THE MODEL ENGINEER

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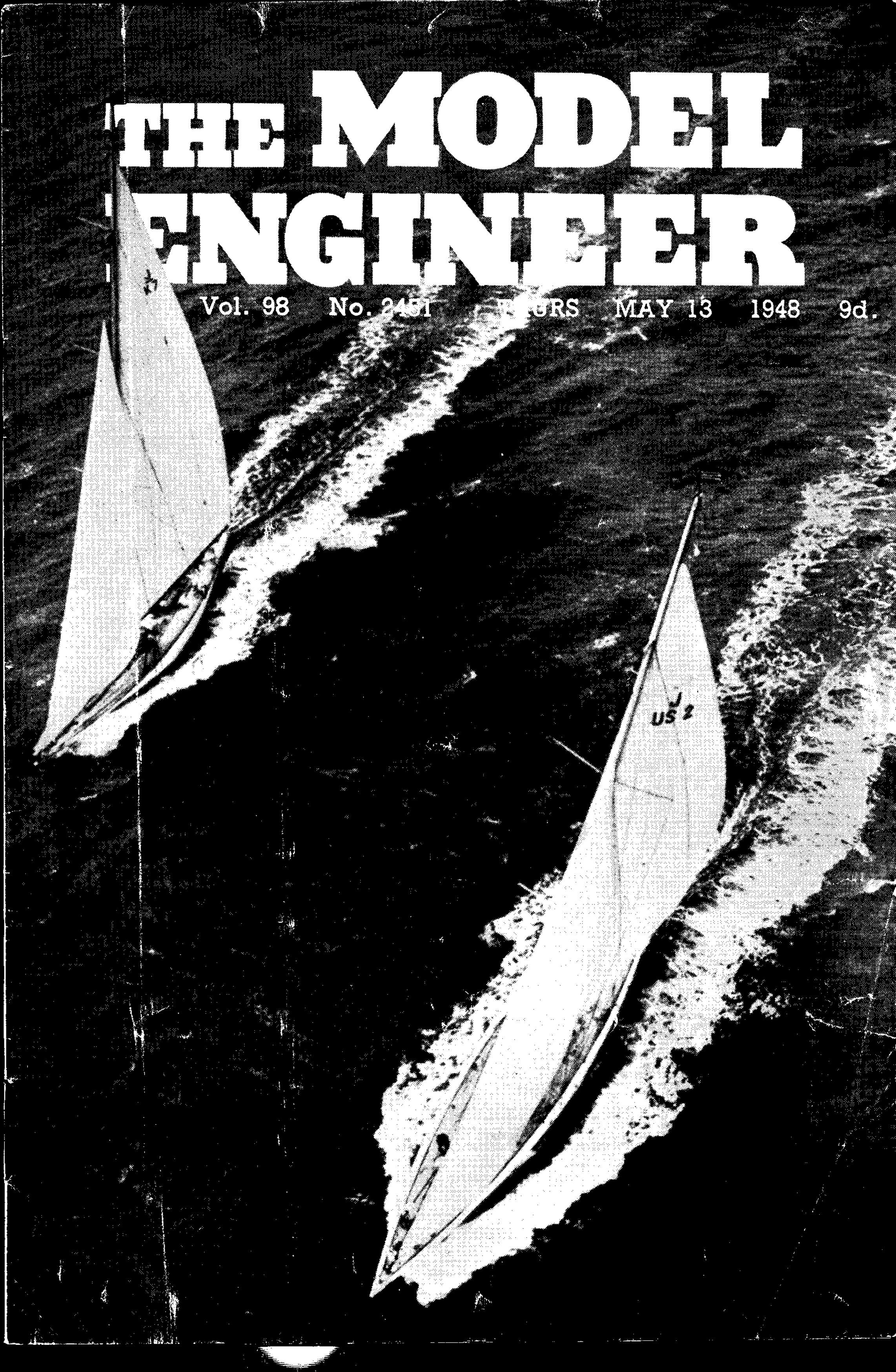


The MODEL ENGINEER

PERCIVAL MARSHALL & CO. LTD., 23, GREAT QUEEN ST. LONDON, W.C.2

13TH MAY 1948 VOL. 98. NO. 2451

SMOKE RINGS

Our Cover Picture

● THIS WEEK we publish an aerial photograph of a phase of yachting which has passed with the war and will probably never be seen again. Two big "J" class yachts are racing neck and neck, sailing close-hauled on the starboard tack somewhere off Harwich. The "J" class yachts reached the limit to which this rig can be built; they had duralumin masts well over 150 ft. in height, and in spite of the most elaborate staying, breakages were all too frequent. The smaller classes are much more practical and can be sailed in weather which would be dangerous for the "J" class yacht. Then again, increasing costs and changing conditions make it extremely unlikely that sufficient of these yachts will be built to form a racing class. One of the last of them, the *Astra*, which although not strictly a "J" class yacht, raced in that class for several seasons, was sold recently for a fraction of its cost, and will probably sail with its rig considerably cut down.—E.B.

Preserving the Thames Barge

● IN VIEW of the popularity of the Thames barge as a prototype for the ship modeller, which is shown by the number of examples to be seen in every model engineering exhibition, our readers will be interested to hear of the club which has been formed to keep a number of them in commission. The club has temporary headquarters at the National Maritime Museum, Greenwich, and its first commodore is Mr. Frank G. G. Carr, the director of the Museum. In the efforts to ensure the barges' survival, the new club will foster the art of sailing them, and will try to revive the annual barge race which was a notable Thames event in pre-war years. Barge skippers are being invited to join, as their experience will be invaluable in training members to handle these craft. A further aim of the club is to preserve plans, drawings, prints and models of barges and other types of coastwise sailing craft. The spritsail barge of the Thames and East coast is, perhaps, the only type of purely sailing craft still working around our shores at the present time, and it is rapidly disappearing. Fifteen years ago, there were 3,500 of them in commission, now it is estimated that there are only about 500. They have outlived most of their contemporaries because of the extreme efficiency of the design of both hull and rigging. The fact that a vessel carrying nearly 200 tons of cargo can be handled by the skipper and one man is ample proof of this. To see them moored in the river or tied up to the quay, one would never imagine how graceful and speedy they are when at sea, or how handy they can be when threading their way through the busy river traffic off Greenwich pier. Some years ago, I spent a thrilling day on Canvey Island watching them and making sketches as they ran before the wind, or tacked across and across the Estuary making their way up the river. This was my first sight of them under way in open water, and I shall never forget the impression of power and beauty they created in my mind. It would be a thousand pities if such craft were allowed to disappear.—E.B.

Back Numbers Wanted

● MR. ALLAN J. HURRY is a reader who wishes to build "Fayette," the 2½-in. gauge locomotive described by "L.B.S.C." in 1928-29. Unhappily he is short of eight issues of THE MODEL ENGINEER in which this series appeared. Advertising has on this occasion failed to produce the desired results, and Mr. Hurry has appealed to me to appeal to you for your help. Whilst it is most unlikely that you will wish to dispose of your own copies, it is just possible that you may know of someone disposing of their library, who may be able to assist. The missing numbers are :—December 13th, 1928—No. 1440 ; March 7th, 1929—No. 1452 ; March 21st, 1929—No. 1454 ; March 28th, 1929—No. 1455 ; April 4th, 1929—No. 1456 ; April 11th, 1929—No. 1457 ; April 18th, 1929—No. 1458 ; and May 2nd, 1929—No. 1460. Mr. Hurry, whose address is 77, Brisbane Street, Greenock, Scotland, would be very glad to hear from anyone who may be able to assist him in his difficulty.—P.D.

A Real Yorkshire "Do"

● MESSRS. T. GARNER & SON LTD., of Barnsley, recently held an informal "At Home" meeting in a local hall, where the latest developments in tools and other engineering products were exhibited, and facilities provided for members of the manufacturing trades to meet customers and discuss current problems. Practical demonstrations in the operation of Myford lathes, Delapena honing appliances, and in the running of "Ensign" and other model petrol engines, kept up a continuous flow of interest, which was highly appreciated by the large number of visitors, many of whom came from far afield. I congratulate Messrs. Garner's on the enterprise which prompted the organisation of this novel exhibition, and welcome the evidence which it affords that, despite present difficulties, our advertisers are still very much alive to the importance of goodwill between dealer and customer.—E.T.W.

How High?

● DISCUSSIONS OFTEN take place among model engineers as to the most suitable height for a work bench, a vice or a lathe, but although there have been attempts at authoritative ruling on these points, they still remain very much a matter of personal preference. In no case is this more pronounced than in the case of the lathe, and one finds these machines installed at all sorts of different heights in various workshops. Obviously the stature of the operator must be an important deciding factor, and it is also necessary to take into consideration whether the operator prefers a standing or sitting position when working the lathe. Considerations are also to some extent different in the case of treadle or power-driven lathes. My personal preference is to have the lathe centres practically breast high, but I know that many lathe users will prefer a much lower position than this. One should always select a position for the lathe, or any other machine tool, which allows of working it in comfort without undue bending of the back or cramping of the muscles. The question of lathes which have to be handled by a number of different operators is somewhat more complicated, and some model engineers who have had to carry out their work in a communal workshop have often had reason to criticise the position and mode of installation of these machines.—E.T.W.

"Great Western"

● IT SEEMS that the well-beloved title of one of the best-known of British railways is destined to remain before the public for some years to come, because the last "Castle" class engine to be built for the Great Western Railway, No. 7007, *Ogmore Castle*, has now had the name changed to *Great Western*. In April, 1846, the first of the celebrated 8-ft. single-wheelers for the broad gauge was turned out of Swindon Works and was also named *Great Western*. After the abolition of the broad gauge, in 1892, no engine carried the name ; but in 1893, one of William Dean's beautiful standard-gauge 4-2-2 express engines, No. 3012, was given the name and remained in service until 1909. Since then, the name has not, until now, figured in the locomotive stock. Incidentally, the Dean engine No. 3012, *Great Western*, is the subject of a very well-executed picture in coloured tiles, which can be seen on the left-hand wall of the entrance porch to the Great Western Hotel at Swindon, Wilts, the town in which all the *Great Westerns* were successively built. This tile-picture is thought to be unique, but, perhaps, some reader may know of another. There are many enthusiasts who deplore the loss of identity of our railways as a result of nationalisation. But what an incentive for some G.W.R. enthusiast to build models of the three *Great Westerns* to commemorate his favourite railway !—J.N.M.

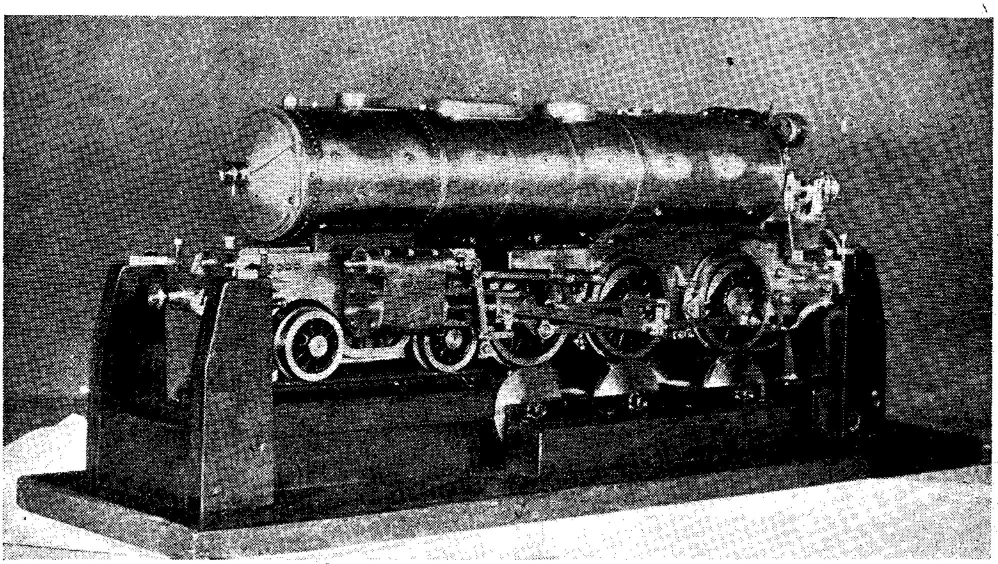
A Change of Name

● AT A general meeting of the Harrow Society of Model Engineers held on April 28th, some discussion took place on the question of enlarging the sphere of the society's activities. Among the decisions which were agreed to was one that the title of the society should be changed to "The Harrow and Wembley Society of Model Engineers." The two areas are so much one now, and so closely associated, that the society can scarcely fail to benefit by the widening of its scope and influence in the district. I am no stranger to the society, and have watched its progress over a number of years. I wish it every success in its new guise.—J.N.M.

A Locomotive Test Stand

by M. A. Millar

THE $1\frac{3}{4}$-in. gauge partly-finished locomotive depicted in the photographs is of free-lance design, very largely based upon the teachings of "L.B.S.C.," particularly with regard to the cylinders and valve-gear. Being the first locomotive I have constructed, and having no track on which to carry out running trials, I felt that the only way I could try out the model under air or steam was to construct a simple test stand, so allowing the anticipated dozens of faults to be corrected properly before further work on the rest of the model was proceeded with.



The $1\frac{3}{4}$-in. gauge 4-6-0 locomotive ready for trials on the test stand

The test stand is very simply constructed from scrap lengths of wood found in the workshop, and odd pieces of metal from the junk box. As will be seen from the illustrations, the bogie of the locomotive rests on a short length of track mounted on a wood block which is held by wood screws to the $\frac{1}{2}$-in. thick baseboard.

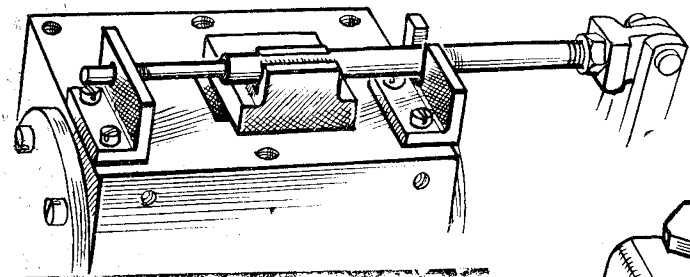
The driving-wheels, however, run on $\frac{3}{16}$-in. thick brass discs which act as free-running rollers, the centres of each pair of discs on an axle corresponding vertically with those of the driving wheels above. The axles are of $\frac{1}{4}$-in. dia. mild-steel rod shouldered down to take the discs which are sweated into position and finally turned to size between centres in the lathe to ensure true running.

The small "chassis" frame which carries the rollers, consists simply of two horizontal $\frac{1}{2}$-in. angle-brass side members, drilled to take six short lengths of brass tube (sweated in position) which act as bearings for the axles. The side members are held by small wood-screws to blocks of wood cut to a depth to bring the driving wheels of the locomotive to the same height as the rails under the bogie. The blocks are held to the baseboard by wood screws.

