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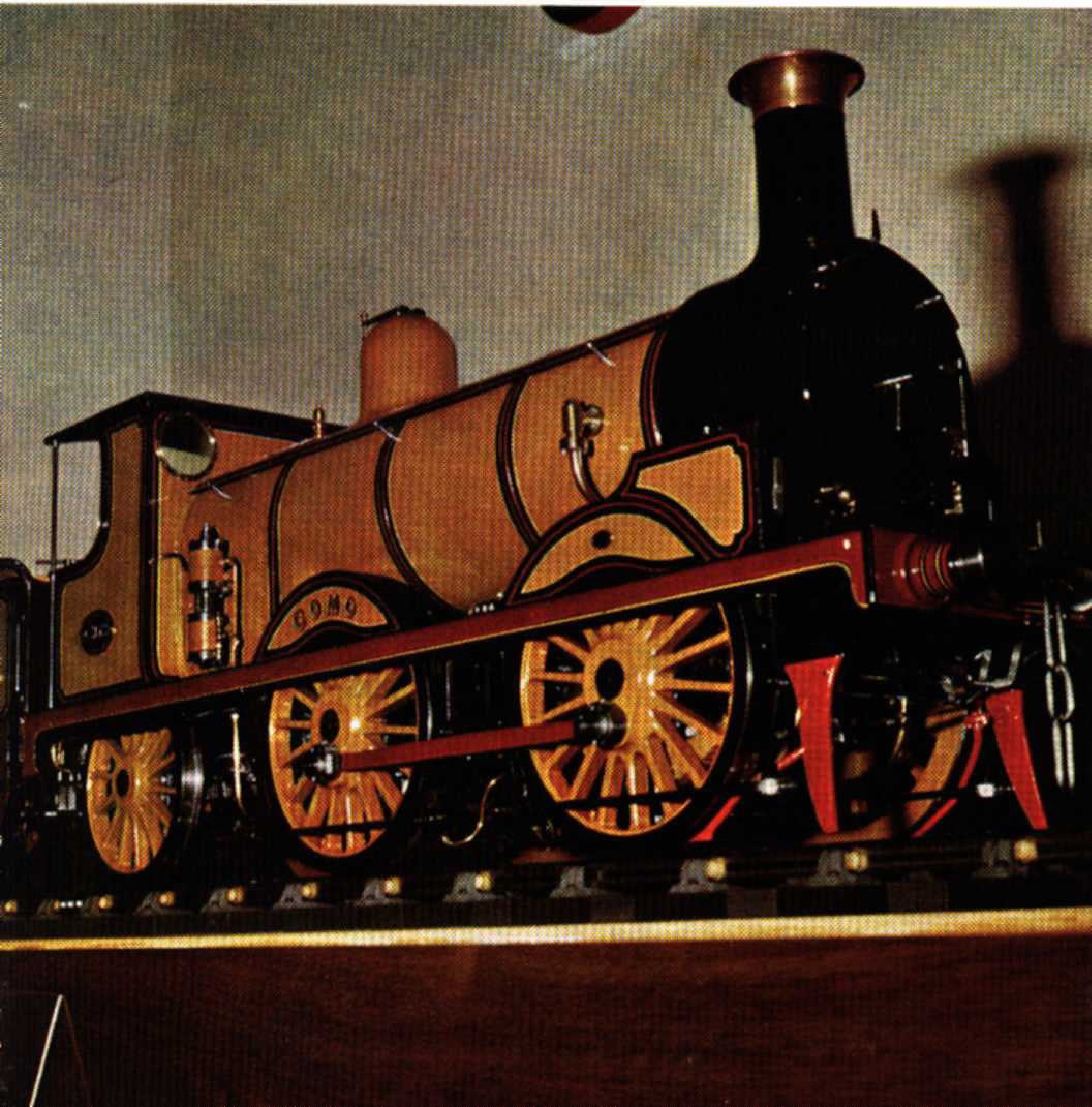
(USA & CANADA—$1)
MAP HOBBY MAGAZINE

Model Engineer



Model Engineer

Founded 1898

Incorporating Mechanics and English Mechanics and Ships and Ship Models

Volume 140 Number 3484

March 1st, 1974

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Second-class postage rates paid at New York, U.S.A. Registered at the G.P.O. for transmission by Canadian Post. American enquiries regarding news stand sales and advertising should be sent to MODEL ENGINEER, Eastern News Distributors Inc., 155 West 15th Street, N.Y. 10011.

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COVER PICTURE

The 1 in. scale L.B.S.C.R. "Como", built by the late Dr. Bradbury Winter, and photographed at the Model Engineer Exhibition by Ron Moulton.

NEXT ISSUE

Further reports from the M.E. Exhibition: Valve gear details for "Metro".

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Remittances to **Model & Allied Publications Ltd., P.O. Box 35,** Hemel Hempstead, Herts. HP1 1EE. (Subscription Queries Tel: **Kings Langley** 62692/3.) Subscription Rate £6.00 (U.S.A. and Canada $15.00) post free, index included.

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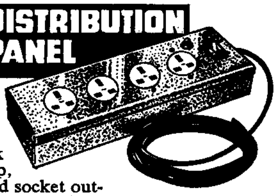

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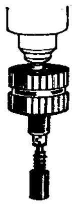

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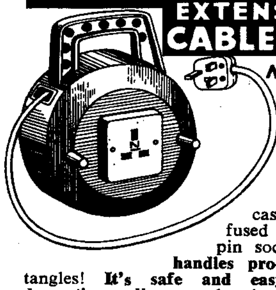

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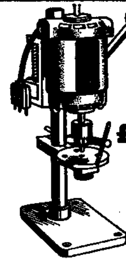

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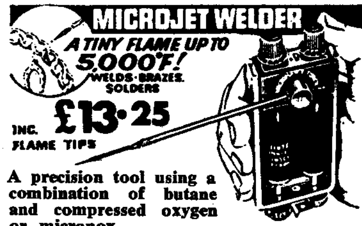

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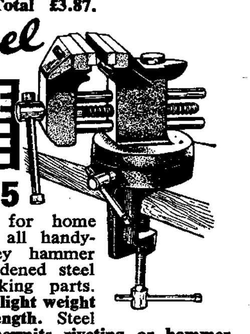

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SMOKE RINGS

A Commentary by the Editor

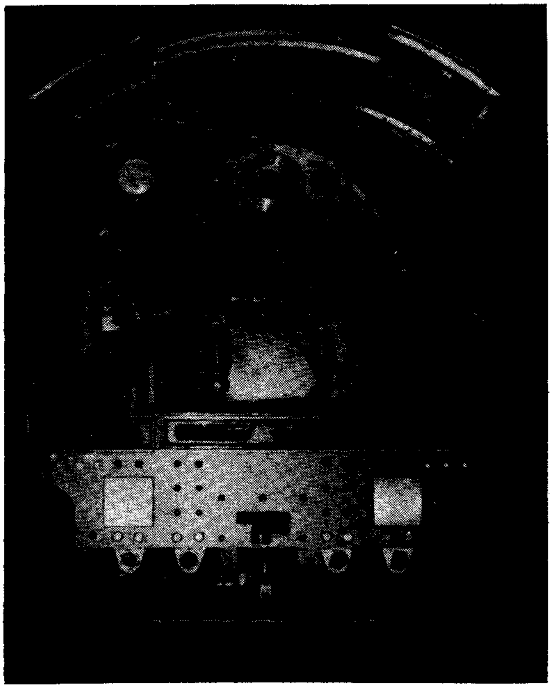
Steam Boat Association

Readers who are interested in small steam boats (not models this time!) may not be aware that there is a society known as the Steam Boat Association of Great Britain. The objects of this Association are to foster and encourage steam boating and the building, development, preservation and restoration of steam boats and steam machinery, to stimulate public interest in steam boats, and to promote high standards of workmanship and seamanship.

The Secretary of the Association is Mr. Peter Hollins, of 30 Ranvilles Lane, Fareham, Hants., from whom full details can be obtained. The Annual General Meeting of the Association was held on February 16th at the Thames Rowing Club Headquarters in Putney.

Another "Britannia"

The late LBSC's design for a 3½ in. gauge model of the B.R. "Britannia" class has been one of his most popular. My photograph shows one of these models which has recently been completed by Mr. D. Holland-Bowyer of Great Witley. Originally started 20 years ago, building was shelved until 1970, when work was restarted and altogether 5000 hours were required to finish the model. Mr. Holland-Bowyer described the building of his first locomotive, a 0-4-0 saddle tank



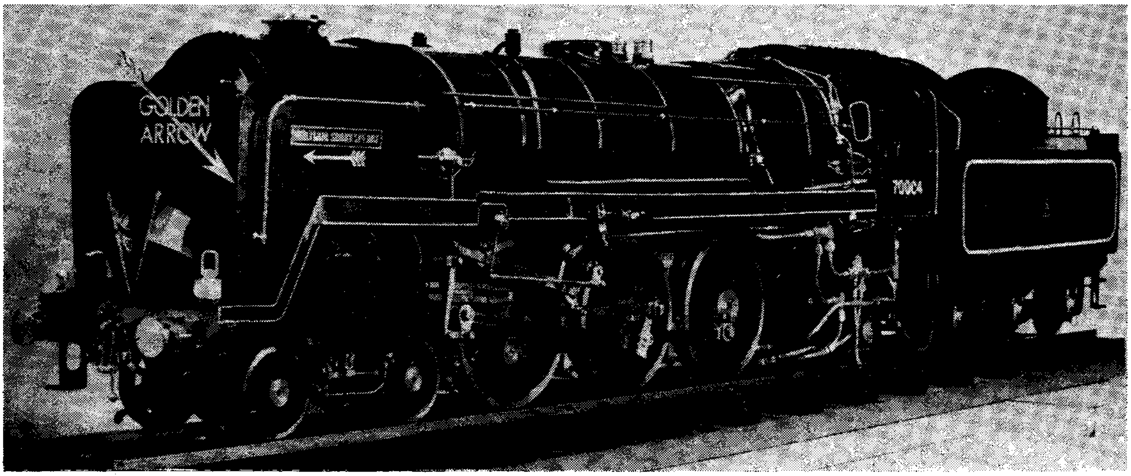
The cab of Mr. N. Popich's 5 in. gauge "Springbok" (See Smoke Rings, Feb. 15th).
Below: Mr. Holland-Bowyer's "Britannia".

for 3½ in. gauge, in January, 1952, and as he parted with this model many years ago, he would be interested to know what has happened to the engine. His address is "The Hillaries," Great Witley, Worcester.

Norwich track

I hear that good progress is being made with the new track of the Norwich & District Society

Continued on page 241



MASTIFF PETROL ENGINE

Part XXVI **By L. C. Mason** *Continued from page 167*

OF THE EXTERIOR FITTINGS to complete the oil distribution system, we could start with the pipe junction-cum-union which receives oil from the pump and delivers it to the crankcase oilways.

This is a three-way junction screwing into the ready tapped hole in the side of the crankcase at the timing end. Oil enters at one side of the union and is fed out of the other side outlet 90 deg. round into the crankcase. Oil on this route goes to the timing end crankshaft and camshaft bushes and also to the pressure relief and oil return hole, all of which are in the crankcase end. As the oil pressure builds up to the relief valve "blow off" point, some is diverted via the bottom outlet to the flywheel end connection to the crankcase, feeding the crank and camshaft bushes at that end. When the pump is delivering its maximum output, pressure to both crankcase feed points is equal, with most of the oil going into the timing end connection and straight past the relief valve back to the sump.

The union is plain turning, drilling and threading from three stubs of 5/16 in. bronze or gunmetal rod, the whole being silver soldered together at the one heat when the various arms have been threaded and drilled. I generally leave completing the drilling until after the silver soldering which I think makes more sure of the silver solder flowing over the contact surfaces rather than into one of the holes, and ensures that the holes are lined up and fully clear when they are finally drilled.

A thin hexagon brass locknut bears on the side of the crankcase, locking the union in its tapped hole vertically, to ensure straight pipe runs. The oil pipes are all ⅛ in. copper pipes, connected with conventional olives and union nuts, the nuts being from 9/32 in. A/F hex. brass.

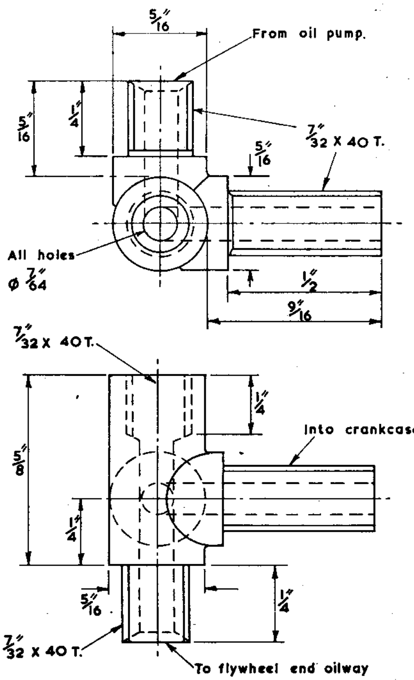
Into the open top of the union screws the oil pressure indicator. This is a stubby brass or gunmetal cylinder, reduced and threaded at its lower end to screw into the top of the union, and threaded externally at the top for a cap. The piece is D-bitted for a true ¼ in. dia. bore, ½ in. deep, in which is housed a tiny brass piston provided with a slender tail or piston rod. The piston is machined to accept an "O" ring of the size for ¼ in. bore for an oil-tight fit, and oil under light pressure below the piston pushes the piston up to the top of the cylinder, causing the piston rod to protrude through a hole in the top cap. The piston and its rod can be turned together at the one setting, gauging the groove for the "O" ring by the use of drill shanks as gauges. The drawing shows the dimensions for the re-commended fit for an "O" ring this size, and the number drills which can be used to size the width and depth of the groove. A very light spring can be included under the cap to push the piston fully in again when the engine stops and the pressure leaks away. The spring must be no stronger than in the relief valve, or the piston will not be moved before the valve lifts.

When the engine was first shown in the M.E. offices, and the various points and features explained, it was jokingly suggested that the indicator should be elaborated to include a pressure operated switch working a tell-tale light, as on most car systems. This could in fact be done, using one of the miniature micro-switches now available — although it is not proposed to describe this addition!

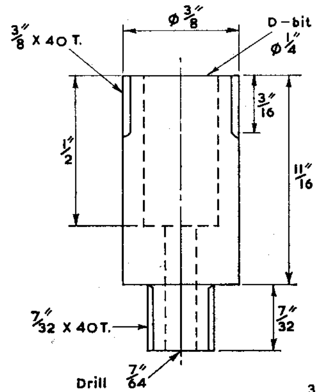
So far as can be seen from numerous runs with the engine as built, the oil system is reliable enough for the pressure indicator to be dispensed with, providing the length of run is well within the capacity of the sump to cope with the amount of oil that may be used. If you do decide not to fit it, the union can be finished off with a screwed plug, it being advisable to have access to the inside for cleaning purposes, if required.

The oil pipe from the union to the flywheel end leads down from the union, swinging rearwards to pass under the bottom edge of the cylinder block flange, and rises again to connect to the banjo union on the end of the crankcase just behind the edge of the flywheel. The banjo is a plain silver soldering job from two stubs of drilled rod, the pipe being soft soldered into the side connection. The bolt is mild steel, turned from 5/16 in. A/F hex. rod.

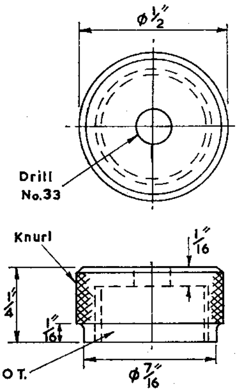
One other item that might be made at this point is a starting pulley. If you have decided not to fit a starting dog, then you will certainly need one; if you are fitting the dog, then you can get a rather better spin over with the pulley — at least in the early days until the engine is run in a bit and has freed up somewhat. The pulley can take two forms: either a plain V-groove affair for use with a round belt as commonly seen in power boats, or the type shown, which has a square-bottomed groove with notched side



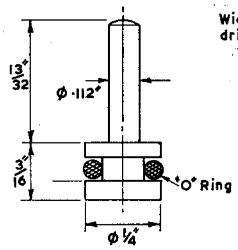
OIL PIPE JUNCTION
Brass or G.M. 1 off



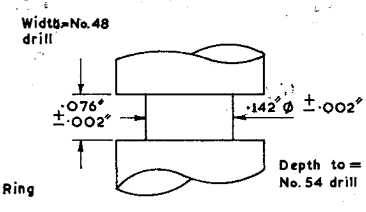
OIL INDICATOR CYLINDER
brass 1 off



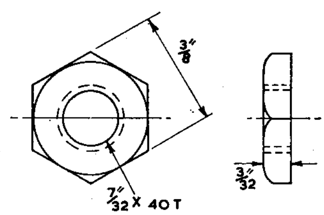
CYLINDER CAP
brass 1 off



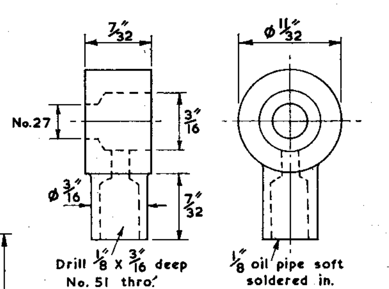
OIL INDICATOR PISTON
brass 1 off



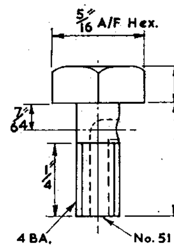
SIZES OF PISTON O RING GROOVE



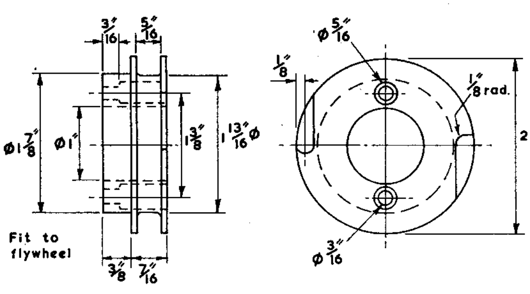
PIPE JUNCTION LOCKNUT
brass 1 off



OIL PIPE BANJO bronze or G.M. 1 off



BANJO BOLT
B.M.S. 1 off



STARTING PULLEY light alloy 1 off.

flanges. This type is used with a length of thin cord fitted with a loop at one end. The loop is hooked into one side notch and then wound round the pulley until either all the cord is wound on, or the pulley is full up. The advantage of this type is that the cord cannot slip, giving a positive spin at any speed, and it does not need two hands to keep it engaged with the pulley.

As the V-groove type is just plain turning, depending on the diameter of the starting belt, the alternative style is drawn. While its main shape is also plain turning, it has the notches in the flange to be shaped. These are produced by drilling a couple of diametrically opposite holes close to the bottom of the groove, and then milling or sawing down into the holes from the outer edge to produce the notches. While only one notch is used at any one time, two are cut to preserve a good balance to the pulley. The short vertical side of each notch should be radial to the pulley centre, so that there is no danger of the cord loop not slipping off the corner as it runs out. For the same reason the "trailer edge" of the notch can be cut back to something like 90 deg. to the leading edge, giving the loop plenty of clearance. Round off all the edges so as not to cut the cord.

The starting pulley is turned with a locating register fitting snugly into the recessed face of the flywheel, and counterdrilled for the two 2BA cheesehead screws which attach it to the flywheel. The centre is bored out big enough to enable a box spanner to be used on the flywheel nut without having to remove the pulley.

So, being unable to think of anything else apart from carburettors that we have not dealt with in respect of the engine itself, the whole thing might be finally assembled. If it is already roughly assembled, then strip it right down again to clean everything thoroughly, remove all traces of swarf in the odd corners, and to make sure everything is marked for correct re-assembly when you have forgotten how it went originally.

I like to be leisurely and methodical about this operation, and it pays to have everything to hand before you start. "Everything" includes a sheet of clean paper on which to lay out the bits, some clean non-fluffy rag, oil can, and all the assembly tools that you will need. The assembly can go in pretty much the order in which the bits were made, except that it would probably be best to start with the crankshaft and conrods into the crankcase, and then the pistons before adding the cylinder blocks. Wipe each component quite clean as you come to deal with it, and give bearings and journals a film of oil. As the assembly proceeds, there will arise the question of gaskets between various surfaces. Most of these can be thin paper; I used the flimsy stuff used for carbon copies in typing. You will get through several quarto sheets of it!

All these gaskets can be fitted dry or lightly greased. Do not be tempted to use any joint-sealing compound with any of them — it will only cause a lot of re-cleaning of joint surfaces after you have taken something off, before you can re-make the joint, and the original machining should have made anything of the sort quite unnecessary. The places where thin paper gaskets can usefully be fitted are as follows:

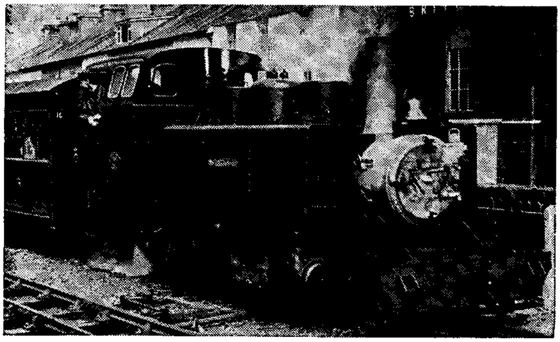
Crankcase to base.
Sump to base.
Timing case to crankcase.
Timing case cover.
Crankshaft bearing housing to crankcase.
Camshaft bush flange to crankcase. (Flywheel end).
Cylinder bases to crankcase (2).
Manifolds to cyl. heads (2).
Oil pump to timing case.
Dipstick housing to crankcase.
Sump oil pipe flange to sump.

When you have the base fitted to the crankcase, and the dipstick housing also in place, before fitting the sump push the dipstick home and lay a rule across the underneath edges of the base, touching the protruding end of the dipstick. Mark across the dipstick flat where the rule edge touches it; this will be the "Full" mark for the sump oil level. While it will hold slightly more, it need never be filled higher than this mark.

As you come to them, washers of thicker paper —e.g., drawing paper—could be fitted under the sump drain plug, oil filler plug, the oil pipe union locknut, and both sides of the banjo oil delivery union. Incidentally, when you come to bolt this up, go very gently. If you are a bit heavy-handed you could strip the short length of thread in what is after all soft light alloy, or twist the head off the thin-shelled bolt.

Cylinder head gaskets are something of a case on their own. I have used thick paper, but this is not too nice as it has little give in it; proper sheet jointing material is much to be preferred. There is some available only 12 thou. thick, flexible as paper, and known as "Lipackite", made by James Walker. This is very suitable,—no doubt the locomotive boys are familiar with it. Like other asbestos-based jointing, holes in this can be fluffy-edged unless you use a leather-work punch for making them. Lacking this, the best procedure it to cut out a piece amply big enough for the gasket, and sandwich it between the cylinder head itself and a piece of flat wood. If you then run a drill through each cylinder head hole into the wood, you get nice clean holes in the gasket. This can then be slipped over a few odd bolts in the head to lay close to the head surface, and the internal shape to be cut out indented round with a blunt pencil. A pair of nail scissors then does the rest adequately. The finished gasket can then be fitted dry or greased. If you grease it, be prepared to see traces of an oil film on the surface of the cooling water for the first few runs; this will not necessarily mean you have a gasket blow from the cylinder bore.

When you fit the head gaskets, run the head nuts down a little at a time in a symmetrical pattern when once the head is bearing on the gasket. These again should not be brutally tight. On the subject of pressure-tight joints, the solid copper washers generally supplied with commercial miniature plugs are of little use — especially for plugs in an alloy head. I invariably replace these with home-made washers made from thin soft aluminium, cut from tablet cans free from the local chemist; he only throws them away! Thin card is quite good, too.



