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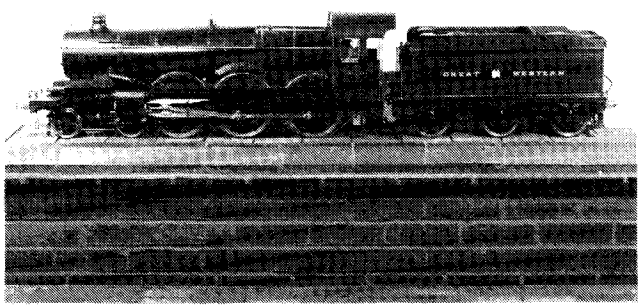
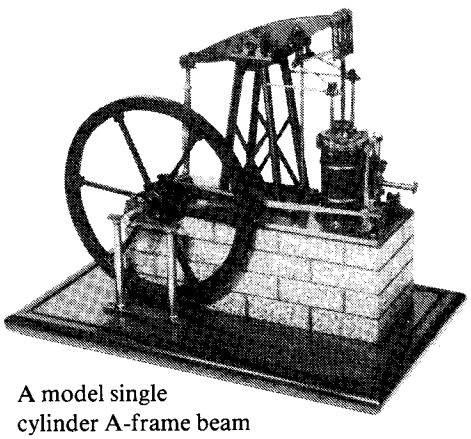


An exhibition standard 5in. gauge model of the Great Western Railway Castle Class locomotive and tender No. 4079 'Pendennis Castle', built by J. Adams, Poole.



A model single cylinder A-frame beam engine, built by E. F. Meyers, circa 1860

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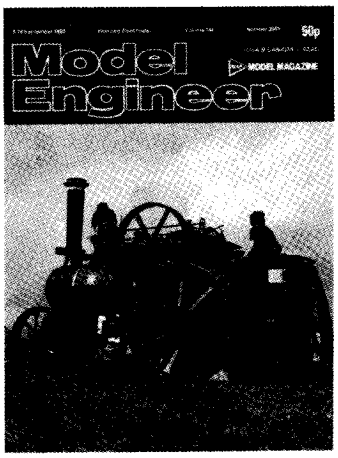

FRONT COVER

1908 Robey Steam Traction Engine. (Photograph: Ivan J. Belcher).

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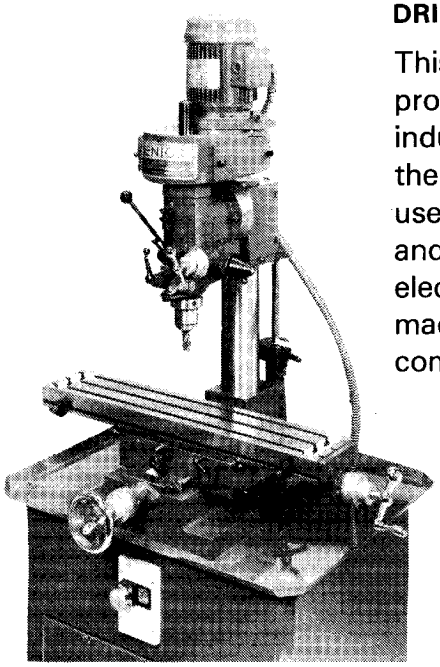

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A Commentary by the Editor

Central Film Library, New Film Guide

A selection of 16mm films on workshop practice for apprentices and students appears on a free reference guide just issued by the Central Film Library. Subtitled "Classic Workshop Training Films", the Film Guide will be mailed out to the relevant departments of secondary schools, further education and technical colleges and polytechnics, mechanical engineers, manufacturers of machinery and machine tools, timber and metal products, MSC Skillcentres, trade unions and employers' associations. The Film Guide lists 100 titles on health and safety at work and workshop practice: some are basic training films, while others demonstrate specific techniques used in woodworking, metalworking and machine tool operation. Many of the films were made some years ago in black and white, but are regarded as classics of their kind and are in constant demand. Some are on free loan, and some are available for purchase. Copies of the Film Guide are available from Central Film Library Marketing Unit, Bromyard Avenue, London W3 7JB.

News from the Trade

A couple of news items of the Trade: we hear that Mitutoyo (UK) Ltd has opened a new suite of repair and calibration rooms at its Andover Headquarters (tel. 0264-53123) for its micrometer and optical projector products. A new company, Newington-Hull Ltd has been formed to take over production and marketing of machine tools hitherto supplied under the Taylor-Hobson name. Taylor-Hobson will be remembered for their small pantograph engraving machines and optical products.

Fairground Carousels, etc.

Over the past year, we have had several inquiries from readers about modelling fairground carousels and other equipment. There were even inquiries from as far afield as South Africa and Australia. What little we know on the subject was told them, but we have now located an excellent book on the subject which is called a Pictorial History of the Carousel by Frederick Fried, published in the U.K. by Thomas Yoseloff Ltd., of 18 Charing Cross Road, London WC2, and in U.S.A. by A. S. Barnes and Co. Inc., Cranbury, New Jersey 08512. The book includes many illustrations, line drawings, etc., showing complete machines and detail parts.

Model Engineering and Models Day, Chalk Pits Museum

The Chalk Pits Museum, the new industrial history centre situated on the banks of the Arun at Amberley, is to hold the first special event connected with Model Engineering at the Museum on 14th September 1980. With the kind co-operation of the Worthing Society of Model Engineers, they are able to provide a track for locomotives, with the facility for 3½, 5 and 24 in. gauge engines. There will also be a boat tank available for the operation of model boats. The Museum has much to interest model engineers, with a working blacksmith's shop, an engineering workshop with overhead lineshafting (under construction) and several working stationary engines. The industrial narrow gauge railway will also be in operation over the weekend. Entries are invited from the owners and builders of all types of models, and forms are available from the Museum on receipt of a stamped addressed envelope. Tel: No. Bury (W. Sussex) 370 (079-881).

W.E.A. Swindon

The Workers Educational Association Swindon programme for the 1980/81 session includes two courses of particular interest to railway enthusiasts. They are: "Railways Then and Now" — A 10-meeting course to be held at the Sanford Centre, Sanford Street, Swindon, Wiltshire, on Fridays at 7.30 pm commencing 26th September 1980. As 1980 is the 150th anniversary of the opening of the Liverpool & Manchester Railway the course will include a comparison of this line with the modern Inter-City railway. Other topics will include Great Western Railway history and the latest developments in the railway preservation field, including the Swindon & Cricklade Railway scheme. Course Tutor: Reg Palk (assisted by panel of speakers).

"Swindon's Other Railway" — A 5-meeting course to be held at the Adult Education Centre, The College, Regent Circus, Swindon, Wiltshire, on Tuesdays at 7.30 pm commencing on 23rd September, 1980. The subject is A history of the Midland and South Western Junction Railway. Course Tutors: Dave Barrett, Brian Bridgeman and Bob Emmett.

Evening Classes in Hampshire

A Model Engineering Class commences on 22nd September next at Cove School, Adult Education Centre, St. John's Road, Farnborough, Hants. Enrolment is from 8th by application at Oak Farm School, Cove. There is a well fitted workshop with Boxford and Colchester Lathes, shapers and milling machines. Attendance is on Monday and Wednesday nights.

Hampshire also have another Model Engineering class at Alton Further Education Centre, Amery Hill School Alton; enrolment from 8th to 11th September and the school is on Monday evenings 6 to 9 p.m.

ASHFORD

by

Martin Evans

A 5 in. gauge version of the Southern Railway "U" class 2-6-0 locomotive

Part V

From Page 926

Valve Liners

Judging by my correspondence, many locomotive builders who have decided on piston valves have trouble over turning and fitting the valve liners to the cylinder blocks. The late LBSC's method was always to make the liner in one piece, to a press fit into the bored hole in the block, the liner being pressed home in the bench vice (if large enough and sufficiently accurate!) or drawn in by a big bolt, nut and brass washer. While it is not too difficult to turn a short length of rod or tube to a good press fit, it is not so easy when we have to deal with something around 3 in. long. As the liner is drawn in by the bolt, it goes tighter and tighter until towards the end it requires a great deal of force, resulting in the liner either collapsing, at its weak points where the ports are situated, or, nearly as bad, the liner becomes considerably compressed, and requires reaming out to bring to size again; and if the required size of reamer is not available, what to do? (Even if a suitable reamer is available, how many of us can be sure of producing a really true bore by this method?)