In order to prevent the model moving fore and aft, two wooden uprights are attached, at each end of the stand, by blocks and screws to the baseboard, each upright butting against the outer end of a buffer-beam, with approximately $\frac{1}{8}$ in. play to give the locomotive a certain freedom of movement whilst undergoing trials in forward or reverse gear. On the top face of each upright is a small brass arm which can be swivelled round so that the screw in the end of it can be adjusted to depress the locomotive chassis to its correct running height.

The test stand is completed by the addition of a hand-operated water-pump (mounted on the stand near the rollers on the off-side and actuated by a long lever) for supplying the boiler, and also a self-energising gas blowpipe which fires straight through the fire-door into the firebox of the Smithies water-tube boiler. The blowpipe is held in position by a bracket built up from strip iron and screwed direct to the wood block between the rear uprights of the stand.

In practice, the test stand was invaluable long before the boiler was made and fitted, as the precise movement of the pistons, crossheads, connecting and coupling rods could be checked, followed by the units of the Walschaerts valve-gear and the worm and nut reversing gear. By jury-rigging the valves on the port faces (see sketch) before the valve chests were fitted, the adjustment and timing of each valve could be carried out under comfortable conditions, and adjustment or alterations made at the right time. Despite the greatest care, a number of small faults did occur during erection of the valve-gear, but all were eliminated eventually. The

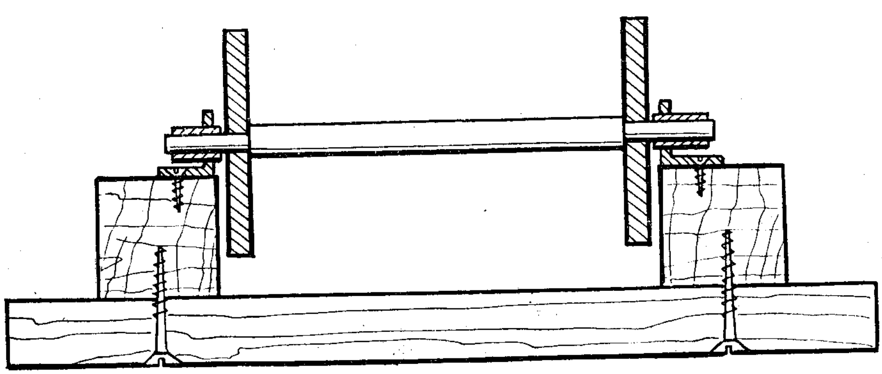


Left—Small lengths of brass angle attached to cylinder port face for temporary locating valve and spindle when timing valves

locomotive chassis is fitted with an axle-driven water-pump, and working compensated brakes operating on all driving wheels are used to apply a suitable load when the chassis is tested under compressed air or steam.

The first trials of the locomotive without the boiler were very satisfactory, under compressed air of 35 lb. supplied by a fairly large works compressor, but it was not realised at the time that air leaks from glands, etc., are invisible and that the sheer bulk and sustained pressure of air from the works supply could keep the big cylinders ($\frac{5}{8}$ in. × $\frac{7}{8}$ in.) going indefinitely so long as the throttle was kept open. But the air tests did prove the valve-gear in regard to settings and also enabled the geometry of the reversing gear to be worked out before the gear was finally made and fitted.

When the boiler was fitted to the chassis and the first steam trials made, it was an entirely different story. The boiler was capable of making plenty of steam but would not keep the cylinders

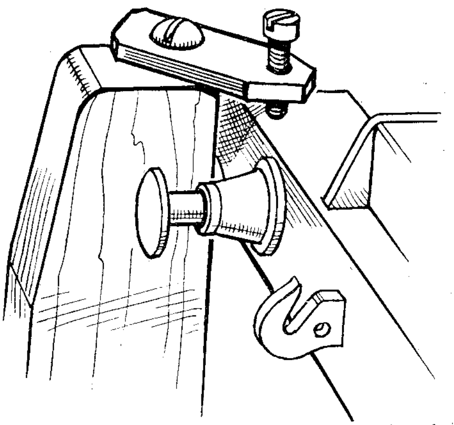


Cross section of stand, showing mounting of rollers in bearings carried on wood blocks

going, owing to faulty blast arrangements, sticking valves, steam-chest leaks and uncertain oil supply from the displacement lubricator.

The cylinder ports are $\frac{5}{16}$ in. wide with large exhaust passages leading to a 3/32-in. blast nozzle; but the blast, at 75 lb. steam pressure, was so fierce that the gas blowpipe flame in the firebox was sucked out immediately the throttle was opened, and not until the nozzle was opened out to a shade under $\frac{3}{16}$ in. could the gas flame be kept going continuously.

When the exhaust arrangements were corrected satisfactorily, faulty oil supply caused the valves



Below—One of the small hinged arms for depressing the locomotive to correct running height

to stick on their spindles and create a blow-by, due directly to wrong adjustment of the needle-valve in the displacement lubricator. These troubles were cured, and while the valve-chests were dismantled, the opportunity was taken to shorten the valves slightly and improve the steam distribution. The cylinder glands were repacked; also, one or two bushes in the valve-gear, which had developed premature play, were replaced. Gradually the performance of the locomotive was improved, with less steam consumption, while against the brakes, regularity in exhaust beats (in full gear or linked up) was duly attained.

One of the principal advantages of a test stand is that a locomotive can be tried out in many directions before it starts life on the track, and the many small corrections can be made on the spot in the workshop ; but it is obvious that the final performance, as regards starting, acceleration and sustained pulling, can only be ascertained when the locomotive is on a track. On this stand, the model is pulling against the brakes—a very different load from hauling a train of carriages, or a live load on a track. With the brakes off, the locomotive will accelerate so violently as to drop the boiler pressure severely—thus upsetting the steady steaming of the boiler—conditions which must be guarded against.

There is ample space between the firebox and the baseboard of the stand for a vertical bunsen burner, if that form of experimental firing is chosen, the same applying to paraffin or methylated spirits burners. If the firebox is fitted with a suitable ashpan, coal or charcoal firing can also be experimented with safely. The $\frac{1}{8}$-in. dia. delivery-pipe between the hand water-pump and check-valve on the rear buffer-beam has a wide bend in it to give sufficiently flexibility for the locomotive to move slightly backwards or forwards.

Friends have often enquired why an attachment has not been fitted on the stand to test the drawbar pull of the locomotive, but while it would not be difficult to devise and fit a form of adjustable brake on the rollers (or their axles), it would not be an easy matter to measure the drawbar pull accurately owing to frictional losses, lack of wheel adhesion and other factors.

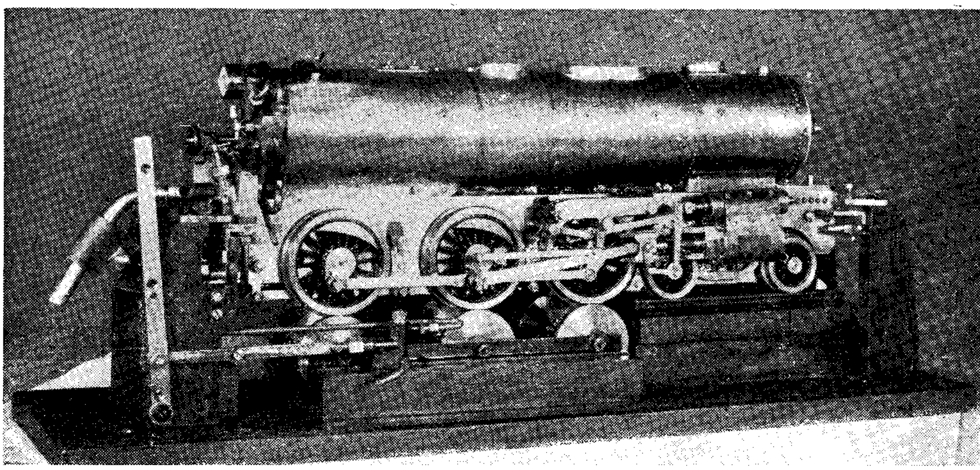


Photo showing the lever-operated water pump and temporary firing of the boiler by a gas blowpipe

The base of the stand could be made of a length to include a short section of track for the tender, so that the latter, with all fuel and water connections could be suitably tested. The stand described was, however, kept to its present length, so that the unit, complete with locomotive could be conveniently carried in an old suitcase to club meetings or elsewhere.

One word of warning to readers who may try testing their locomotives on a stand : Keep a sharp eye on the ceiling of your workshop—the exhaust from the funnel may spatter the ceiling with condensate or, worse still, with oil spray from the displacement lubricator. This happened to me on two occasions, just after the ceiling had been newly made and distempered—with somewhat severe domestic embarrassment, as can be imagined ! The remedy is to fit a small horizontal baffle about 6 in. above the funnel, supported by a light stand, or from a bracket in the workshop wall.

Castings for 15-c.c. "Seal" Engine

In the "Sales and Wants" column of the April 22nd and 29th issues in an advertisement for castings of the "Seal" 4-cylinder engine inserted by Craftsmanship Models Limited of Norfolk Road Works, Ipswich, the capacity of the "Seal" engine was stated as 10-c.c. This has resulted in a large number of readers, seeking 10-c.c. 4-cylinder engines for model cars, applying for these castings. Followers of Mr. Westbury's Petrol Engine Topics will, of course, know that the "Seal" is a 15-c.c. engine and that the figure "10-c.c." was a printer's error.

We apologise to readers whose search for a 10-c.c., 4-cylinder engine has resulted in disappointment, and to our advertiser for the additional work this mistake has involved.

Making Hand-Wheels for Models

by K. N. Harris

ANYONE who is interested in the making of scale models must, from time to time, have to make various sorts of hand-wheels.

These are fiddling things to make by normal methods in the smaller sizes, and by no means easy to produce cleanly, of good proportions and finish.

I recently bought up a complete workshop which had belonged to a deceased model engineer of long standing, and amongst its contents were a number of part-finished models, including a horizontal engine to a design given in these columns many years ago.

Unfortunately, this workshop was an "outside" one of galvanised iron, and more unfortunately still, the late owner had been unable to give it any attention for two years, hence things were in an appalling condition of rust.

However, this engine had at least sound castings and was of not bad design, so I decided to rebuild it. Like so many jobs lightly undertaken, the "rebuild," in the upshot, meant very nearly a new engine; actually, all that remains of the original is the cylinder body (rebored and the ports and passages altered), the main frame (with new bearing caps) and part of the steam chest. Crankshaft, flywheel, eccentric, pulley, connecting-rod, crosshead, eccentric-rod piston and piston-rod, covers, valve and valve-rod, etc., are all new.

A Star Hand-Wheel

However, to come to the point, I wanted a four-spoked "star" hand-wheel for the throttle valve, and what follows is a description of the method used in making it; of course, with variations it is applicable to all sorts of wheels, including ships' steering-wheels with fancy-shaped spokes and handles.

First a stub-end of brass was chucked in the three-jaw, faced truly and turned on its diameter until this was about 1/32 in. below the outside diameter of the rim of the required wheel.

Next, a steel disc $\frac{1}{16}$ in. wider and $\frac{1}{16}$ in. greater in diameter than the required wheel, was truly faced on one side.

The position of the brass stub in the chuck was marked, it was then removed, the steel disc soldered to it as accurately central as possible (faced side), and the whole re-chucked.

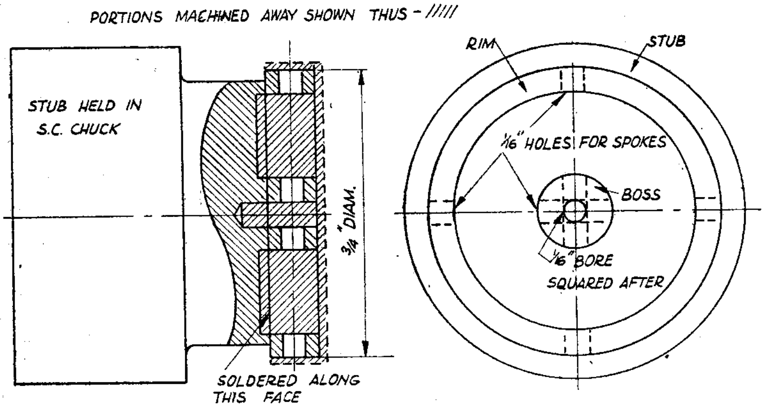


Fig. 1

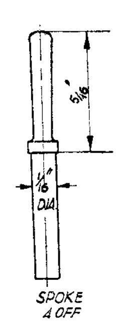


Fig. 2

The steel disc was then machined on the rim and face and recessed as shown in Fig. 1 and bored; in effect, this left a boss and a rim concentrically attached to the brass stub.

Next, a drilling spindle was mounted on the top slide at centre height and at right-angles to the lathe axis. A small size Slocomb drill was mounted in the drill spindle chuck. The lathe mandrel was locked by the dividing device (described in THE MODEL ENGINEER, January 29th, 1948) and the Slocomb drill advanced until it was central with the width of the rim, and the rim centre drilled. The Slocomb was then substituted by a $\frac{1}{16}$-in. drill, and this was put through, and through boss into centre bore.

The mandrel was then moved through 90 degrees (30 holes on the 120 circle) and the process repeated; this was done twice more, leaving four holes.

Spokes and Handles

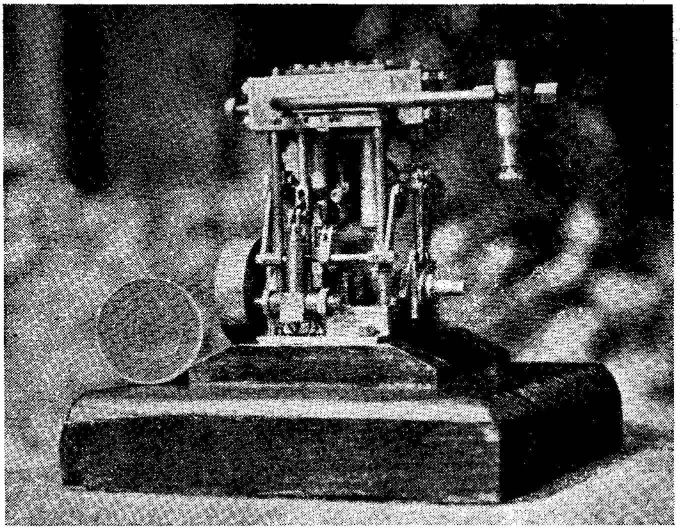
Next came spokes and handles: these were made as sketch (Fig. 2) care being taken to ensure that the distance from the face of the collar to the inner end of the spoke was not sufficiently long to allow spoke to foul the bore.

Next, the holes in the steel rim and boss were each given a tiny touch of solder paste, ditto the inner ends of the spokes and the part just below the collars. The spokes were then carefully pushed into place (it is highly desirable that they should be a good fit, neither too slack nor, on the other hand, so tight that forcing them might risk

(*Continued on page* 502)

A Small Marine Engine

by "R.G."