MOUNTAINEER

A narrow-gauge 2-6-2 tank locomotive for 3½ in gauge

by Don Young

From page 171

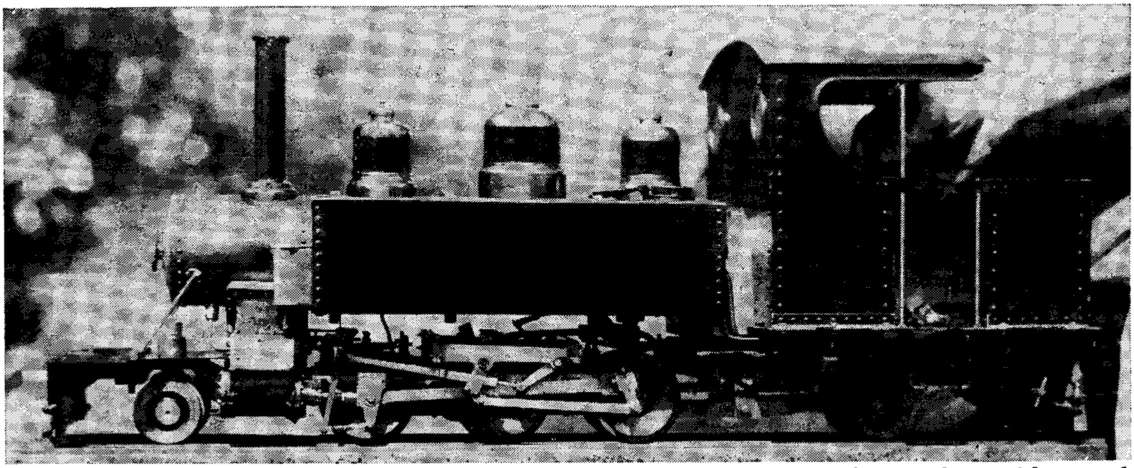
FOR THE PAST TWO WEEKS, which included the Christmas holiday period, a serious start was made in boxing up tools, castings, and materials in the workshop ready for the move. A selection of stout boxes was obtained and each was loaded; I use the word loaded in its literal sense, for the boxes containing mild steel sections and the gunmetal castings could not be lifted afterwards. Yours truly blamed this problem on Ron Isted for his recent article on moving his workshop, you did not mention weight Ron! Over 800 lb. (avourdupois not sterling!) of equipment has now been removed from the workshop, but still the task seems hardly started; the next 12 weeks or so are going to be extremely hectic.

Mention of Christmas reminds me that there is a whole host of readers to be thanked for their season's greetings; time will not allow me to answer them all as I would wish, so I must tell you that your good wishes really cheered us up. The sight of three Rio Grande K36 Class 2-8-2's blasting across the mantelpiece, followed by a Festiniog Railway 'Fairlie' in full cry, with *The Earl* from the Welshpool and Llanfair Light Railway bringing up the rear was really something. This could be labelled a "Narrow-gauge Christmas", for several readers supplemented their greetings with photographs, drawings, and specifications of favourite locomotives; one reason why clearance of the workshop did not proceed to plan! Talking of proceedings, it is time to make further headway with *Mountaineer.*

Ted Been of Bromley wrote to say that he spent his Christmas trying to assemble the pony trucks for his *Mountaineer* and found two snags, both attributable to yours truly. The first concerned the alignment of the spring pockets in the axleboxes with those in the top plate. I should have mentioned in the text that on assembly short lengths of ⅛ in. rod were to be used as dowels to maintain this alignment. The second error was much worse, and I trust other builders have not reached the stage of machining the gunmetal castings for the pony truck cross beam, or stay. The design was modified as I proceeded, to fit the yoke between the top plate and the cross stay, yet I forgot to subtract the ⅛ in. thickness for the yoke from the total depth of 1 7/16 in. The depth of the cross stay should therefore be 1 5/16 in., with top and bottom flanges a bare 5/32 in. thick. I have a sample casting by me and this is capable of machining to the new dimensions without alteration: sighs of relief.

Ted Benn, as are several other builders, is trying to tackle *Mountaineer* in the form as she was built in 1917; in this respect the official works photographs have been of great value. To augment this information I am now going to ask our worthy Editor a considerable favour, that is to publish a second G.A. drawing of No. 1265 as built. In this form the chassis remains unchanged, as I have retained the modified springing arrangement in way of the firebox, for reasons already stated, the only alterations are to the smokebox, sandboxes, tanks and cab.

The smokebox is cut back to its original length, flush with the front of the tanks, and the stays to the frames are omitted; these latter were fitted in France. The original sandboxes on the boiler top are much more shapely than those now fitted to *Mountaineer,* but although they look much smaller there is very little difference in their capacity. For the miniature *Mountaineer* I purposely cut down the width of the tanks and



2½" gauge Baldwin 2-6-2 T. by Douglas Swain of Winnipeg to a design by Graham Anderson. Photograph by Carl Purinton.

spaced them further apart than full size, knowing the problems of heat radiation from the boiler and its effect on injector performance. For the G.A. of No. 1265, the number given to our *Mountaineer* when built in 1917, the tanks are sized and spaced correctly. The major alteration is to the cab, and here I have provided all the relevant dimensions for this to be made in original form. This should now allow those builders who desire to carry on and complete their engines in original form. Incidentally, this exercise has proved just how lucky I was in drawing up *Mountaineer* from photographs, with an absolute minimum of important dimensions, the result was so incredibly accurate when compared with the works drawing as to be beyond belief. Because of this yours truly is hopeful that builders will forgive me the detail dimension discrepancies that have inadvertently crept in; or with the description.

From this point onwards we are looking into the future; not too far ahead it is hoped, for the description depends on the cab floor being laid and finally positioned; otherwise there is no platform for the reverser.

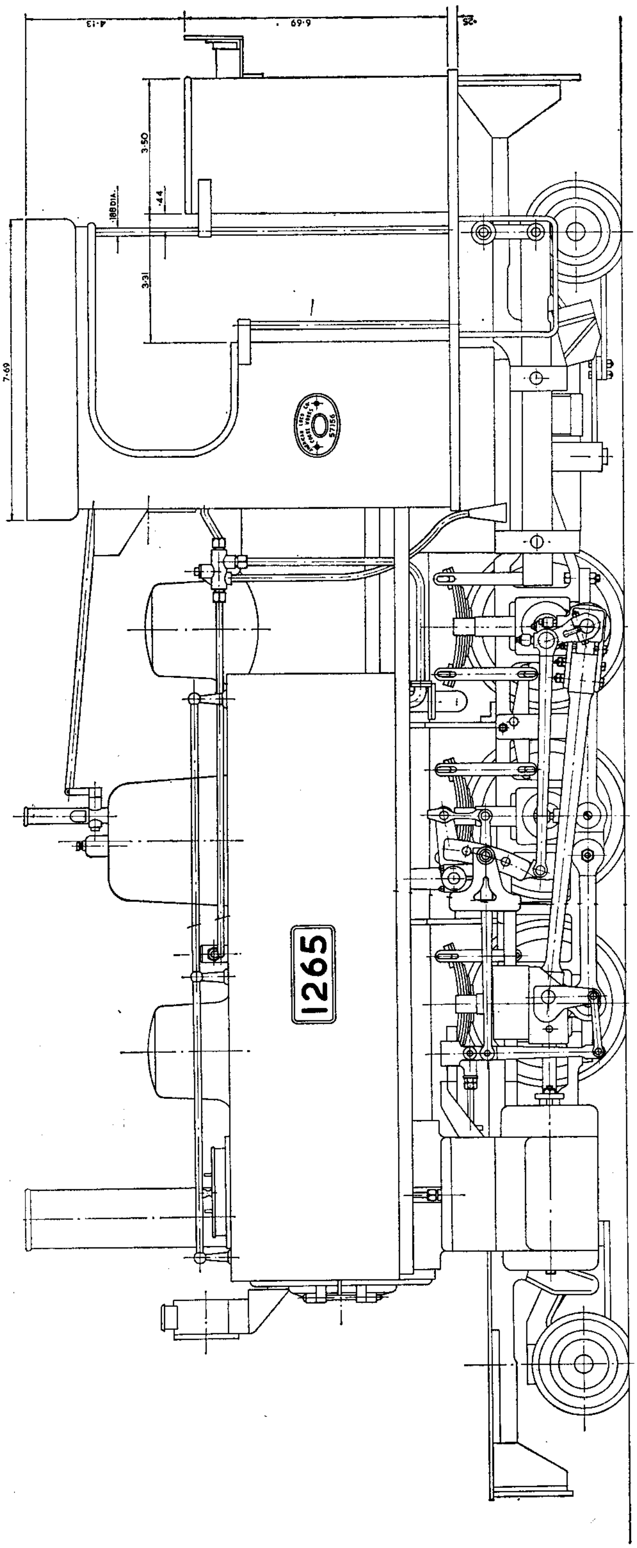
The valve gear arrangement drawing shows the assembly of the reverser, so let us start with the stand; this is fabricated from ⅛ in., or 10 s.w.g. mild steel. Hold the pieces together for brazing with 8 BA screws, as described for the dragbox for *County Carlow*, filing their heads off afterwards.

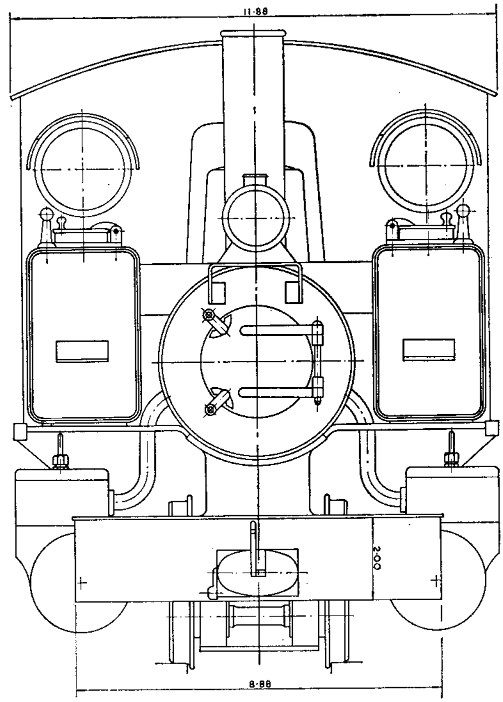
The rack is cut from ¾ in. x ⅛ in. b.m.s. bar; complete the outer profile, drill the two fixing holes, but omit the notches for a while. The reverser rack strap is a simple bending job, from 5/16 in. x ⅛ in. steel strip; drill the end holes from the rack and the remaining pair from the stand. Erect the pieces made so far.

The pole, or perhaps it would be better to call it the Johnson bar for the benefit of American readers, is made from ½ in. square bar. The 5/16 in. x full ⅛ in. recess is to accept the rack, quite a neat arrangement. Mill, or saw and file to shape, then drill the requisite holes. Turn up the fulcrum pin from ½ in. steel rod and braze to the bottom of the pole; the pole pin is made from 2BA hexagon steel bar, turned down to ¼ in. dia. for ⅜ in. length and further reduced at the end and screwed for a 2BA nut.

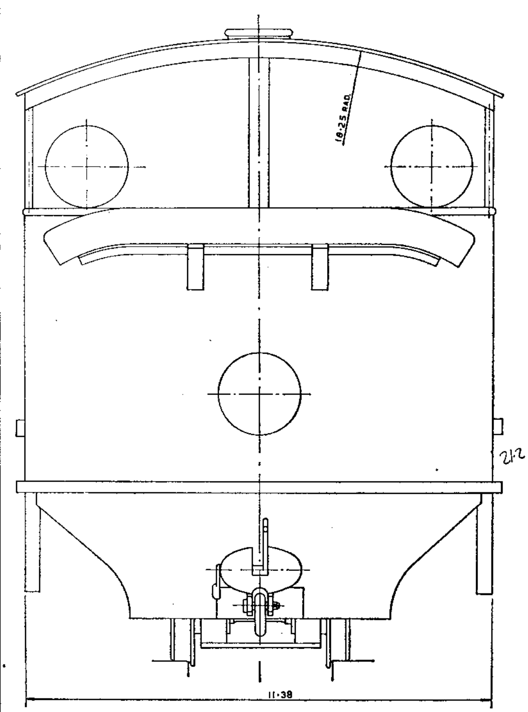
Now for the locking mechanism, starting with the latch. Cut a piece ½ in. x ⅜ in. from 13 s.w.g. steel sheet. Chuck a length of 3/16 in. steel rod in the 3 jaw, face the end, centre and drill down No. 43 to ½ in. depth before parting off a ⅜ in. slice. File a bevel on the end of the piece of plate to accept the drilled rod, then braze the pieces together. Saw and file out the centre portion of the rod, to form a 3/32 in. wide slot, then tidy up to the dimensions shown. Drill two No. 34 holes at the extremities of the slot and file out the centre portion. Assemble to the pole with a 6BA bolt, locking at the back end with a 6BA nut. Set the pole vertical, mark off and cut the mid-gear notch in the rack; carry on and cut the remaining notches. Builders will soon realise that not all the notches specified are useable, meaning those at the back gear end. It was quite common practice to do this full size; after a period in service, the rack was reversed, to produce more even wear of the notches.

The catch is another item of clever design, though not too easy to reproduce in miniature; it can either be milled out of ½ in. x 5/16 in b.m.s. bar or fabricated, with a personal preference for the latter method. For the upper portion cut a





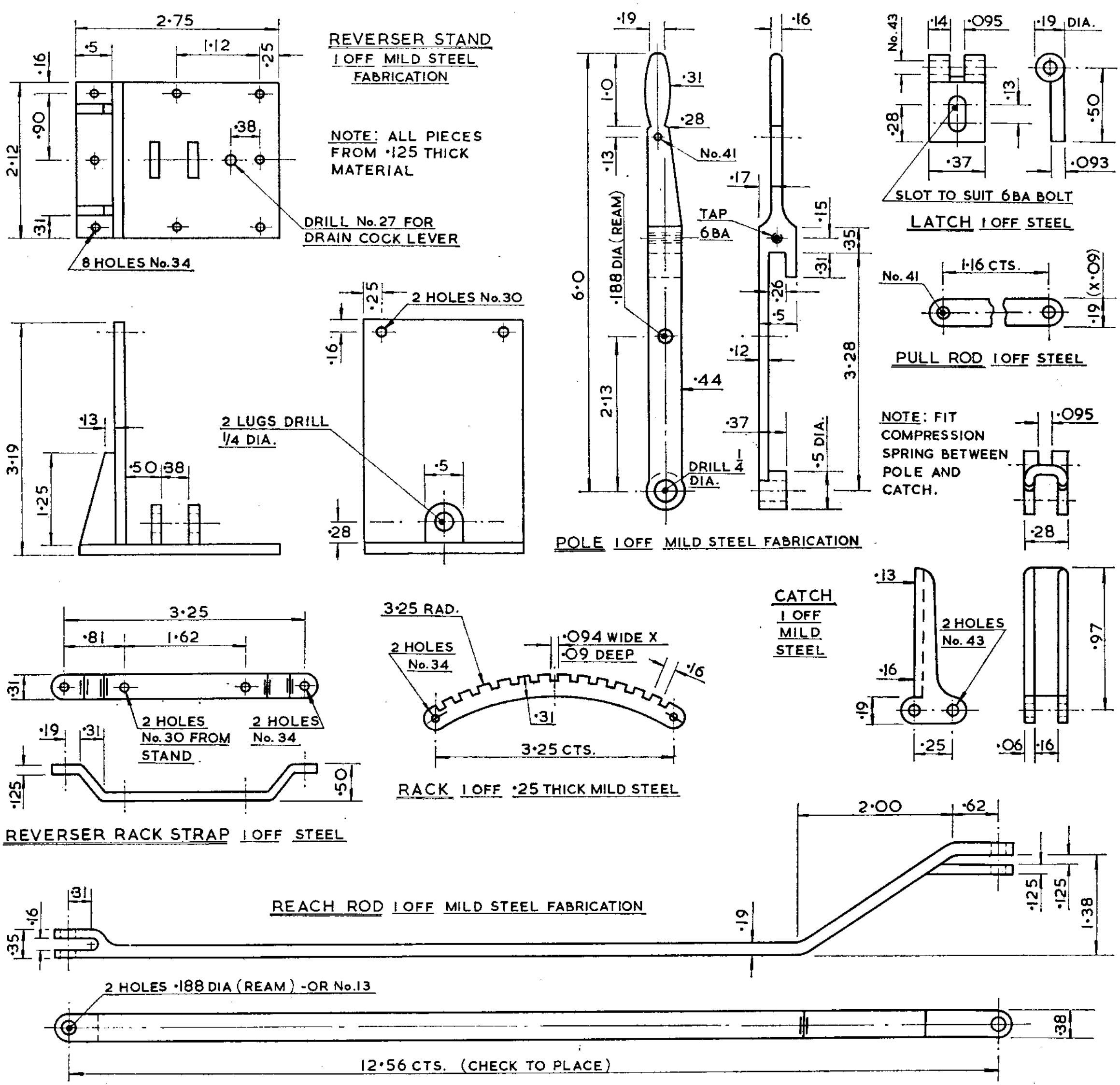
General arrangement, front and end elevations of No. 1265 as originally built.



$\frac{7}{8}$ in. length from $\frac{3}{4}$ in. x 1/16 in. steel strip. Get a length of 5/32 in., or 4 mm. thick material as a forming jig, radiusing two edges to get the correct profile; bend the strip around the jig, then finish profiling this piece. Next cut a $\frac{1}{2}$ in. length from 5/16 in. x 3/16 in. bar and reduce to 9/32 in. width. Drill the two No. 43 holes at $\frac{1}{4}$ in. centres then radius the ends; braze to the upper portion. Mill through a 3/32 in. wide slot, opening out to 5/32 in. in way of the pole. Try in position with an 8BA bolt, making up the little pull rod from 3/16 in. x 3/32 in. steel strip to suit. Use 3/32 in. snaphead rivets as pins to fix the catch to both pole and pull rod, and a length of 3/32 in. silver steel rod to fasten the lower end of the pull rod to the latch.

There appeared to be immense difficulty in providing a spring return to the latch, that is until the 'U' shaped trough of the catch loomed clear through the fog. A short 5/32 in. o.d. compression spring, about 7/32 in. free length, will drop neatly between the catch and the pole, remaining in place of its own accord. Isn't it amazing how much time one can waste, when a simple solution should be readily apparent?

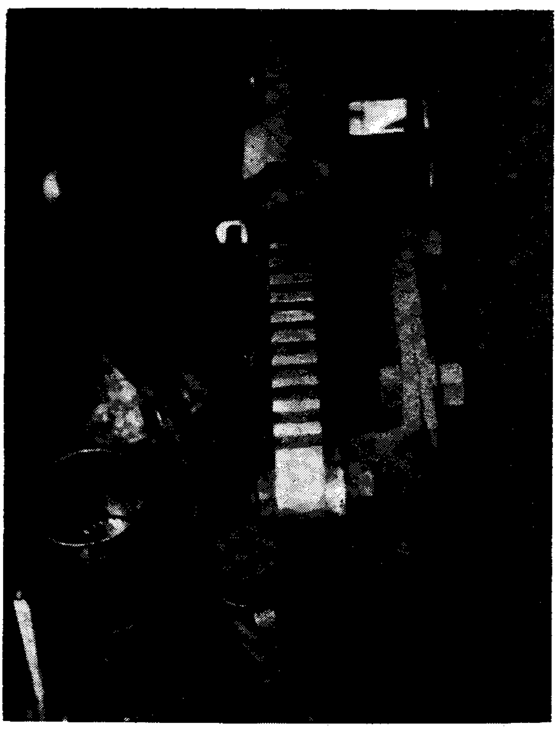
Set the reverser in mid gear, likewise the weighshaft, and we can measure the length of the reach rod; this reach rod has a nasty set in it, but is as



full size now that the reverser is sited on the L.H. side of the cab. Originally the reverser was on the R.H. side, with the rack actually attached to the firebox, which brings the thought that as the boiler warmed up, so the cut-off decreased in fore gear; similarly when the boiler cooled the cut-off increased, a sort of automatic advance and retard! Returning to the reach rod before yours truly incurs the Editor's wrath, bend up from $\frac{3}{8}$ in. x 3/16 in. b.m.s. flat, braze on a $\frac{3}{8}$ in. square lump for the forked end and finish this end first. Drill No. 13. and ream 3/16 in. dia. at the reverser end. Next chuck a length of $\frac{3}{8}$ in. steel rod in the 3-jaw, face, centre and drill No. 10 for $\frac{1}{4}$ in. depth before parting off an $\frac{1}{8}$ in. thick slice. Use this as a spacer for locating the $\frac{1}{8}$ in. thick inner jaw of the reverser end fork for brazing. Erect the reach rod to both reverser and weighshaft, then replace all the temporary valve gear pins with proper hardened ones. We are ready for valve setting.

Valve setting has been thoroughly described in the recent past, both by Martin Evans and yours truly, but as more queries are received on this subject than any other, a brief resumé may be in order. Remove the steam-chest cover, then set the engine in mid gear. Turn the engine from front to back dead centre, and vice-versa, on each side of the engine, centring the valves so that the lead is equal on both ports. First thoughts are that slide valves are much easier to set than their piston valve cousins, but one must use the feeler gauges correctly, holding the blades vertical, or some strange results can be obtained.


Mountaineer's pole or "Johnson bar".


The reverser stand and rack, with an assortment of oil cans.

Turn to front dead centre on the L.H. side of the engine. A d.t.i. in contact with the main crosshead will tell you when this position is reached; transfer the d.t.i. to the valve crosshead. Set the expansion link angularly, so that lifting the radius rod from the full back gear to full fore gear—yes I got it the right way round—causes no movement to the valve crosshead. Adjust the dummy eccentric rod to the distance arrived at between expansion link and return crank and fit in place. Move to back dead centre, again with the d.t.i. against the main crosshead, transfer once more to the valve crosshead and try lifting and lowering the radius rod; there will almost certainly be some movement imparted to the valve crosshead.

Alter the return crank setting on its crankpin; if you move it the wrong way the first time you will soon discover your error, go back to front dead centre, reset the expansion link for no movement to the valve crosshead and readjust the eccentric rod length; try again on b.d.c. Once you get into the rhythm of this valve setting operation the job becomes a piece of cake and before long you will attain a setting where reversing the engine has no effect at all on valve crosshead, indeed the valve movement at both front and back dead centres. All we have to do now is make the proper eccentric rod to exactly the same length as the dummy one and repeat the dose on the R.H side of the engine.

Very little needs to be said about manufacture of the eccentric rods; each is milled out of a 6½ in. length of ¾ in. x ½ in. b.m.s. bar. Ream the return crank end 7/16 in. dia. and press in the bronze bush. Next, lay on the dummy eccentric rod, use a ¼ in. silver steel pin at the return crank end as location, then drill through at the expansion link end to No. 13 and complete the fork to drawing. Tidy up, erect, and the valve gear is ready for service.

Readers may be interested to learn that the ALCO specification for *Mountaineer* gives full gear travel at 3 3/16 in., lap at 19/32 in. with a lead of 1/16., there being no exhaust clearance. David Walker tells me that her present setting is exactly half that for the famous L.M.S. 'Royal Scots'.

To be continued

MODEL ENGINEER EXHIBITION

Further reports from the Seymour Hall

THE LOCOMOTIVES

by Peter Dupen

THE NUMBER of locomotives exhibited at the 1974 Exhibition was the highest for some years, and many were of extremely high quality.

Great Western fans, and in fact all locomotive enthusiasts must have spent many hours trying to find fault with the beautiful G.W.R. 1400 Class 0-4-2 Tank Locomotive built by Mr. K. J. Woodham of Carlton-le-Moorland, Lincolnshire. I very much doubt if they found many, as this was one of the outstanding locomotives of recent years, the workmanship was of the highest order, paintwork although simple was very good and fidelity to prototype very difficult to fault, this all added up to the Championship Cup and the J. N. Maskelyne Memorial Trophy.

To fully appreciate the model one had to refer to the very comprehensive photographic album prepared by the builder showing the model in various stages of construction and also details of the prototype, and although the model was produced in the remarkable short time of 18 months there was no evidence of lack of attention to details.

The cast-iron cylinders of 1¾ in. bore x 3 in. stroke had the valves between the bores and these had a travel of 17/32 in., short compared with modern practice, but true to prototype; even in 7¼ in. gauge the space available for this type of construction presents problems.

