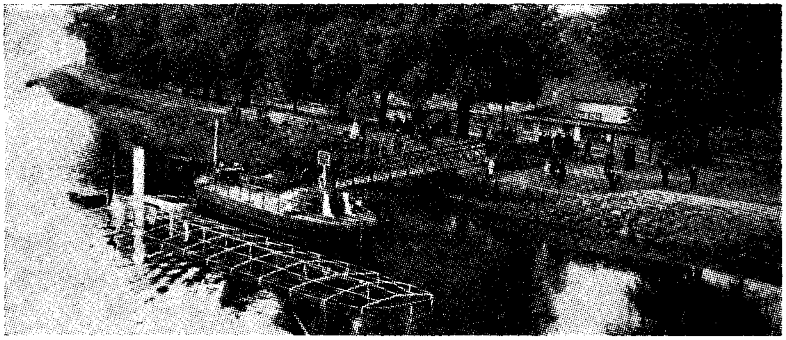
TRACTION ENGINE QUERY

SIR,—In Readers' Queries of February 2, C.B., Yorkshire, asks for information about the 3 in. scale traction engine which he is building.

Henry Greenly's articles in ME from 1909 should be helpful. Valve gear dimensions were all given on 9 February 1911 (Vol. XXIV).

In view of the increasing interest in larger sized traction engines, could we have a reprint of these articles ?
Dingwall, Ross-shire. JAMES S. REID.

[*What do other readers think ?*—EDITOR.]



Canopy framing and white funnel are all that can be seen of the sunken QUEEN ELIZABETH. *How did it sink ? asks Mr C. K. Hicks*

WHAT SANK HER ?

SIR,—In Postbag of March 2, W. Hunter mentioned the *Queen Elizabeth* steamboat.

I have a picture postcard in a collection belonging to a deceased relative and I wonder if the sunken steamboat is the *Queen Elizabeth*. You will note the white funnel showing above the water; this agrees with Mr Hunter's recollection.

Perhaps Mr Hunter, or some other reader would comment on the picture and tell us what caused the steamboat to sink.
Darlington, Co. Durham. C. K. HICKS.

SLIDE VALVES

SIR,—The notes by Martin Evans in ME of 22 December 1960 on piston or slide valves were very interesting. While our slide valves tend to become large, on the larger engines they are not usually as large, in proportion, as on the full-size machines.

Owing to more or less excessive lubrication on our small engines, the so-called large valve face is very well lubricated. Where bearings are concerned, large areas are reckoned to be a good thing !

I would say, that for beginners and those of us who have not had a great deal of experience, slide valves should be the first choice, as they remain steam-tight for longer periods, and make possible larger measure of success with less than average workmanship.

Piston valves, on the other hand, require good workmanship even for reasonable results, or leaks will soon develop.

Greater success is possible with piston valves when the double-ported system is used. The leakage area will be the same whichever scheme is used, but the larger contact area between bobbin and liner will again give better wearing characteristics.

Naturally, the smaller power needed to drive piston valves is an advantage, and the valve gears may be more to scale. But who would not rather fit a new set of valve gear pins now and again, instead of re-conditioning a set of piston valves nearly as often ?

Small locomotives that are built to do really hard work require robust sets of valve gear anyway, and so why not use slide valves, knowing that they will remain steam-tight ?

The working conditions on our small engines do not match those of the big locomotive in steam pressures and temperatures. Our slide valves and valve gears, therefore, have an easy time in comparison.

Let me say that the series on *Jubilee* and *Springbok* leave nothing to be desired. May Mr Evans continue with the good work. Tank engines, are my weakness and I have been looking forward to the new serial.

Good wishes, to all members of ME staff, for 1961.
Johannesburg. E. ROWBOTTOM.

AMERICAN BOOKS

SIR,—D'Arcy Lever's *Young Sea Officer's Sheet Anchor* and Steel's *Masting, Sailmaking and Rigging* [Queries, February 23] have both been reproduced by the photolithographic process and printed and published by Edward W. Sweetman of New York, the first in the edition of 1819, the second in the edition of 1794.