When I made my piston valves for the original *Springbok*, back in 1960, I used the above method, but had a great deal of trouble, although I got over it by carefully filing the liner in the lathe (using a dead smooth Swiss flat file) so that the liner entered its bore fairly easily for about half way, becoming progressively tighter as it was pressed right home. Since then, I have tried making the liner in three pieces and in two pieces, using press fits and combinations of press fits and Loctite. My own preference now is to make the liner in two pieces, and to ensure that when the first half is pressed in, it can only go exactly half way into the cylinder block, I turn the part which is to protrude beyond the cylinder block a few thou. larger in diameter. Further, I now turn the two parts of the liner to such a diameter that they can be pressed home with very little pressure — only slightly more than could be applied by hand. To make sure that the two halves are not blown out again by steam pressure, I fit a short grub screw, say 4 BA, as seen in my drawing. In any case, assuming that the piston valves are not leaking, the liners are only subjected to the pressure of the exhaust steam.

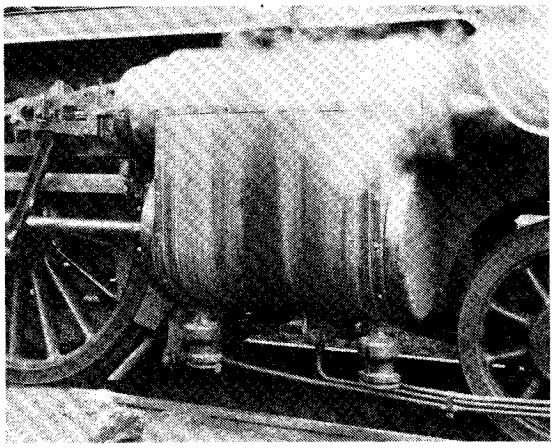
As far as the piston valve cylinders for *Ashford* are concerned, I am suggesting that the front end cover of the liner should only be a "hand-press" fit in the liner and this too kept in place by a 4 BA grub screw. To ensure steam tightness, it could be smeared with Red Hermetite before assembly. So that the piston valves can be withdrawn from the front of the locomotive, two tapped holes could be provided in the piston valve head, say 6 BA. After removing the two nuts and washer, a couple of rods of any suitable length, threaded 6 BA, could be inserted into these tapped holes, so as to get a good grip on the valve. To avoid having to remove the running boards first, little inspection covers could be provided to enable the above operation to be done.

The rear cover of the valve liners in this design is a casting, integral with the valve spindle guide. This, too, can be made a hand-press fit in the liner, with once again a 4 BA grub screw to ensure that it doesn't work out again. This grub screw could be put in at the back if preferred, though in the position shown it will be hidden from sight by the running boards when these are fitted.

Referring now to the valve spindle, at one time the practice was to thread this for almost its full length, with nuts and locknuts, for valve position adjustment, at each end of the valve. My efforts at threading stainless steel over such long lengths, using an ordinary carbon-steel die in a tailstock die-holder, were not always successful (some stainless is nasty stuff to thread) so it was not long before I adopted the arrangement shown, with the spindle reduced in diameter at the front end, with only a very short length of spindle to be threaded.

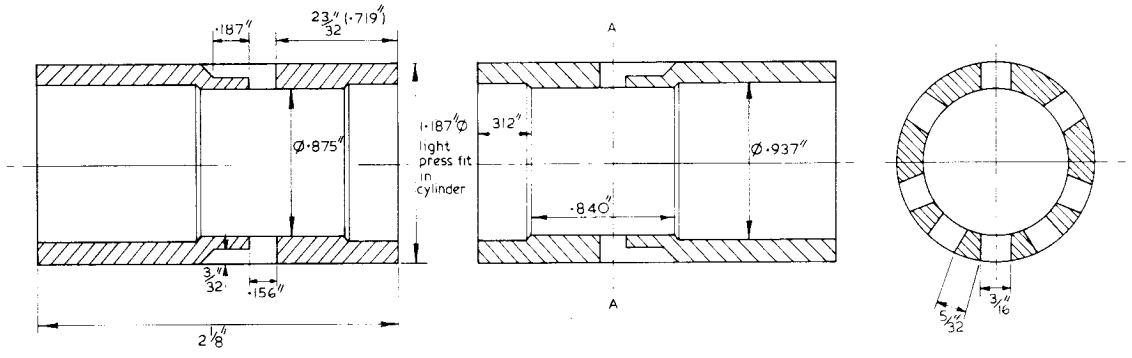
If builders are adopting cast-iron for their cylinders, they will be well advised to adopt proper rings for both pistons and piston valves. The rings for the valves should be around 1/16 in. × 1/16 in. section. For gun-metal cylinders, graphited-yarn is usually recommended (for the pistons — not the valves, I hasten to add!), but I wonder whether we might not use home-made stainless steel rings in gunmetal cylinders with advantage; I know that some builders have tried this with apparent success — but lubrication must be reliable. As for making the rings, a very good article on this subject by Professor Chaddock was published in *Model Engineer* a few years ago.

The cylinder of a Southern Mogul



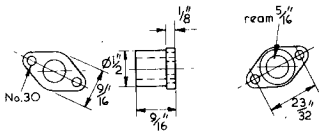
Perhaps I had better say something about machining the valve spindle guides. I hope that castings will be available for these and if so, that a good thickness of metal be provided above and below the slot, to give sufficient strength while milling the vertical slot. Probably the best way to deal with these items is to chuck them by the outer end first, using the 4-jaw, turn the front end to suit the piston valve liners, and also to drill and ream for the valve spindle. Next, make up something to hold the casting by the turned front end. I suggest a short piece of steel or brass about 1 1/8 in. square, bored to a good fit for the spindle guide, which can be held firmly in this by a clamping screw, say 2 BA, but don't forget to insert a little piece of soft copper rod between screw and guide to prevent scoring. Tackle the ¼ in. wide slot (seen in the side elevation) first. The square "spindle guide holder" can either be clamped under the lathe tool-holder and brought up to lathe centre height, or it could be clamped cross-wise in the machine vice fitted to the vertical-slide (I would prefer the latter). Drill holes at each end of the slot, starting with a centre-drill in the 3-jaw, then using a drill about 3/16 in. dia. at top speed, followed by one slightly larger than ¼ in., say letter G (0.261 in.). Follow up with an end-mill 7/32 in. (or 3/16 in. dia.), finally with ¼ in. dia. end-mill.