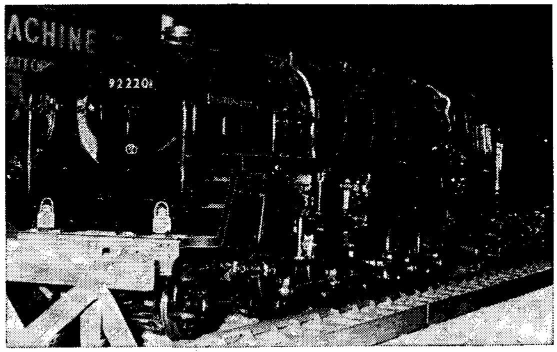
The cab and backhead layout was particularly well carried out, most fittings being to scale and also working; where this was not possible, as in the case of the sight feed lubricator, the working sight glass was set behind the dummy ones, and while visible was not obtrusive. There was no doubt this was an excellent model and well deserved the awards.

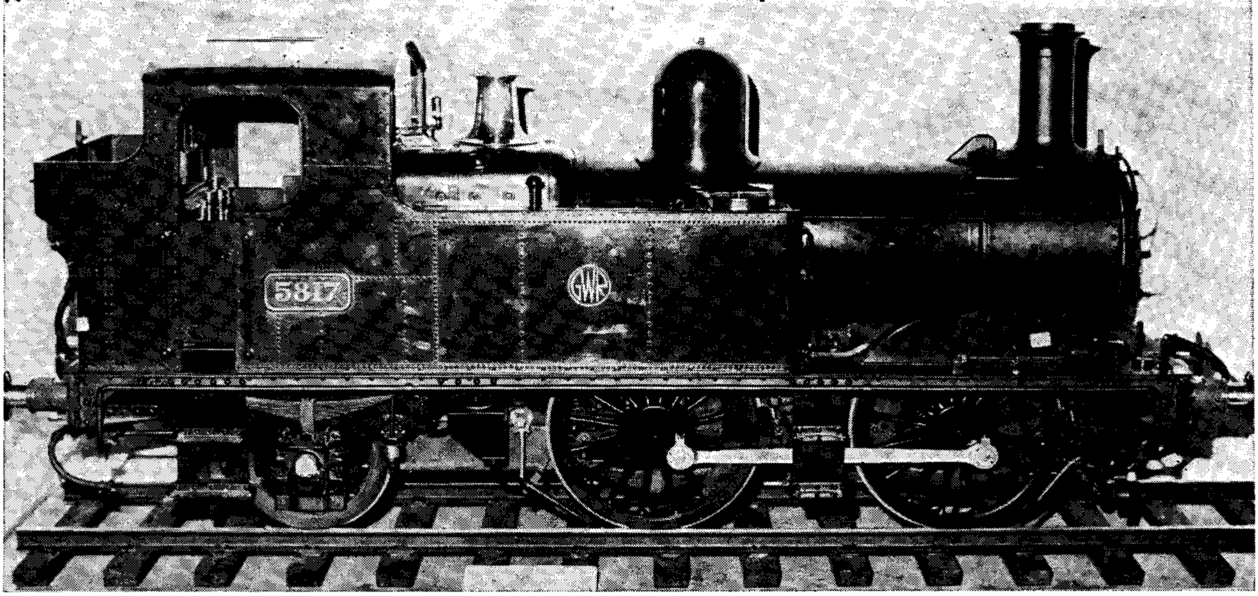
For quantity of work the maximum marks were awarded to Mr. E. Lowe of Rotherham for an extremely well detailed model of *Evening Star*, the last steam locomotive built by British Railways, in the form of a 5 in. gauge class 9F 2-10-0 an impressive looking locomotive.

Having seen the model under construction over the years one must admire Eric Lowe for the courage and tenacity in attempting such an enormous task. I doubt if there was any detail on the prototype that was not faithfully reproduced on the model, and on this class of engine there was plenty of detail work, but it just came short of the major award and was awarded a Silver Medal and the Crebbin Memorial Cup.

I rather feel the builder of this engine was working against time, the finish on the motion work could have been improved, the paintwork

Eric Lowe's "Evening Star" won a Silver Medal and the Crebbin Memorial Cup.





The Championship Cup winner: Mr K. J. Woodham's 0-4-2T.

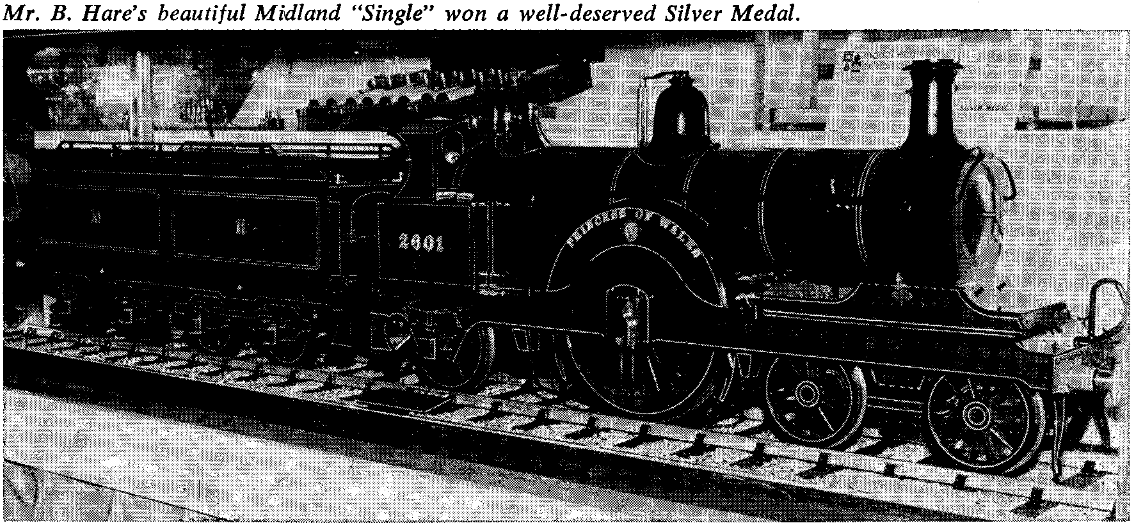
although beautifully carried out, rather emphasized the slight defects, particularly in the platework, and the use of tape lining was rather out of keeping with such an outstanding model. A few faults indeed but just enough to lose the coveted Cup in these days when outstanding models are the rule rather than the exception.

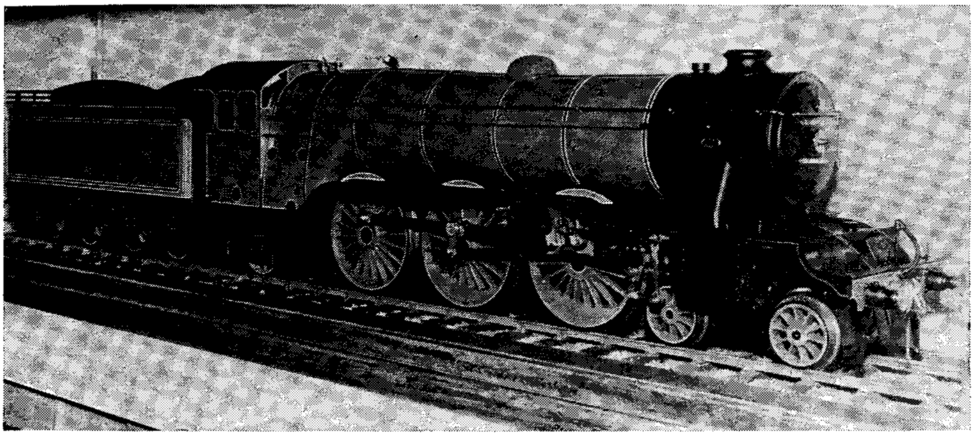
The paintwork including shaded lettering and crest on Mr. B. Hares' Midland Railway 4-2-2. *Princess of Wales* in 5 in. gauge was undoubtedly the best in the show, and it did not need very much imagination to visualize Johnson's beauty at the Paris Exhibition 74 years ago, the bright steelwork, polished brasswork, crinson lake paintwork with simple but effective lining and the large bogie tender, Mr. Hares certainly brought to life in model form one of the most attractive locomotives ever built.

The cab layout and backhead, a very prominent feature on the older type of prototype, was a very good example of what can be done in this direction, the tender platework and riveting was very well executed and it was good to see that the tyre retaining bolts between the wheel spokes had been fitted.

It was unfortunate that one could see the gunmetal cylinder and slide valve covers, as these locomotives were fitted with piston valves, also the screwed glands on the piston rods should have been studded. The launch-type links on the Stephenson gear, although giving increased valve travel, should of course have been loco type links; all these features are rather prominent on this type of loco., nevertheless it was an extremely good model and really deserved a higher award than the Silver Medal.

Mr. B. Hare's beautiful Midland "Single" won a well-deserved Silver Medal.





L.N.E.R. A.1. "Pacific" by J. C. Flint, notable for its excellent finish: Silver Medal.

Another Silver Medallist was Mr. J. C. Flint of Stroud, Glos. for a very well finished L.N.E.R. A1 Pacific No. 4470 *Pickwick* in 2½ in. gauge. As the larger gauges are becoming more popular these days it is refreshing to note that some builders still prefer the smaller gauges.

This locomotive was another example of excellent paintwork, the motion work was also very good but some of the hexagon nuts were rather out of scale, and the slotted head screw adjacent to the snifter valve out of keeping with the otherwise excellent finish.

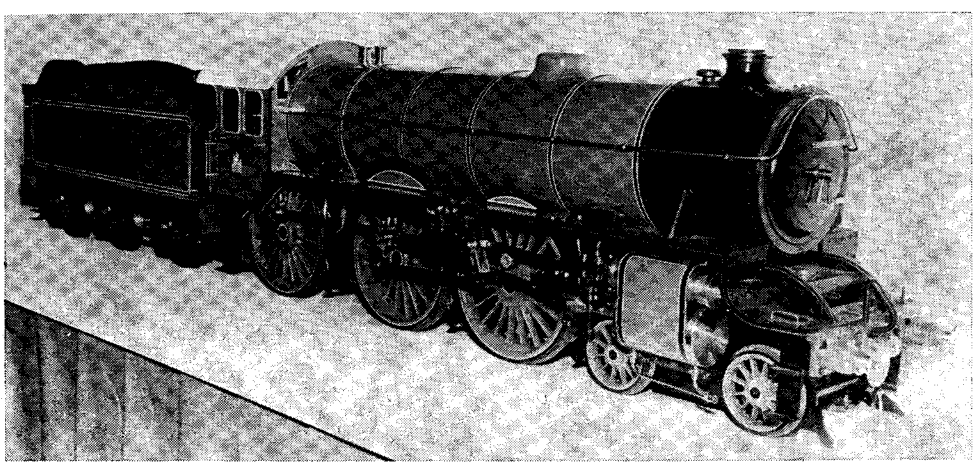
The two Bronze Medallists were Mr. W. R. Skuse of Ramsgate for a 3½ in. gauge *Evening Star,* and Mr. F. R. M. Lowne of Bromley, Kent with a 3½ in. gauge L.N.E.R. B2 class 4-6-0. *Royal Sovereign;* both were good examples of workmanship and finish.

In the case of Mr. Skuse's model, the use of a number of socket head screws in the running boards and screwed glands on the piston rods spoilt the general appearance, the cab layout was functional but lacked detail and although the lining was excellent the green paint was rather light for BR standards.

Mr. Lowne's locomotive being a Royal engine had a very detailed Coat of Arms hand painted on the cab sides, a very difficult task, but the white lining was a little too wide and the gunmetal crossheads detracted from the general appearance.

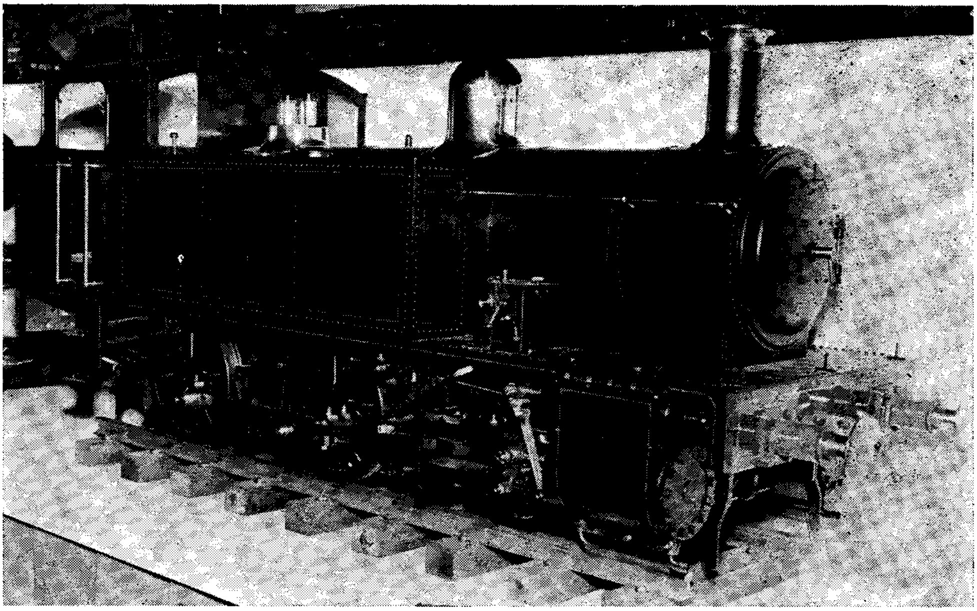
A rather unusual prototype was the choice of Mr. W. L. Hayward of Carshalton, Surrey with a 7¼ in. gauge Stephenson's *Rocket;* it is surprising how small this engine comes out even in 7¼ in. gauge. At first sight the general finish on this model was not particularly good, but then the *Rocket* was not an exhibition engine. On closer examination it was obvious that a great deal of care and attention had been put into this model, the square headed bolts and nuts, the water barrel and tender woodwork, all very true to the prototype. The gunmetal cylinders and covers were rather too prominent and I doubt if the *Rocket* ever ran on flat-bottomed rail. It received a well deserved V.H.C.

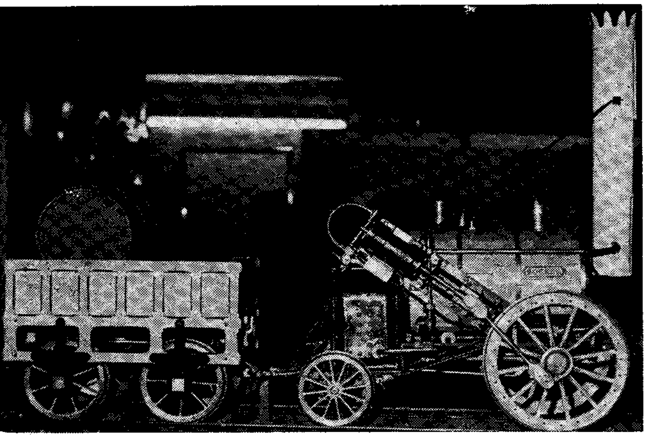
Another V.H.C. was awarded to Mr. H. W. Saunders of St. Albans, Herts. for a 5 in. gauge



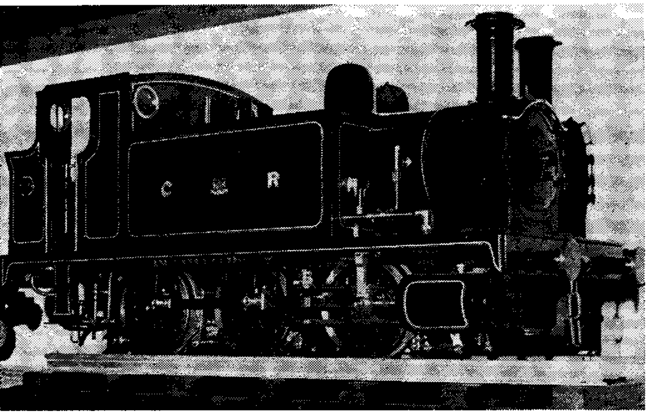
L.N.E.R. "Royal Sovereign" by F. R. M. Lowne. Bronze Medal.

A good-looking "Simplex" by H. W. Saunders of St. Albans. A good worker which gained a V. H. C. Certificate.





A fine 7¼" gauge "Rocket" by W. L. Hayward: V.H.C.
Below: Perhaps the best of the "Rob Roys" on show was this example by J. Brooker (Commended).



0-6-0T *Simplex* the very popular locomotive designed by Martin Evans. A neat and well finished model, no frills, and undoubtedly a good performance on the track.

Aerolite in its original condition as built by Kitson Thompson & Hewitson of Leeds in 1851, a 2-2-2 well tank, was the prototype chosen by Mr. M. H. Cox of High Wycombe for a very attractive model in 5 in. gauge and was Highly Commended. It is very encouraging to see more and more model engineers getting away from standard designs and producing something unusual.

A nicely made model of the G.W.R. 4-6-0 *County of Gloucester* in 3½ in. gauge by Mr. G. Jones of Stroud was Commended for finish and paintwork.

The other 7¼ in. gauge locomotives were a 0-4-0 tank *Hercules* by Mr. B. Newman of Moulsford obviously built for hard work with no frills and would undoubtedly put up a good performance on the track, and a 204 h.p. Hunslet Diesel Shunter by Mr. P. A. Johnson of Gosforth, a well made and detailed model powered by a 49 c.c. OHV 4-stroke engine driving through a 3-speed forward and reverse gearbox and centrifugal clutch; also included was electric starting, alternator and electric cooling fan, I hope in the not too distant future we will see a locomotive fitted with a multi-cylinder "true" Diesel engine, this would be a real challenge.

Of the three *Rob Roy's* entered, Mr. J. Brooker of Bexhill-on-Sea produced the best example and was Commended.

The ever popular *Tich* in 3½ in. gauge was represented by a total of four engines and Mr. Z. Horton of Stevenage was awarded the New Zealand Cup.

A L.M.S. Beyer-Garratt in 3½ in. gauge by Mr. A. W. Edgson of Leighton Buzzard was an impressive model and some of the platework on the tanks and bunker was good although the rivets were far too large. The motion, boiler and cylinders were not up to this standard.

In spite of the difficult transport conditions at the time of the Exhibition no less than 20 out of a total of 21 entries arrived on time making 1974 another outstanding year for locomotives.

THE ROAD VEHICLES
by W. J. Hughes

I CANNOT RECALL a previous year in which the number of entries in this class was so small, to wit five only, and of these only two were steam road vehicles. The first was the 4 in. scale Foden 6-ton 'C' type steam wagon built by Terry Morris of Seisdon, which many viewers saw on the B.B.C. television programme "Blue Peter" during the exhibition.

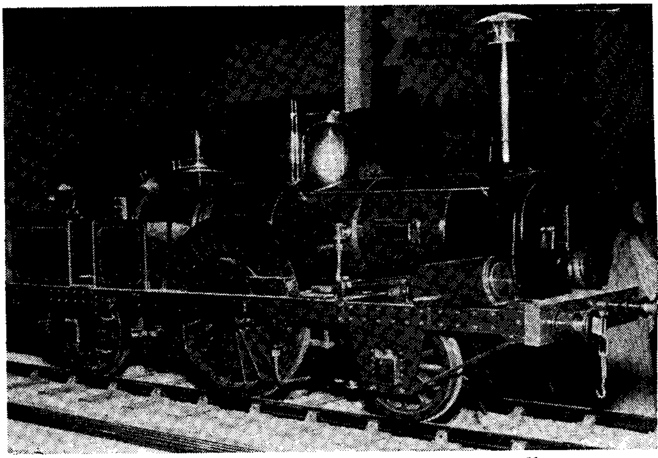
The model has also been widely seen at traction engine rallies during the 1973 season. It is built from official drawings, and so is a true representation of the prototype, of course, with its compound high speed engine, its two speed gear, and its final chain drive.

For ease of access to the controls, the rear of the cab is hinged down, and the wagon can then be driven from the platform behind. It is licensed for use on the roads, and carries number plates and a road fund disc. Standard fittings include a flywheel brake and a hinged cover over the motion work at the rear to keep oil splashes off the driver.

This fine model was awarded the Championship Cup and the Aveling-Barford Trophy.

The second steam exhibit was a good example of Len Mason's inch scale "Minnie" traction engine, though not as good as some we have seen in the past. For example, some file marks were visible where they shouldn't be, and the paint had some "orange peel" in places, as well as not being lined out at all. This model, by F. A. King of Shepperton, was awarded a Bronze Medal.

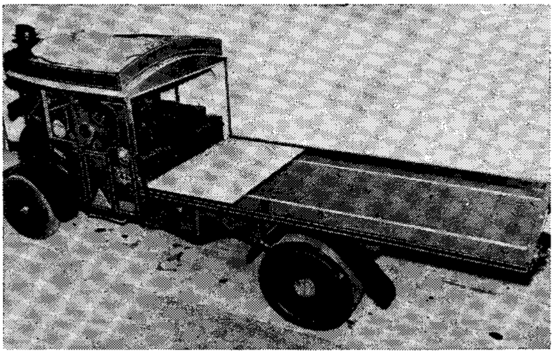
C. C. Cornell of Wheathampstead entered a working model of an electric tramcar as owned by Edinburgh Corporation in 1922. It was perhaps 6 in. or 7 in. long overall, but of lovely make and finish. The detail was very finely executed, and the lining-out, scrollwork and lettering were equally good. With its open upper balconies at



An unusual model was this "Aerolite" as originally built, by M. H. Cox (H.C.).

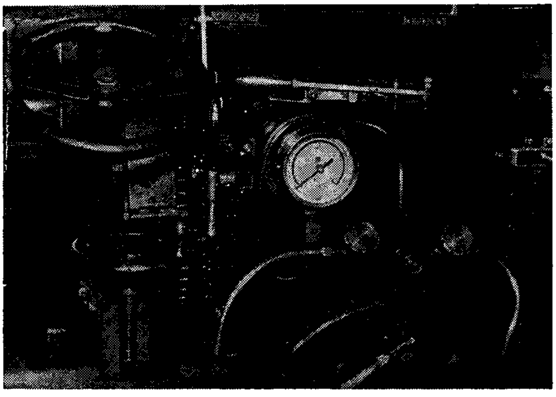
front and rear this model must have had nostalgic memories for many visitors. It won a Silver Medal for its builder.

The remaining two entries in this class were racing car models, which strictly speaking perhaps cannot be described as "road" vehicles, though the difference is scarcely worth an argument. They were entered on behalf of the late A. F. Weaver

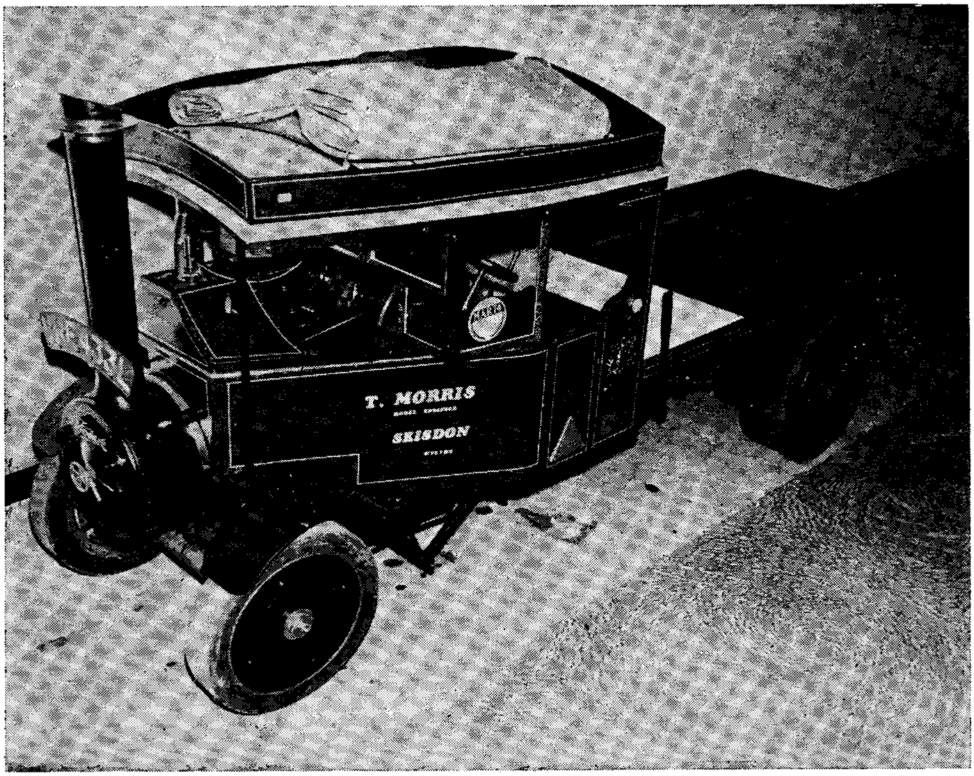


Mr. T. Morris' Foden steam wagon.