THERE is always a reason for building a model, and the reason why this little engine was built was to endeavour to construct a marine engine from the box of odd ends left over from other jobs. The "scrap box," from which so many have built superb models, seems, according to the results obtained from the use of its contents, to be more like a treasure cave. Having no such store of precious metals, the odds and ends of brass and steel were spread out.

The Size of Model?

The size of the engine depended upon the dimensions of the piece of metal available for the cylinders. The only possible piece was a 2-in. length of brass, ½ in. square, which would allow a two-cylinder engine ¼-in. bore × 5/16-in. stroke. A piece of this was cut 1¼ in. long and two pieces of brass angle were cut and soldered to the sides for attachment of the cylinder to the standards. Next, all faces and the ends were squared up and the length made 1 3/16 in. Then the bores were marked off, drilled and reamed, after which the inlet and exhaust ports were cut. The inlet ports are 1/32 in. × ⅛ in., and the exhaust 1/16 in. × ⅛ in. The top covers are 1/16 in. thick × ½ in. square brass, each with a 1/32-in. spigot for registering in the bores, and are held down by 1/16-in. Whit. screws. The bottom covers are similar, but with tiny packed glands for the piston rods.

The valve-chests are pieces of ½ in. square brass, ¼ in. thick, each with a packed gland for the valve-rod. The covers are flat brass plates, 1/16 in. thick, and, with the chests, are held in place by 1/16-in. Whit. studs and nuts.

The pistons are phosphor-bronze, a bare ⅛ in. thick, with a 3/64-in. groove containing a twist of graphited yarn, and were finished to size after fitting to the 1/16-in. dia. piston-rods.

The cylinders are fitted with trunk guides which spigot over the piston-rod gland boss. The guides and bottom covers are held to the cylinder by 1/16-in. Whit. screws. All steam joints are made of thin brown paper.

Two crankshafts were made, the first being built up and the second machined from the solid, using a piece of ⅜-in. square mild-steel. Both proved equally satisfactory until the machined one was accidentally dropped, thereby sustaining a kink which finished its useful life. The shaft in use now is the built-up one and has 5/32-in. dia. bearings and ⅛-in. dia. crankpins.

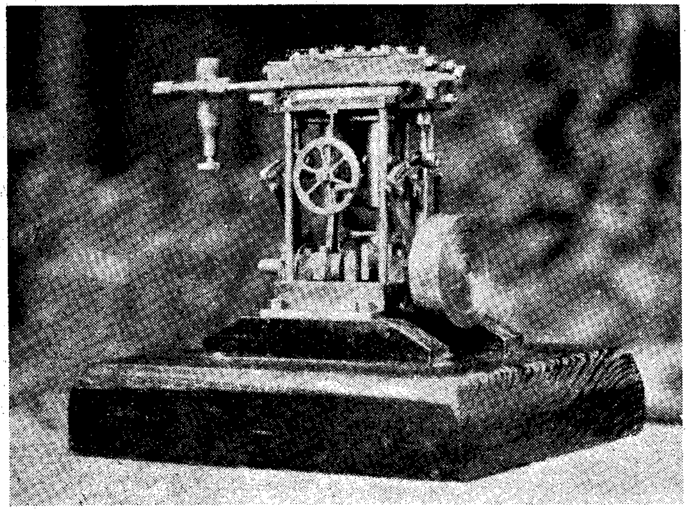
Stainless steel, which some think should have been used, not being available, the connecting-rods are cut out of ⅛-in. thick brass, the big-end caps being attached by 1/16-in. Whit. screws. The rods are attached to the crossheads by 1/16-in. dia. pins, one of which is made sufficiently long to operate the forked lever for driving the boiler feed-pump.

The Base

The base is made from a piece of 1-in. × ⅛-in. brass strip, to the sides of which are soldered two pieces of ¼-in. brass angle, which form the feet. Rectangular holes are cut in the plate to allow clearance for the connecting-rods and crank throws. The main bearings comprise upper and lower halves attached to the base-plate by 1/16-in. Whit. screws.

The engine is fitted with Stephenson's link reversing-gear, thereby necessitating two eccentric-sheaves for each valve. Some difficulty was experienced in fastening these to the crankshaft as they had to be made separately, because the eccentric-straps are each made in one piece, from 1/16-in. brass. The problem of attachment was solved by making one eccentric of each pair with a long boss and fitting the other eccentric over this, pinning the two together and locking with a thin nut after timing, the assembly being fastened to the crankshaft by a small taper-pin.

The expansion-links are cut from 1/16-in.



A boiler feed-pump is $\frac{1}{8}$ in. bore × 5/32 in. stroke and is mounted on the starboard side of the engine. It is driven by a forked lever operated by the crosshead pin of No. 1 cylinder, the suction and delivery valves being 3/32-in. dia. bronze balls.

The reverse is effected by a screw and links operated by a hand-wheel mounted on the port side of the engine.

The approximate overall dimensions of the engine are: height, $2\frac{1}{2}$ in.; length, $2\frac{3}{4}$ in.; width, $1\frac{1}{2}$ in.

The engine ran for two and a half hours on compressed air at 20 lb. per sq. in. pressure at THE MODEL ENGINEER Exhibition in 1946, and has worked subsequently very successfully under steam.

It is proposed to make a boiler of suitable dimensions in the near future and mount the whole plant on a common baseplate, after which it is hoped to try it out in a boat about 26 in. long.

steel plate and operate a tiny "D" slide-valve through a $\frac{1}{16}$-in. valve-rod. The cavity in the valve is $\frac{1}{8}$ in. square and the travel just over $\frac{1}{16}$ in.

The lubrication of the cylinders is effected by means of a small displacement lubricator attached to the 3/32-in. dia. steam-pipe and works extremely well.

Making Hand-Wheels for Models

(*Continued from page* 500)

damaging the job). The whole was then removed from the chuck, stood on end, wheel-up, and gently warmed with a gas blowpipe, using a soft large flame, until the solder ran both at the spokes and, of course, that holding rim and boss to stub. A pair of forceps were used to remove the wheel, which was carefully wiped free of solder whilst still hot.

In the heating operation, heat the *stub* and let the heat from this do the job, don't play the flame direct on the wheel.

The wheel was next mounted on a small stub, mounted in a collet on my Wolf-Jahn lathe and polished to remove any traces of solder.

Finally, the hole in the boss was carefully squared with a tiny broach.

It could, of course, be tapped, and from a working point of view this is perfectly satisfactory, but it does not happen to be usual full-size practice.

Wide Variation

As I said earlier, this method is capable of wide use and considerable variation; the important principle is the assembly, whilst the wheel rim and boss are accurately and rigidly mounted concentrically and in plane with one another.

If carefully carried out, the resulting wheels come out cleanly, and the actual method of construction is almost impossible of detection.

The Rust Trouble

One small hint: as you must know from bitter experience, fine bright steelwork is highly susceptible to rust, which can be very hard to get rid of, especially in fiddling little jobs like hand-wheels, therefore (*a*) as soon as polished, clean carefully round the boss and spokes to remove any possible traces of soldering fluid, and (*b*) when this has been done, carefully wipe *all over* with a greasy rag.

Now you may think a greasy rag is just a greasy rag—not so. An *oily* rag is of little use in this connection.

Take a piece of soft linen and wrap up in it a lump of *vaseline*, knead it and knead it until the whole fabric is completely impregnated; add a few drops of sweet oil and thoroughly knead it again. Keep in a clean tin and use to wipe over all bright steel work; used with care and discretion, whilst it is not a 100 per cent. cure for the rust fiend (the only one I know is a perfect vacuum!), it will take care of all ordinary conditions with a marked degree of success.

*Making Scale Ships' Fittings

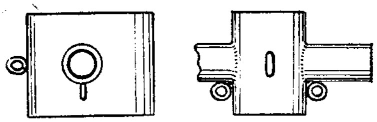
Suitable for motor-yachts, cabin-cruisers, A.S.R.Ls., M.T.Bs. and other "light craft"

by W. J. Hughes

THE mainmast band was turned from the solid and worked to shape in a similar manner to the step. There are two sockets for the crosstrees, and these (sockets) have tiny spigots silver-soldered into holes drilled in the sides of the mastband. Three small eyelets, for forestay and mainstays, were sweated into No. 70 holes during the tinning operation. Fig. 24 shows the construction.

(Fig. 25). The inner ends were sweated into the sockets in the mastband, and both mast and crosstrees were treated with the varnish-stain and cellulose finish previously mentioned. The bands were left bright.

The mast stays and halliards were made from nylon fishing-line, the former being painted with aluminium paint to represent galvanised wire rope.



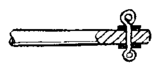


Fig. 25. Section through end of crosstrees, showing how two eyelets are formed from one pin

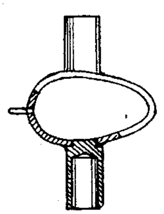


Fig. 24. The mastband, showing streamlined shape to suit mast

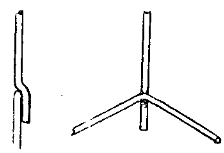
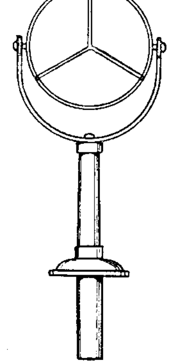


Fig. 27. How to make the wire guard for the searchlight. After silver-soldering, the projecting part is cut away



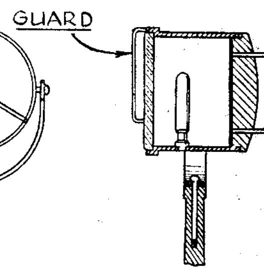


Fig. 26. Searchlight, with stand extended to form fixing-dowel on which the whole can rotate

Mainmast (Photos Nos. 4 and 5)

A piece of straight-grained mahogany (from an old chair-back) was planed to size for the mainmast. At its base its maximum diameters (to use an Irishism !) were $\frac{5}{8}$ in. × $\frac{3}{16}$ in., tapering at the top to $\frac{1}{4}$ in. × $\frac{1}{8}$ in. After planing to these sizes, keeping a rectangular section throughout, it was planed and filed to the streamline section, taking care that it was left a good fit for the socket and the mastband. A small spigot $\frac{1}{8}$ in. diameter was filed at the top to fit into a hole in the mast-cap, which was turned from plastic rod to represent an insulator. When the latter was finally cemented in place, a No. 70 hole was drilled right through, into which a pin was inserted, the ends of which were made into small eyelets to take the mast stays.

Crosstrees (Photos Nos. 4 and 5)

Short pieces of 3/32-in. diameter wire were tapered down to form the crosstrees. Small bands were fitted on the ends, and drilled right through for the pins which were formed into two eyelets, one above and one below the band

*Continued from page 474, "M.E.," May 6, 1948.

Ensign (Photos Nos. 4 and 5)

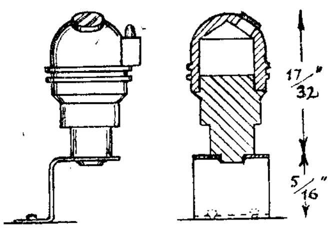
None of the model-shops seemed to stock R.A.F. ensigns, and it was necessary, therefore, to make one. A piece of fine cambric was secured from the domestic authority's workbox, and the design sketched on it in pencil, after marking carefully to size. A raid on the childrens' desk next secured a box of pencil crayons, with which the design was coloured.

Some clear dope having been applied to the cloth, and allowed to dry, the ensign was cut out. The dope not only stops the colours fading and running ; it stops the edges fraying and also stiffens the fabric somewhat so that the ensign looks as if a light breeze were lifting it lazily. At the same time it is not so stiff and heavy as to prevent the ensign streaming properly in a decent breeze.

The ensign was fixed to the halliard with "Durofix"—I had my doubts as to whether this would not soon come off, but it has not done so yet, nor does it show signs of it (after 12 months' running).

Searchlight (Photos Nos. 4 and 5)

Construction of the searchlight is shown in Fig. 26. The barrel was turned from $\frac{1}{2}$-in. diameter brass rod, and was bored out to a thin shell. A recess having been turned to take the perspex "glass"—note it is flat and *not* a lens—the barrel was parted off. Two No. 70 holes were drilled for the pivot pins, and a 1/32-in. diameter hole for the spigot of the dummy bulb and holder. The latter were turned in one piece from 18-gauge nickel wire, and highly polished to represent the projector bulb. In the prototype the half of the bulb which faces forward is silvered to reflect



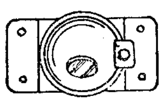


Fig. 28. *The binnacle and stand*

all light back to the rear parabolic reflector, and this is represented quite well by the polished nickel. No one sees the back of the bulb, so that's all right!

To make the back of the searchlight, a spigot was turned on the end of a piece of $\frac{1}{2}$ in. brass rod, to be a good fit in the barrel, and sufficient was parted off to allow for the rounding of the back. This was done with the piece reversed in the chuck. The hand-grip is a piece of 26-gauge wire silver-soldered into two holes in the back.

by means of a pin fitting into a No. 70 hole, the whole being sweated together. The whole stand rotates in the hole in the dashboard, instead of the stirrup rotating on the pedestal, as it should.

The pivot-pins were now pushed through the holes in the stirrup into those in the barrel, and were sweated in to the latter—a somewhat difficult task without sweating them to the stirrup too, but it was accomplished by putting a little grease on the latter so that the solder wouldn't "take." The bulb having been sweated into its hole, the interior was painted dull black, except, of course, for the bulb and the reflector. A disc filed from 1/32-in. thick Perspex was cemented into the frontal recess to represent the glass.

Probably the most ticklish part of the searchlight was the wire guard which protects the glass. Piano wire was used for strength, as it was desired to use the thinnest gauge possible for the sake of scale appearance. At first I attempted to silver-solder three wires butted together at 120 deg. They were placed on an asbestos sheet, and held down with weights, but buckled sufficiently under the heat to spoil the butt joint.

After two or three attempts, all failures, a piece of wire was bent at 120 deg., and another piece "joggled" to fit underneath it (Fig. 27). The wires having been weighted down, the joint was silver-soldered, only to be spoilt in the somewhat delicate operation of filing-up. The next attempt was also unsuccessful, but, as with Bruce's spider, the third attempt did the trick. After cleaning up, the wires were cut to length, bent at right angles, and the ends were sweated to the front of the searchlight—another delicate operation to avoid the heat of the soldering-bit affecting the Perspex.

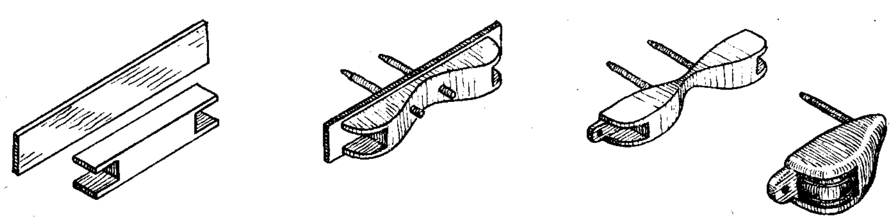


Fig. 29*a* *Fig.* 29*b* *Fig.* 29*c* *Fig.* 29*d*

Method of making the side-lights

After sweating the back into place, a disc was cut from a strip of the highly polished aluminium foil sold for Xmas decoration, and was cemented to the inside of the back to represent the reflector, which should really be parabolic, but the difference is not noticeable in the model.