The "holder" is now turned through 90 deg. (easy as it's square) and the vertical 3/8 in. wide slot milled out. Here again, I would suggest using a 5/16 in. end-mill to start with, and only penetrate 1/16 in. deep at each cut, as the spindle guide is now becoming

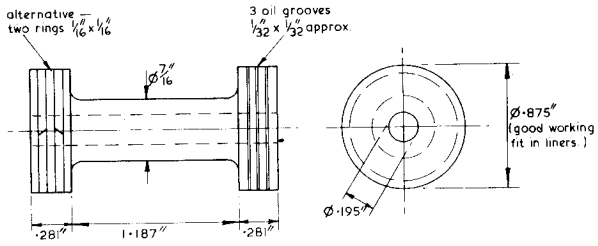


VALVE LINERS (Front & Rear are identical)

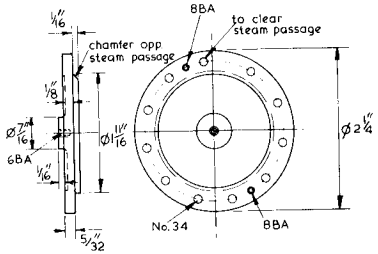
Section AA



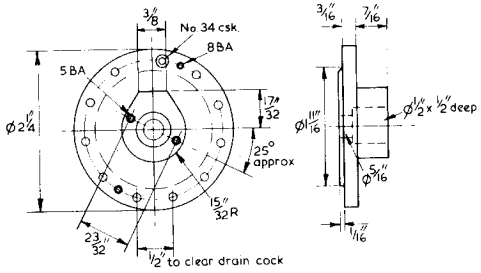
GLAND FOR REAR COVER: 2 off gunmetal



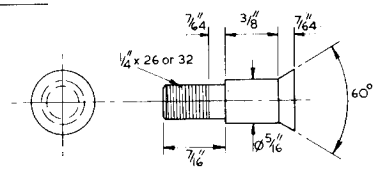
PISTON VALVE



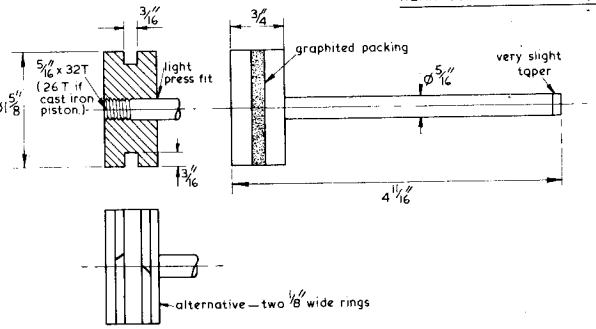
FRONT COVER (left hand cylinder)



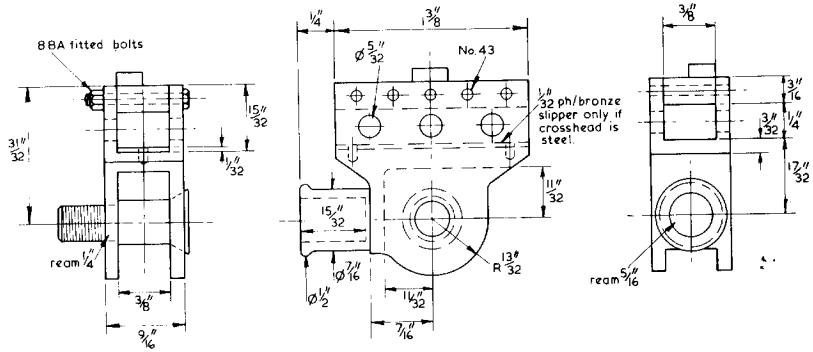
REAR COVER (left hand cylinder)



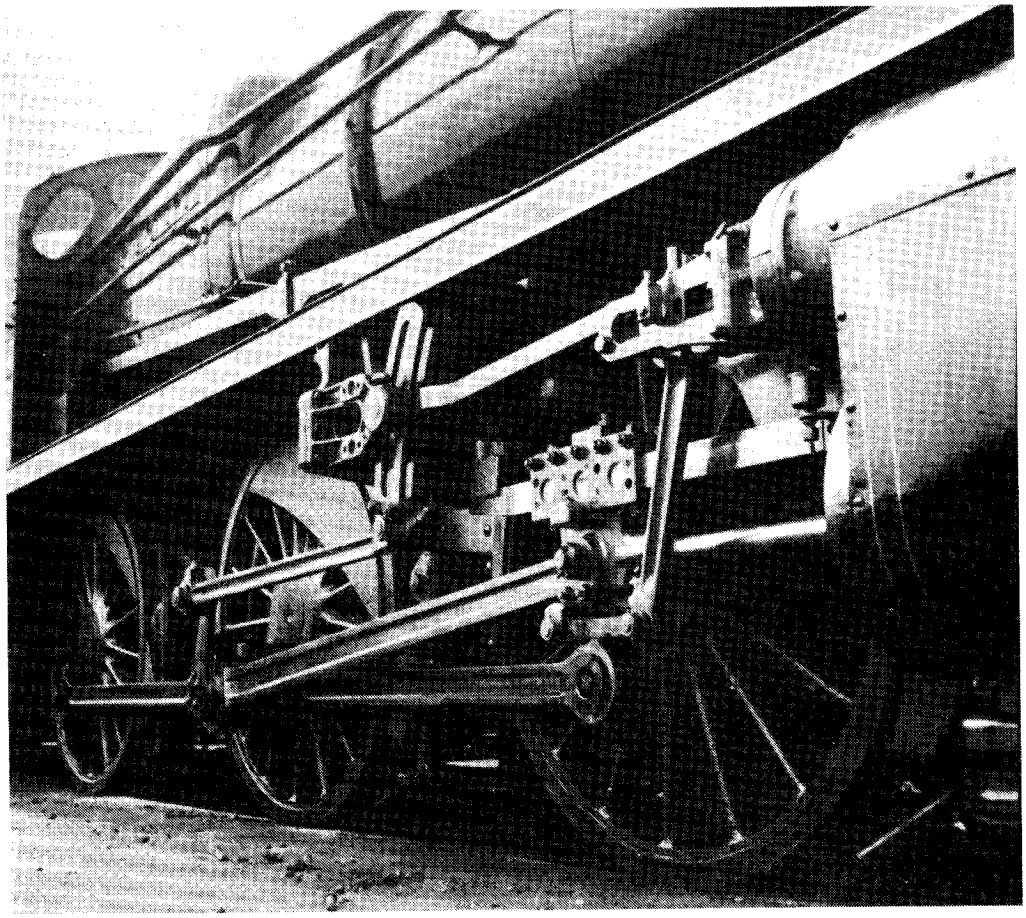
GUDGEON PIN
2 off silver steel or c.case hardening stl.



PISTON & PISTON ROD Rod — stainless steel
Piston — drawn gunmetal, stainless steel or cast iron for C.I. cylinder.



CROSSHEAD L.H. drawn *b.m.s. or ph/bronze casting



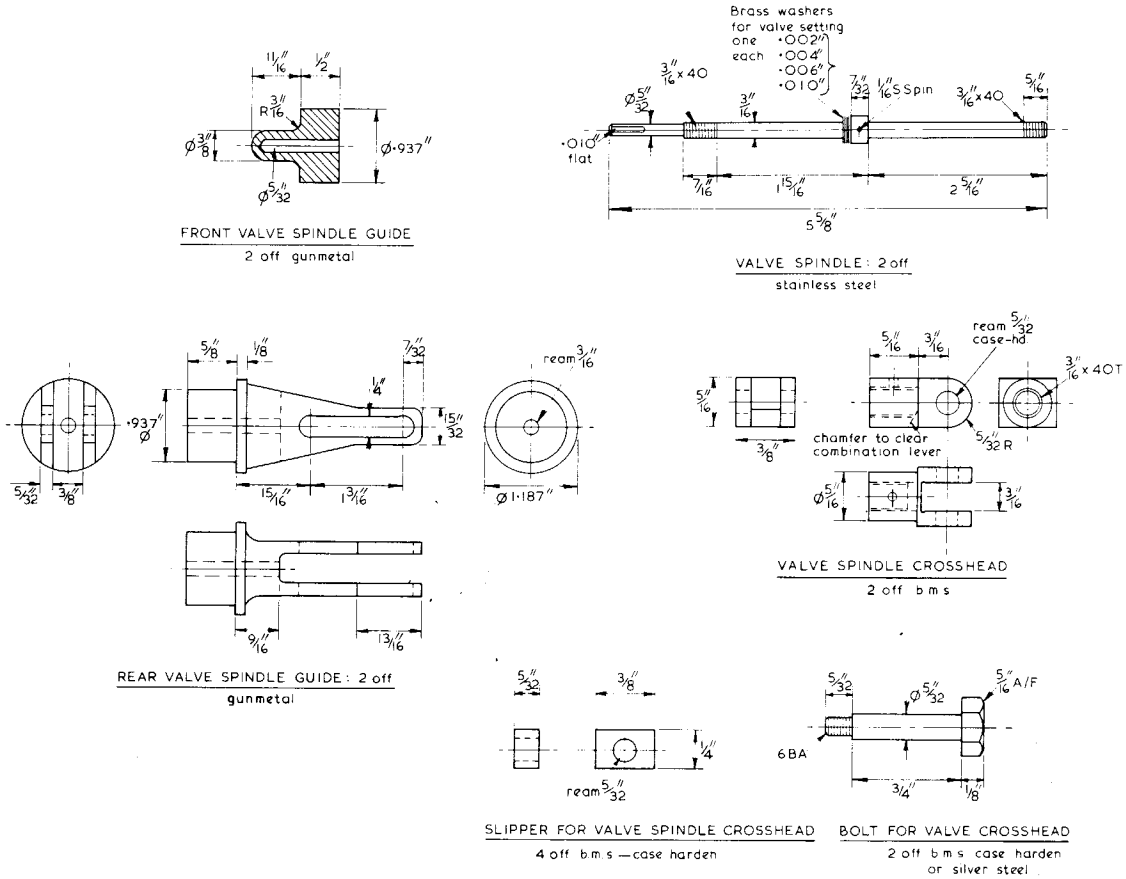
This view of an 'N' class Mogul *shows the crosshead and valve gear clearly*