Inside the cab of the Foden.



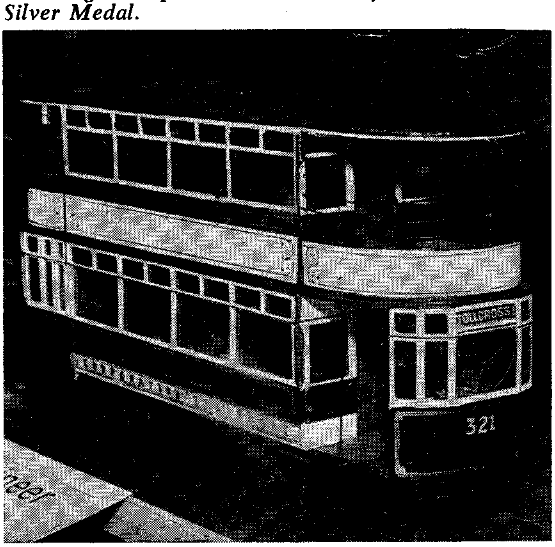
Terry Morris' impressive 4 inch scale Foden 6 ton "C" type steam wagon. This model was awarded the Championship Cup and the Aveling-Barford Trophy.



of Tregynon, Mont., who also incidentally had two hot air engines in another class, and three scale but non-working models of racing cars in yet another.

The first of the two working models dated back to the late forties when i.c. engined cars were timed racing round a pole, to which they were

Edinburgh Corporation Tramcar by C. C. Cornell: Silver Medal.



tethered by a cable. Within a few years, however, this system had been superseded by racing up to six i.c.-engined cars side by side, but guided by rails in a similar manner to the rather gutless modern electrically-propelled ones.

Mr. Weaver's cable-racing car was externally a faithful model of a "B" type E.R.A. with beautifully hand-beaten bodywork which had regular and evenly executed louvres on the bonnet. About 18 in. long overall it was on leaf springs, with a nicely equipped cockpit, and was propelled by an engine of perhaps 10 c.c.

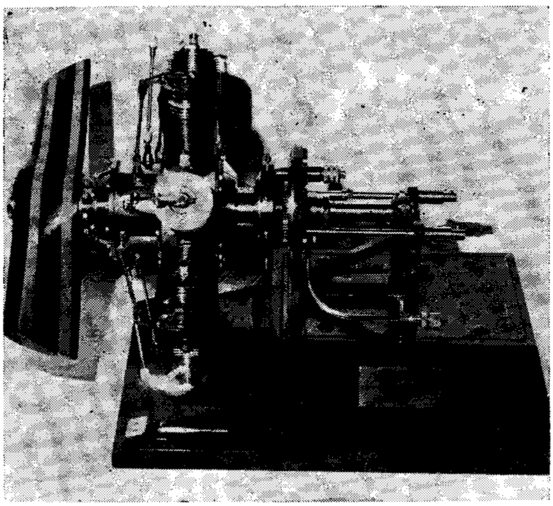
The other model was a Miller Indianapolis car, rather smaller with an engine of possibly 5 c.c. This too had beautifully wrought bodywork, with a copper radiator shell. The E.R.A. was Very Highly Commended and the Miller Highly Commended.

THE I.C. ENGINES

by D. H. Chaddock, C.B.E.

ALTHOUGH the number of models entered in Class K for internal combustion engines was not large, seven in all, the quality was, for the connoisseur, very high.

Pride of place and a Championship Cup went without question to Mr. L. W. Chenery of Edg-

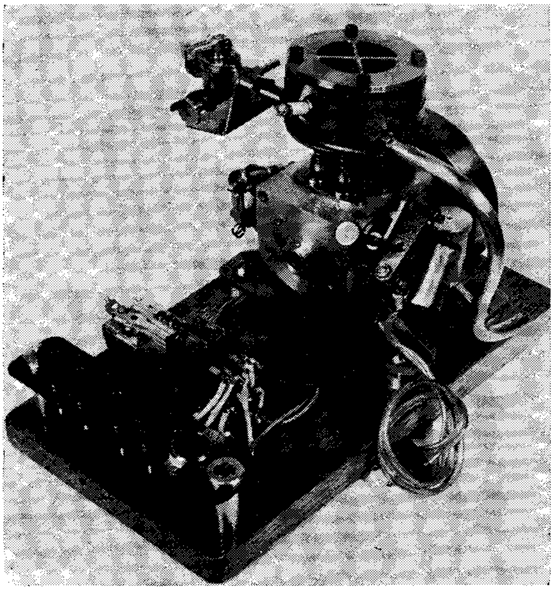


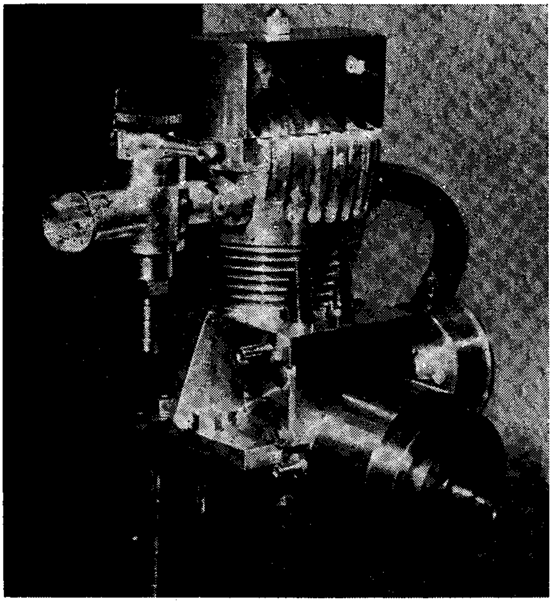
L. W. Chenery's 9-cylinder aero engine. (see also picture on page 174, last issue).

ware for his Gnome "Monosoupape" 9-cylinder rotary aero engine. This is not the first 'Mono' that we have seen, both the late Mr. F. Boler and Mr. J. Loudon have entered similar models, but in some respects Mr. Chenerey's model seemed to recapture more nearly the delicate sophistication of the original engines.

Immediately noticeable was the fact that the crankcase was solid, not built up as in the other engines. Machined from a grey iron casting surface treated to represent steel it must have been an even more hazardous task than was machining the full size engine crankcases from steel forgings. This realism was well supported by superb detail elsewhere, although keen students

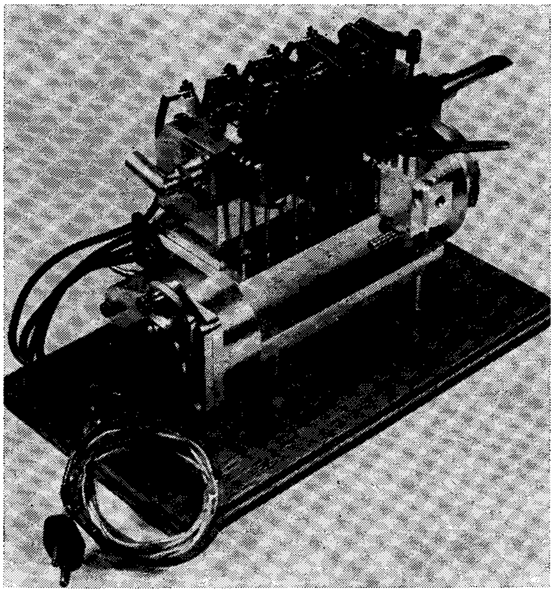
3½ c.c. S.V. engine with cylinder head designed to permit observation of combustion while engine is running. A second contact breaker, seen under the carburetter in conjunction with a relay controls the timing of an electrically operated camera shutter — not yet completed; by L. C. Mason (Silver Medal).





O.H.V. 4-stroke petrol engine by N.W.B. Portlock — Highly Commended.

Another outstanding engine by L. C. Mason was this 4 c.c. 4-cylinder O.H.V. water-cooled. Possibly the smallest successful 4-cylinder petrol engine yet made.



of these engines noted some discrepancy in the propellor bolts, alternate laminations of light and dark wood in the propellor more suited to marquetry than aero engine building and a large hexagon nut on the crankshaft which should have been a ring nut. In these engines even the weight of the metal in the corners of a large hexagon would have mattered!

The second highest award of a Silver Medal and the Edgar T. Westbury Memorial Challenge Trophy went to an engine which, tucked away in the corner of a glass case, probably went unnoticed by 99 per cent of the visitors to the Exhibition — Mr. L. C. Mason's 3½ c.c. side valve engine. This innocuous and positively misleading description concealed the fact that this was a highly original research engine with a borosilicate glass cylinder head and camera timing gear which enabled the progress of combustion to be watched in the actual cylinder head from the moment of ignition onwards. Although this technique has been applied in full size engines it has never before been attempted in a 3½ c.c. model. It is the sort of original experimental work which would have fascinated the late E.T.W. — hence the Memorial Trophy.

I chided Mr. Mason severely for his lack of showmanship in presenting the engine and threatened that by way of recompense he should show the engine running at the next Exhibition so that visitors could see for themselves the flame growing from the plug points and following the piston down the cylinder!

The same competitor showed a four-cylinder O.H.V. spark ignition petrol engine of 4 c.c. capacity which was very highly commended. At first sight it appeared to be a misprint for 14 c.c. because like other engines of Mr. Mason's design the outward bulk of the engine and the size of the auxiliaries tend to belie the real size of the internal parts. But it was indeed a four cylinder engine with an individual cylinder capacity of only 1 c.c. Thus it had a fair claim to be smallest 'multi' in the World — a feat made possible only by Mr. Mason's incredible 4 BA sparking plugs with which this engine and the 3½ c.c. research engine are fitted. What a ballyhoo our U.S. friends would have made if they had had such an engine in one of their Exhibitions instead of sticking it away in the corner of a glass case!

Mr. N. W. B. Porlock's own design 5 c.c. O.H.V. four-stroke petrol engine was highly commended. Designing an engine to be machined from the solid, as this was, presents a double challenge. Firstly to design an engine which *can* be machined without leaving ugly lumps of metal in conspicuous places and, secondly, to be able to execute some quite intricate machining to achieve it. Although Mr. Porlock's engine still bore some traces of the solidity of its origin it was a very well balanced and thought out design and the workmanship was excellent. In the writer's opinion the external appearance of the engine would have been very much improved if, instead of leaving it with a semi-polished surface reminiscent of 'ice cream licked all over', the external surfaces had been grit blasted to a uniform matt surface by the very simple piece of apparatus which he described in *Model Engineer* 5th May, 1967.

The same competitor exhibited a modified 10 c.c. O.H.V. *Dolphin* to E.T.W.'s design and a very interesting free-lance 25 c.c. O.H.C. water-cooled twin cylinder four-stroke petrol engine was entered by Mr. G. Punter of Newhaven. This engine bore on its crankcase the name 'Thumper' which seemed to fit in well with its rather massive and robust construction and left one wondering exactly for what purpose the engine had been designed and built.

An interesting year, but as in other classes, with the standards now running very high and working scale models of complex prototypes breathing hard down the necks of the locomotive builders. Who I wonder will be the first to overtake them and lift the Duke of Edinburgh Challenge Trophy with a working scale model of a big Diesel-Electric?

PARTING OFF

Sir,—Your contributor Mr. Beck seems to insist on wading breast high in order to solve a problem whose solution lies in the shallows. He writes of oil film thicknesses, pressure vectors etc. to explain the ease of parting with rear tool posts.

Parting tools work perfectly well in the normal tool post when taking **light** cuts as we all know, but the moment a heavier load is imposed on the tool for **any** reason, down goes the tool and CRACK! Back to the grindstone.

In the case of a rear tool post (or an inverted tool in the normal tool post and reversed rotation of the lathe mandrel), the situation is quite different.

A sudden increase of loading now causes the tool to move AWAY from the work centre **not towards it** so reducing the load. Instead of a "dig in" we have a "dig out"! Result: a better finish and no broken tools.

A **really** rigid professional lathe can part off 3 in. dia. nickel chrome steel with a parting tool 5/16 in. wide, IN THE FRONT TOOL POST, but not a model engineer's lathe which is, by comparison, flimsy.

Oldham. G. A. Eveniss

See also Postbag on this subject.

JEYNES' CORNER

E. H. Jeynes talks about the Abyssinian well pump

THE ABYSSINIAN is a type of pump developed for the British Army's use during the Abyssinian war; hence its name. It can be used where the water bearing strata is near the surface, and consists of a gravelly nature; it can be used for depths of around 15 ft., or a little more under very favourable circumstances.

This type is often called the 'Tube Well Rump', so called because it needs no well to be dug; a tube having a pointed head slightly larger than the tube being simply driven into the ground, additional tubes being added as the penetration proceeds. Of course rock cannot be penetrated, and if any is encountered, the tube is pulled up again, and a fresh place selected for trial.

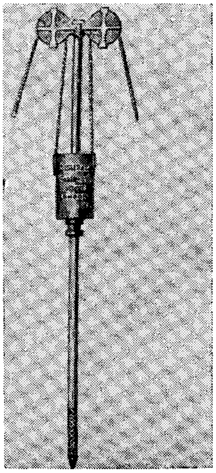
Before we go any further, let me say that this type of pump will never be as efficient as an ordinary pump drawing from a dug well, primarily because the atmospheric pressure has no free surface of water to act upon; therefore the work of pumping will be a lot harder, and the quantity of water raised will be less for the labour expended.

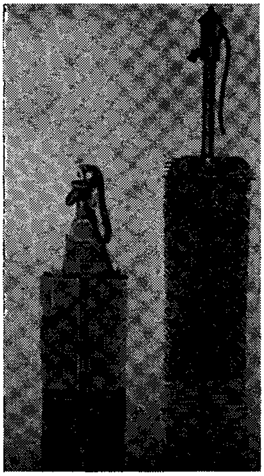
On suitable ground, the whole operation of installing the pump can be carried out in a few hours, without a great deal of equipment, the chief item of which is a weight to slide upon the tube being driven, and means to raise it several feet, before allowing it to drop down the outside of the tube until it strikes a tube clamp. This item is called a 'Monkey on a Stick', and as the penetration proceeds, the clamp is moved upwards, and when the tube has been driven as far as possible, another tube is screwed on, the joint being made airtight, and the work of driving continued. A weighted line is dropped down the tube frequently, and drawn up and examined for moisture, which will enter through the blast holes, which are just behind the enlarged head of the first tube.

When moisture appears, water is poured down the tube, and either hydraulic or pneumatic pressure applied to drive the water in the tube out through the blast holes, clearing these in the process, and also forming a water space around the bottom of the tube. In some cases in valleys, it has been unnecessary to fix a pump, a stop valve merely being required, as water under several pounds pressure has been encountered before now.

Where the ground being penetrated is soft and wet, a muddy slime will enter the blast holes, and this has to be removed by passing a smaller tube down inside the well tube, and pouring water down between them to reduce the slime to a liquid which can be pumped out through the smaller tube. Where possible, as much water as can be spared should be poured into the well tube, and hydraulic pressure applied by a pump of the force type, to erode a space around the bottom of the tube.

Where the strata is sand, great difficulty is experienced, as the sand closes in onto the tube, and enters the blast holes; where this happens, it is best to forget about Abyssinian pumps, as the tube would require clearing of sand too often to be practicable.





Left: "A Monkey up a stick" used by Islers for driving tubes into near surface water-bearing stratas. Right: The Abyssinian or Tube Well Pump.

I have mentioned withdrawing the tube and trying elsewhere, and to effect this the monkey is applied below the clamp, when it will be found that the tube is easily withdrawn.

The idea of forcing water under pressure down the well tube helps to open up waterways in the strata, besides clearing a water space around the blast holes. There are often small streams underground, or perhaps I should say "Rapid Percolation" of the water bearing strata, especially if this is gravel, as this latter has some filtering effect on the water. It will be appreciated that if one of these tube wells is driven into solid clay, no water will ever be obtained from it.

In conclusion, I would say that I watched the whole operation carried out in Lincolnshire, from starting to drive the tube to water being pumped took less than a working day. Again I will say that these pumps are not as efficient as pumps drawing from a well, and will not draw much over 15 or 16 ft., as the atmospheric pressure which acts upon the surface of the water in the well has in a sense to penetrate the ground; where percolation is very rapid, air is brought along with the water and the pump works easier.

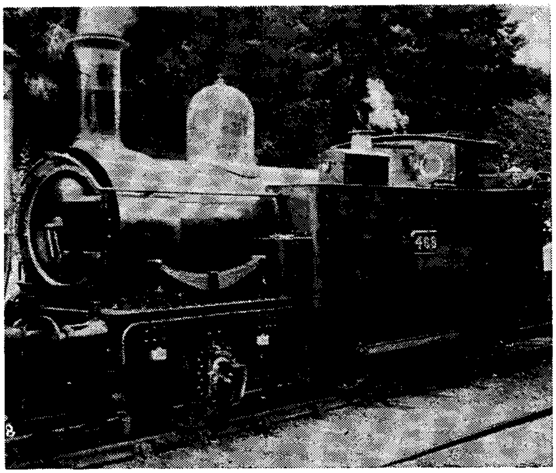
"MASTIFF" DRAWINGS

PE. 32. Sheet 1. General arrangement, crankcase, crankshaft and camshaft bearings.

Sheet 2. Timing case, camshaft cover and sump.

Sheet 3. Cylinder block, liners, cylinder head and valve guides.

Price 60p each.



METRO

A new locomotive for 5 in. gauge based on the Great Western Railway "Small Metro" class

by Martin Evans

Part VI *continued from page 185*

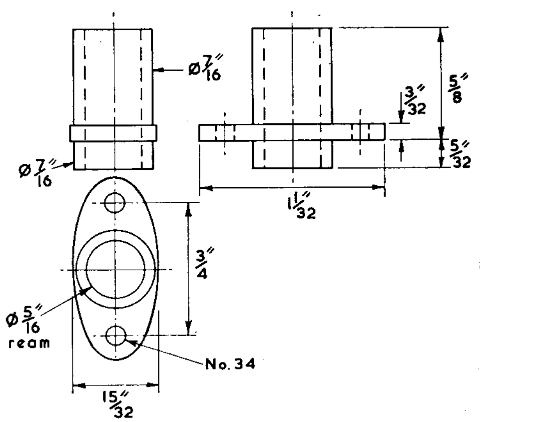
THE NEXT ITEMS to be tackled for our 2-4-0 tank are the crossheads. These were shown in our last issue. There is an important point to note here — steel crossheads do not work well against steel slide bars. As it is convenient to make the slide bars, which are plain $\frac{1}{4}$ in. square items, from silver-steel, I would suggest that the crossheads be made from gunmetal or phosphor-bronze. If the yellow appearance of this metal is objected to, the crossheads could be tinned all over with soft solder. As crossheads get dirty and oily pretty quickly in service, "tinned" crossheads might easily pass for steel ones.

An alternative to bronze crossheads is to make them in mild steel but to fit thin "slippers" of hard bronze sheet in the slide bar recesses.

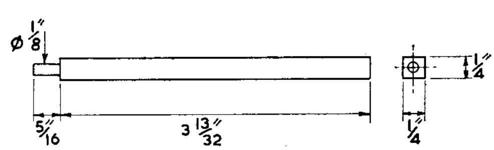
If phosphor-bronze is used, the crossheads could be made from castings or drawn bar $\frac{3}{4}$ in. x $\frac{1}{2}$ in., which is a commercial size. After machining the sides and ends to bring to a section of 11/16 in. x 7/16 in., machine the slide bar grooves by end or face milling, but drill and ream the 3/16 in. dia. cross hole for the gudgeon pin before doing this. To machine the neck for the piston rod, hold the crosshead in the 4-jaw and use the D.T.I. to ensure that it is running truly. Centre deeply, drill 5/32 in. dia. and tap 3/16 in. x 40t. Finally, mill out the 7/32 in. wide recess for the small end of the connecting rod.

To assist assembly, I am including a fairly comprehensive side elevation of the motion work, and also a plan view, both of which will show how the crosshead feed pump is arranged. This feed pump is rather like that specified for *Boxhill,* though the valve box is at 90 deg. to the ram, as the cylinders and motion of *Metro* are not inclined as in the "Terrier". The pump body, and particularly the ram, are longer than those on *Boxhill,* though the diameter of the ram is slightly less at 3/16 in. *Boxhill* builders have reported that the 7/32 in. bore feed pump on this engine delivers slightly more water than the locomotive can use, under average conditions, and anyway, the stroke on *Metro* is greater.