The next step was to make the pedestal and stirrup, as the latter had to be made before the pivot-pins could be sweated to the searchlight itself.

The pedestal was turned from $\frac{3}{8}$-in. diameter brass rod, the base being integral, and a $\frac{1}{8}$-in. diameter spigot was left below the base to fit into a corresponding hole drilled in the dashboard of the bridge. The stirrup was filed up from thin sheet brass, and fixed to the pedestal

Binnacle (Photos Nos. 4 and 5)

The method of construction of the binnacle is shown in Fig. 28. The body is turned in two parts from $\frac{3}{8}$-in. diameter brass rod, one being spigoted and sweated into the other. The groove on the upper part was turned with the "special parting-tool" made as described for the mushroom vents.

The lamphouse is a scrap of brass with a stub of wire pressed into a hole in its top (this saved putting on the four-jaw chuck to turn it!), and is sweated to a flat filed on the body. The body has a small spigot sweated into a hole in the stand, which was bent up from tinplate.

After sweating all the parts together, white

(*Continued on page* 508)

*Building a $3\frac{5}{8}$-in. Centre Lathe

by E. W. Brennand

OF all the mechanism of the lathe, it is the headstock which seems to hold the most interest for the model engineer, although, as already mentioned, all parts must fulfil their functions satisfactorily if the lathe, as a whole, is to be a good tool. The headstock in question is very unconventional, and on this account there may be much to cause interest and, at the same time, induce criticism. In case misgivings should arise in the minds of some readers as a result of reading what follows, it would, perhaps, be as well to give some idea of what this headstock will stand up to. On test, a mild-steel bar, 1 in. diameter, can be turned down to $\frac{5}{8}$ in. in one cut, using the slowest power feed and a cutting speed of 80 ft. per minute. This was chuck turning, of course. A similar bar held in the chuck can be parted off at a point 4 in. from the front spindle bearing, at an initial cutting speed of 50 ft. per min., the parting tool being nearly $\frac{1}{4}$ in. wide. A $\frac{5}{8}$-in. bar held in the collet can be parted off when running at 1,000 r.p.m., i.e., at a cutting speed (initial) of 150 ft. per min., the same tool being used.

Two views of the headstock are shown in Photos 2 and 4. It is cast in nickel-iron and is of box form. It is in two parts, the lower and main portion being capped by a lid, the joint line coming at the centre line of the spindle. The drive to the latter is by two V-belts, there being no cone pulley, as already indicated. The object of this is to provide adequate power at slow speeds without recourse to backgear. For various reasons, the less use made of backgear the better it is for a lathe.

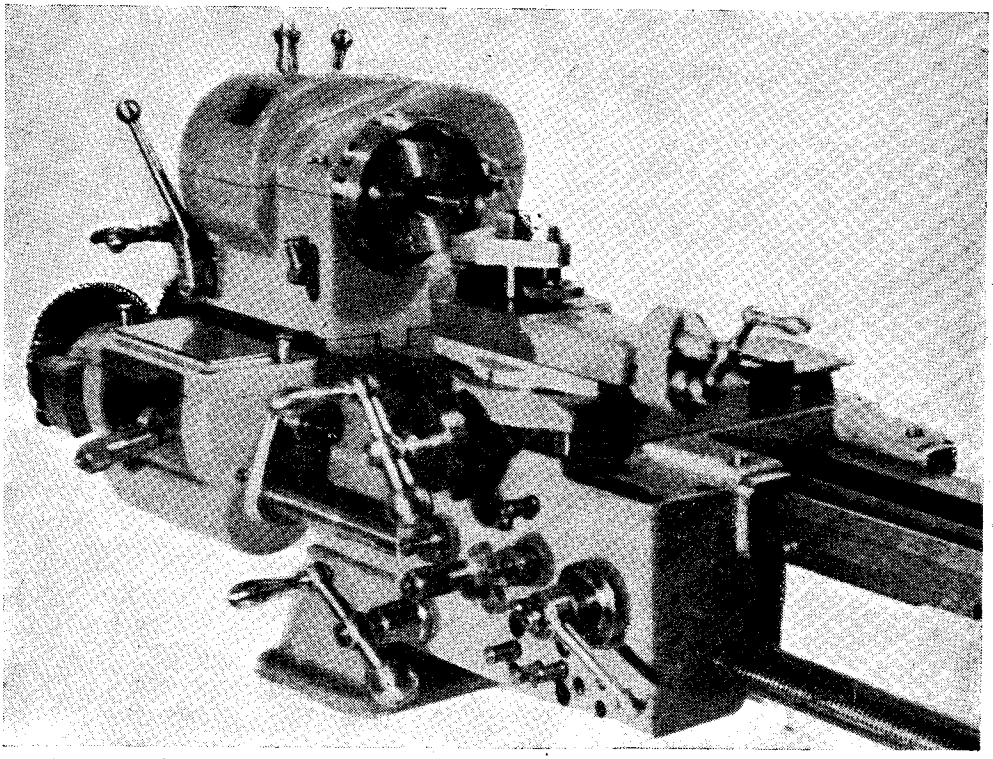


Photo No. 4. The headstock

The spindle is short by accepted standards, since, contrary to general opinion, the writer is opposed to long spindles and believes that, within reason, the shorter they are the better. Several considerations limit the diameter of spindle that can be employed, and as spindles always bend to some degree under load, this bending is greater in a long spindle than in

*Continued from page 463, " M.E.," April 29, 1948.

a short one of the same diameter. The long spindle has, therefore, to have greater clearances in its bearings than a shorter, stiffer spindle, as otherwise the deflection when loaded may give rise to serious trouble.

The spindle in question is of case-hardened steel ground all over and lapped on the journal surfaces to a mirror finish. The grinding was done with a home-made grinding spindle, the main lapping being done with cast-iron laps, the final finish being obtained by leather laps charged with very fine abrasive. The internal bore and tapered seating for the collets are ground out true with the outside diameter.

A view of the spindle, complete with its bushes, is shown in Photo. No. 5. It will be seen that the usual screwed nose is absent, there being in its place a flange mounting for chucks and the like. This flange is hardened and ground and is tapered on the rim. The chuck backs are tapered internally to suit and the backplate boss is threaded on the *outside*. Over the flange of the spindle, and taking a bearing on the back of the flange, there is a ring nut which engages with the thread on the backplates and which draws the latter securely up to the tapered seating on the flange. There is an arrangement for a dog-drive between spindle and backplate; this drive takes the cutting load. Several advantages accrue from this method of chuck mounting. The chuck is mounted very rigidly, since it is located and held on a large diameter close to its rim instead of on a comparatively small diameter screw. The mounting is very accurate, since it is controlled by the mating of two tapered surfaces which are relatively easy to keep clean, whereas screwed surfaces are not. Chucks do not tighten up when the lathe is at work (the drive is taken by pegs in the backplate engaging in slots in the front face of the flange) and so removal is easy. Also this method of drive enables the lathe rotation to be reversed with no possibility of unscrewing the chuck.

No Provision for Adjustment!

The spindle runs in cast-iron bushes lapped out to a very fine finish and the writer imagines that a great deal of surprise will be felt by most readers when he states that these bushes have no provision for adjustment to take up wear. Should wear take place—as indeed it must, given sufficient time—the matter can only be remedied by fitting new bushes. In view of the existence of many varied designs of adjustable bearings and the attention which must, therefore, have been given to this matter, it may seem the height of folly to equip a lathe with bearings which cannot be taken up. The writer has found, however, from his own experience, that an assembly with a hardened and well-finished spindle running in lapped cast-iron bushes is practically immune from wear provided (and this is most important) lubrication is adequate and constant. Four sets of spindles and bushes designed by him for some special-purpose lathes during the war and made up by him on these lines, ran for a period of over twelve months, working constantly at high speed for two shifts a day. These bushes were provided with means of adjustment, but they were never touched during that period, the run being terminated only by the end of the war and the consequent end of the contract involved.

Twenty months ago, the writer's Exe lathe called for overhaul in the matter of the spindle and bushes. The spindle of this lathe is of alloy steel, but not hardened, running in phosphor-bronze bushes. The spindle was trued up and lapped, but left soft and lapped cast-iron bushes (not adjustable) were made to suit. The oiling arrangements were altered to conform to modern ideas regarding the proper maintenance of an oil film. After assembly, a test was made to measure the side shake of the spindle in the front bush. Under considerable side pressure this shake was 0.0005 in. Today, at the time of writing and for the purposes of this article, the test has been repeated, the lathe having had considerable use (in the model engineering sense) since the overhaul was made. The side shake is now less than $\frac{3}{4}$ of a thou., i.e., there has been less than 0.00025 in. of wear, and this with an unhardened spindle.

In the case of the writer's own lathe, the bearings were put up closer than those of the Exe, this being permissible on account of the stiffer, hardened spindle. On original assembly, a similar test by dial indicator showed a side movement of the spindle amounting to a shade less than 0.00025 in. Today, the test has been repeated, and the reading is the same, showing that no measurable wear had taken place after ten months of use. Recently the headstock was stripped down and the spindle and bearings critically examined. Their condition was excellent, appearing to be in exactly the same condition as when first made. Further, the oil was quite clean, with no sign of that discoloration which arises from contamination by metallic sludge caused by wear.

Careful Work in Fit and Finishing

It must be emphasised that these satisfactory results are to be obtained only by the most careful work in the original fit and finish of the bearing members, and no pains must be spared to attain the desired end. Nevertheless, the time spent would be wasted if the most important matter of lubrication had been neglected. In bearings as closely fitted as these, the oil film must be maintained during the whole time the lathe is at work, and this means that lubrication must be constant and not intermittent, which latter is the condition usually arising when oil is supplied occasionally through the usual type of oilers. To secure proper lubrication this spindle is fed with oil by felt pads situated in slots milled in the bushes and which are held to the spindle by light springs located in blind holes bored in the headstock body. These pads are fed by wicks which dip into oil-wells drilled in the main casting. These wells are replenished from time to time by means of the lubricators seen at each end of the front of the headstock.

Photo. No. 5 shows the front bearing complete with pad and wick, the little weight attached to the latter ensuring that the wick sits well down in the oil well. The rear bush is shown turned round to show the slot in which the felt pad is housed.

End thrust of the spindle is taken, in both directions, by cast-iron collars bearing directly on the rear bush, the latter having a suitable oil-groove arranged to provide a supply of oil to the thrusts. These cast-iron to cast-iron thrust surfaces work together very well and with surprisingly little friction. All the surfaces are lapped flat and the camming action or endwise movement of the spindle when rotating is negligible.

can only come into operation once per revolution of the main headstock spindle, and this spindle is in the same position relative to a fixed point on the driving pinion of the gear train each time the clutch is engaged. All backlash between gears is, of course, taken up in the same direction each time that drive commences. Provided, then, that the leadscrew nut is not disengaged

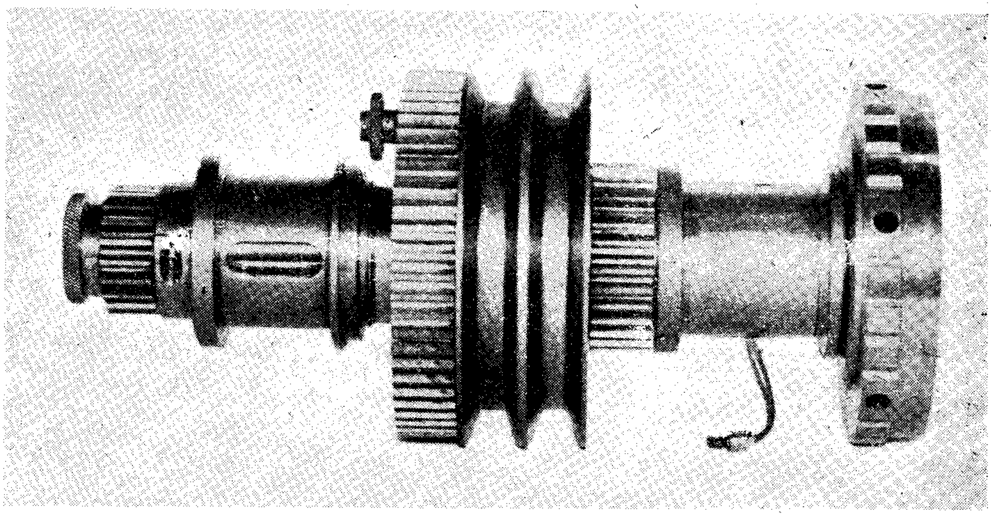


Photo No. 5. Headstock spindle

and the tool is brought back to its starting position (after each traverse along the thread being cut) by revolving the leadscrew by hand, the thread is picked up without possibility of error, every time the clutch is engaged.

The backgear is orthodox type, the wheels being brought into engagement by an eccentric shaft. A feature, however, is the provision of a felt pad for lubricating the sleeve, the spindle being drilled up and fitted with a lubricator so that oil can be forced to the pad with a gun. A felt pad is also fitted to the spindle pulley so that adequate lubrication is assured when the pulley is running loose on the spindle with the lathe in backgear.

A single dog-clutch for operating the gear train is incorporated in the cluster gear assembly, and this clutch greatly simplifies the process of screwcutting, it being possible to pick up any pitch of thread with absolute certainty. The spindle on which the cluster gear is rocked is drilled up and carries a rod through this hole. The rod is fitted with a cross-pin which protrudes through a longitudinal slot in the spindle. The other end of the rod (inside the headstock) has a small rack which engages with a pinion on a shaft which terminates in the lever shown to the left front of the headstock. The pinion driving the gear train to the gearbox is mounted on a sleeve which slides on the cluster gear spindle and which has a dog to engage with a slot cut in the hub of the last wheel of the cluster gear. This sleeve has a groove turned internally, and the cross-pin already mentioned engages with this groove. Movement of the headstock lever to the right draws the sleeve along the spindle and engages the dog-clutch, thus closing the drive. Movement to the left moves the sleeve away and disconnects the drive. The dog-clutch

The only other fitment to the headstock which calls for special mention is the indexing plunger, mounted on the "lid," over the large backgear wheel on the spindle. This plunger engages with that wheel, which has 60 teeth, so that a fair range of divisions can be obtained. It also serves to lock the spindle, should this be necessary, as in the case of milling keyways and the like with the aid of a milling spindle in the slide-rest.

The seatings for the spindle bushes are formed half in the main part of the headstock casting and half in the lid, the seatings for the backgear shaft being arranged similarly. By removing the lid, the spindle assembly and backgear assembly can be lifted out complete—a very convenient and time-saving arrangement. To secure accurate positioning of the lid with the main portion, the former is provided with tongues which fit accurately into slots formed in the main portion.