somewhat fragile. Without shifting the "holder", the two outside surfaces can be machined, bringing the "arms" of the guide to 5/32 in. thickness.

The valve spindle crossheads should be easy to make, from 3/8 in. × 5/16 in. b.m.s., or 3/8 in. square if that is not available. Drill and ream the 5/32 in. dia. cross-hole before slotting 3/16 in. for the combination lever. This component will require case-hardening later on, unless the builder prefers to fit a phosphor bronze bush. Perhaps I should mention at this stage that wherever my drawings show reamed holes in a steel component that are to be case-hardened, an excellent alternative is to bush with phosphor bronze. Incidentally, does anyone reverse the usual procedure with valve gear and similar pins, case-hardening the component while making the *pin* from phosphor bronze? This seems to me sound practice. As the pin would probably wear out much quicker than the case-hardened component, it would be the item to be replaced — and what could be easier than fitting another phosphor bronze pin?

Crossheads

The crossheads fitted to the Southern *Moguls* were rather unusual, at least as far as British locomotives were concerned — the design was often adopted by the private locomotive building firms for overseas customers. But the design lends itself very easily to machining from the solid mild steel and, as the upper slipper is a separate item, held in place by a horizontal row of bolts, it is very easy to fit a thin phosphor bronze slipper to take the thrust during forward running. For cutting from the solid, we will need a length of b.m.s. of 1½ in. × 9/16 in. section, though the nearest commercial size is probably 1½ in. × 5/8 in. I would make a start, after reducing the bar to 9/16 in. thickness, by marking out the two crossheads back to back, the piston rod "necks" to the outside. I would then drill and ream ¼ in. dia. for the gudgeon pins (the 60 deg. tapered hole on the inside could be done later on). Next, the 3/8 in. wide little-end recess could be partly cut out from the underside, by end-milling. After this, the five No. 43 holes would be



drilled right through near the top of the bar, followed by the three 5/32 in. dia. holes (these were probably merely lightening holes in the full-size crossheads). The deep slot for the slide bar would be cut next, 3/8 in. wide, and 15/32 in. deep, assuming that a 1/32 in. phosphor bronze slipper is to be fitted. This slot is best cut by face-milling, though it can also be end-milled, in which case it pays to cut it 5/16 in. wide to start with, then follow up with a 3/8 in. end-mill.

To turn the piston-rod necks, the bar can be held in the 4-jaw, a piece of 3/8 in. thick material being placed in the slide-bar slot, to give the jaws of the chuck something to grip. After completing the turning, the necks can be drilled and/or bored to a shade under 5/16 in. dia., then finished with a 5/16 in. 'D' bit. The two crossheads can then be sawn apart, and the rear ends machined off square (again holding them in the 4-jaw). By clamping the embryo crossheads in the machine vice attached to the vertical-slide, the machining of the little-end recess can be completed, the 3/8 in. end-mill now being used at 90 deg. from the original setting, thus "squaring off" the recess. The connecting rod can be tried in place at this stage, to ensure clearance.

The phosphor bronze slippers can now be fitted these being merely 1 3/8 in. lengths of hard phosphor bronze sheet 1/32 in. thick and 3/8 in. wide. They can be prevented from sliding out by fitting two little pins, as shown, made from 1/16 in. dia. phosphor bronze. The upper slipper, made from 3/8 in. × 3/16 in. b.m.s. is fitted next, being clamped against a piece of similar section material to the slide bars while the No. 43 drill is put through. Fitted bolts with rather thin heads are strongly recommended here, rather than ordinary commercial screws. The heads must be on the thin side owing to the proximity of the coupling rods. On the outside, normal nuts can be used, *except those on the two bolts nearest to the cylinder* — these must also be thin, not thicker than 0.060 in., otherwise they would foul the combination lever when the crosshead approaches the front dead centre position. The final job on the crossheads is to shape the radiused part of the "body", and to blend in between here and the piston-rod neck. This is really a question of careful sawing and filing.

Next time, we will deal with the rather elaborate motion brackets and the Walschaerts valve gear.

Continued

THE JONES 22.5

A two cylinder, two-stroke, i.c. engine

by Colin Jones

Part IV

From Page 953

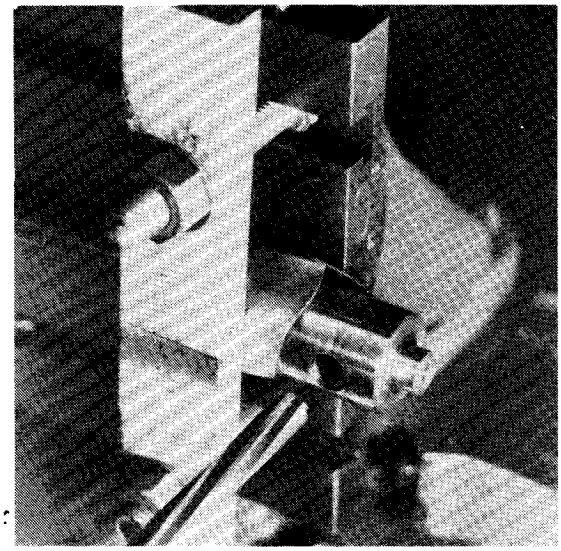
The Rotary Induction Valve

The valve itself can now be made from b.m.s. bar. This is a straightforward turning operation except for the two crossholes which should be drilled accurately through the centre of the bar and also at 90 deg. to one another. A good method of drilling through the centre is to use a "V" block and square as used for the gudgeon pin holes in the piston. The positions of these holes should match the holes which are to be bored through the main block and the rotary valve housing, so a bit of care is called for here, so the position of the holes are probably best marked from the main casting, (i.e. the cylinder centre lines). For drilling, the bar is clamped on the vertical slide using some brass packing pieces to prevent damage to the surface (photo 13). Having drilled and reamed one hole, a piece of 5/16 in. is inserted into it and used with a square to position it at 90 deg. to the axis of the drill for drilling the second hole. To drill the inlet ports the rotary valve housing is bolted to the crankcase and then mounted on the vertical slide and then offset by 35 deg., both holes are then drilled and reamed so that if extended they would pass through the crankshaft centre line (photo 14). The valve and housing are now de-burred and checked for fit; the valve should be a good fit with little or no tendency to bind. Check the holes in the valve will line up with those in the housing, any small discrepancies can be eased with a fine round file. Also check the lateral alignment and if any adjustment is necessary, compensate for this when making the end covers. The end covers are made from the chucking stub, each one being held in place by countersunk 8 BA screws.