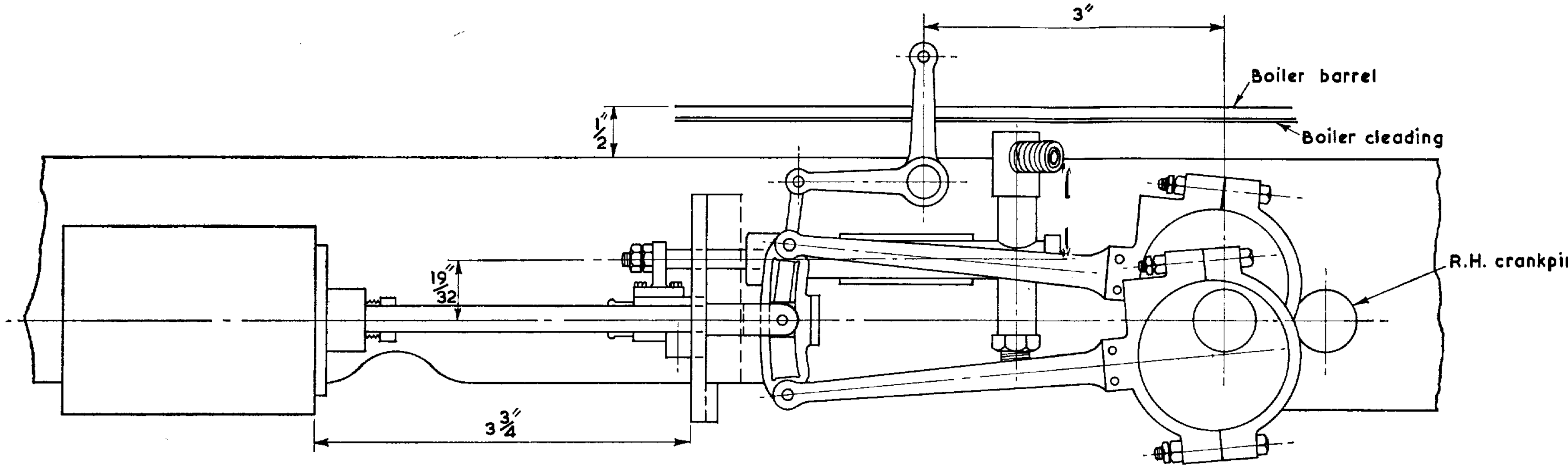
The Stephenson link valve gear is a typical late nineteenth century type with locomotive-type expansion links and with centre suspension. The links themselves are made from 3/16 in. thick



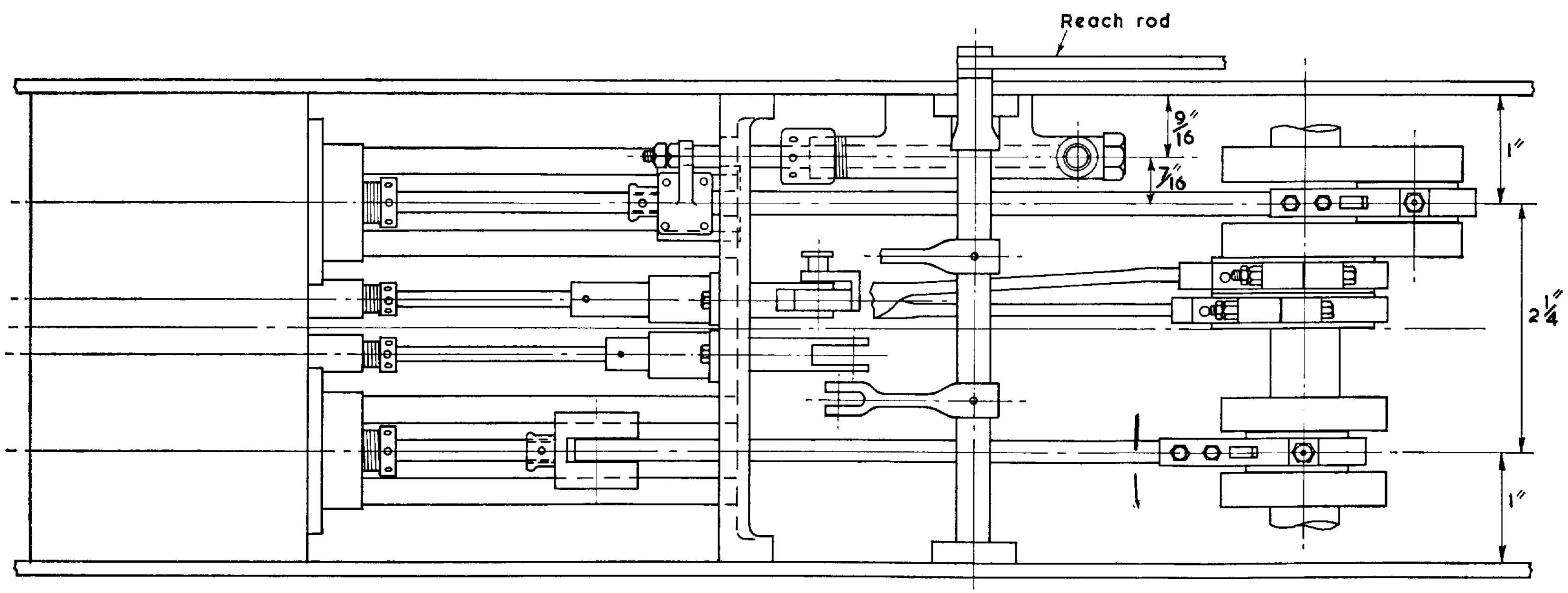
VALVE SPINDLE GUIDE 2 off Ph/bronze. (x 2)



SLIDE BAR
4 off silver steel



SIDE ELEVATION OF MOTION R.H.
connecting rod omitted for clarity

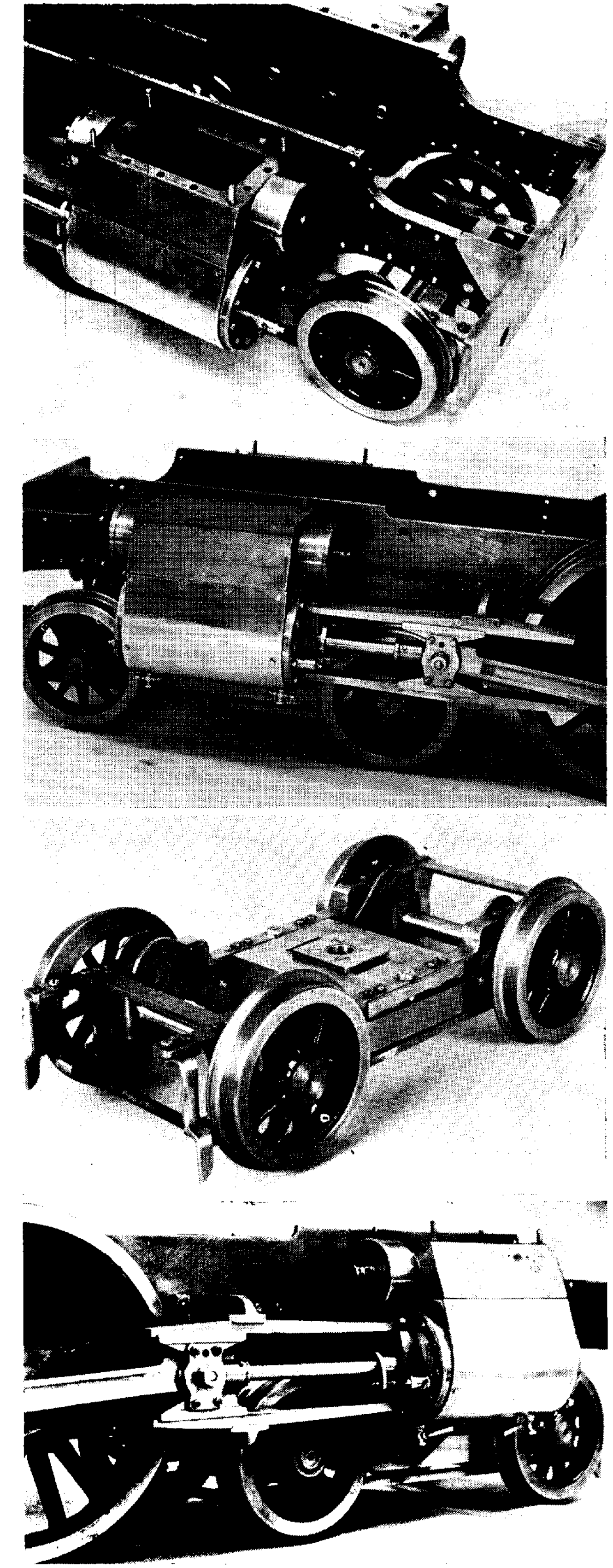


PLAN OF MOTION

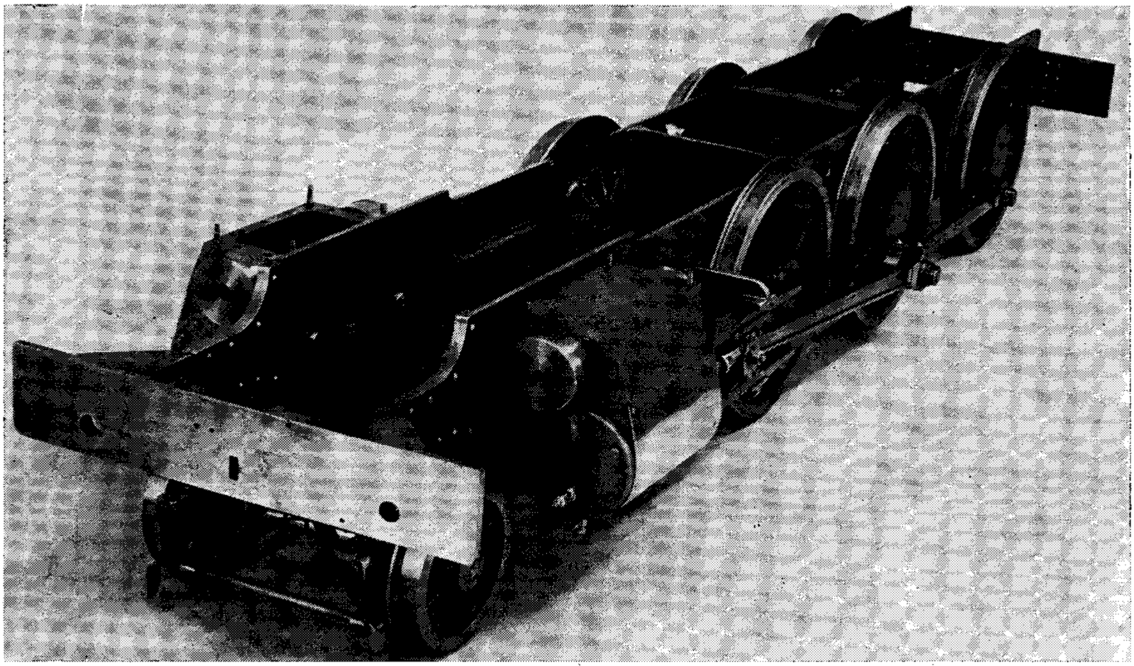
gauge plate and all pins are hardened and press-fitted, except for those in the suspension levers, though there would just be enough metal in the ends of the various links and levers to bush them with bronze if preferred.

I expect our usual advertisers will provide a casting for the motion plate, which would save a great deal of work, but if this is cast in gun-metal check that it is not "warped" before starting to mark it out. I have shown fairly deep beadings right across both the top and bottom edges to try to avoid this trouble.

A point to note is the additional cutaway on the right-hand side to clear the feed pump ram. Although the pump bracket which is bolted to the top of the right-hand crosshead does not reach as far to the rear as the motion plate even at the back dead centre position, it might be a



Right: Four views of a 5 in. gauge "Torquay Manor" being built by Keith Tucker of Gosport. — *See next page.*



The "Torquay Manor" under construction by Keith Tucker.

good idea to make this cutaway large enough to enable the right-hand crosshead with its bracket in position to pass right through the motion plate. Apart from making assembly a little easier, this would enable the feed pump to be withdrawn complete, for adjustment or cleaning. (It should be possible to get at the screws holding the feed pump to the frames by dropping the driving wheels slightly).

Unfortunately, I have not been able to find out what type of connecting rods were fitted to the "Metros," but I doubt if "Marine" type with round rods were used, as in the "Terriers", so my drawing shows a typical late nineteenth century design. The "jaw" of the big end is held to the main part of the connecting rod by two long 6BA steel bolts. These should be turned fitting bolts and might well be made from stainless steel. The hole through which these pass is of course merely a lightening hole as without this the full-size connecting rods would be unduly heavy.

To hold the two "brasses" firmly together and hard against the back of the "jaw," a proper taper cotter is used, together with a "glut". The glut is really only a very thin cotter, its thickness is 1/16 in. at the thick (top) end, and its taper should match the main cotter closely.

To make a really "posh" job, the two bolts should be fitted with full nuts and lock nuts, and the main cotter should have a tiny taper pin pressed in from the side, after it has been driven right home.

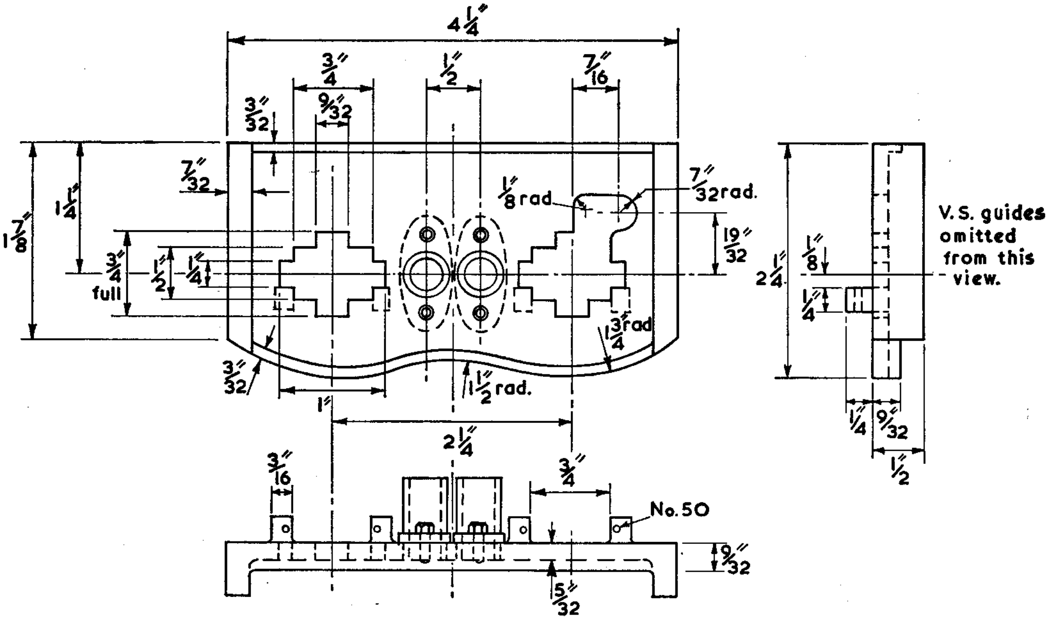
I have shown a "solid" small end, for simplicity, and this is fitted with a bush turned from cast gunmetal and pressed home. A small oil reservoir can be drilled from above. Note that the main part of the rod is tapered in "elevation" but not in "plan". Its thickness should be slightly less than 7/32 in. (the width of the slot in the crosshead) to avoid rubbing.

Several readers who are building my last design, the 5 in. gauge Great Western "Manor" class 4-6-0, have asked if I have been able to obtain any photographs of models under construction. Well, I am pleased to say that only a few days ago, builder Keith Tucker of Gosport sent me the five photographs reproduced here. Note the stiffening for the main frames at the front end, and the cylinder relief valves — a typical Swindon touch.

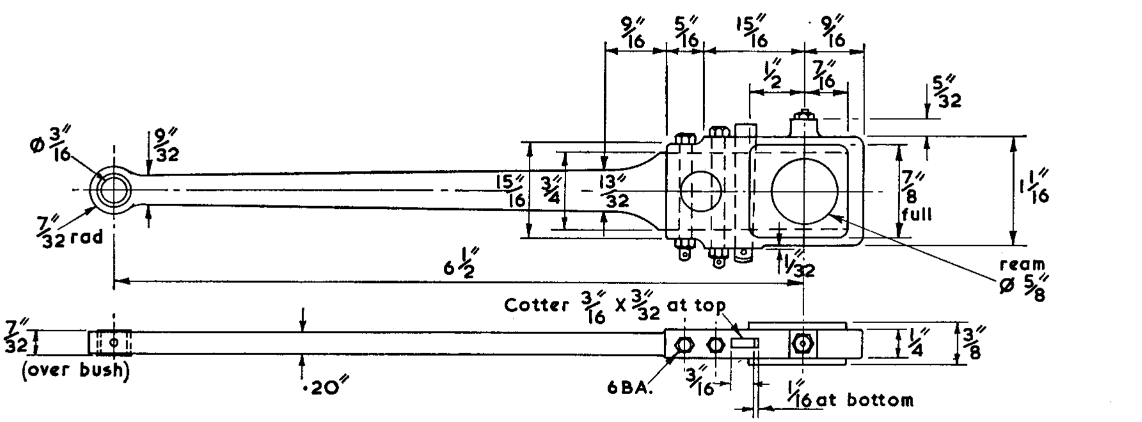
"METRO" DRAWINGS

Sheet No. 2 is now available giving details of main horns, driving wheels, crank-axle, cylinders and crossheads.

LO. 941. Sheet 2. Price 60p. (which includes post and V.A.T.).



MOTION PLATE & VALVE SPINDLE GUIDES



CONNECTING ROD: B.M.S. Gunmetal bushes

THE EXHIBITION

Sir,—After visiting the 1974 Model Engineer Exhibition on its final day, I felt I ought to write to you to express my disappointment in the quality and type of models on display. I first sensed something to be wrong when I failed to see the usual enthusiastic queues outside Seymour Hall. However, this I have put down to the possible threat of bomb scares and the present deficiences in our transport system.

The quality of the models, and I am sure many readers and visitors will agree with me, was not quite up to the usual exhibition standard. Only a mere handful, dare I say, really deserved to be on show.

As for the type of model on show, I have always been led to believe that the exhibition was for models of an engineering-based structure, which I am quite sure does not include models such as militaria or wargaming. I do not deny these kind of modellers their hobby, in fact probably as much if not more time, patience and craftsmanship go into these models as into any other. To come to the point I do not think that these models should be included in an engineering-biased exhibition. I realise that these statements will possibly offend many enthusiasts, but on the other hand I could have several supporters.

I hope in the future that something will be done to swing the balance back to pure engineering as our forefathers intended it to be.

Hillfields, Coventry. J. A. WHITTAKER

BUILDING THE ALLCHIN

Part XVI **by W. J. Hughes** *From page 144*

IN DESCRIBING the arrangement of the hind wheels, we mentioned that they were not symmetrical, and recently a letter came from an American builder who is in advance of the serial, and who was worried about another asymmetrical feature. He found on a trial assembly of hornplates, bearings, shafts, and hind wheels that one wheel is nearer to its hornplates than the other is, by 9/32 in.

To save anyone else worrying about this slight asymmetry of both the wheels and the assembly, it is necessary to mention that on a traction engine the width overall was of paramount importance. This was to make as easy as possible the negotiation of narrow farm tracks and especially gateways, which frequently had heavy stone gate-posts. So that if a couple of inches or so could be saved at one side, but not at the other, by bringing the hind wheel rim closer in, then it was done, regardless of whether it "balanced" exactly or not.

And now to return to the wheel-hubs, and in particular their outside ends. As with the centres, probably the best way of holding these for machining is in the four-jaw chuck, and if the castings have chucking-spigots they can be sawn off.

First take the outside end of the left-hand hub, and set it in the chuck to run truly, with the larger spigot outside. Face up the outer surface, and turn the spigot to a good fit in the corresponding counterbore in the hub-centre. Centre, drill, and bore out the hole to a good running fit on the left-hand end of the hind axle. Remove from the chuck, and then the other three hub-ends can be machined in exactly the same way. The outer faces will be done shortly.

Finishing the Hubs

The hub-centres still have to be counterbored at one end, concentric with the main bore, and the best way to do this is to turn up a stub-mandrel about ⅝ in. long to fit the bore.

Press one of the centres on to the mandrel, and counterbore to fit the spigot on the corresponding hub-end. Repeat the operation with the other hub-centre, but do not remove the mandrel from the chuck: we are now to use it for the hub-ends.

Start with that for the inside end of the right-hand hub, pressed on with the small spigot inward. Turn the outer face to leave the flange ¼ in. thick, and turn away the outer spigot to a length of 5/16 in. and a diameter to fit the counterbore in the driving-boss.

Set the surface gauge to centre height, and scribe a line across the major axis of the hub-end, set horizontally. Remove from the mandrel, and reduce the latter's length to ⅜ in. or so. Press on to it the inside end for the left-hand hub, with small spigot inwards, and face off the outer surface to leave a total flange thickness of 5/16 in. Again scribe the major axis centre-line.

Finally, in turn, face up the outer surfaces of the hub outside ends, to leave the flanges 3/16 in. thick and the spigots 1 in. dia. by 1/32 in. deep. (These small spigots are to act as registers for the hub-caps later). On these ends, too, scribe the centre-lines: this is to assist later in assembly.

Set out and drill the four countersunk No. 42 holes in each end, noting that those in the inside ends are set differently from the others. From these holes jig-drill and tap the 8 BA ones in the hub-centres. After inserting the screws to clamp the pieces together, file up the outside edges of their flanges to level them off flush. The outer and inner edges of the flanges should be rounded, but only very slightly, as seen in the photograph (Fig. 1, which, however, shows the components before being drilled and tapped). Do not drill any other holes in the hubs yet.

Hind Wheel Spokes

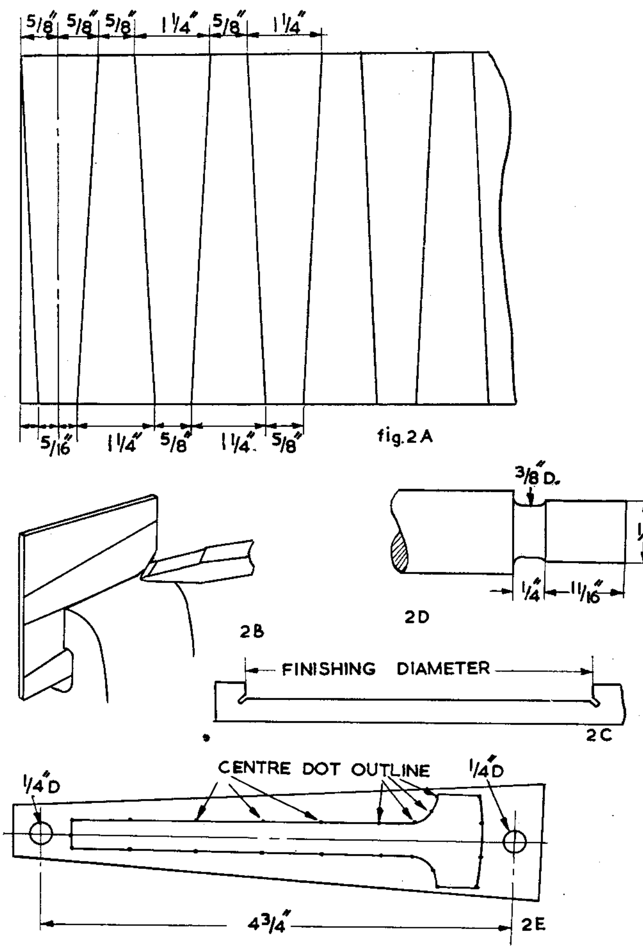
As I have mentioned in an earlier article, Reeves have had the enterprise to make dies to press out blanks for the spokes for both hind and front wheels; no doubt many readers will want to use these, to save time—they need only to be cleaned up on the edges with smooth files.

But other builders prefer to manufacture all their own bits and pieces, and in any case there are numerous people building models of other prototypes, but using these articles as a guide. So we will describe a useful "mass-production" method of making the spokes, of which we need thirty-two in all for both hind wheels.

If 1 in. by 14 s.w.g. steel strip is available this will save some trouble, but otherwise do as I did and cut the blanks from 14 s.w.g. sheet. Cut off a strip 5¼ in. wide, and set out as shown in Fig. 2A. This allows a little over for machining, but not too much.

Fig. 1 The hub centres before being drilled and tapped.

Cut off the strips, with bench shears if available, but otherwise with a sharp cold chisel as in Fig. 2B. Grip the work in the vice with the line just showing, and hold the chisel at an angle of about 20 deg. to the surface as sketched. It is surprising how quickly the work can be done: the chisel acts as the moveable blade of the shears, and the vice jaws as the fixed one. Shearing leaves the blanks twisted, and they may be hammered flat, though final straightening true can be done after shaping.



Jig for Milling

My blanks were milled to shape, eight at a time, using a commercial end mill in the lathe. They were bolted to a jig which itself was gripped in a machine vice bolted to the vertical-slide (fig. 3). The jig was a piece of 1 in. by $\frac{7}{8}$ in. wrought iron bar from some old railings — the surfaces were not too accurate, but a skim over each face with a 1 in. end-mill soon rectified that.

One of the blanks was set out carefully, to act as a "master", with an equal amount of waste at each end in which a $\frac{1}{4}$ in. hole was drilled for the clamping bolts. It was then used to jig-drill two $\frac{1}{4}$ in. holes through the jig-bar, on its centre-line. Centre-dot the outline of the spoke.

Now using a single tool-maker's clamp in the middle, the master blank was clamped to a pack of four more blanks, and used in jig-drilling $\frac{1}{4}$ in. holes through these. This was repeated until all blanks were drilled with two coinciding holes.

Milling the Spokes

Set the bar in the machine vice as photographed, with its face square with the lathe axis and its centre-line parallel with the lathe bed. Slip two $\frac{1}{4}$ in. bolts through the holes in the jig-bar, from the back, thread in seven blanks and slip the master on top. Put a washer and nut on each bolt and tighten up. Use the surface-gauge to check that the centre-line of the master traverses parallel with the lathe bed, and we're ready to go.