In the machining of the headstock casting, the first thing done was the surfacing of the bottom face which bears on the bed and the tenon which lies between the ways of the bed. This was done on the milling-machine. The joint faces of the main part and of the lid, together with the locating tongues and grooves, were then milled up, a final fit being made by scraping.

The main difficulty arose in connection with boring the holes carrying the main bearing bushes and the backgear shaft. No lathe fitted with a boring table and with sufficient height of centres was available, so it was a case of making it a faceplate job—a difficult piece of machining, on account of the considerable overhang of the work and of the long unsupported boring-bar which was required. It was found that by making a special angle-plate the job could just be swung on the faceplate of the 6½-in. South Bend lathe previously mentioned, and a pattern for this angle-plate was made and a casting obtained. This casting was milled up and two long grooves were cut, parallel to each other, in that face on which the headstock casting was to be bolted. These groves accommodated the headstock tenon and were accurately positioned so that when all was mounted on the faceplate these grooves stood at right-angles to it, i.e., parallel with the lathe centre line. The grooves were also cut so that corresponding edges in each were the same distance apart as the distance between the centre lines of the headstock spindle and the backgear shaft. Clamping screws were provided to force the headstock tenon against either of these edges as required. Thus, when the angle-plate was mounted on the face-plate, and so adjusted on it that the headstock casting was in position for boring the main spindle holes, by removing the casting and clamping it in the other groove in the angle-plate (the latter remaining undisturbed on the face-plate) the position for boring the back-gear holes was automatically obtained. This ensured that not only were the two sets of holes accurately spaced, but that they were parallel in all planes.

The actual job was, in practice, one of the worst the writer has ever undertaken. In order to obtain anything like balance when the lathe was at work a formidable array of balance-weights in the form of steel discs and lumps of cast-iron had to be bolted to the faceplate and not enough could be got on to secure the degree of balance required to enable the lathe to be worked at a reasonable speed. The overhang looked tremendous, and the angle-plate cleared the lathe bed by no more than ⅛ in. As the lathe was a borrowed one, the writer was in a constant state of anxiety lest anything should shift, but fortunately nothing of that nature occurred. The lathe having to be worked at slow speed caused the job to take much longer than if a proper balance could have been obtained, and this caused further anxiety, since the tool was available only for a very limited time. In addition to the boring, all the portions of the casting adjacent to the holes, had to be faced up and the balance-weights prevented any view of the inside of the job being obtained through the belt slot in the lid. All the work on the interior had to be done "blind." At first, considerable chatter took place, but by attending to the tool angles and the top rake, this was eliminated. It was, however, with a great feeling of relief that the lathe was stopped for the last time with the last finishing cut successfully completed.

(To be continued)

Making Scale Ships' Fittings

(Continued from page 504)

paint was introduced into the interior of the body through the window aperture in the top, and this was then covered by a small oval of 1/32-in. Perspex cemented on. When painting the binnacle black, the edge of the Perspex was painted too.

The instrument is fixed to the dashboard by means of shortened household pins.

Sidelights

Figs. 29 (*a*, *b*, *c* and *d*) should make fairly clear the method of forming the sidelights.

A short piece of 3/16-in. sq. section brass was filed out at each end, and a strip of 22-gauge brass cut oversize for the back-plate. After shaping the square rod as shown in Fig. 29*b*, this and the back-plate were dowelled together with 18-gauge wire and silver-soldered. Further filing resulted in the shape as at Fig. 29*c*—note the dowel-pins still protruding—and then the corners were rounded off and the pair of lights cut in two.

The "dioptric lenses" were turned from red and green transparent catalin. Note that in plan they are rather more than a quarter of a circle. After polishing in the round, the surplus was filed off while the rod was still in the chuck, using No. 1 jaw as an index.

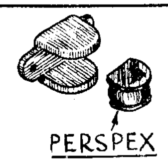


Fig. 30. Stern-light filed from solid, ready for fitting "lens"

The bodies of the lights having been tinned, the lenses were cemented in place, and the protruding dowel-pins were forced into holes drilled in the curved side of the wheelhouse roof, the front fixing lugs being held by household pins cut short.

Stern Light

The stern light is mounted at the top centre of the transom, and thus does not show on any of the photos, but is sketched in Fig. 30. The body was filed up from 3/16-in. sq. section brass rod, and tinned; the lens is turned from clear catalin rod, flattened on one side, and cemented in place.

Two shortened household pins hold the light in position.

(To be continued)

PETROL ENGINE TOPICS

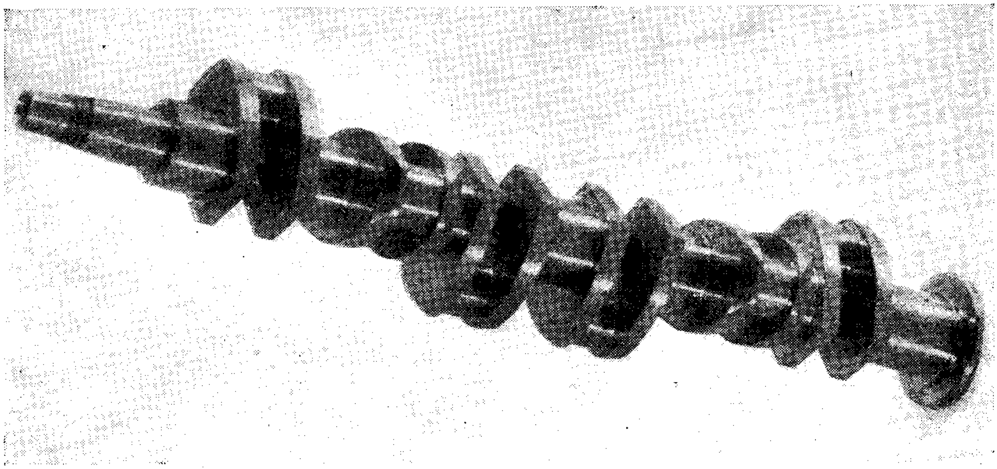
Why Build Your Own Engine?

by Edgar T. Westbury

MODEL internal combustion engine enthusiasts at the present day are divided into two classes—those who construct and make experiments in the design of such engines, and those who buy ready-made engines and adapt them to various purposes. In view of the developments in the commercial production of these engines, the latter class are undoubtedly predominant these days, though it does not necessarily follow that they are on that account the more important.

The suggestion has often been made that, instead of concentrating almost entirely on the construction of engines, I should devote more attention, and a good proportion of available space, to the running, handling and maintenance of commercially-produced engines, and thereby cater for the interests of the large majority of readers who use them. And whatever may be my personal opinions about these suggestions, I am, in view of my avowed intention to supply the kind of information which readers ask for, bound to give them my very careful consideration.

Having done so, however, I have formed the conclusion that such a change in the policy of "Petrol Engine Topics" would not be for the better. In the first place, the users of commercially-produced engines are fairly well catered for, in respect of general information on their handling, by many writers on aircraft and other powered models, not to mention numerous handbooks on these subjects. Seondly, the makers of engines should undertake at least some responsibility in supplying all essential information on their particular engines, and in giving individual advice and assistance to users who call upon them to do so. (Many of them, at present, do not; I have on many occasions encountered cases where the querists have been treated with scant courtesy, or advised to "write to the 'M.E.' about it.") And thirdly, but by no means least, the "M.E." is essentially a constructor's journal, which supports, and is in turn supported by, the readers who have the urge to create engines, besides merely running them.



A six-throw crankshaft for a scale model Rolls-Bentley engine, constructed by Mr. Geo. Hayes, of Leeds

In a world so crowded with different people going different ways and pursuing different interests, it is perhaps inevitable that in trying to make progress in any given direction, one must necessarily tread on a few corns. I have often been accused of being antagonistic to the "model trade," who produce and sell ready-made models; and it is more than probable that the above remarks will be interpreted by some people as hostile propaganda. But as I have so often affirmed in the past, the best interests of the trade can only be served by keeping alive the enterprise and craftsmanship which is the true foundation of model engineering progress, and in which the amateur constructor must play an essential part. So far from being an enemy of the professional model manufacturer, I can claim that the latter has often benefited, directly or indirectly, from the material which has appeared in "Petrol Engine Topics." In many cases I have been called upon to give direct advice and assistance to manufacturers in dealing with their particular problems—though some of them would die rather than admit it!

I trust, therefore, that I may be absolved from any suspicion of ulterior motives in making these comments. Indeed, if personal profit or kudos were my objects, it is more likely that I should stand a better chance of attaining them by putting the interests of the commercially-produced engines first. However, I feel sure that in exhorting readers to build their own engines, I am doing nobody in the trade any real harm, and am helping many creative craftsmen to realise a worthy ambition. In the majority of cases, the engine designs which I offer for the consideration of amateur constructors do not clash seriously, if at all, with commercial productions; and even if they did, it would be illogical for any manufacturer to conclude that the small number of engines built in amateur workshops would appreciably affect the sales of his mass-produced engines. The reverse effect is far more likely, because the demand for the latter often arises through the possibilities brought to light by the amateur constructor; and people who have seen the results of his enterprise, and lack the abilities or equipment to emulate them, turn to the commercial product as a means of attaining the desired result.

The Thrill of Achievement

But the strongest reason of all why readers should attempt to build their own engines is the real pleasure which can be obtained during the process of actual construction, and even more so, when the products of one's labour of love takes unto itself a living entity, imbued with the ability to breathe, pulsate and give voice in the joy of life. Do not think I am merely going all sentimental and poetic-like; not only I, but many others who have built engines, can assure you that this pleasure is a very concrete and enduring one, which never palls, however often repeated. Only a few days ago, a reader who had been building an engine of my design, and had just succeeded in getting it to run for the first time, was so pleased that he dashed out into the night to find a telephone box and ring me up to tell me of his achievement. Some of our cynical, super-blasé moderns may say this sort of thing is childish, but if so, I am not ashamed to confess that I have never grown up, and so I was enabled to share to the full in this constructor's enthusiasm.

This is the one thing that the man who buys an engine can never experience, however fine the engine, or however much he pays for it. Nor can he realise how every moment spent on the machining and fitting of the various parts all contributes to and heightens the satisfaction ultimately obtained. In spite of the number of engines I have built, I feel just as keenly as ever the pleasure of seeing the crisp shavings curl away from a piece of work in the lathe, the bright finish left by a sharp, well-set tool, or in scheming out the many little problems of setting-up, or unusual machining operations which arise in engine construction.

The novice can taste of these small joys just as much as the advanced constructor, but he is often haunted by a quite unnecessary inferiority complex, engendered by his lack of ability, or more truly, lack of confidence in his ability. I often encounter constructors who are diffident or half-apologetic about their work; but however humble the effort—however far short it may fall short of expectations, or however serious its faults, never imagine that it is not worth while. If success were not so elusive, there would be less fun in chasing it; but its achievement is certain if it is pursued long and diligently enough. You need never be ashamed of any job if you can honestly say that you have put your best effort into it.

The Non-Constructors

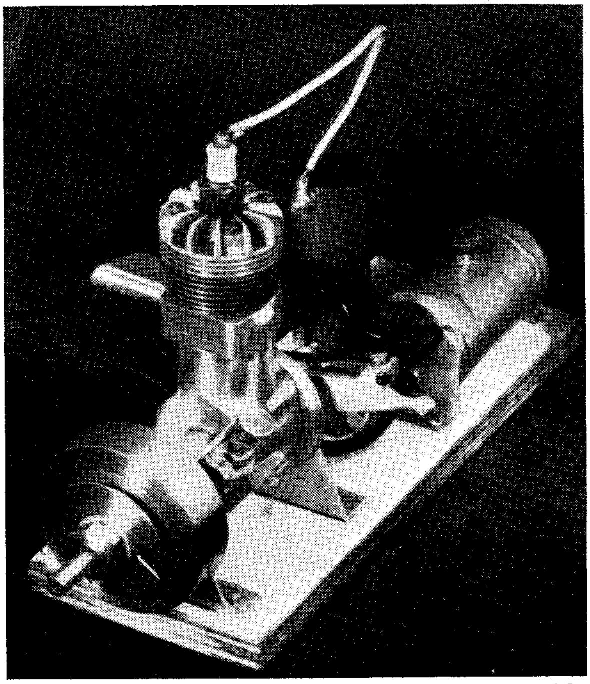
I am by no means intolerant or unsympathetic towards those enthusiasts who, for one reason or another, are unable to construct their own engines. Many of them tell me of their troubles, and I am fully aware that they often have to take the choice between buying a ready-made engine and having no engine at all. In most cases, lack of workshop equipment and facilities is the deterrent, and it is fully agreed that not only the difficulty of obtaining lathes and other tools, but also lack of suitable housing accommodation, often present an insuperable obstacle to the readers who wish to set up a model workshop.

Other readers, while full of enthusiasm for model engines, deplore their lack of constructive ability and feel sure that they would never be able to carry out the highly skilled precision work necessary in building them. Here, I think, we see that old "inferiority complex" at work again; one wonders whether some of these people have ever tried—or how hard they have tried—to build an engine. Few people are born with the natural ability to carry out skilled manipulative work; it can only be acquired by long and diligent practice, by making mistakes and profiting by them, and by cultivating the cardinal virtue of patience, not only in the actual execution of the work, but also in overcoming the inevitable setbacks and disappointments encountered.

I must admit that such proficiency as I have myself acquired have been approached by this long and arduous road, and even now, I still make just as many mistakes, and scrap just as many jobs, as the rawest novice—though I flatter myself that I rarely make the same mistake twice! There are, no doubt, some people who could never be successful mechanics, however hard they tried; but nearly everyone who is really interested in this work can become skilful by effort and practice.

I am by no means certain that the handicap of limited workshop facilities is insuperable, if one is really determined to become a constructor. In very many cases, model engineering societies are able to offer some facilities for the use of a workshop, or individual members who are fortunately placed in this respect will often prove willing to help. My own workshop, such as it is, has often been put at the disposal of a fellow-enthusiast, and I have, in turn, often been given similar assistance when access to my own workshop was impracticable.

Most model workshops are a monument to labour, patience and self-denial; few of us, indeed, would ever have had a workshop at all if we had waited until its equipment could readily be acquired, or till we could "afford" it. The man who cannot start to build models until he



An interesting adaptation of the "Kestrel" engine, with separate fuel tank and rear contact-breaker. Built by Mr. Hicks, now serving on the Gold Coast, W. Africa, this model is now in the possession of Mr. R. J. Gibbs

has a super lathe and a glittering array of comparable supporting equipment, is not the likeliest person to be successful in doing so, anyway. Enterprise, initiative and improvisation are necessary, not only in building models, but also in acquiring the means to do so. I have seen good engines built in pigeon lofts, coal cellars and boot cupboards, with equipment varying from next to nothing to the wildest creations of the late Mr. Heath Robinson.