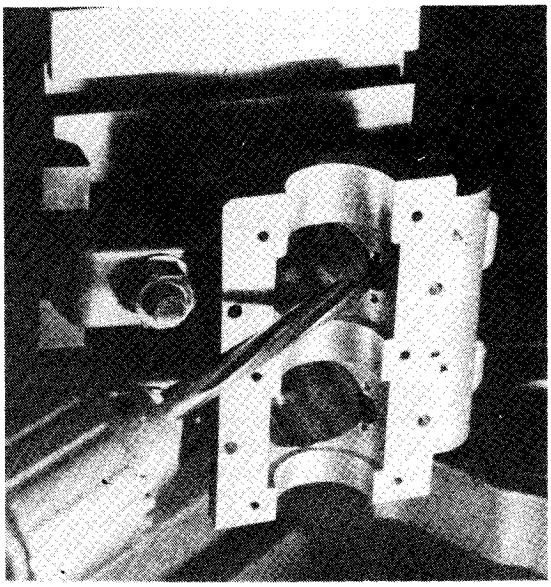
Carburettors

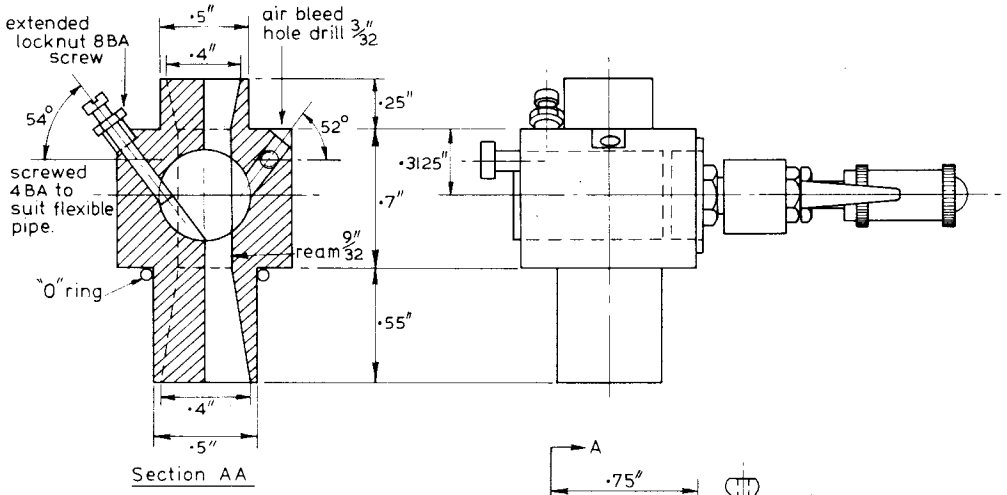
The carburettors are virtually identical to the one used on the .605. The important thing to remember though is to make a left hand and a right hand carburettor, and to make them a matching pair. Although the carburettors are made simultaneously,

Below: Photo. 13.

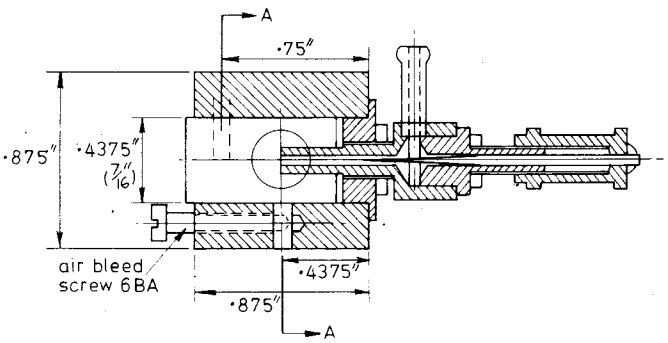


Right: Photo 14.





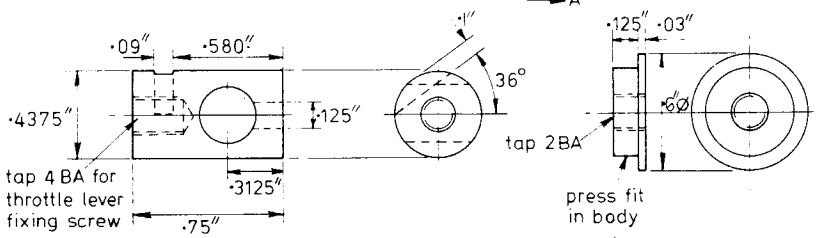
Section AA



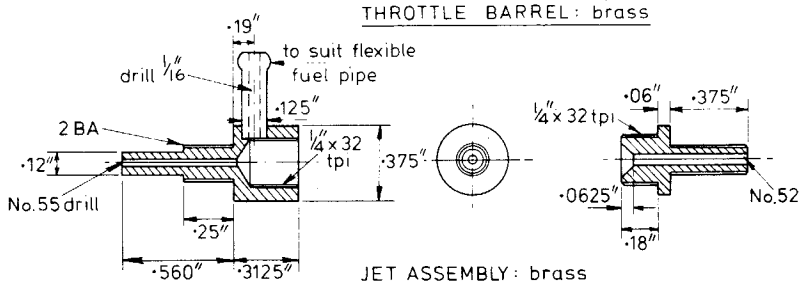
CARBURETTOR : 2 off

body aluminium

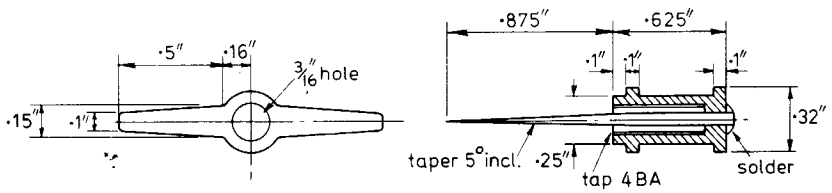
One carburettor to be left handed & one right handed.



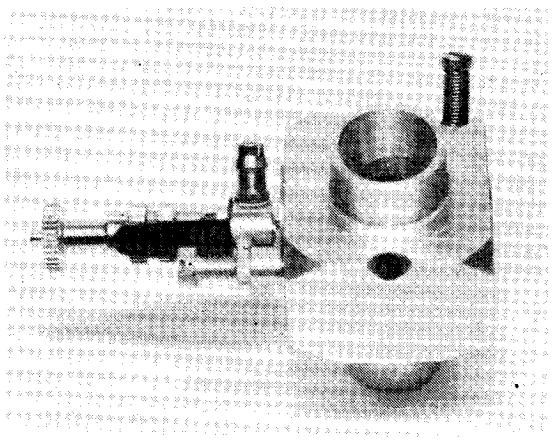
THROTTLE BARREL : brass



JET ASSEMBLY : brass



thus saving time, I will describe the operation for just one of them for simplicity. Firstly a piece of aluminium alloy bar is cut to length plus a small safety amount and milled to 7/8 in. square if necessary. A centre line is scribed all round the bar and the choke centre line marked at both ends. The choke centre is then centre popped and carefully centre drilled. Then, between centres, the bottom end or mounting stub is turned to size. It is then mounted in a collet chuck by this stub and the top end turned to size leaving it a little longer than necessary to provide a secure mounting in the collet chuck when finishing the

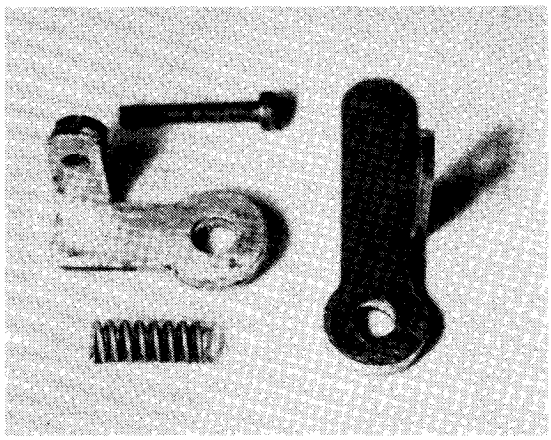


A completed carburettor.

bottom stub. The central hole is drilled and reamed to size. The bottom stub can now be finished by flaring out the central hole to form the choke. The top stub is then turned to length and also flared. All these operations are done using the collet chuck. All holes are drilled in their respective places and angles. The throttle barrel is drilled and reamed to accept the brass barrel. The angle of the air bleed hole is not too critical except that it should be uncovered by the hole in the throttle barrel at its closed or tick-over position, where it is used to adjust the slow running mixture. For the angular placement of the holes I use the swivelling vertical slide, although other methods are perfectly satisfactory, the main requirement being to match the carburettors.