The bulk of the material can be milled away with a stouter end-mill — I used one of 1 in. dia. — but a $\frac{1}{2}$ in. one will be needed for finishing in order to attain the $\frac{1}{4}$ in. radius where the spoke

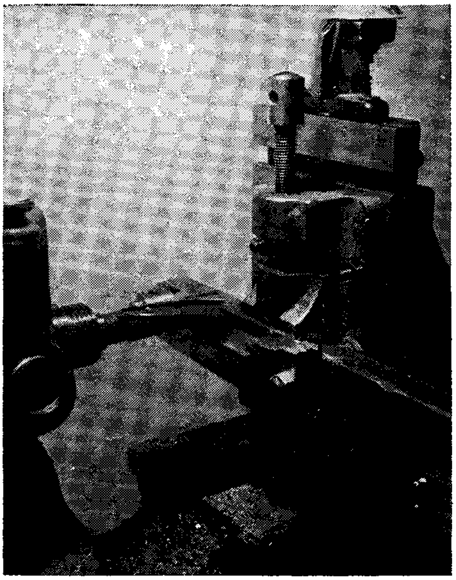
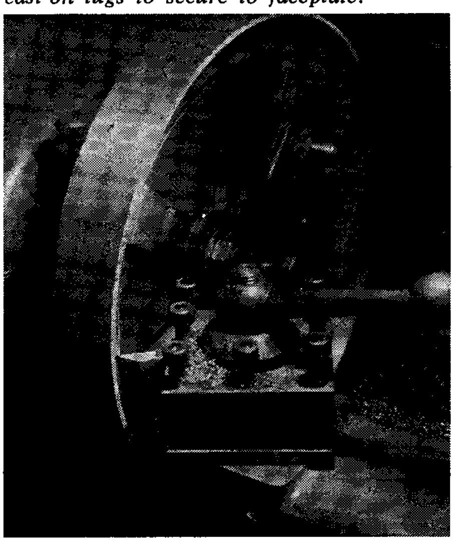


Fig. 3. End-milling a batch of hind-wheel spokes.

is palmed out. A slot drill type of home-made end-mill will not do here because cutting-edges are needed on the face of the tool, but a suitable cutter can be made from silver-steel in the same way as we made the form-cutter for milling the splines on the second shaft. Simply turn the end of a piece of 9/16 in. or $\frac{5}{8}$ in. dia. to match Fig. 2D, and "plane" on it eight or ten teeth as described, for the form-cutter. Centre-pop at No. 1 jaw, remove from the lathe, relieve the tips of the teeth, and harden and temper the tool.

Fig. 4. Machining hind-wheel tee ring, with cast-on lugs to secure to faceplate.



My milling procedure was, first, to level off the top edge of the palm, and then to mill down nearly to the other line, taking cuts of about 30 thou. at a time. The mill was then changed for the $\frac{1}{2}$ in. one, and this was used to finish to within two or three thou. of the line. This allowed later for fitting each spoke to its individual slot, to ensure a tight fit.

The undersides of the blanks may now be milled at the same setting, running them over the top of the cutter, and of course feeding backwards against the cut. Fig. 3 shows the first cut being completed. Just a word of caution—by the way—when separating the spokes after removing them from the lathe, the milled edges can be razor sharp!

To mill the next batch of eight, place them on the jig, with the master on top and run a scriber round the master on to the one beneath. Remove the master and the top one, centre-pop the outline on the latter, replace it, and carry on as before. Now, however, you mill right to the line, because this already allows the surplus for fitting.

The other two sets of blanks are done in the same way, naturally, but use the same master each time to avoid cumulative errors. In passing it may be mentioned that I made my last two batches of *nine* each, so as to have two spares in case of need, and you may care to take the same precaution. In the event, mine weren't needed, but . . . !

In trimming off the spokes, cut the surplus off the master first, and file the palm to shape. Its four corners need rounding very slightly—about 1/32 in. radius will do. File the inner end roughly only, for since the spokes vary in length, these will need individual treatment later according to their position in the wheel.

Now the master can be laid on the others in turn to scribe round it, following which the outline is centre-dotted and the waste removed. Do not drill any holes at this stage.

Hind Wheel Tee-Rings

There are several methods of making the tee-rings, according to one's resources. If you have a source of thick-walled steel tubing, the rings can be turned from the solid. Again, at least one constructor was able to use rings burnt out of $1\frac{1}{4}$ in. thick steel plate.

Another method is to have rings rolled round from a heavier section tee-iron say $1\frac{1}{4}$ in. by $\frac{1}{4}$ in. —welded at the joint, and then turn these up. Or again, to have rings rolled and welded from flat materials; then further rings rolled *on edge* and welded or brazed inside the others to form tee-rings. The materials used here would have to be "full" on all dimensions to allow for turning, of course.

A variant of this way was used by Sidney Christopher of Ainsdale, whose Allchin was one of the first to be completed and was the very first which I had the pleasure of driving. First he bored a large hole in a thin disc of metal, and then rolled four rings of flat steel, allowing them to expand to be a tight fit in the hole, following which the joint was welded. Next Sidney bolted a disc of sheet steel to the faceplate, and turned it to a tight fit in one of the rings. At the same time a ½ in. hole was bored in the disc. Removing the latter from the lathe, it was silver-soldered in the centre of the ring, and then remounted on the faceplate, using a ½ in. dia. stub in the mandrel to locate it truly. The outside and inside of the ring could now be machined to the correct dimensions, and finally parted off as a tee-ring.

But having mentioned all these ways of doing the job, the majority of builders undoubtedly will prefer to use the castings which are available from Reeves. When this engine was first designed, I specified, and the firm supplied, malleable iron castings.

However, under present day conditions these are no longer available, and alloy castings have had to be substituted. They are perfectly satisfactory, but being somewhat softer than the iron would be, more care is needed when riveting.

The First Operation

The casting has four lugs cast on to the inside web, to enable the job to be clamped to the faceplate. Lay the plate on the bench, face up, with a piece of clean paper or card beneath to keep dirt off the boss, and lay the ring on it, making sure the lugs bed flat on it. Use four clamps or dogs to hold the work to the plate, as shown in Fig. 5, but don't tighten the nuts too much.

The turning operation will make the faceplate very tight on the mandrel nose, so oil the threads before screwing it in place. Set the job to run as truly as possible, tighten the nuts fully, and check for truth again. A round-nosed tool will do for rough-turning the ring, first on the outside diameter, and then on the edge. Following this, turn the tool sideways and backwards, as in the photograph and rough out the inside part of the ring.

Not many readers, I suspect, will have outside calipers capable of measuring the outside diameter, 8⅞ in., and so a gauge is needed, as Fig. 2c, made from a suitable strip of steel. This will help in that most important job of getting all four rings to the same diameter.

Regrind the tool and finish the outer diameter to the gauge, which should just slide over the rim. Now turn the tool as before, to finish the inside of the rim, the side of the web, and the outer edge of the rim. The inside edge of the vertical web can now be rough-turned, and at the same time the ring can be parted off from the lugs. The same tool, turned at right angles, will do this, but don't force it straight in, so to speak. Work the cross-slide handle slightly to and fro to make the groove wider than the tool.

Next turn the other three tee-rings in the same way.

SMOKE RINGS

From page 215

at Eaton Park. On January 20th, the circuit of sleepers was completed, and at the time of writing these notes, the drilling and screwing down of the rail was going ahead with only another 70 ft. to complete. The track, which will be for 5 in. and 3½ in. gauges will eventually have a length of 940 ft., with three 20 ft. steaming bays.

Reading Exhibition

The Reading & District Model Engineering Society are holding an exhibition in the Town Hall, Reading, on Saturday, March 2nd, from 9.30 a.m. to 6 p.m. All types of models will be on display, and there will be a portable passenger-carrying track in operation.

Witney Exhibition postponed.

The exhibition arranged by the Witney & West Oxfordshire Model Engineering Society for April 6th has been postponed.

GAS ENGINES

Sir,—Mr. Thorne's letter in *Model Engineer* 21st December caught my attention as I had a pair of flywheels identical to those in the photograph given to me many years ago. I used one on a steam engine, since disposed of but still have the other.

Quite by chance, looking for something else in the "Model Engineer" for Jan. 1900, I noticed an advert. with photograph of this identical design. The peculiar finned cylinder confirms this. The advertiser was "The British Modelling and Electrical Co.", Macclesfield, also advertising locomotives and stationary steam engines both finished and castings. Quality appeared to be good.

The gas engine castings, with full instructions, were supplied in 3 sizes, 1 in. bore @ 7s. 6d. 1⅜ in. bore @ 12s 6d and 2 in. bore 25s carriage paid!

There appears to be an automatic inlet valve on the side of cylinder with a cam-operated exhaust valve on the cylinder head. This valve is worked by a shaft alongside the cylinder and seems to be driven by a bevel wheel on the crankshaft. A flame guard can be seen, its top above the fins but on the far side, being part way along the cylinder barrel. I imagine that there were no compression, flame ignition engines, popular at that time.

Chalford Hill, Stroud. John Denley

QUORN

TOOL AND CUTTER GRINDER

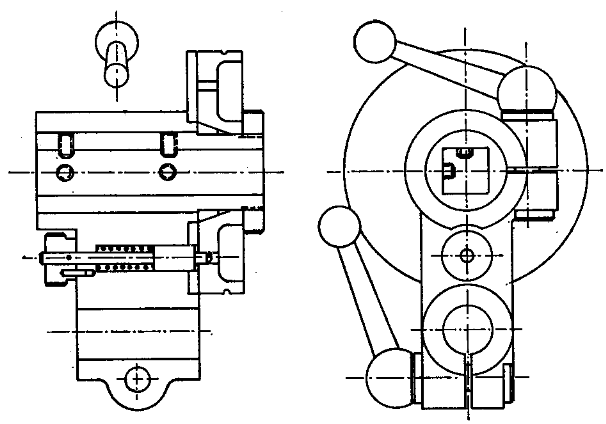
by D. H. Chaddock, C.B.E.

Part V *From page 189*

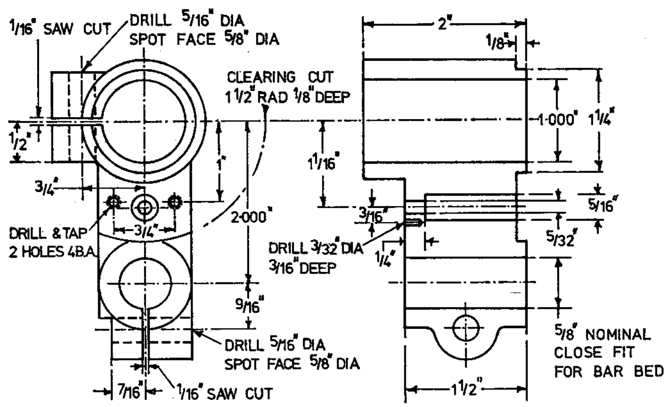
THE TOOL-HOLDER shown in Fig. 29 is a versatile piece of equipment into which a wide variety of arbors and mandrels, all of which can be made by the amateur to suit his individual needs, can be fitted. It comprises a cast iron bracket which can be clamped at one end by the standard split boss, lock bolt and ball handle to either of the long or short bar beds at any point along their length. At the other end it has a parallel hole, again with a split clamp, to carry the various arbors and mandrels. For work such as lathe tools and engraving tools which must be turned a prescribed amount for a datum face in order to impart clearance angles, an interchangeable index plate is provided. It is graduated in 360 divisions and has 12 or more index holes which are engaged by a retractable spring-loaded index pin housed in the main casting.

The main casting shown in Fig. 29 is one of three which it is convenient to machine together, the other two being the head bracket and the tailstock. They are intended to be interchangeable and in particular that the centre height, shown on all drawings as a nominal 2.000in. should be as closely as possible the same on all three components even if it is not an exact 2in. by N.P.L. standards. Therefore first machine the lower $\frac{5}{8}$in. dia. hole in each casting to a close fit for the $\frac{5}{8}$in. centreless ground round bar or bright drawn bar if that is what you are using. For this operation the castings are small enough to be held in the four-jaw chuck. After boring, cross-drill, spot face, split and fit a temporary clamp bolt.

It is now necessary to improvise some form of temporary fixture in which each of the castings in turn can be located from this hole for boring the next. In Fig. 30 a piece of $\frac{5}{8}$in. bar has been clamped in a "Myford" or "Keats" type V block itself clamped to the lathe faceplate and offset 2in. from the centre line of the lathe. Once set, it must not be moved until all three castings in turn, clamped by their split bores, have been machined at the other end. Although this set-up was perfectly successful it does rely upon very secure clamping—if the casting should slip disaster would ensue. Also, as witness the massive balance weight, it is rather out of balance.



TOOL HOLDER ASSEMBLY



TOOL HOLDER BRACKET 1 OFF C.I.

FIG. 29

A rather safer set-up, which however involves a little more preliminary work, is shown in Fig. 31. Here a shouldered stub, $\frac{5}{8}$in. dia., with a broad and truly faced flange, has been bolted to the lathe faceplate, again at 2in. offset distance. The casting can either be clamped to it, as in the previous example, or, as in the photograph, held to it by a bridle. The important additional feature however is the two angle plates which butt up against the casting on either side and so effectively prevent it from moving under the pressure of the boring tool. Although the castings shown here are in fact those for the spiralling head the others can be dealt with in exactly the same way, only

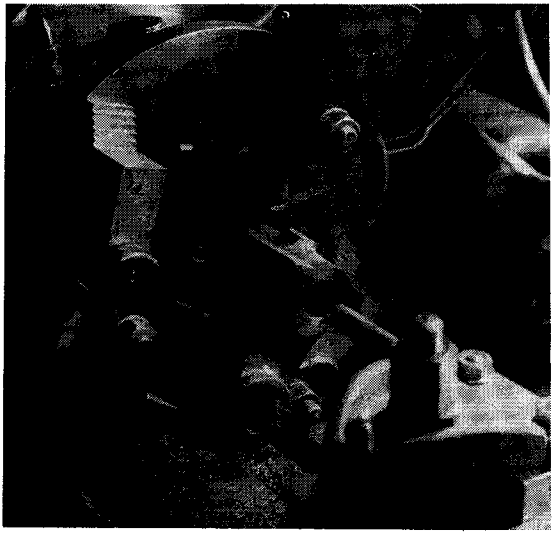


Fig. 30. One method of boring the tool holder casting. Photograph by A. Throp.

altering the distance between the angle plates.

Alternatively, all three castings may be machined on the saddle of the lathe with a boring bar between centres, as was described for the base castings. Having the necessary tackle to hand, the writer did his this way relying on the cross-slide feed screw setting to bring the centre distance of the holes the same in each case. It is a moot point which is the better. Cross-slide boring certainly ensures that the holes are parallel but the centre distance may vary. Locating from an eccentric spigot certainly ensures that the centre distances are identical to very close limits but unless the spigot is dead at right angles to the faceplate and the faceplate itself dead true the holes may not be parallel. So you pays your money and you takes your choice.

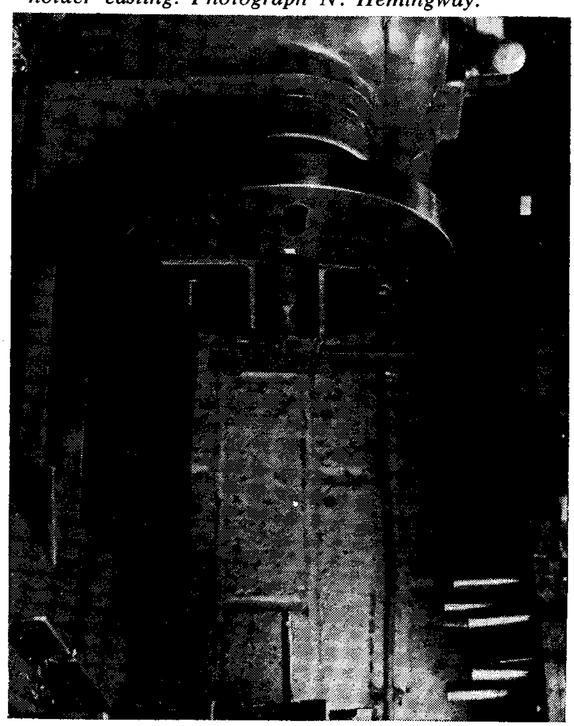
The rest of the machining is conventional, but before boring the $\frac{5}{16}$in. dia. hole for the index pin you must decide whether you are going to make this hole first and to locate the holes in the index plate from it, or whether you are going to make the index plate first and locate the hole for the index pin from it. Unless of course your equipment and skills are such that you can make both separately and know that the index pin will enter the holes in the index plate without jamming or backlash when they are assembled.

Other details for the tool holder are shown in Fig. 32. The backplate can most conveniently be made from sheet steel, either bright or blue. The outer rim should be left with a good finish as it will eventually carry the engraved zero mark. The index plate had best come from a sawn $3\frac{1}{4}$in. x $\frac{3}{4}$in. blank. If you càn only get a 3in. dia. blank, not to worry. Just reduce the size of the backplate and index ring to one to which it will just clean up. The set-up for engraving 360 divisions is exactly the same as that for engraving the rotating base, again holding the index plate from the inside on the jaws of the four-jaw chuck in the "lathe" position.

If you have a milling and drilling spindle which can be mounted on the toolpost or are going to use the Quorn's own spindle for this purpose it is very convenient to drill the holes in the index plate at the same setting and using the same means of dividing. On the drawing I have shown 12 holes. This gives divisions of 2, 3, 4, 6 and 12, but any other number can be chosen. Thirty is probably the next best choice, as it gives 2, 3, 5, 10, 15 and 30 divisions but not of course 4 or 12. The degree scale should be numbered as was the rotating base 0-40-40-0 in each quadrant taking care that the zeros coincide at least approximately with the holes. Minor errors can be corrected after final assembly by engraving the zero mark on the backplate exactly in line with a zero mark on the index plate after it has been locked in position by the index pin, duly fitted into a hole which has been spotted from the index plate itself.

If a milling and drilling spindle is not available,

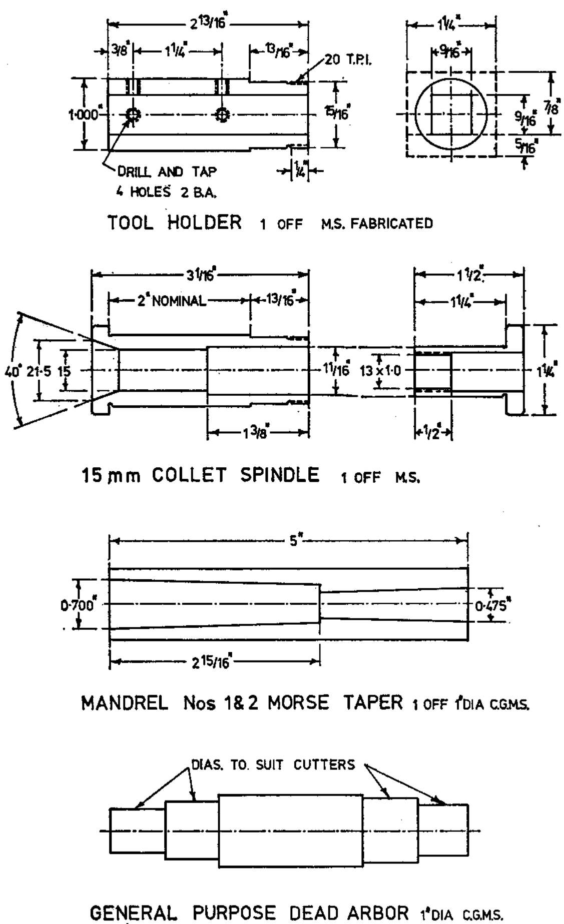
Fig. 31. An alternative set-up for boring the tool holder casting. Photograph N. Hemingway.



the tool holder itself can be used as a drilling and dividing jig. In this case first drill the hole for the index pin in the main casting and fit in it, temporarily, a bush $\frac{5}{16}$in. outside diameter and $\frac{1}{8}$in. internal diameter. Engrave a zero mark on the backplate and assemble the undrilled index plate in its working position. Then by setitng the degree scale at 0 deg., 30 deg., 60 deg., etc. and locking the spindle each time, the holes in the index plate can be drilled through the bush in the certain knowledge that they will not only be exactly in line with the index pin when it is fitted but that the degree marks will exactly coincide with the hole positions.

The $\frac{5}{16}$in. dia. body of the index pin should be a very close fit, without any shake or backlash, in the hole in the casting. The latter should be reamed to size or, an old trick, finished to size with a 'D' bit made from a piece of the same silver steel as the pin itself. The point of the pin should be rounded and given a slight taper so

Below: Fig. 33



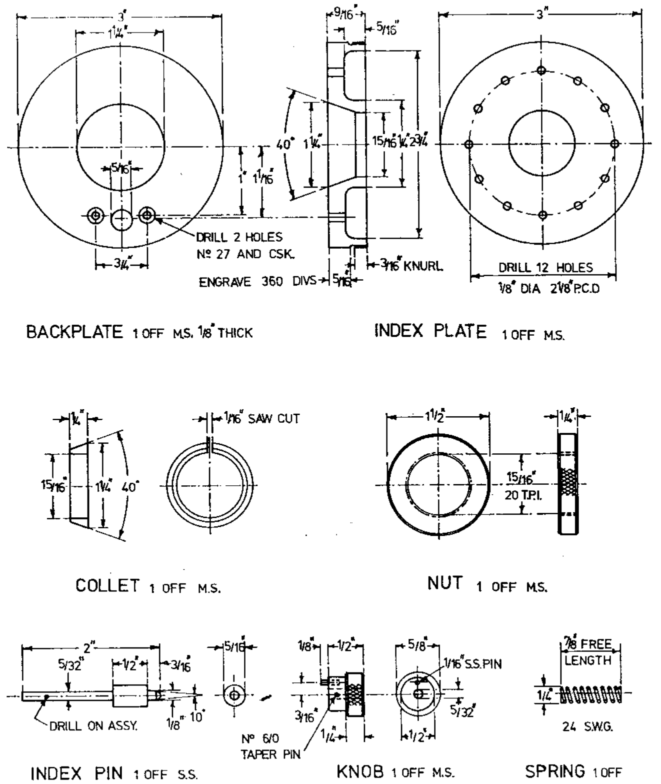


Fig. 32

that it engages positively with the holes in the index plate without shake or sideplay. If hardened, the point of the pin should be drawn back to purple temper colour to avoid brittleness which might cause it to fracture. The knob should be taper pinned to the shank of the index pin in such a position that the latter can go right home into the index plate without the knob making contact with the face of the casting. The $\frac{3}{16}$in. dia. pin in the knob itself should be long enough to hold the index pin quite clear of the index plate when it is parked on the face of the casting and the degree scale is being used.

A great deal of the versatility of the machine depends on the wide variety of simple arbors and mandrels which can be fitted to the workhead. Some typical ones are shown in Fig. 33. The first has a $\frac{9}{16}$in. square hole in it, the same size as the hole in the "Norman" toolholder on the writer's $3\frac{1}{2}$in. Drummond lathe. It will take all lathe, planer and shaper tools with shanks up to this size. Experts with a file will make the square hole this way, but if you can beg, borrow or steal a $\frac{9}{16}$in. square broach and a press to drive it the work is much easier. Probably the most effective way is to take a leaf out of the locomotive builder's book when they are making spring buckles and to make it in two parts. So end mill a $\frac{5}{16}$in. wide by $\frac{5}{16}$in. deep slot in a piece of $1\frac{1}{4}$in. by $\frac{7}{8}$in. bar about 3in. long and silver solder or braze it, open side down, to a piece of $1\frac{1}{4}$in. by $\frac{5}{16}$in. strip of the same length. After cleaning and pickling, drill and tap the four holes for the clamp screws and use them to hold the work on a truly centred $\frac{5}{16}$in. square mandrel. At this setting the corners can be turned off and the outside, including the screw thread, which must be lathe cut, brought to finished size truly concentric with one another.

In using the holder, readers may be worried that only tools with $\frac{5}{16}$in. square shanks will be held "true" and that tools with smaller shanks will, of necessity, be held off centre. This is of course true but it does not matter in the least nor is it necessary to make a series of holders each with a hole to suit the shank sizes of individual tools. In grinding square or rectangular shanked tools all that is important is that the various rake and clearance angles bear an accurate relationship to the base of the tool. This will be the case if the tool is turned through a known angle regardless of whether it is "on centre" or not. The tool holder can and must be withdrawn from the workhead to operate the 2 BA clamp screws which must not project beyond the circular body.