I very much deplore the fact that some readers who have both the equipment and the ability to build engines, prefer to obtain them ready made, the reason usually given for this course of action being that "they haven't got time." It is not for me to pass judgment on these matters, but I have some reason for suspecting that in a few cases at least, time could be found if one really had the necessary enthusiasm. Users of engines in racing or other competition models, who fondly imagine that they can save time by side-tracking the job of building an engine, often find out a long time afterwards that their object could have been better and more quickly achieved if they had faced up to this job at the start.

Although the manufacturer of engines, who lays out and equips a production plant for large quantities, might logically be expected to have many advantages over the lone amateur, the latter enjoys much greater freedom of outlook both in respect of design and methods of construction; he does not find it necessary to subjugate detail refinement to production cost, or to concentrate on the lines of design which appeal to "the masses." It is a significant fact that despite the advance in the quality of commercially-produced engines in recent years, the best and most efficient engines, in this country at least, have always been amateur-built.

An Example of Crankshaft Turning

Speaking of interesting machining operations, I find that many of my friends share my enthusiasm in scheming out ways and means of carrying out some of the "fancy" operations which arise in engine construction. Among these, crankshaft turning is a great favourite, and I know of cases where this job has formed the nucleus, or perhaps one might say the centre of inspiration, in the creation of a model.

An old friend of mine, Mr. George Hayes, of Leeds, who has produced some excellent model petrol engines in the past, recently brought to my notice the outstanding example of work illustrated in the photograph. It is a scale reproduction of the crankshaft of a Rolls-Bentley car engine, and it is correct down to the scale pitch of the thread on the end journal, and the oil passages in the webs and crankpins. A particularly interesting feature of this job is that the orthodox method of turning the crankpins on throw centres was discarded in favour of a very ingenious method of eccentric chucking, which is in accordance with modern manufacturing practice. I have described eccentric chucking methods for simple types of crankshafts, and have recently employed a method similar to that devised by Mr. Hayes, in the machining of a small two-throw shaft for a new engine which will be described in due course.

Among the many joys of model engineering, I rate very highly the privilege of examining bits and pieces, or complete models, imbued with the personality of their constructor, and of discussing the hundred-and-one little individual problems which arise in producing them. Can anyone doubt that life would be much duller if these things were entirely superseded by the stereotyped and entirely impersonal factory-made product?

A Simple Tribute

As the above article was written, I have learned with deep regret of the passing of our beloved Chief, under whom I have had the privilege of serving, as a member of THE MODEL ENGINEER Editorial Staff, for nearly sixteen years. More eloquent pens than mine will pay an appropriate tribute to his memory, but I would like to record my personal appreciation of one whom I have come to regard more as a colleague and fellow-

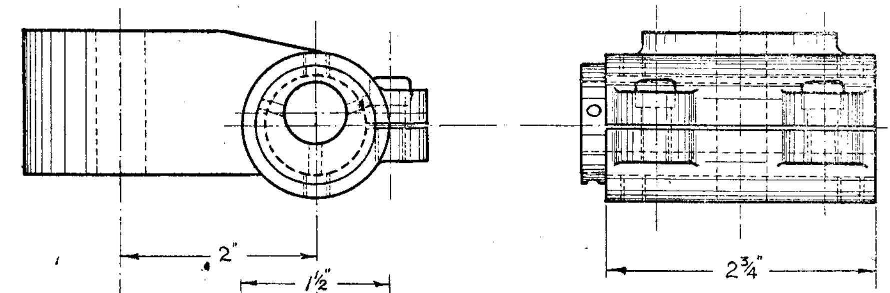
(*Continued on page* 516)

Vertically Adjustable Dividing Head

by A. R. Turpin

FOR those whose lathe accessories do not include a vertical slide, a dividing head or milling attachment that is capable of being adjusted for height is almost a necessity.

The drawing, Fig. 1, gives the basis of a design for such an attachment that has a simple means



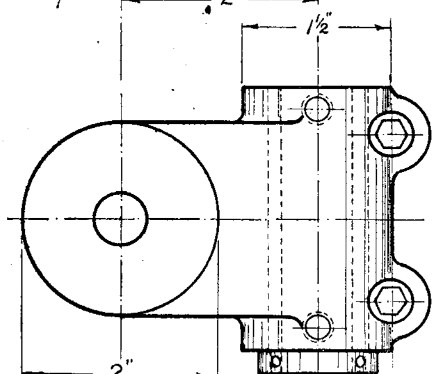


Fig. 1

of obtaining vertical height adjustment, and at the same time is devoid of screws, etc., so that it is easy to construct.

The main casting is simple and the only difficulty that is likely to be encountered here is getting it cast, but relying on the truth of a recent

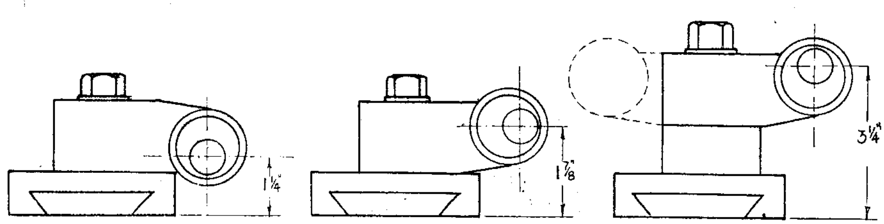


Fig. 2

article that most model-makers are interested in music, one can also assume they know something about "fiddling" and so the casting difficulty should not arise.

The said casting consists of two bosses at right-angles to each other; the vertical one is drilled to take a bolt to secure the attachment to the cross slide, and the horizontal boss is bored 1 in. diameter right through to take a mild-steel mandrel, which should be a nice sliding fit. This mandrel is bored ⅝ in. diameter, ⅛ in. out of centre, and at one end it has a shoulder around which are drilled three equally-spaced holes to take a tommy-bar so that the mandrel may be rotated in the boss, thus giving the centre hole in the mandrel a relative height adjustment of ¼ in.

The boss in which the mandrel rotates is split down one side so that the latter may be clamped in any position by tightening two ¼-in. B.S.F. Allen screws located in two lugs at either end of the boss.

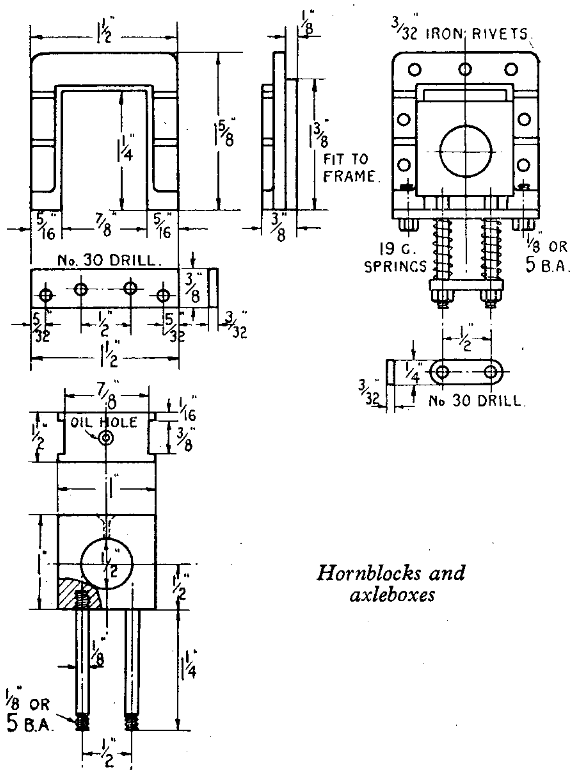
This horizontal boss is also off centre in relation to the vertical boss by ¼ in., so that if the casting be reversed on the cross slide a variation in height of ½ in. is obtainable, see Fig. 2. Further height adjustment may be obtained by placing packing pieces under the vertical boss, Fig. 2. The fixture may also be swung through 190 deg., as shown dotted.

Holes are drilled and tapped ¼ in. B.S.F. at either end of the horizontal boss, top and bottom, to take a dividing indent. If the attachment is to be used for milling, the mandrel will be the bearing and should be turned from phosphor bronze, being relieved as necessary and oilways cut.

A $3\frac{1}{2}$-in. Gauge L.M.S. Class 5 Loco.

by "L.B.S.C."

SECOND thoughts are best, says the old saw. Well, at time of writing (don't forget that I write several weeks ahead of publication—this isn't the "Daily Moan"!) correspondents who are waiting to get on with a $3\frac{1}{2}$-in. gauge locomotive are asking for an early start of the serial, and plenty to keep them busy whilst I deal with more items of the "Maid" and the "Minx." To the best of my knowledge and belief, nobody building either of the 5-in. gauge engines has yet caught up with the instructions, nor anywhere near it; those big wheels and big cylinders are not turned, bored and fitted in the proverbial five minutes! Therefore, the best thing I can do, appears to be to give an extra-special instalment of detail drawings for the $3\frac{1}{2}$-in. gauge job, without going into full details of all the machining and fitting. As this isn't really necessary, in view of the fact that only just recently, full details have already been given for similar jobs; so here are some components of "Doris" and a brief description of each.



Hornblocks and axleboxes

The hornblocks and axleboxes are the same as specified for "Molly," "Juliet" and other engines, so stock castings can be used, and plenty are available. The contact faces can be end-milled, or if the castings are clean, merely filed to fit the openings in the frames. Note, however, one small difference:—As the top of the openings have rounded corners, the hornblock flanges must be rounded off to suit. The hornblocks are riveted into the openings, using seven 3/32 in. iron or steel rivets in each; the feet or lugs are smoothed off with a file, flush with the bottom of frame, and the jaws filed or milled out to $\frac{7}{8}$ in. width with the frames temporarily bolted together "inside out." Use a piece of bar, $\frac{7}{8}$ in. wide, as a gauge; it should slide in easily, but without shake.

The hornstays are $1\frac{1}{2}$ in. lengths of $\frac{3}{8}$-in. by 3/32-in. mild-steel rod, drilled as shown, and attached to the hornblock lugs by $\frac{1}{8}$-in. or 5-B.A. screws, hexagon-head for preference, though any available heads will do.

The axleboxes are made from cast or drawn bronze or gunmetal bar, of 1 in. by $\frac{1}{2}$-in. section. Our advertisers will supply a stick long enough for all six. If your lathe won't end-mill the full length for the groove, cut the stick in half and take two "bites." Saw, or part-off the six lengths, face the ends in the four-jaw, then drill as specified for other engines, first drilling $\frac{1}{8}$-in. pilot holes in Nos. 1, 2 and 3, and "mating" them with the boxes on the other side of the engine, 1 to 4, 2 to 5, and 3 to 6. Ream each pair of boxes when in position in the hornblocks, and don't forget to locate the holes for the spring-pins by jamming the boxes up against the hornstays and poking the drill through the spring-pin holes in same. Screw the spring-pins by holding them in the three-jaw, and using the die in tailstock chuck, or else the pins will screw in as the kiddies call "wonky," and will bind in the hornstays. Assemble as shown in the illustration, and jam a bit of $\frac{1}{8}$-in. wire, or square rod, between each hornstay and axlebox, to keep the latter in position whilst the engine is being erected.

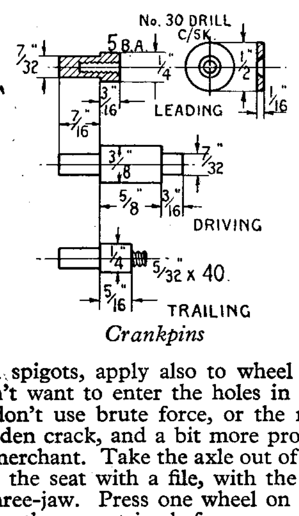
Coupled-wheels and Axles

The average 4-in. three-jaw chuck will open out enough to grip the treads of the $4\frac{1}{2}$-in. coupled-wheel castings, so you can go ahead on the usual instructions for doing the job, viz. first grip by tread, turn the back, and boss, drill and ream. Then reverse in chuck, turn the front, and projecting boss, also cut the rebate simulating the joint between centre and tyre on a full-sized wheel. Finally, mount on an improvised faceplate made from an old wheel or iron disc, and turn the treads and flanges. Beginners note that the treads are parallel; leave a good radius between tread and flange, to avoid railhead grind, and bevel off the outer edge of the tread as shown. The crankpin holes are drilled by aid of the well-known jig consisting of a bit of bar with a $\frac{7}{16}$-in. peg and a 7/32-in. hole in it, at $\frac{7}{8}$ in. centres.

If your chuck won't open sufficiently to grip the wheels, you'll have to follow the instructions I gave for turning the "Maid of Kent's" coupled wheels on the faceplate.

The crankpins are shown in the illustration, which gives the sizes. They are quite easy to do; the only point you want to watch is that the spigots are turned so as to press in tight enough to prevent movement, but not tight enough to split the wheel bosses. This is especially desirable on the driving-pins, which carry the return cranks actuating the valve-gear, as any shifting of the pin would upset the valve-setting. Put a nut on the thread of the trailing-wheel pins when pressing home, to protect the threads.

If your chuck is true, within reasonable limits, turn the axles from $\frac{1}{2}$-in. ground steel, or failing that, ordinary mild-steel, holding in chuck. If the chuck is far from being like Caesar's wife, turn the axles between centres, and so make sure they are O.K. The remarks above, applying to



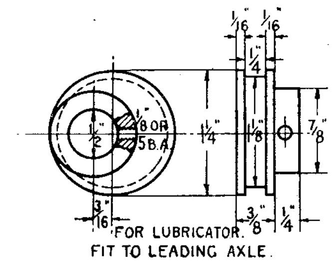
Crankpins

crankpin spigots, apply also to wheel seats. If they don't want to enter the holes in the wheel bosses, don't use brute force, or the result will be a sudden crack, and a bit more profit for the casting merchant. Take the axle out of the wheel and ease the seat with a file, with the axle held in the three-jaw. Press one wheel on each axle, and make the eccentrics before you put on the second one.

Eccentrics

Two eccentrics are required, one for pump and one for lubricator. They can both be turned from a bit of steel bar held in the three-jaw; a stub end of mild-steel shafting does fine, and is easily obtainable. Face the end first, then turn diameter over flanges; form groove with parting-tool, and part off at $\frac{5}{8}$ in. from end. Mark axle hole from the true centre left by facing tool; centre-pop, and chuck in four-jaw with pop-mark running truly. Drill a pilot hole first, $\frac{1}{8}$ in. or No. 30; open out to 31/64 in. and ream $\frac{1}{2}$ in. Finish the boss with the eccentric mounted on a stub mandrel held in three-jaw; drill and tap hole for set-screw, and it's "finis Johnny." Put the eccentric for the lubricator drive ($\frac{3}{16}$ in. throw) on the leading coupled axle, and the bigger one on the driving axle.