The throttle barrel is made from brass and is turned from a bar to size and the end drilled and tapped 4 BA for the throttle lever screw. The position of the cross hole is now marked and the bar mounted on the vertical slide for boring and reaming. The hole must be both square and central in the bar, the centring being done using a square and "V" block method. Having done this the barrel is parted off at a generous ¾ in. long and then mounted in the collet chuck for facing and drilling the hole for the jet tube. A 3 jaw chuck will suffice, but be careful not to deface the surface of the barrel. The position of the retaining and limiting slot is best marked from the carburettor body using the throttle stop screw to mark the position of the slot. A ruler is used to extend the line of the screw across the end of the barrel, at full throttle position, to mark the angle of the slot, a bit un-scientific but the angle is not too critical. The most important thing is to make sure the hole in the barrel corresponds to the hole in the carburettor body. The slot is cut using a slitting saw or very careful filing. Finally the barrel is de-burred and fitted to the body.

The barrel should rotate freely but not be sloppy or loose in the body. Check that the hole in the barrel corresponds to that of the body, if only slightly out a reamer can be passed through the carburettor with the barrel in position. The brass end is turned to be a press fit in the carburettor body and tapped to take the jet assembly. I prefer to use a commercially available jet assembly as these seem to be much neater than I can manage and also have finer threads giving a better mixture adjustment. I cannot specify a particular assembly except to say that a replacement for a .40-.61 cu. in. size engine will be necessary. The only draw back with this is that they have a very fine metric thread and a tap will have to be made to tap the brass end cover, but I think this is easier than making a complete jet assembly with its tapering needle. The jet assembly I think needs little comment except that some patience is needed here. The fuel feed nipple is soft soldered into the assembly so check that the hole is clear of solder or flux after soldering.



The carburettor linkage.

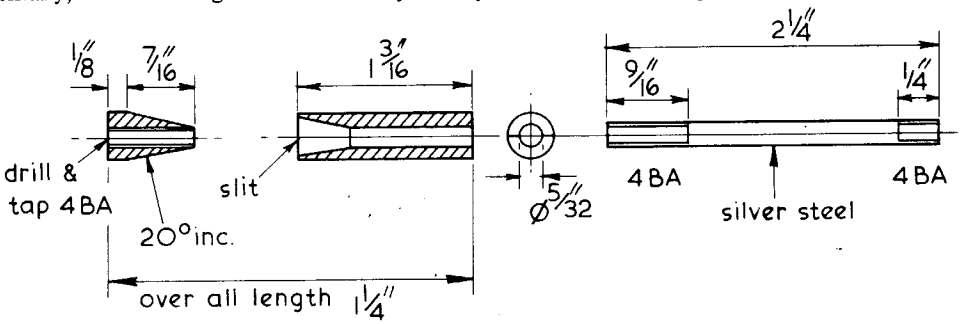
The carburettor linkage is fabricated from 18 gauge brass sheet and is simply bent into shape. The 8 BA nut is silver soldered to the arm for security, this allows the carburettors to be synchronised for smooth running. Before assembly the carburettors are placed in their respective mounting stubs with the "O" rings in position. Each one is pressed firmly down on to the "O" ring and the positions of the fixing screws marked on to the carburettor stub. These positions are then lightly drilled so that the grub screws will positively locate the carburettors in their mounting stubs.

Mounting Foot

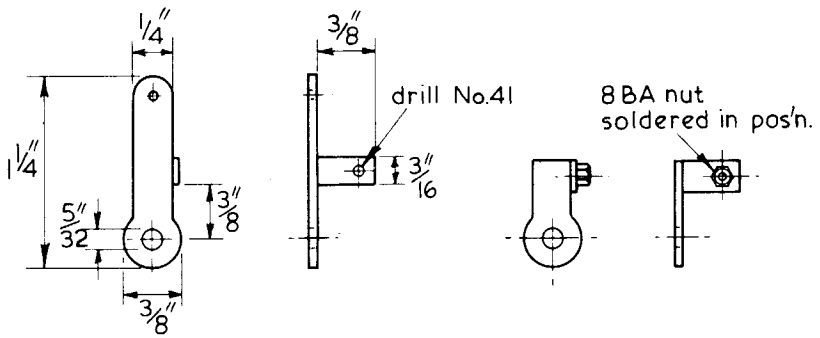
I initially fabricated this item out of aluminium sheet and 3/8 in. × 1 in. alloy bar, but later decided that a one piece casting would be much simpler and less time consuming. Firstly, the casting is held in the 4 jaw chuck so that the bottom can be machined flat. It is then placed on the vertical slide and the mounting rails milled flat and to the correct height. The cut-outs are also milled so that the crankcase bottom will fit between the rails and finally the four 4 BA holes drilled and tapped to accept the engine mounting bolts. If you wish you can also machine a nice clean edge all round the plate, but I prefer to leave it as it is. Incidentally, the mounting foot is necessary mainly because of the rotary valve assembly, as this bars any access to mounting screws on this side of the engine. It is also easier I think to have a flat surface to bolt an engine to when mounting rather than mounting between two rails.

Flywheel and Collet

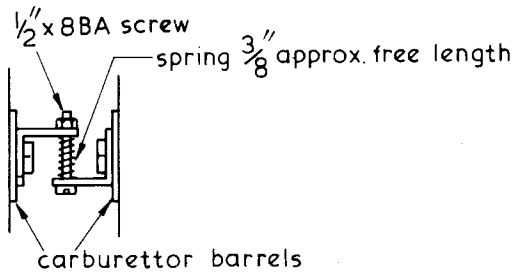
The flywheel is turned from B.M.S. or brass. It is firstly held in the 3 jaw chuck and the rear face turned, a ¼ in. hole is also drilled right through. The top slide is then offset by 10 deg. and the retaining taper turned; the flywheel is now removed from the 3 jaw chuck and reversed so that the front can be roughed out to about + 10 thou all over. The flywheel is now removed from the chuck and a piece of ½ in. bar substituted. The