They may be obtained from the London agents, Francis Edwards, 83 High Street, Marylebone, London W1.

L.H.R. must have asked the wrong person at Foyles as these books are well-known to all who are interested in ships of that period, and are standard works of inestimable value to ship modellers.
Vice-President, Wembley SMS. E. C. FREESTON.

CLUB NEWS

Send news and notices to The CLUBMAN, 19-20 Noel Street, London W1.

FETE TRACKS

Most societies try very hard to have a permanent track of their own—and a very good asset it is. Some of the others might do more to exploit their portable tracks.

I know that many of you have portable railways, but are you using them to full advantage? Here at the ME offices we are constantly receiving enquiries for portable tracks to be operated at fetes and similar events. This is particularly so in London. Wherever possible, we direct the enquirer to the nearest society. But this year we are faced with a problem. We know of only about six tracks in London, and already three of them are fully booked for the summer.

Take the Acton MES for example. Last year we were able to direct enquirers to Acton, and nearly always they could be accommodated. But now I have received a note telling me that the track will be fully engaged for the summer.

If you have a portable track which is not fully booked and you do not mind spending your Saturdays driving trains (what live-steamer does?) write to me about it. Enquiries from your area will then be directed to you.

I would particularly like to hear of portable tracks in the London area.

GASLIGHT

Any old gas lamps? This strange request comes from the Sussex Miniature Locomotive Society.

Somebody has had the bright idea that a couple of nice Victorian gas lamps would improve the look and character of Beechurst Station. I should imagine that, with the change from delicately-shaped gas lamps to hideous things in reinforced concrete, old lamps could be picked up cheaply. Take your time in selecting them though, because some of the old gas lamps were rather badly designed.

Secretary: Mr S. R. Bostel, 8 Cranbourne Street, Brighton 1, Sussex.

SUMMER RALLIES

On August 12 the East Anglian Traction Engine Club is holding a rally at Chatteris, Cambridgeshire. Chatteris is eight miles south of March and is reached by the Eastern Region of British Railways.

The secretary is Mr C. G. Hall of The Burrell, 53 Litchfield Road, Cambridge, Cambridgeshire.

On May 14 the City of Birmingham Museum and Art Gallery is repeating last year's rally in Newhall Street. It will be a grand steam day with many engines and wagons on show and a display of the stationary engines inside the museum. The rally begins at noon and lasts until 5 p.m.

Then on July 1 and 2 the Alton Towers rally will be taking place. In midsummer the beautiful gardens at Alton Towers are a blaze of colour. The place is eight miles north-west of Uttoxeter, Staffordshire, and is served by British Railways Midland Region (Alton Towers Station).

The admission charge of 2s. 6d. for adults and 1s. 3d. for children will go towards the upkeep of the gardens.

Entry forms may be obtained from Mr S. L. Wedgwood, 58 Clough Hill Road, Kidsgrove, Stoke-on-Trent, Staffordshire. The rally is organised by the North Cheshire Traction Engine Club which is affiliated to the NTEC.

In Club News of March 16 I said that the Ravesby traction engine rally would be held at Revesby near Bolton; Revesby is near Boston, Lincolnshire. The Taunton rally also announced on March 16 will be held on July 29.

CHANGES

Change of secretary:

Acton MES, Mr S. G. Hickmore, 106 Milton Road, Hanwell, London W7.

Change of name:

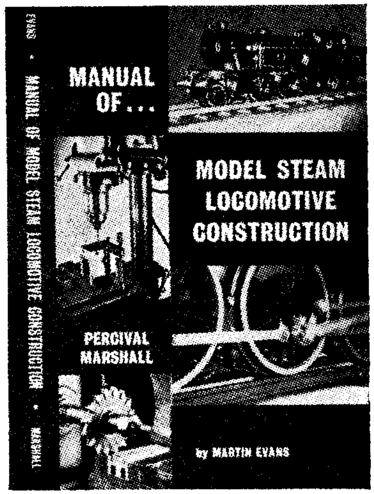
Lancashire and Cheshire Ship Model Society becomes The Middleton Ship Model Society. The secretary is Mr F. Hinchcliffe, 83 Wessender Head Road, Meltham, Huddersfield.