Beginners, remember that when erecting wheels, the best plan to prevent the whole issue from becoming mixed up, is first to number each

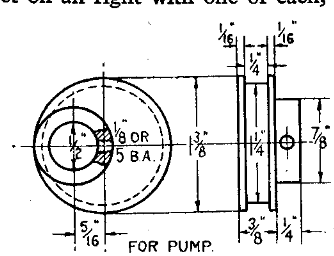


Eccentric for mechanical lubricator

axlebox and hornblock; then poke the axles through the boxes before removing from frame, not forgetting to put the eccentrics on; then put the second wheel on each axle as far as it will go by hand. *Then* take out the hornstay screws, lift the assembly out of the frames, and go ahead and quarter the wheels by aid of try-square and scribing-block, as I described for the "Maid," or by Mr. Adams's quartering gadget or any other that you fancy; after which, the wheel is pressed right home, and the axleboxes replaced in the frames. All three axles should be dead parallel; the wheels should spin freely, and there should be no sign of what our motoring friends would call wheel-wobble. If there is, either you have not bored and reamed the wheels truly, or the seating is out. Same should be corrected before anything further is done.

Eccentric-driven Pump

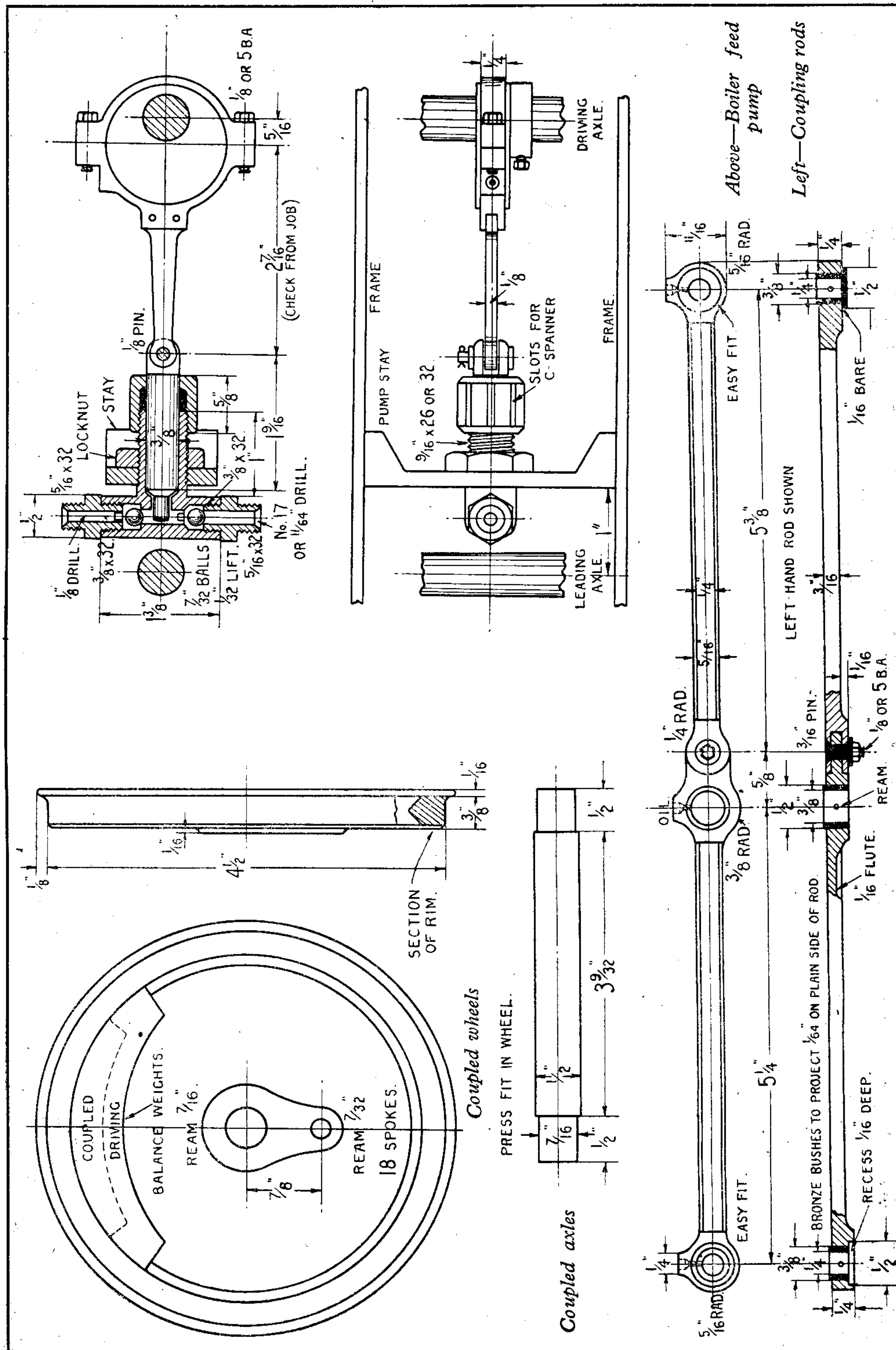
The big sisters, of course, have injectors to feed their boilers, and no pumps, but little engines get on all right with one of each, as some



Eccentric for feed pump

good folk find it difficult to manipulate little valves when the engine is under way, especially steam valves on the backhead. A pump by-pass valve doesn't get hot, and you can set the pump to maintain the level without attention on a continuous run, though personally I like to operate the injector.

Castings are available for the pump, with a chucking-piece opposite the barrel. Machine the valve-box first by gripping one end in the three-



Above—Boiler feed pump

Left—Coupling rods

Coupled wheels

Coupled axles

jaw and setting the other to run truly. Then face, centre, drill right through, open up, and tap for the ball-chamber cap. To turn the other end, screw the turned end on to a screwed pip formed on a stub end of rod held in three-jaw. Then grip the casting in the three-jaw by the chucking-piece, and drill and screw the barrel; the hole for the anti-airlock pin is $\frac{3}{16}$ in. Cut off the chucking-piece, fit the balls and ball-chamber union caps, and make the ram from a piece of $\frac{3}{8}$-in. ground rustless steel or drawn phosphor-bronze. The gland-nut is made from a piece of $\frac{3}{4}$-in. round bronze, drawn or cast, and is slotted to take a C-spanner; but anybody who prefers a hexagon nut may, of course, use one.

The eccentric-strap is turned up from a casting. First, clean up with a file, drill the lugs No. 40, and saw across; then open up the clearing holes, and tap the screwholes, screwing the bits together, and boring and facing one side, with the casting held in the four-jaw. The other side is faced on a stub mandrel in the chuck. Cut a $\frac{1}{8}$-in. slot in the lug, by milling or planing, and in it fit a $\frac{1}{8}$-in. steel eccentric-rod, as shown. Don't finish off the eye to the fixed dimension shown, but check from the actual job when the pump is erected; see below.

Screw the pump through the stay, and erect same in frame, as shown in the illustrations; beginners, be mighty careful not to put the whole bag of tricks upside down, which has been done by more than one enthusiastic but thoughtless tyro! Line up the eccentric with the barrel, and put the eccentric-rod in the slot in the ram. Tighten up the set-screw, then push the pump ram right home, and put the eccentric on front dead centre, that is, as near to the pump as possible. With a bent scriber, scribe a mark on the eccentric-rod through the hole in the pump ram. Take off the eccentric-rod, make a centre-pop on it 1/32 in. nearer the strap than indicated by the mark, and drill a No. 30 hole. When the pump is connected up, and the pin put in, this will ensure 1/32 in. clearance between the end of the ram and the end of the pump barrel, which is correct. I have shown a pin secured by a washer and a weeny split-pin; but you can, if you so desire, use a pin with a nut at each end, or a bolt. The gland may be packed with graphited yarn, or a bit of unravelled hydraulic pump packing, but it shouldn't be screwed up tight enough to cause the eccentric to act as a band-brake.

The coupling-rods are made by the same process as described for the "Minx," so there isn't the slightest need to detail out all the rigmarole again. The leading end differs from the "Minx's" rods, inasmuch as it cannot have a nut projecting beyond the boss, otherwise the outside connecting-rod couldn't pass. Instead, the rod is stopped from coming off the pin by a washer recessed into the boss, and held by a set-screw. Drill a No. 30 hole in the boss, and form a recess $\frac{1}{16}$ in. deep with a pin-drill $\frac{1}{2}$ in. diameter, having a $\frac{1}{8}$-in. pilot pin. Then open out the hole to $\frac{3}{8}$ in. diameter, and squeeze in a bush turned up from good hard bronze, with a $\frac{1}{4}$-in. hole through it. This bush must be flush with the bottom of the recess, but should project 1/64 in. at the back, so as to prevent the boss of the coupling-rod rubbing over the face of the wheel boss. Same applies to the other bushes. The driving bush is flush with the face of the boss, and should be reamed to an exact fit on the driving crankpin; but the other bushes should be an easy fit, otherwise the rods will bind when the axleboxes move up and down, as the engine travels at speed over a bad road, or through crossing frogs or "diamonds." The trailing bush has a flange a bare $\frac{1}{16}$ in. thick, on the front of the rod. Drill a $\frac{1}{16}$ in. oil-hole in each boss, and counterbore it with a 5/32-in., or No. 22 drill.

The knuckle is a proper forked joint, made as described for the "Minx," the pin being turned up from $\frac{1}{4}$-in. rod, reduced to fit the $\frac{3}{16}$ in. holes in the fork and tongue, and further reduced to $\frac{1}{8}$ in. and screwed to take a nut. When the rods are placed on the crankpins and the wheels turned, there shouldn't be the slightest sign of stiffness or binding. If there is, the cause is usually incorrect quartering, so check that off before you start to ease the bushes or adopt any other expedient. A good tip for beginners, when marking-out coupling-rods, is not to set your dividers to the measurement given on the drawing, but to the actual centres of the axles on which the coupled wheels are mounted, as they must, of necessity, be the same. When the rods are O.K. put a nut and washer on each trailing pin, and fix the washer in the recess in the front boss by an ordinary countersunk screw.

Petrol Engine Topics

(*Continued from page* 511)

enthusiast than as an employer. Of the many jobs I have had in the course of a patchwork career, none has been happier than that under the guidance of "P.M.," whose human qualities, no less than his technical and organising genius, I have always esteemed very highly.

The many hundreds of readers who knew "P.M." in person, and even those who have only had a glimpse of his personality through the intimate paragraphs in "Smoke Rings," will know that he does not need a fulsome eulogy of praise; but only those who have been actively associated with his life's work can fully realise to what an extent he was devoted to the interests of model engineers. Not only was he an admirer of good models, and the fine craftsmanship in their construction; he also loved the people who made them.

Though "P.M." has passed on, the torch that he lit some fifty years ago still burns as brightly as ever, and has been the means of kindling many lesser lights all over the world. For my part, I avow my intentions to carry my small brand to the best of my ability and do my utmost to promote that SPIRIT OF MODEL ENGINEERING to which "P.M.'s" whole life was dedicated.

The S.M.E.E. Jubilee Exhibition

WHEN in 1898, a few months after THE MODEL ENGINEER was founded, a small group of enthusiasts met in the office of Mr. Percival Marshall, probably none of them thought that in fifty years time the society founded at that meeting would have grown to the size it has, or that forty clubs scattered over the whole Empire would have become affiliated to it.

Very few of these founders still remain and "P.M." himself, the founder of the society has unhappily not lived to see the Jubilee Exhibition of the society by a matter only of weeks.

The exhibition is intended to mark the Golden Jubilee of the S.M.E.E. For that reason it is not competitive, but a display of the work of members of the affiliation over the years. Some of the models will be familiar to the readers of THE MODEL ENGINEER as cup and medal winners at THE MODEL ENGINEER Exhibitions of the past. Among these may be mentioned Mr. S. T. Harris's "Amalgamation," Mr. A. W. Marchant's paddle engine and the late Mr. H. G. Eckert's generating plant, all winners of championship cups in past "M.E." Exhibitions. Others, it may be predicted, will be cup and medal winners in the future.

Commander W. T. Barker's four magnificent models, depicting the history of the reciprocating marine engine will be there—all running under power. Mr. Dearden, the winner of the first gold medal awarded by the society and whose ¾ in. scale "Caledonian" locomotive is now in the possession of the Institute of Mechanical Engineers, is showing his recently completed 1 in. scale "Caledonian."

The *Robert Allen*, an 8 ft. cargo boat designed for radio control and embodying a novel design of watertube boiler with highly ingenious and

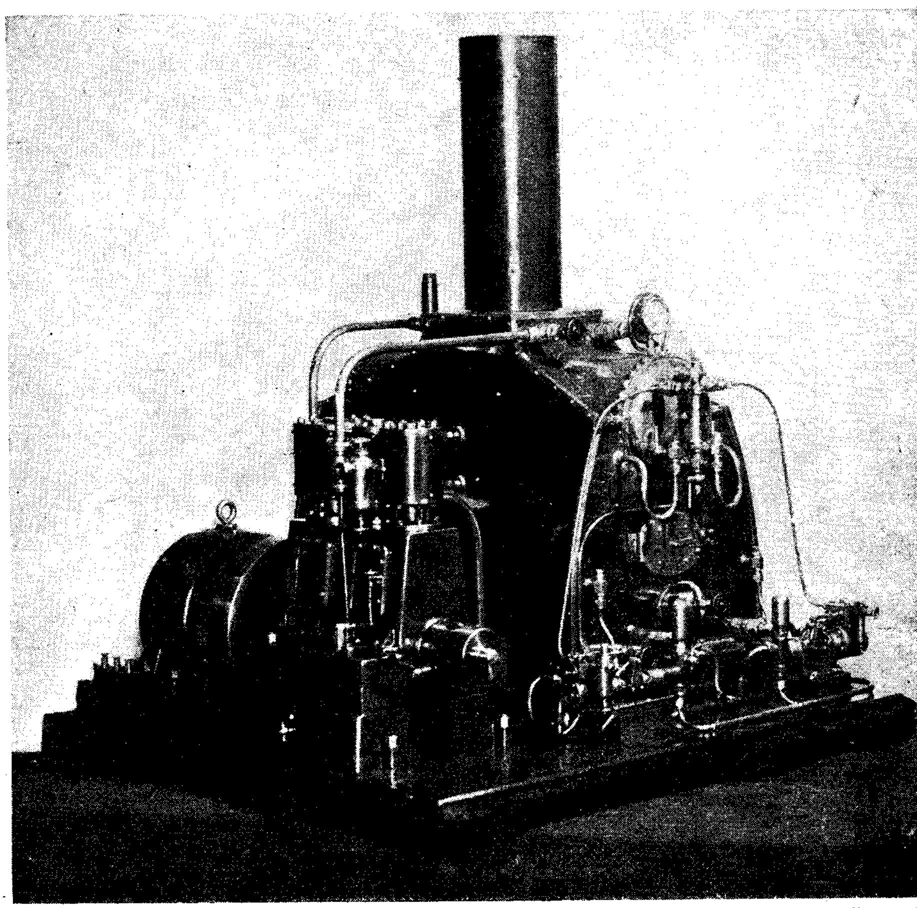


Photo by courtesy] [*The S.M.E.E. Journal*

General view of the S.M.E.E. boiler and generator. Made by W G. McCall effective automatic controls, will be shown with engines running in a tank

The tramway track of the Tramway and Light Railway Society will be demonstrated—and will show that there is more in the too-often despised tram than the casual observer might think.