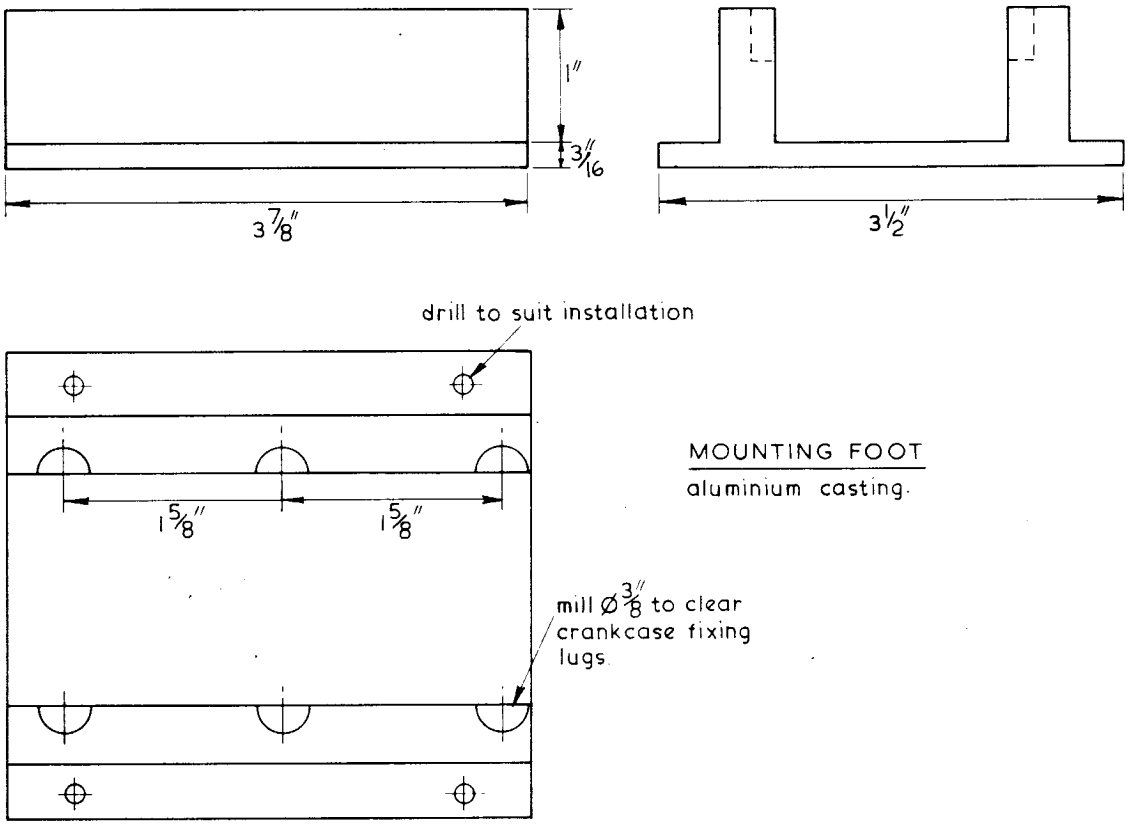
CRANKSHAFT PLUG FOR ATTACHMENT OF SMALL DRIVE PULLEY.



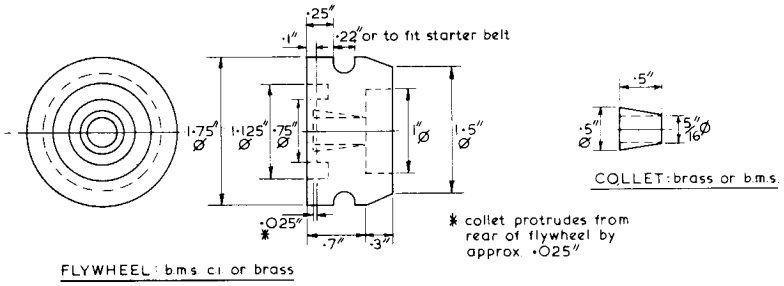
CARBURETTOR LINKAGE : 18 s.w.g. brass



ARRANGEMENT OF CARBURETTOR LINKAGE



collet is now made from the end of this bar without disturbing the 10 deg. offset on the top slide. A small tool may have to be used upside down in the tool post, as though in a rear tool post, to turn the taper, unless, of course, you can reverse the direction of rotation of the lathe. The 5/16 in. hole down the collet is very carefully drilled and reamed or ideally bored. A ¼ in. B.S.F. thread is drilled and tapped further into the bar and the flywheel held on to the collet by ¼ in. B.S.F. bolt, the outside and front of the flywheel can now be finished ensuring good concentricity. The groove for the starting cord or belt can be cut to suit whatever size belt or cord you want to use, the size specified being about average. The flywheel is now removed and the collet is parted off so that about 20 thou protrudes behind the flywheel and it is split with a fine slitting saw or an Exacto balsa saw. The collet should be a nice firm fit on to the 5/16 in. diameter retaining stud or else you will have trouble with the flywheel creeping or loosening when trying to start the engine. *Continued*



SCREWCUTTING PROCEDURES

by Geo. H. Thomas

Part II (conclusion)

From Page 995

WE COME NOW to the final method in which the tool is fed at an angle by means of the topslide but in which no compensation is consciously made for the angular path of the tool. This method was demonstrated to me well over fifty years ago by the "star" turner in a shop engaged entirely on experimental work and for which, together with the drawing office, I was responsible at that time. It is simply a matter of procedure which will be made clear by the series of diagrams illustrating the steps in setting up. The initial preparations for this method are the same as for the last one, i.e. the topslide is set round to the desired angle which can be either one half or near-half of the thread angle. The topslide is fed in a forward direction until its collar reads zero and, finally, the cross-slide is fed forwards until the tip of the tool *just* touches the work which can be determined, if desired, by nipping a cigarette paper. At this point the cross-slide collar is set to zero and we have the situation which is shown at (A) in Fig. 3 — the tool is touching the work and the two collars read zero.

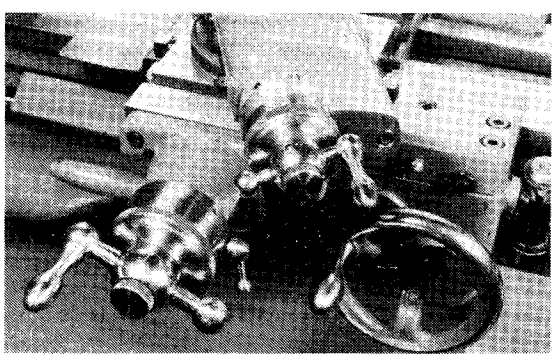
At (B) the carriage is moved to the right so that the tool is clear of the end of the work.

(C), The cross-slide is fed forwards by an amount equal to the true depth of the thread and its collar is then set to zero again.

(D), Leaving the cross-slide untouched, withdraw the tool by means of the *topslide* until the tool is clear of the O/Dia. of the work. The tool will travel along an angular path as shown by the arrow on the diagram.

(E), After moving the carriage back to the left, feed the topslide forward until the tool touches the work again. This determines the starting point and after moving the carriage along to clear the work, the first cut can be put on at the topslide as shown at (F). The correct depth of thread will be reached when the topslide micrometer collar reads ZERO. During the

The geared screw topslide with large dial on Geo. Thomas's Super 7 (see M.E. 7/10/77)



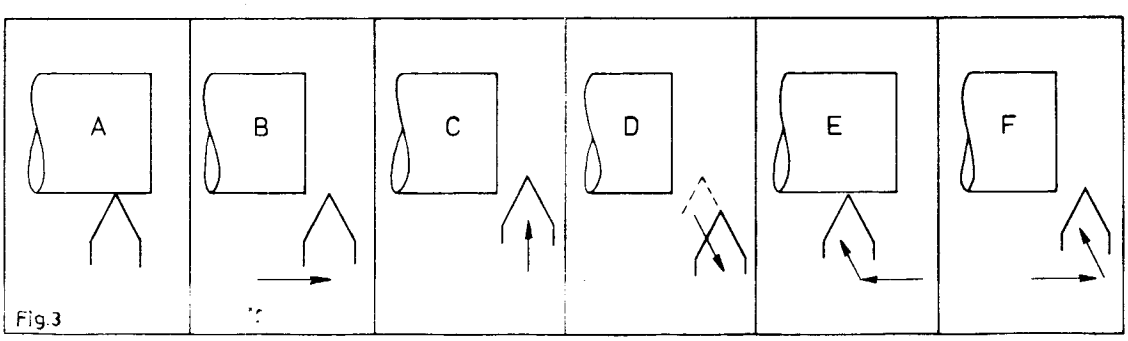


Fig.3

course of the cutting the cross-slide can be used conveniently for withdrawing and returning the tool between passes, the return being made to zero reading each time. It is interesting to note that during the cutting of the thread the tool will be advanced by the topslide by D/cos without anyone having made the calculation.

NOTES ON THE USE OF THE TABLE.

Col. 1. denotes threads per inch.
2. gives the true depth of Whitworth form thread.
3. Topslide feed at 27.5 deg.
4. Topslide feed at 25 deg.
5. TDI indication.

All depths are in thousandths of an inch.