CLUB DIARY

April 13 Sutton MEC. Track repair.
April 13 Rugby SMEC. Model night.
April 14 Thames Ship Lovers' and Ship Model Society. Combined meeting with the Greenwich SMS. Lecture by Dr. R. C. Anderson on Galley and Oared Men-o'-War at Charlton House at SE7 at 8 p.m.
April 15 The Thames Group Marine Modelling Society. Meeting arranged for March 18 has had to be altered to tonight. It will be held at the Anglo Saxon Hall, Gravesend.
April 15 Tal-y-llyn Railway Preservation Society. Meeting at the Memorial Hall, Albert Square, Manchester at 2 p.m.
April 15 City of Leeds SMEE. Track meeting at Temple Newsam.
April 15 SMEE. Chairman's address at 28 Wanless Road, SE24 at 2.45 p.m.
April 15 Historical Model Railway Society. Visit to see progress at the BTC Museum, Clapham at 2 p.m.
April 16 Worcester SMEE. Track day at Waverley Street, Diglis, Worcester.
April 16 Manchester MES. Track day at Mote Park.
April 17 Wigan MES. Meeting at St Michael's Institute, Earl Street, Swinley, Wigan at 7.30 p.m.
April 17 Leicester SMEE. Annual general meeting.
April 18 Northampton SME. Film show at the Kingsthorpe Community Centre at 8 p.m.
April 19 Southampton and District SME. Meeting at 42 Carlton Road, Southampton.
April 20 Sutton MEC. Track work.
April 20 Bristol SMEE. Meeting at the Games Room of the YWCA.
April 21 Rochdale SMEE. Lecture on springs by Mr H. Bonser at Lea Hall, Smith Street, Rochdale.
April 21 Ramsgate and District MC. Demonstration on book-binding at Effingham Street, Ramsgate at 7 p.m.
April 21 Coventry MES. Track night.
April 22 Historical Model Railway Society (Mallard and South West Area). Lecture by Mr I. H. Smart on the Dartmouth and Torbay Railway at the Mallard and Royal Hotel, Gloucester at 3 p.m.
April 22 City of Leeds SMEE. Track meeting at Temple Newsam.
April 22 SMEE. Headquarters maintenance at 28 Wanless Road, SE24 at 2.45 p.m.
April 23 Wulfruna MPBC. Regatta at West Park, Wolverhampton, SR and RC only.
April 23 Harrow and Wembley SME. Meeting in the morning at the pond in the West Harrow Recreation Ground.
April 23 City of Leeds SMEE. Club visiting day to Temple Newsam.
April 24 Welling and District MES. Meeting at the Welling Library at 8 p.m.
April 24 Sutton Coldfield and North Birmingham SME. Annual general meeting at the Swan Inn, High Street, Erdington.
April 24 North Staffs Model Society. Visit to Meaford Power Station at 7 p.m.
April 25 City of Leeds SME. Track meeting at Temple Newsam.
April 26 Harrow and Wembley SME. Locomotive section night at the Heathfield School, Harrow at 8 p.m.
April 27 Sutton MEC. Track work.
April 28 Thames Ship Lovers' and Ship Model Society. Meeting at the Baltic Exchange at 6.30 p.m.
April 29 City of Leeds SMEE. Track meeting at Temple Newsam.
April 29 SMEE. Visit to the Engineering, Marine, Welding and Nuclear Energy Exhibition.
April 30 City of Leeds SME. Private running at Temple Newsam.
April 30 Maidstone MES. Track day at Mote Park.
May 3 Southampton and District SME. Meeting at the Crown and Sceptre, Bevois Valley.

Manual of Model Steam Locomotive Construction

by MARTIN EVANS



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