A novel feature of the exhibition will be the display of photographs of models from overseas. The Bombay Society and the Toronto S.M.E.—both affiliated to the S.M.E.E.—have sent photographs of members' work, as also have the Cape Town and Rand Societies, the New England Live Steamers, the Chicago S.M.E. and the Otago (New Zealand) Society.

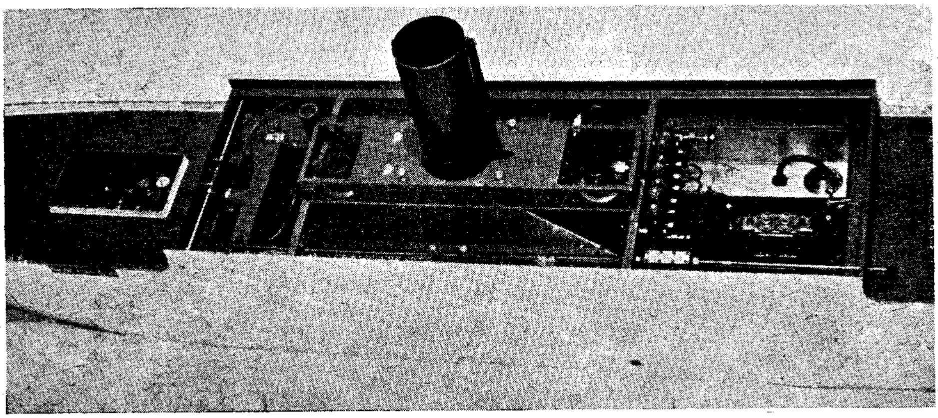


Photo by courtesy] [*The S.M.E.E. Journal*

Midships view of the model S.S. " Robert Allen "

The " OO " gauge fans will be interested in the layout provided by the North London S.M.E., not only for the number and variety of the control stations, but also because it is throughout, a two-rail layout. This society is, with considerable success, featuring two-rail working among its members.

Another attraction provided by the North London Society is the interesting display demonstrating the operation of a modern waterworks and showing the circuit of water from well, through reservoir, to tap. The model will also be running throughout the show.

The centre piece of the show is a stand on which working models are to be shown, running under compressed air. A particular feature will be an old table engine, presented to the S.M.E.E. by Mr. Keith Charsley. The model was made in 1830 by Mr. Charsley's grandfather, who was a surveyor on the early railroads and later a mathematical don at Oxford, and won a prize awarded for the best working steam engine. It was constructed on a lathe built by its maker and later, after its success, was used for many years to drive the lathe on which it had been built.

Several of the models constructed by the late Mr. T. W. Averill and bequeathed by him to the S.M.E.E. will be shown running, among them his locomotive *Goliath* which has been revivified by Mr. J. A. B. Graham and will, it is hoped, renew its prowess on the track.

Other locomotives, too will be there in plenty, among them Mr. Crebbin's stud with the evergreen *Cosmo Bonsor* and the mighty *Mallet*, Doctor Robinson's collection of Victorian beauties and the tried and trusty locomotives of Mr. Pole, Mr. Maxwell, and Mr. Storey. Newcomers to the show will be two 1-in. scale heavyweights of Mr. McCall. Another specimen of this gentleman's handiwork in a somewhat different sphere is the boiler and generating plant presented by him to the society, which will be shown running at frequent intervals. The main difficulty about this plant has been its terrific evaporation and, to avoid filling the hall with steam, extensive experiments in condensation are being tried, the latest involving the coupling together of two car radiators.

Among the other models of interest, should be mentioned Mr. Shackles collection of model of agricultural steam engines—showing development over a period of years, the locomotive, "1831," and other exhibits shown by Mr. Ian Bradley. But the list could be prolonged indefinitely, and merely to mention that among the exhibitors are such men as Mr. E. W. Fraser, Mr. Keiller and Mr. K. N. Harris, will give some idea of the standard of the work.

One of the titles of the society is, of course, "Experimental," and though model engineers' experiments only too often never see the light of day, far more experimental work goes on in the society than is generally known. The workshop ceiling still has the scars caused by some drastic experiments on bursting pressure of boilers and backs of menu cards in nearby restaurants are apt to bear mysterious symbols, letters and diagrams. Recently, spurred on by the enthusiasm of our vice-president, Mr. D. H. Chaddock, the society has been making an attempt to produce apparatus for measuring the various forces arising in models and finding out the why and wherefore. How far the society has succeeded will be seen at the exhibition. There will be displayed not only an electrical dynamometer for testing stationary steam and petrol engines (largely presented by Mr. Chaddock), but also a locomotive test stand. This machine, which is adapted to take locomotives of from 2½-in. to 5-in. gauge, will give drawbar pull readings at all speeds and settings of the valve-gear and should enable actual brake-horsepower measurements to be taken. A devoted board have worked to get the job ready for the exhibition and also to keep up with the refinements produced by the back-room boys. I understand that once the main structure has been tried out a number of further "blobs and gadgets" are proposed to enable such things as smokebox vacuum and temperature, water consumption and the like to be determined.

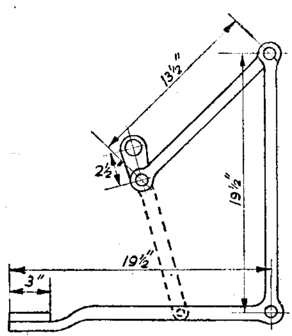
Though the exhibition is to celebrate the Golden Jubilee of the S.M.E.E. it is not, as the above will show, a one-club affair. Forty clubs are now affiliated to the S.M.E.E. and the whole forms, I think it may be fairly said, a happy family working together informally and without friction and offering, in fact, a happy contrast to some organisations in altogether larger and more important matters.

Editor's Correspondence

Treadling

DEAR SIR,—Further to your recent correspondence on this subject in your columns, I wonder if any of your readers can explain the theory behind the design of the treadle gear on the lathe which gave rise to my original letter.

The diagram herewith illustrates this and the dimensions given are accurate within ⅛ in. The purpose of the vertical arm of the bell crank is obscure, and one would have thought that exactly the same result could have been obtained without



it by shortening the throw of the crank and connecting it direct to the pedal arm, as indicated by the dotted lines. Do I detect a faint smell of the old perpetual motion idea of something for nothing? Incidentally, in many walks of modern life this underlying attraction of "Perpetual Motion" seems to be much in evidence; 9d. for 4d. appears to be just as attractive (and just as chimerical) as it was in the early 1900's.

Yours faithfully,

Wealdstone. K. N. HARRIS.

"Roaring" Boilers

DEAR SIR,—I have read the remarks on "Roaring" Boilers, in a recent issue of THE MODEL ENGINEER, and would like to say this is a common occurrence with the boilers of steam trawlers working on natural draught. Occasionally, the fires get a bit heavy, and then the procedure is to level them with the rake or "devil," and then prick them up between the bars. This breaks the fire up, and gives the air an easier passage through the firebars, and then they roar to such an extent that to anyone not accustomed to this performance, the boiler seems to be doing its best to shake itself to pieces.

Before the war, I remember one trip when we took coal aboard at Harstard, Norway, after a fishing trip to the White Sea grounds. When the furnaces had been fed, there was a terrific roaring set up until the coal had burnt, when there was an immediate cessation of roar and vibration. We soon found out, that as soon as the roar ceased, it was time to fire up again.

During the war, I was at one time in a converted trawler, and after our new commanding officer had, *while on the ship's bridge*, heard the roaring that ensued when the fires had been pricked up, he was curious to know what happened to make the boilers go "roaring like a Heinkel?"

Incidentally, I do some of my model work at sea, that is, weather permitting; my workshop floor doesn't always stay put!

Yours faithfully,

Grimsby. J. W. ASHWELL.

"Models With a Purpose"

DEAR SIR,—The illustration of a small petrol engine included by Mr. Donald Stevenson in his article on the above subject roused a strong chord of memory.

In your issue of February 13th, 1913, there is a description of an engine which, as far as one can judge, is identical. It is there attributed to the work of a Mr. A. T. Hawkins, and is described as a prize-winning entry in a competition organised by Messrs. Drummond Bros.

In his account of the engine, Mr. Hawkins says that it is the outcome of experiments made on a previous engine and indeed in your March 16th, 1911, issue, is a photograph of Mr. Hawkins, his aeroplane and an engine which may well be the prototype of the later one.

Since Mr. Hawkins there appears as a young man of 25 to 30 years, he may see these lines, in which case it would be most interesting to hear from him and of the present whereabouts of the engine.

Mr. Stevenson, too, since he was using an engine so similar to Mr. Hawkins' may be able to throw some light upon the matter. My interest is aroused by profound admiration for such a pioneering effort. Even today, 4-cylinder engines with a power-to-weight ratio of 1 h.p. for $5\frac{1}{2}$ lb. "all up" are none too common. The weaknesses to which Mr. Stevenson refers and which I well believe existed could easily be rectified in the light of present-day knowledge. The big-ends, for example, are only $\frac{3}{16}$ in. diameter and the double overhung crankshaft $\frac{1}{4}$ in.—this for four cylinders 1 in. bore by $1\frac{1}{8}$ in. stroke.

However, such notable models should not be allowed to pass into oblivion, unhonoured and unsung, and if the present engine and also the Stanger engines can be presented to some central body, the S.M.E.E. for example, I am sure they can be preserved for posterity.

Yours faithfully,

Sevenoaks. D. H. CHADDOCK.

Club Announcements

The Society of Model and Experimental Engineers

The society's Jubilee exhibition will be held at the Imperial Institute Hall, South Kensington, from May 13th to 22nd, both dates inclusive.

A visit to the Army Apprentices, School at Arborfield, near Reading, has been arranged for June 11th next. Will members wishing to join the party notify the secretary as soon as possible.

The next meeting of the society will be held at Caxton Hall, Westminster, on June 12th, when Mr. Victor Harrison will give a talk on "Model Scenic Railways."

Secretary: E. L. ASHTON, 20, Pollards Hill West, Norbury, London, S.W.16.

The Buxton Model Engineering Society

The above society held their annual general meeting at Messrs. Collinson's Cafe on Thursday, April 22nd. Mr. R. Hattersley, as chairman, opened the meeting with a reference to the death of Mr. Percival Marshall and invited members to stand for one minute in silent tribute to the man to whom model engineers owed so much.

Very satisfactory reports of the last year were presented by the secretary and treasurer. The secretary also announced that the society have a very interesting and full programme before them for the coming year.

The society holds it meetings on the second and fourth Thursdays of each month at Messrs. Collinson's Cafe, Spring Gardens, at 7.45 p.m., where all interested in model engineering will be welcome.

Hon. Secretary: L. N. HOBDEY, Westward Ho!, Lightwood Road, Buxton.

The Kent Model Engineering Society

The following meetings have been arranged:—

May 18th. Informal Night.
May 24th. Brains Trust.
May 31st. Bits and Pieces Night.
June 7th. Mr. Brown on "X-rays."

Headquarters: Crantock Road, Catford, S.E.6. Chairman: V. Wattingham.

Hon. Secretary: F. H. GRAY, 73, Sangley Road, Catford, S.E.6.

Grimsby and District Society of Model and Experimental Engineers

Work is going ahead on the new railway site, the preliminaries of marking-out, etc., are over, and the real hard work of excavating tons of soil is being tackled with a will. The society are planning to visit the steel works at Frodingham in conjunction with the Scunthorpe Club in the near future.

Hon. Secretary: J. TARTELIN, 101, Ladysmith Road, Grimsby, Lincs.

Wrekin Model and Experimental Engineering Club

We are holding our first exhibition of models in collaboration with Owestry and Shrewsbury Model Engineering Clubs on Friday evening, May 14th, 1948, from 7 p.m. to 9 p.m., and on Saturday, May 15th, 1948, from 2.30 p.m. to 9.30 p.m.

A fine selection of models will be exhibited, including locomotives, steam engines, boilers, internal combustion engines, ships, speedboats, yachts, etc., aircraft and small tools.

A miniature 5-in. gauge railway will be on view, with locomotive and coaches for passenger-hauling.

Control-line flying demonstrations will also be arranged, weather permitting. This is our first exhibition and members are extremely keen that it shall be a great success.

Hon. Secretary: J. H. IRVING, 10, Hartshill Avenue, Oakengates. Tel. 272.

Barnoldswick and District Model Engineers' Society

The above society was inaugurated last month, and a cordial welcome will be given to any interested reader in the Craven area.

Hon. Secretary: A. BERRIDGE, The Orchard, Coates, Barnoldswick, Via Colne.

Dublin Society of Model and Experimental Engineers

Please note that the meeting previously announced for Friday, May 7th has been postponed, due to unavailability of meeting room, until Friday, May 14th, at 7.45 p.m., at 5, Leinster Street, South.

The remaining ordinary meetings of the summer session will, however, be held on the evening of the first Friday in each month (same time and place) unless special notification to the contrary is circulated.

All members are asked to publicise the exhibition as widely as possible, with special reference to the new dates: July 5th to 10th, inclusive.

Hon. Assistant Secretary: J. D. KEANE, 1, St. Helen's Villas, Booterstown, Dublin.

Croydon Society of Model Engineers

The Croydon Society held its annual competition on Thursday, April 15th, with an encouraging number of entries of all classes. Six challenge cups were awarded and several entries were specially commended where judging proved difficult.

Hon. Secretary: J. F. STRINGER, 59, Windmil Road, West Croydon.

Eastbourne Society of Model Engineers

The meeting of the above club on May 19th will be devoted to a discussion dealing with the construction of an outdoor multi-gauge locomotive track. All members please attend.

Hon. Secretary: C. T. UPTON, 13, Lawns Avenue Eastbourne.

The Meteor Model Race Car Club

This newly-formed club serves the North Staffs area, but owing to limited track facilities, under present conditions, the membership is to be limited to fifteen. The main object is to improve the breed of high-speed model race cars with a view to possible forthcoming international events, and its status is strictly amateur.

Hon. Secretary: F. G. BUCK, Beacon House, Rockfield Avenue, Baddeley Edge, Milton, Stoke-on-Trent.

NOTICES

The Editor invites correspondence and original contributions on all small power engineering and electrical subjects. **All such correspondence should be addressed to the Editor (and not to individuals)** at 23, Great Queen Street, London, W.C.2. Matter intended for publication should be clearly written, and should invariably bear the sender's name and address.

Readers desiring to see the Editor personally can only do so by making an appointment in advance.

All correspondence relating to sales of the paper and books to be addressed to THE SALES MANAGER, Percival Marshall & Co. Ltd., 23, Great Queen Street, London, W.C.2.

Correspondence relating to display advertisements to be addressed to THE ADVERTISEMENT MANAGER, "The Model Engineer," 23, Great Queen Street, London, W.C.2.