An equally useful spindle is one that will take collet chucks. The drawing in Fig. 33 is dimensioned for 15mm "short" 'C' size standard collet chucks with a draw spindle to suit. This is a useful size since it will pass $\frac{3}{8}$in. and will accept $\frac{1}{2}$in. for a limited distance at the nose. But the spindle is big enough to take any size of collet from 6mm to 16mm, long or short. By modifying the front end and boring it No. 2 Morse taper so that it is a replica of the Myford lathe mandrel nose the "push-in" type collets supplied by that company could also be used. Any form of collet will, however, be found to be extremely useful in dealing with round shank tool bits and plain shank cutters.

In making these spindles which rotate in the workhead it is not only imperative that the nominal 1.000in. diameter is a close running fit in the body but that the 2in. nominal length between the shoulders be adjusted until, with the index plate drawn up tight on its collet, the spindle can rotate freely but without any end shake. If the accuracy of collet chucking is to be preserved, boring the inside of the spindle truly concentric with the outside is always a problem. The work cannot very well be accomplished at a single setting, so probably the best way is first to complete all the external work, either between centres or overhanging from the chuck and to put a rough hole down the middle. After parting off, re-chuck the tail end, with soft packing to avoid marking the work, in the four-jaw chuck and support the front end in the fixed steady. Set to run true, and here a "tenth thou" clock really is useful, not forgetting the fore and aft check to ensure parallelism. Incidentally I wonder how Mr. W. K. Kirkwood of Ancaster, Ontario, Canada (Postbag, *Model Engineer,* 16th November 1973) accomplishes this class of work if in his 55 years of experience as a machinist he has never found it necessary to use a D.T.I. Perhaps he uses a piece of chalk or would concede that it is here legitimate, indeed imperative to bore a bush (English) bushing (American) to hold the work truly to tenth thou limits for a second operation.

Milling cutters with tapered shanks should be reground or sharpened supported by their shanks. For this a plain mandrel made from 1in. dia. centreless ground round mild steel is easy to make. Again special care must be taken to ensure that the inner tapered bore is truly concentric with the outside. This type of mandrel is not intended to be used with the index plate, therefore it need not be turned down and threaded at one end. Instead it slides and rotates freely in the workhead, the cutter being guided by its own teeth in contact with a tooth guide in a manner which will be described in due course. The drawing shows a mandrel bored to receive at one end a No. 1 and a No. 2 Morse taper at the other, but of course other mandrels can be prepared to receive Brown and Sharpe or any other tapers. Unfortunately 1in. diameter is not quite big enough to take No. 3 Morse so if much work of this size is to be done it would pay to bore out the workhead casting to $1\frac{1}{8}$in. dia. and to turn all the other parts to suit.

Milling cutters which have a central hole in them, such as plain cutters, side and face mills, circular saws and the like should, wherever possible, be ground from the cutter's own bore, turning and sliding on a close fitting dead mandrel. Only in this way, and even if the mandrel is eccentric, can absolute truth of the teeth with the centre hole be ensured. For this purpose a semi-expendable mandrel can be prepared from 1in. dia. bright drawn stock—no need to use centreless ground—and turned down to suit the work in hand.

Made professionally of course, all these mandrels and spindles would be case-hardened and ground which would certainly improve their lives in the rather severe environment which inevitably exists in the vicinity of any grinding machine.

Continued on page 252

OSCILLATING STEAM ENGINES

Part II

by Dr. J. M. Gregory

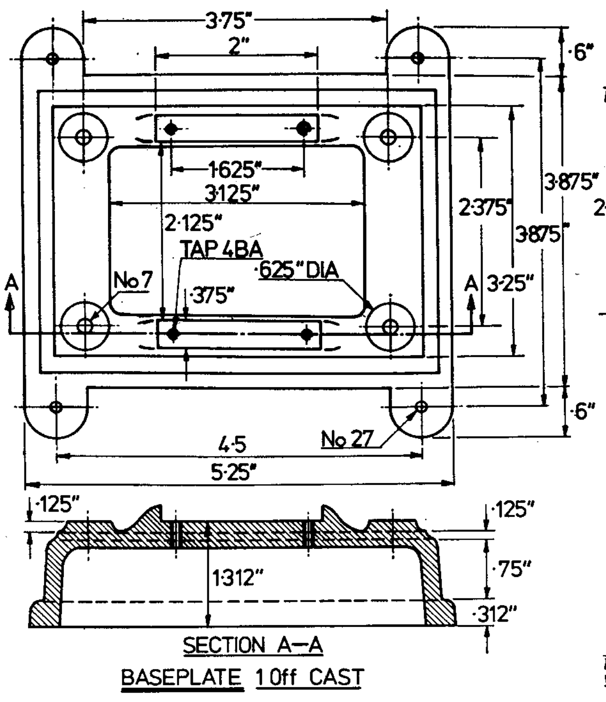
From page 180

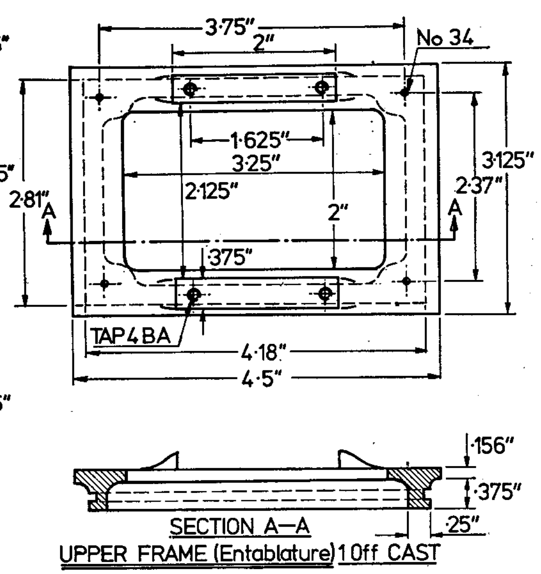
The undersides of both the baseplate and the entablature can be faced off by mounting the casting on the faceplate on the lathe. All the lands on the top surfaces are co-planar and since there are snugs for the various bearing blocks, these surfaces require the shaper or milling machine. The pillars to support the entablature are simple turning jobs from 0.5 in. round stock. The taper only lasts for 2.25 in. of the length of the pillar so it can be turned by setting over the compound rest of the tool holder the requisite amount.

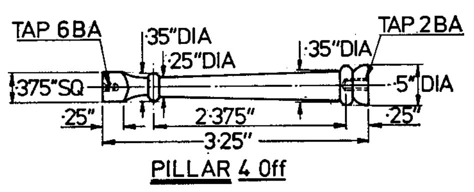
Machining the cylinder is a similar job to tackling the cylinder of the type 1 engine. Mount the casting in a 4-jaw chuck and machine the bore and top end to the dimensions given. Remove the cylinder from the lathe and mount it on a 1.25 in. mandrel (left from building the other engine) to machine the other end. Now put the cylinder back in the 4-jaw chuck to turn one of the spigots. Care is needed in setting up here to ensure that the cylinder axis is perpendicular to the axis of the spigots. Turn the spigot down to 0.625 in. for 0.75 in. length. Centre the end and drill 0.156 in. dia. for 0.875 in. deep. Enlarge this hole to 0.312 in. dia to a depth of 0.625 in. finishing off with an end-mill to give a square shoulder to the hole. Tap the end of the hole ⅜ in. x 26 tpi to a depth of 0.375 in. for the gland nut.

Remove the cylinder from the lathe and remount it with the completed spigot held in a self-centring chuck. Carefully centre the other spigot and support it on a rotating centre. Turn the spigot down to 0.625 in. Remove the centre and carefully drill and tap the spigot for its gland so that it is identical with the other side.

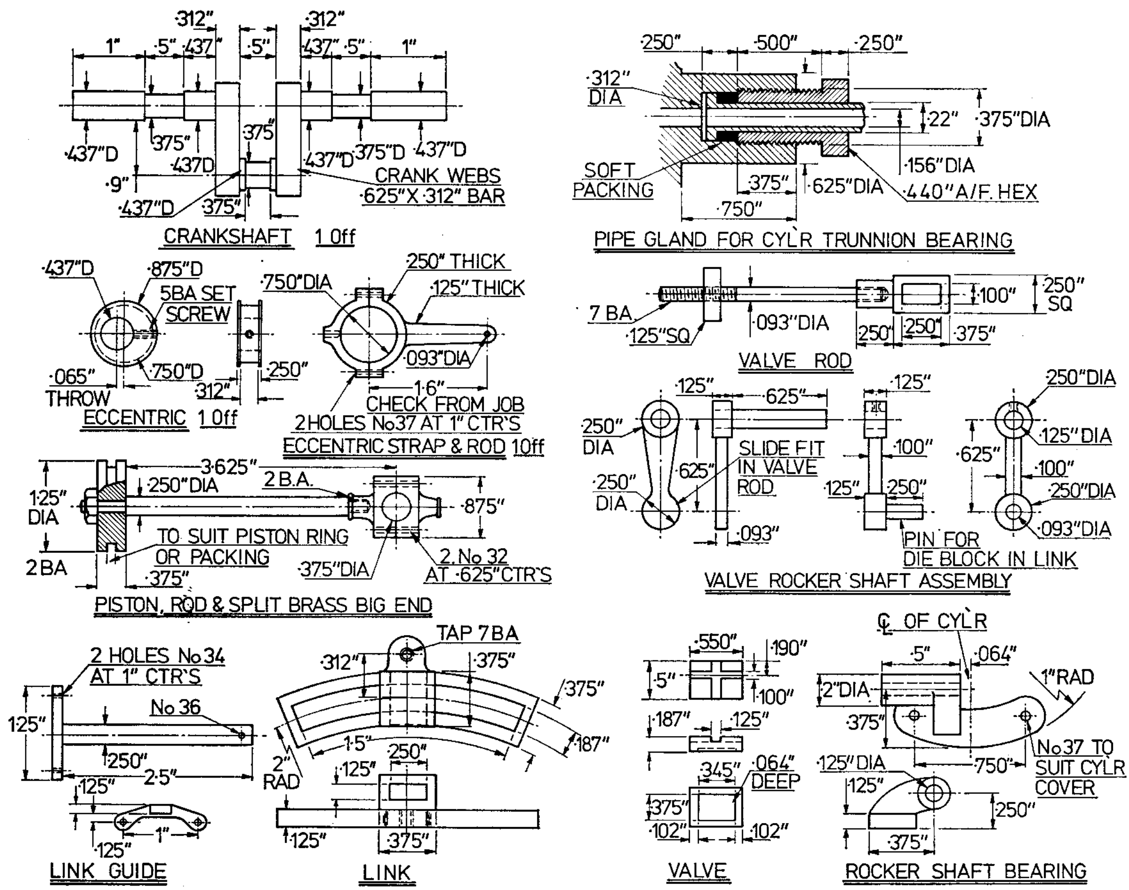
The steam and exhaust connections are turned from 0.312 in. dia. brass rod. It is drilled 0.156 in. dia. right through and turned down to 0.22 in. where it passes through the gland nut. The gland nut is made from ¼ in. B.S.W. brass hexagon solid—it is drilled 0.23 in. to clear the pipe connection and turned down to 0.375 in. dia for 0.5 in. for the ⅜ in. x 26 tpi thread of the gland. A small amount of soft packing is placed between the gland nut and the pipe connection to ensure a steam tight seal.







DETAILS OF TYPE 2 ENGINE



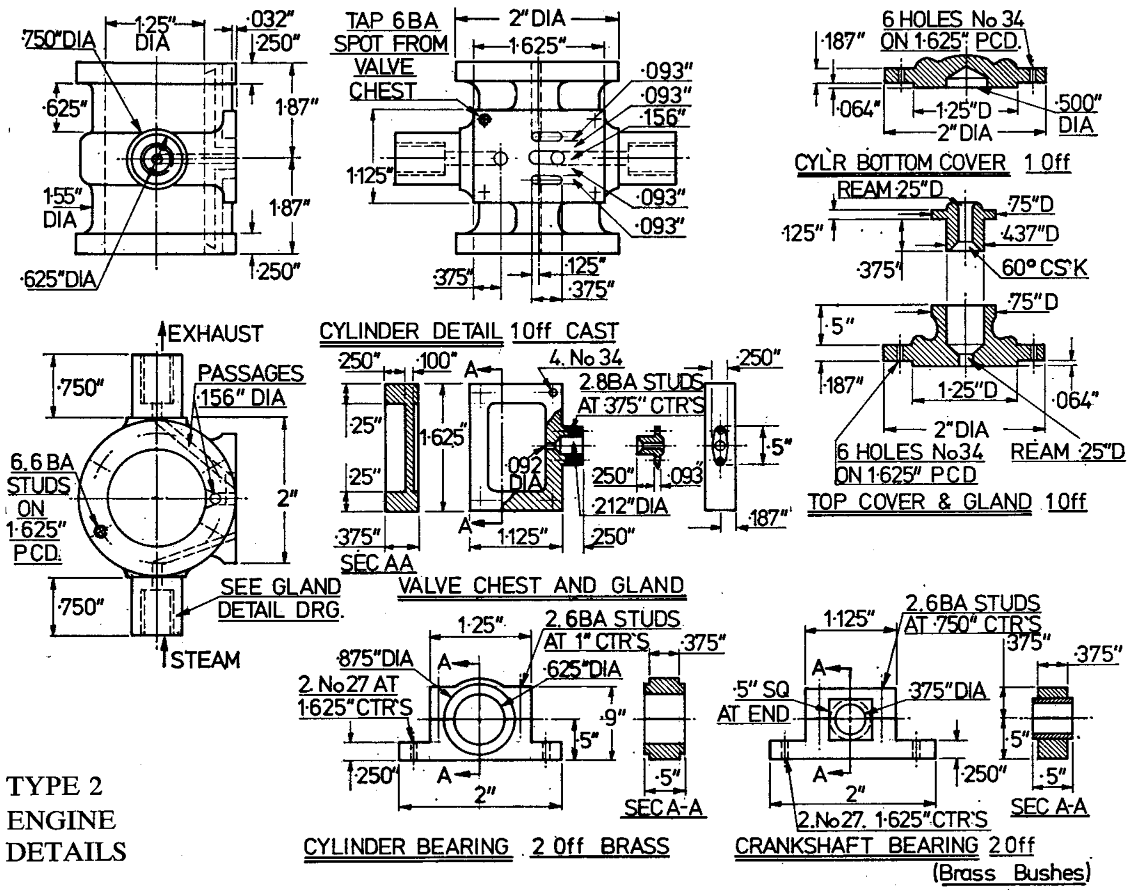
TYPE 2 ENGINE DETAILS

The next machining job on the cylinder is to face off the valve port face. This done, the steam and exhaust ports can be marked out and milled to size. The passages connecting the ports to the ends of the cylinder and to the spigot glands are then drilled. The piston, as in the type 1 engine, is brass with two cast iron split rings, and it and the two cylinder covers are straightforward turning jobs.

The valve is brass. I cut it out of 0.064 in. brass strip, and drilled and filed out the recess to make sure its dimensions were correct for the port face. When satisfied, I silver soldered it to a brass block in which slots were filed for the valve rod and buckle. The valve chest is in one piece (Nineteenth century practice) and has a simple gland for the valve rod. It might be easier to set up the valve gear if the chest and its cover were separate so that the cover could be removed for valve setting.

The crankshaft is a mild steel fabrication. The shaft and crankpin are turned from 0.437 in. dia. round stock, and the webs are cut from 0.625 in. x 0.312 in. mild steel bar. The assembly is silver soldered and the section of the shaft between the webs cut out. I have taken to silver soldering crankshafts and similar assemblies in place of brazing them. If the parts are a good fit together in the first place, the result is more than adequately strong and there is less chance of distortion. Also the resultant component is much easier to clean up!

Now is the time to make the split bearings for the crankshaft and for the cylinder. This done, the main components of the engine can be assembled before the valve operating gear is started upon. The eccentric sheave is turned from 1 in. dia. rod and is located on the crankshaft by a 5 BA socket grub screw. The eccentric rod is a brass fabrication. The link is cut and then milled or filed from 0.125 in. thick steel strip, and subsequently silver soldered to its guide block. If the guide bar assembly is now fabricated and bolted between the entablature and the top of



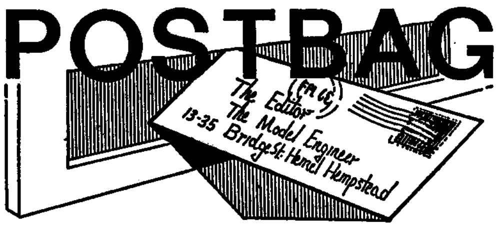
TYPE 2 ENGINE DETAILS

the cylinder trunnion bearing, the eccentric may be assembled to drive the link unit.

The valve rod is a piece of 0.093 in. dia. stainless steel rod and is threaded 7 BA at its lower end for the valve buckle. The top carries a brass slotted piece into which the valve operating lever fits. This operating lever is of steel and is pinned to a 0.125 in. dia. shaft journalled in a brass bearing held by two of the studs which attach the top cylinder cover. The other end of this rocker shaft carries a lever of length equal to the valve operating lever. This second lever carries, at one end, a pin of diameter 0.093 in. which locates in the die block sliding in the link, whilst the other end is drilled 0.125 in. dia. to fit the rocker shaft and is fitted with an 8 BA socket grub screw. With all these bits made, the valve gear can now be set up. With the valve in its mid position, the valve rod is adjusted in the buckle to make the valve operating lever perpendicular to the piston rod. The angle between the two arms on the rocker shaft can now be adjusted so that, as the crankshaft is rotated, the movement of the valve is symmetrical about its mid position. This done the grub screw is tightened and, if desired, the operating arm may be pinned to the rocker shaft. Finally, the eccentric must be fixed on the crankshaft in its correct angular position—approximately 105 deg. in advance of the crank web.

To finish the engine we have yet to a. machine the flywheel casting (identical with the type 1 engine), b. arrange the pipe work to connect up the steam and exhaust glands, and c. make the trimmings such as a pulley and oil cups for the bearings.

Both models work well and they form a pair of variations on what most people have come to think of as a 'model oscillating steam engine'. Some day, with modified base and entablature castings, I must build a pair of the type 2 engines, mount a condenser in between them, and fit them in a paddle steamer! There is plenty of variety in the layout of the steam engine, so, happy building. ■



The Editor welcomes letters for these columns. He will give a Book Voucher for £1.50 for the letter which, in his opinion, is the most interesting published in each issue. Pictures, especially of models, are also welcomed. Letters may be condensed or edited.

Parting off

Sir,—I have just read the article by Derek Beck — A First Affaire with a Lathe—in the current issue of *Model Engineer.* I have derived great pleasure from reading the whole of this series. I am particularly interested in the part describing his rear tool-post. I can readily endorse all he says about simplicity of its use not only when parting off, but also in most forms of turning.

However I wondered whether Mr. Beck ever paused to consider the strain his back tool-post imposes on the cast iron "T" slot of his cross-slide.

The original "M.E." back tool-post is made "L" shaped and the holding down bolts (two of them) are situated in the toe of the "L" directly below the business end of the cutter bit. The maximum upward pull on the "T" slot can therefore never exceed the actual strain imposed by the revolving work upon the cutter. Mr. Beck's back tool-post however takes the form of a lever, the back edge forming the fulcrum and supposing his cutter bit to project only $\frac{3}{4}$ in. the magnification of the upward stress is three times, and this concentrated on a single bolt.

I must say that at times, when dealing with a heavy cut, I have had qualms about my own cross-slide, but not any more when I consider I am working with a safety factor of six as compared with Mr. Beck.

I have never actually broken a "T" slot myself but on several occasions I have witnessed where others have done it and it is not a pretty sight.

Shotley Bridge. Wm. Duncan M.B. B.S.

Sir,—Mr. Beck is correct, of course, in saying that a great deal of our work can be done and often must be done by "fit and try" without a micrometer.

However, he has overlooked, I think, the fact that in practically all model work, certain parts, minor perhaps but essential, have to be made to dimensions. I need only mention studs, unions and, indeed. practically all threaded work.

Since I use 'O' rings a good deal. I also have to make other parts to standard dimensions, to suit the standard "O" rings.

I agree that a patent specifiication and drawings do not specify dimensions, since the principle is being patented, but a mechanic constructing something to those drawings would almost certainly have to make some parts to measured dimensions.

I see that Mr. Beck now has two micrometers. I wonder if he has ever checked how often he uses them? It is very easy to keep picking up and putting down a tool without realising consciously that you have used it. For myself, I bought a 6 in. dial slide gauge some time ago from one of your Advertisers. This reads inside and outside to a thou. I find myself using it for everything from 12 BA to its full range. Its cost to me was probably less than the cost of Mr. Beck's two micrometers, and I would not be without it.

However, I have noticed that over a time, one gets an attachment to a particular tool, or method of work. In the past year a friend of mine in the North London Society has practically abandoned the use of chucks and relies entirely on faceplate jigs and fixtures. He defends this most eloquently. I myself, over the years, have switched from rather hefty solid lathe tools to smaller tools in a 4-position turret, and now to 3/16 in. tools in tool-holders, and at any time I would have given strong arguments in favour of the practice I then adopted. I should not be surprised if, in a year or two, Mr. Beck has abandoned his treasured dial test indicator, and I have discarded my slide gauge for something else!

London, W.1. T. W. Pinnock

Micrometers

Sir,—Reading the recent discussions in the pages of M.E. about the controversial use of clock gauges and micrometers, reminds me of my apprenticeship training days.

Our machine tool instructor was a product of Horwich works apprenticeship, in L.M.S.R. days I believe, and was greatly respected for his skill and method of instruction.

Micrometers were only allowed to be used after he was reasonably satisfied that his pupil could turn a diameter to within about 5 thou using only calipers and rule. Certainly we never used a clock gauge for *measuring,* comparing certainly, and commonly for setting work in the 4-jaw or on a mill.

I can only consider the humble "mike" as an essential tool in any workshop, and one that is far more useful than a clock gauge. Mr. Beck and I will no doubt disagree on that point, but I would commend Mr. Beck for his extremely interesting articles.

I can recall one other memory of my apprenticeship days, which may be of interest. We were given an exercise whereby the object was to produce a true hexagon from a piece of 3in. diameter black mild steel bar. The hexagon, one inch thick, had to have faces truly square and flat, and have a one inch hole in the centre, into which a one inch cube of mild steel (which also had to be made true to size and square and parallel) had to fit precisely by each face. The only tools allowed were a hammer, chisel and a few files, apart from equipment needed for marking out.

There are no doubt far more difficult exercises given to apprentices, but the "dreaded hexagon" was a formidable task for a raw first year apprentice, and I still have the one that I made, as a reminder of the weeks spent chiselling and filing, striving to produce a perfect example!

I enjoyed Don Young's articles about his experiences at Doncaster when he was an apprentice. Would it be possible to hear from other readers who have similar experiences?

Stourbridge. R. K. Harper

Swarf in motors

Sir,—Some two years ago I was greeted by a loud bang when I switched on the motor of my Super-7 lathe. An examination indicated that the wiring at the back of the lathe was in good order so I concluded that a piece of swarf had found its way into the motor and caused a temporary short. The motor started normally on the next try but I decided that something should be done to protect it and a note was made on my list "Jobs to be done". Unfortunately, I could always find more interesting things to do and so the job remained on the list.

Recently, whilst turning some items out of 3¾ b.m.s. which produced mountains of swarf, there was a repetition of the previous trouble, but this time the motor would not start. I could get the motor to run by giving a pull on the chuck at the same time as switching on; so it appeared that I had lost my starting circuit. On dismantling the motor it was found that a piece of swarf had been picked up by the lugs on the end of the rotor and, scratching across the starting winding, had caused a direct short to earth which had burnt a small gap in the winding at the point where the wire emerged from the slot.

My motor is a resiliently-mounted ¾ h.p. Crompton-Parkinson but a motor of almost any other make could easily be subject to the same trouble as most of them are ventilated and any apertures to allow air to pass through will, most likely, let swarf in. I have now fitted a shield which consists of a piece of sheet aluminium 7 in. x 7 in folded through a right angle 3 in. from one edge. The shorter side is fastened to the base of the motor with two screws. This shield completely protects the right-hand end of the motor and, at the same time, tidies up the appearance.

An accident of the kind described, which caused me considerable trouble and expense, could happen to anyone and I am writing this to warn lathe users who have a motor mounted in a position where it can be bombarded with swarf. And don't put the job down on the list; do it! In conclusion, I would like to pay tribute to the excellent service I received from Myford Ltd., who, upon receipt of a telephone call from me, despatched a replacement motor by return. The original motor, after repair, will shortly be used on a new piece of equipment.

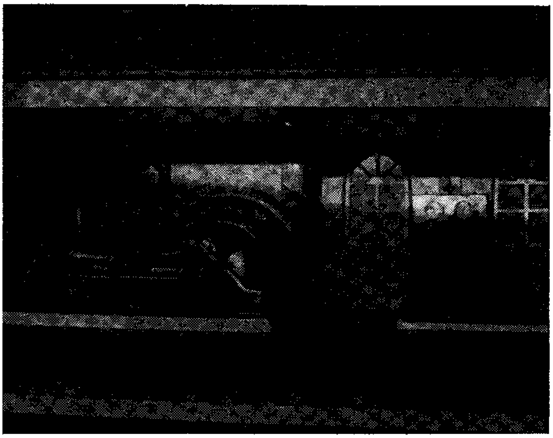
New Milton, Hants. Geo. H. Thomas

Gas engines

Sir,—As a reader of *Model Engineer* for about 35 years, I have read with interest articles on Gas Engines of the open crank type as described by Mr. Jeynes, and the latest article in "Postbag" by Mr. W. Boddy in the 18th January issue.

I have always been interested in this type of engine, my earliest recollection of these was when I was about 12 years old. I lived in a village, and one of the local men repaired wringing machines in his spare time. He had a workshop with a gas engine about 5 in. or 6 in. bore, 12 in. stroke and twin fly wheels about 4 ft. 0 in. in diameter. He also had a lathe on which he turned the rollers for the wringing machines, and I earned many an ice cream wafer by turning rollers on a Saturday afternoon. This particular engine ran on petrol with hot bulb ignition heated from a blowlamp, with exhaust valve governor.

I am enclosing a photograph of a model heavy oil engine which I made some years ago. The making of this model was prompted by an event which took place in Halifax about 1929, the year I started my apprenticeship to engineering on Trams. The price of electricity, then about ¾d per unit, was too much for



the manager of the Halifax Theatre Royal, so he decided to instal two heavy oil engines, a generator and a control panel, the engines were about 90 H.P. each, one for stand-by. This set could be observed from the street through a large window which came down to floor level, this being some 2 ft. 6 in. above the side walk, an ideal position for viewing the proceedings. Many times I missed my tram home through watching one of these beautiful engines turning, with the control panel softly lit and the theatre sign for information to the driver.

These engines were made locally by a famous gas and oil engine firm, The Campbell Gas Engine Company, which had offices in London, Calcutta and Cairo, their engines being sold all over the world. I have one of their old catalogues, and it was from this I got the outline for my own model.

I made my own pattern, the engine is water cooled from two tanks behind the engine house 3 in. diameter and 9 in. high. The bore is 1⅛ in. x 2 in. stroke, and runs on petrol with electrical ignition. I have enjoyed many hours running this model, which generates its own power for lights in the engine-house, these looking very realistic at night.

As will be seen from the photograph, the model has a camshaft driven by skew gears. The flywheel is 7 in. diameter with belt pulley and outrigger bearing, I managed to make a three ram oil pump for bearings, big end and piston, also Mr. Westbury's mixing valve as per "Centaur". I have thought of trying the engine on gas but have not yet had time to do the conversion.

I might add all my modelling activities are not confined to gas and oil engines, I have also made two locomotives, a 3½ in. gauge "Green Arrow" and a 5 in. gauge G.5 N.E. Tank. At present I am building a William Adams X.2 4-4-0 No. 575 in 5 in. gauge, which should be ready for trials this summer.

Trusting the above information will be of interest to fellow readers of the Model Engineer.

Brighouse. D. W. Horsfall

Sir,—"Memories of Models",—Mr. Boddy, Postbag Jan. 18, prompts me to put his mind at rest regarding at least one model gas engine of that bygone era that has survived in working order to this day. I have been a reader of *Model Engineer* for over sixty years and I cannot recall ever seeing a description of a gas engine that I possess; it was given to me about sixty years ago, give or take a few days! and it was then at least sixty years old.

Horizontal engine, tube ignition, rotary valve in head driven by bevel gears, one to one, on crank-shank through 68-34 teeth wheels on valve spindle, 1¼ in. bore 1½ in. stroke water cooled cylinder, crankpin 5/16 in. dia. ½ in. dia. crankshafts. Two flywheels 7⅝ in. dia. ⅝ in. face 6 spokes overall length of engine 10⅛ in. width over flywheels 5⅞ in. weight of engine 13½ lb. hardly a toy to put in ones pocket! Oh! a bunsen burner to heat ignition tube.

Maker's name with scroll around unfortunately not discernible and was not when it was given to me, obviously "Made in England" because all measurements and screws are standard British, painted maroon colour edged with black (original).

Tube ignition, no plugs, wires, batteries, breaker points, friction, etc., the simplest thing that ever was and still in use today on diesel engines only it is called a Hot Bulb.

Unfortunately my little engine rated I believe ⅛ H.P. will not drive my 4 in. Britannia lathe (incidentally £22-10s-0d. in the very early twenties) so I must be content to treadle, in fact I am on towards finishing a Stuart Triple expansion engine, a wonderful exercise for a boy well into his seventies!

The engine runs well on Town Gas, have not tried it on bottled gas, rather anxious to find out how it will cough on North Sea Gas, not too bronchitic I hope! Many years ago I tried it on gear oil, not "Ambroleum" the "oil that makes engines purr like pussies" but ordinary gear oil like Treacle, put some in a boiler, raised steam, sorry gas, piped it into the engine and it worked but not as satisfactorily as gas.

Far be it from me to rob any motor-cycle of its magneto, keep it in its original state, it is much more fun.

Thornton Heath. A. Perman ("Smoky")

Model Ships

Sir,—Two letters in succeeding issues of M.E. (No. 3480 and 3481) on totally unrelated subjects, Model Steamships and Memories of Models respectively, have persuaded me to commit pen to paper.

I have taken your magazine for over three years and, whilst a full analysis has not been carried out, it seems to me that much of the available space is taken over by serialized constructional articles, principally covering locomotives and workshop equipment. Perhaps I am in the minority in thinking that model engineering embraces far more subjects than appear within your covers. Could it be that contributors in other fields are backward in coming forward?

Personally, my interest lies in model shipbuilding and for that reason I should like to respond to Mr. Gordon's letter in No. 3480. I too am interested in model shipbuilding in its truest sense and am constructing an all-metal tug which was on show at the recent Stockport M.E.S. Exhibition on the Manchester Radio Controlled Models Club Stand. The interest aroused in the model engineering fraternity was quite remarkable. Supposedly many others have considered building scale vessels (liners, cargo vessels and warships), but being practically minded and wanting a **working** model, models with scale fittings are prone to pondside damage apart from the damage at exhibitions caused by itching fingers as any exhibitor at the M.E. will know! One has therefore to compromise and tugs, trawlers etc. would seem to be the practical answer, built in reasonable scale the various fittings can be made sufficiently robust to minimise accidental and deliberate damage.

Turning now to propulsive units, no two modellers will agree. Some take laborious affectionate pride in hull and superstructure construction, but any motive power will do. In my own case the prototype is powered by a three-cylinder diesel and as a stopgap, the model will be powered by a twin-cylinder compression-ignition engine of commercial manufacture. Can anyone suggest a method of converting a two-stroke C.I. engine to four-stroke please? Similarly, if anyone has tried a four stroke C.I. design, would they please make their observations public?

Mr. Gordon's cry in the wilderness has not passed unheard and as an introduction, I would suggest he referred to the series of constructional articles on "St. Ninian" which were in your covers some time ago. These articles inspired me initially in the current project.

Readers may be interested that in the course of construction of my scale tug, photographs and notes are being taken and already I am in communication with a publisher with the view to passing on my trials and tribulations so that others may learn from my experiences. It is hoped that the tug will be in an advanced stage of construction for the South Manchester Models Group Exhibition in October/November, this year.

If Mr. Gordon or any other reader has some particular project in mind and wishes to exchange views, please give them my address and with limited time available, I will endeavour to assist.

Wilmslow. M. E. Plant.

A Strange Vice

Sir,—Here is an odd mechanical puzzle to which someone may have an answer.

I have an old 'Perfect' bench vice of industrial size (now no longer manufactured) that has given excellent service for years. Readers will be familiar with the type, which is quite modern in design and has a quick-release lever to enable the lead screw half-nut to be disengaged for rapidly opening and closing the jaws.

Of late, the half-nut has been in the habit of slipping out of engagement when tightening the vice. I have tried increasing the tension of the release-lever spring, but without any improvement.

The obvious reason for this slippage is wear on the buttress threads of lead screw or half-nuts — although very little is apparent on examination of these parts. But whether or not wear is the reason, why is it that there is **no** slippage when a workpiece is held in the left hand side of the jaws, and **always** slippage when moved to the right hand side of the jaws? This occurs regardless of the size of the workpiece.

There is negligible side play on the moveable jaw of the vice, and only a few thou. vertical play. In any case, elimination of the vertical play effects no difference to the slippage phenomenon.

Surely the question of which side of the jaws by which a workpiece is gripped should have no effect on the forces acting on the leadscrew or nut (not in this type of vice, anyway). So what is the explanation?

Sunderland. D. H. C. Fulton

Model Steamships

Sir,—Mr. D. G. Gordon invites explanations for the lack of general interest in modelling ocean-going steamships and several are immediately apparent to me, even though the simple steam launches of my even so my impressions are relevant to the problem.

It is felt that the type of chap who is interested in constructing power plant would find the multitude of non-working deck detail rather irksome — and when the vessel is functioning would vanish at a short distance from shore anyway.

The imposing lines which attracted him in the first place would likewise become insignificant when cruising, and a near scale power plant would only be visible when the superstructure was lifted — to the detriment of the vessel's appearance (full size vessels do not have deck sections whipped off in port).

The waves of even a placid lake produce a most unrealistic bobbing about of even a large model and destroy the realism. Perhaps his suggestions concerning near scale I.C. marine engines could be pursued without too many problems — some of the early diesels are quite as attractive as steam marine engines — being of open type construction — and could be run on propane gas with low compression at modest r.p.m. under load. The late E. T. Westbury considered producing such a design but told me that he had detected very little interest among the boating fraternity and the scheme was dropped in favour of more conventional automotive and motor-cycle type engines which had a wider following. There must be somewhere, however, a lone hand sailing a lovely near-scale vessel on some quiet lake of a summer evening away from the madding crowd of squawking little motor boats devoid of exhaust systems, but by the very nature of things it can never become popular, a steam launch with everything visible would be more fun I think, coal fired of course.

Netherton, Dudley. R. F. Willetts

QUORN TOOL AND CUTTER GRINDER

Continued from page 245

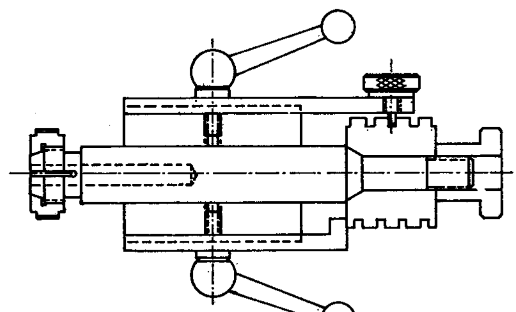
But given care and in amateur use they will perform quite well if left soft and if they do wear they are not too difficult to replace.

The real purpose of the "QUORN" Universal Tool and Cutter Grinder was not however as far as the writer was concerned to grind "run of the mill" tools and cutters although it does this well enough. Its real "raison d'etre" was to find some way to make and resharpen the really tiny cutters down to 1/16 in. dia. which the writer has used in profusion to mill from the solid all the components of a 1/4 scale model B.R.M. V8 racing engine. Such tiny cutters cannot be sharpened by aligning the teeth against a rest—at least the writer cannot do it—the friction is too great and the slightest slip spells disaster. What was clearly wanted was some way of independantly guiding the cutter so that the teeth had the right motion in relation to the grinding wheel, but which did not rely upon making contact with the teeth themselves. After various experiments the Spiralling Head, shown in position on the machine in Figs. 1 and 2, and in more detail in Fig. 34 was evolved.

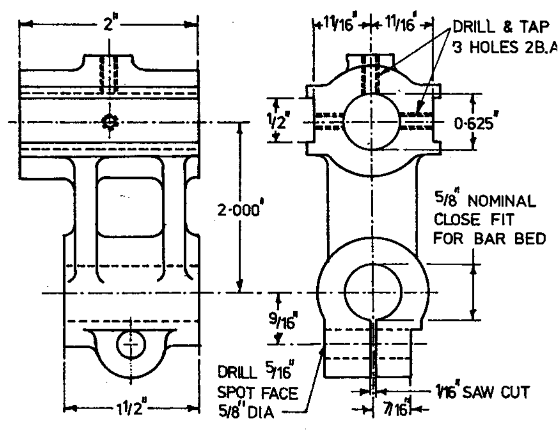
It comprises a long, relatively slender, spindle which is free both to rotate and slide backwards and forwards in the workhead. At one end the spindle forms a spring chuck in which the cutter to be ground can be securely clamped. At the other end it carries a guide hob which has cut upon it a multiplicity of spiral grooves equalling in number the number of teeth in the cutter and having the same linear pitch. A guide pin carried in a fixed but adjustable guide bar engages the spiral grooves and an adjustable stop bar limits the movement.

To be continued

FIG. 34



SPIRALLING HEAD ASSEMBLY



HEAD BRACKET 1 OFF C.I.

ERRATUM

We regret an error in the caption to the photograph of the organ, page 146 (Jeynes' Corner, February 1st). The picture shows the front view *of the organ.*

CLUB DIARY

Dates should be sent five weeks before the event. Please state venue and time.

March 1 Lincoln M.E.S. Club Night, Unitarian Chapel, High Street, Lincoln. 7.30 p.m.
March 1 Romford M. E. C. Competition Night, Ardleigh House Community Association, 42 Ardleigh Green Road, Hornchurch, Essex. 8 p.m.
March 1 Brighton & Hove Society of Miniature Locomotive Engineers. Members' Colour Slides (please bring yours), Elm Grove School, Elm Grove, Brighton. 8 p.m.
March 1 Stockport & Dist. S.M.E.E. Bits and Pieces, 8 p.m.
March 2 S.M.E.E. Talk "The 'Lion' has Wheels" Mr L. P. Purple, Marshall House, 28 Wanless Road, London SE24. 2.15 p.m.
March 2 The M.E.S. Northern Ireland. Meeting, Strathern Hotel, Belfast Road, Holywood, Co. Down. 3 p.m.
March 2 Reading & District S.M.E. Model Engineering Exhibition, Reading Town Hall, 9.30 a.m. to 6 p.m. Working and static models of all kinds including portable track in operation.
March 2 Tramway & Light Railway Society Annual General Meeting, Kent Room, Caxton Hall, Westminster (T.L.R.S. members only) 2.30 p.m. followed at 6.30 p.m. by entertainment.
March 4 Peterborough S.M.E. Film Night, Clubhouse, Lincoln Road, Peterborough. 7.30 p.m.
March 4 Leicester S.M.E. Meeting, Royce Institute, Crane Street, Leic. 7.30 p.m.
March 6 Guildford M.E.S. Illustrated talk on the Highland Railway by Peter Tatlow, H.Q. Stoke Park (near A.A. Offices), 7.45 p.m.
March 6 Swansea S.M.E.E. Lecture, Y.M.C.A., Swansea. 7.30 p.m.
March 6 Bristol S.M.E.E. Talk by Rev, C. J. B. Marshall on "The Grandfather Clock", Unitarian Hall, Lewins Mead, Bristol, 7.30 p.m.
March 6 Harrow & Wembley S.M.E. Committee, B.R. Sports Pavilion, Headstone Lane. 7.45 p.m.
March 7 Harlington Locomotive Society Member's Historic Movie Evening.
March 7 Ilford & West Essex M.R.C. Track and Point building by A. Austin.
March 7 Sutton M.E.C. Members' work Clubhouse off Chatham Close, Sutton, Surrey. 8 p.m.
March 8 Colchester S.M.E.E. Jim Banyard — The Westinghouse Pump. The Clubhouse, Old Allotments, Lexden. 7.30 p.m.
March 8 Bournemouth & District S.M.E. Talk "The Southern Railway Leader Class Locos" by Mr. L. Warnett. Postman Hotel, Ashley Road, Boscombe. 7.30 p.m.
March 11 Clyde Shiplovers' & Model Makers' Society. Magazine Night at Kelvingrove Art Gallery and Museum at 7.30 p.m.
March 11 North Wales M.E.S. Meeting Penrhyn New Hall, Penrhyn Bay, Llandudno. 7.30 p.m.
March 12 Sutton Coldfield & North Birmingham M.E.S. "Some aspects of Model Shipbuilding" Mr. C. F. Palmer. Co-op Meeting Road, 286 Brookvale Road, Erdington, Birmingham 23. 7.30 p.m.
March 13 Cannock Chase M.E.S. Talk on the SS "Olympic" 1933. Mr. Caunce. Lea Hall Social Club. 7.30 p.m.
March 13 Harrow & Wembley S.M.E. Slide Competition. B.R. Sports Pavilion, Headstone Lane. 7.45 p.m.
March 14 Harlington Locomotive Society. Railways of Uxbridge by Mr. K. R. Pearce. 8 p.m.
March 14 Leyland, Preston & District S.M.E. Meeting. Roebuck Hotel Leyland Cross, Leyland, Lancs. 8 p.m.
March 14 Hull S.M.E. Rummage Sale of members surplus equipment. Trades & Labour Club, Beverley Road, Hull. 7.45 p.m.

CLASSIFIED ADVERTISEMENTS

continued from page 259

CLUB NEWS

Changes at Romford

The new officers of the Romford Model Engineering Club are as follows:— Chairman, L. Hammond, Secretary, A. D. Lewis, Treasurer, P. Jones, Engineer, T. Glinister. Peter Dupen, who has been Chairman for the past ten years, has stood down for personal reasons, and members were very sorry to hear of his decision. The Club enjoyed a good year in 1973, and new members totalled 17. The Club meets on the first and third Fridays at Ardleigh House Community Association, 42, Ardleigh Green Road, Hornchurch, Essex. The Secretary's address is:— 45, Repton Avenue, Gidea Park, Romford, Essex.

Cheltenham Society.

The Cheltenham Society of Model Engineers enjoyed a very interesting talk last November, by Mr. Hawley, Chief Flight Engineer of the Concorde project. Another good talk was given by Mr. Butt, Regional Engineer for British Railways, Western Region. This dealt with motive power on the railways from 1950 up to the Advanced Passenger Train. Secretary:— Mr. R. W. Jones, 15, Granley Gardens, Cheltenham, Glos.

News from Norwich.

Mr. M. Greenfield has been elected Chairman of the Norwich & District Society of Model Engineers, and Mr. R. Heasman Vice-Chairman.

At an informal meeting on January 9th, Malcolm Greenfield produced the hull of a model of a French 17th. century sailing ship. Albert Peacock described how to make draw plates and use them to produce special sections in brass. He showed several draw plates which he had made and mentioned the use of beeswax as lubricant. Secretary:— A. W. E. Hoskins, 5, Hellesdon Road, Norwich.

S.M.E.E.

At an informal meeting on October 27th, Mr. George Wildy discussed model locomotive valve design and vacuum relief or snifting valves. Mr. George Thomas described a four-faced drill having chisel edges and point, which has the advantage of starting a hole without centre-popping the position and which does not wander. He also discussed the use of Loctite for fixing wheels on axles.

Items seen "on the table" were a Works plate from the locomotive "Wouldham", an Andrew Barclay engine of 1920 which was the last survivor of those which worked on the tramways in the cement works and chalk quarries of the Medway Valley; a whistle from a similar engine was also displayed and a Salter spring balance for a safety valve from a Fletcher-Jennings 0-4-0 tank locomotive. These items were shown by Mr. G. R. Hatherill. Mr. P. Wardropper showed a chimney for a ¾ in. scale "Rob Roy" and Mr. F. M. Collins showed a test rig consisting of a modified Stuart No. 10 to test the behaviour of an "O" ring when used on a balanced valve. It has run 4 hours at 3000 r.p.m. on 20 p.s.i.

On November 3rd. Mr. D. H. Chaddock gave a most interesting talk on his "Quorn" tool and cutter grinder, which is now being described by him in *Model Engineer. Secretary:— A. A.* Smith, 28 Wanless Road, London, S.E.24.

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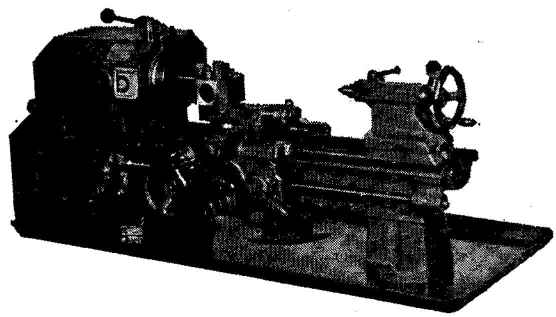

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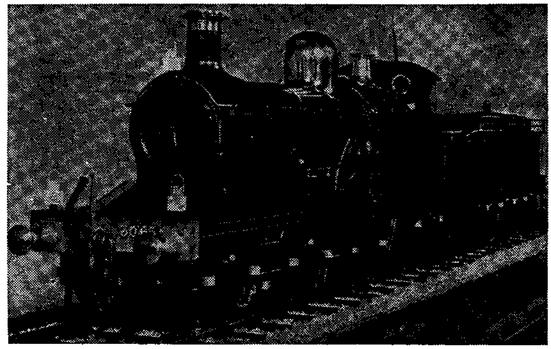

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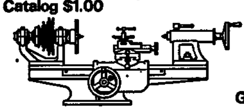

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continued on page 253

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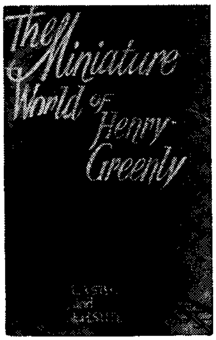

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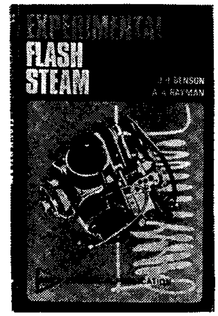

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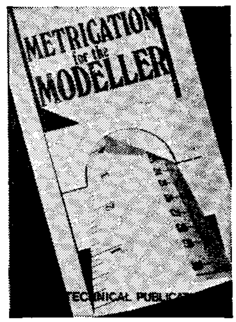

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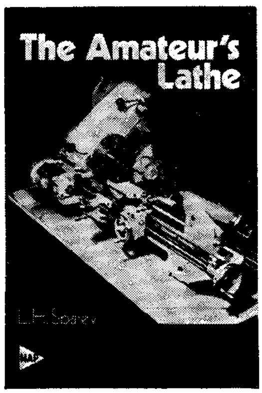

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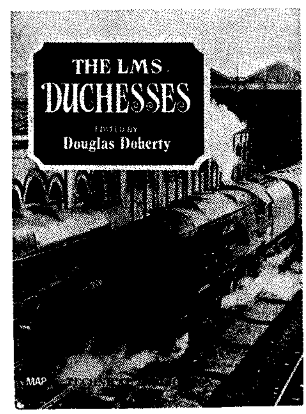

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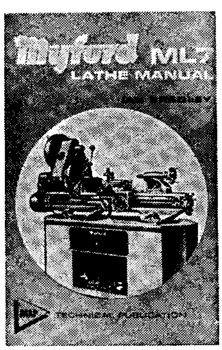

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