Included in the table of thread depths is a column giving information on the use of the T.D.I. for all the listed threads. I know that many workers do not properly understand the working of this device and so do not obtain the full benefit from its use. The following is the key to the use of the letters 'a' to 'd':

a. Engage anywhere — 16 positions round the dial. Used only for numbers divisible by 8.
b. Engage at any whole number or any position half-way between — 8 positions. Used for numbers divisible by 4 but not by 8.
c. Engage at any whole number. 4 positions. Used for even numbers not divisible by 4.
d. Engage on any pair of opposite numbers i.e. 1 & 3 or 2 & 4 — 2 positions. Used for any odd number.

Note that it is never necessary to engage at the same point on the dial every time EXCEPT for numbers containing one half a thread e.g. 11½ t.p.i. which is used in U.S. as a pipe thread.

It is not proposed to deal in this article with the cutting of internal threads which are, admittedly, not quite so straightforward as most external work but the basic principles remain the same. Difficulties are usually due to one or more of the following: (1) Bore not correct to size. (2) Cutting tool not of the correct form. (3) Tool rubbing due to faulty clearances (very common). (4) Tool insufficiently rigid. All of these can be aggravated by the fact that it is often impossible to see what is going on.

AFTERTHOUGHTS. Too often one reads articles in which the author writes "By the way, I have omitted to mention that . . .", by which time it might be too late! The following jottings, however, are in a somewhat different category and my only excuse for lumping them together at the end is that it will save retyping the whole manuscript. Much of the foregoing has been concerned with the attainment of the correct depth of thread and all the methods described are based on the use of micrometer collars on the feed-screws. Many old lathes were not so equipped and a method of working which was commonly adopted was to turn a small step on the end of the work the diameter of which was the correct core-size of the screw. The tool was fed in until it just scratched the smaller diameter. There are obvious advantages in the methods using micrometer collars — not the least of which is that one always knows where one is and how much has, at any time, to be removed.

Use of a Screw Pitch Gauge. Readers will hardly need reminding that, in the absence of a reliable screw pitch gauge (and there are some ropey ones about) a tap — preferably G.T. — of the correct pitch can be used instead.

Thread Dial Indicators. It might be helpful to mention that different makes vary in their markings. Some indicator dials have all the engagement points marked on them but those supplied with Myford lathes have the four numbers stamped on the top surface and the four half-way lines on the bevelled edge. Earlier Myford dials had only the four numbers on them but it is simple enough to engage the nut at the mid position. The 8 t.p.i. leadscrew as fitted to most popular lathes is ideal for its purpose, especially when a 2 in. base T.D.I. is used in conjunction with it—i.e. one having a 16T wheel.

This combination will readily "pick up" any number of t.p.i., odd or even, with or without a half-thread included. Lathes with metric leadscrews will be found to be much less convenient in this respect — even when cutting metric threads — largely because of the "inverted" nature of metric threads which are rationalised on the basis of pitch instead of threads per unit length.

1	2	3	4	5
8	80	90	88	a
9	71	80	78	d
10	64	72	70	c
11	58	65.5	64	d
12	53.4	60	59	b
14	45.7	51.4	50	c
16	40	45	44	a
18	35.6	40	39	c
19	33.7	38	37	d
20	32	36	35	b
22	29	32.6	32	c
24	26.7	30	29.3	a
26	24.6	27.6	27	c
28	23	25.9	25	b
32	20	22.5	22	a
36	18	20.2	19.6	b
40	16	18	17.6	a
48	13.4	15	14.7	a
56	11.5	13	12.6	a
60	10.7	12	11.7	b
64	10	11.2	11	a

"COUNTRYMAN'S STEAM"

The Road Gears and Hind Wheels of the Suffolk Dredging Tractor

by John Haining

Part IX

From Page 941

REFERRING TO THE train of road gears in orthodox traction engine terminology, the countershaft, supported in two mild steel fabricated brackets behind the two vertical channel engine columns becomes the second motion-shaft. It is supported in brackets which differ only in plan view, the nearside one being longer and extending out from the 3/16 in. thick m.s. plate bolted to the column back flanges and carrying only a plain flanged bush pressed into place from the inside. The shorter offside bracket ends flush with the edge of the channel and backplate, carrying a much more substantial flanged bearing supporting the projecting second-shaft.

At the nearside end the latter carries only the water-pump disc crank, but to ensure that the bearing bush cannot move out of the bracket it is dimpled lightly for a No. 4 BA setscrew screwed through the forward face of the bracket. A glance at the drawing on page 411 of *Model Engineer* (Part 4) will show how the second shaft supports the inner sub-frame bar on the nearside and the outer one on the offside while the third and fourth (hind axle) shafts run through all four sub-frame bars.

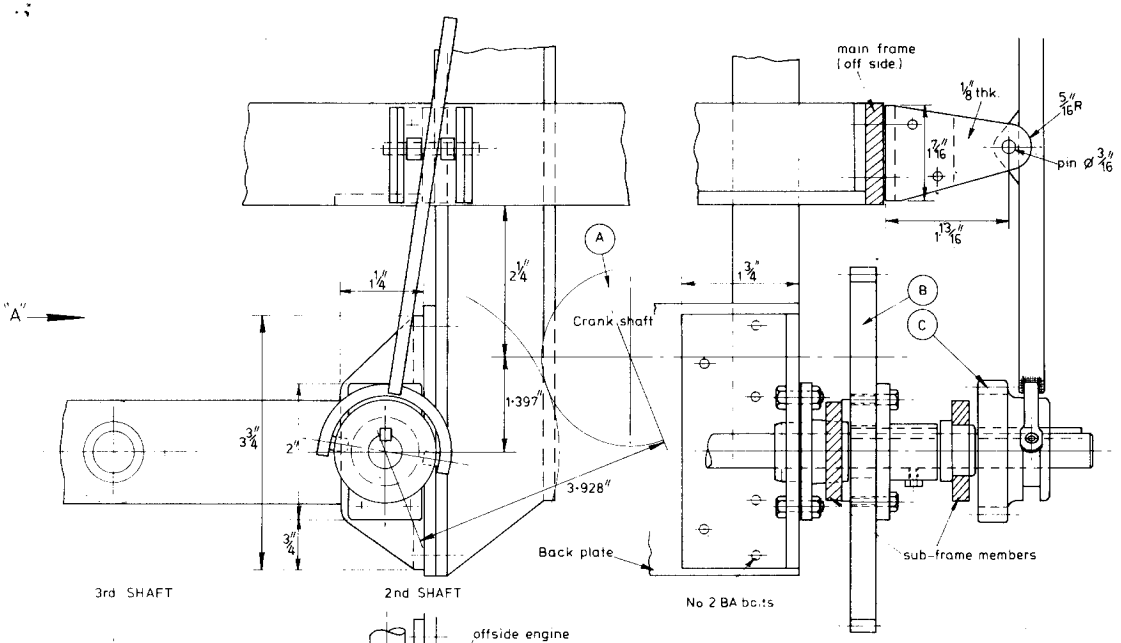
The second-shaft remains driven at all times by the crankshaft, gear 'A' being in constant mesh with 'B', ensuring that the water pump is driven at the required lower r.p.m. for maximum efficiency. In the original design, gear 'C' ran freely on the second shaft, in constant mesh with gear 'D'. Sliding on keys let into the outer end of the shaft, a dog clutch engaged with dogs machined in the extended outer face of gear 'C', controlled by a road-gear lever held in the bracket above on the frame member. A disadvantage encountered with this method of engaging and disengaging road drive is that the small gear 'C' has to be retained by a claw extending down from the lever bracket or frame member, to prevent it following the dog clutch along the shaft when drive is disengaged; in the interests of simplicity I have modified the arrangement to that shown on my drawing, eliminating the need for dog clutch members and a retaining claw, by using a sliding gear.

The gear lever bracket, made up from m.s. plate and square tube cut to channel form, is that used with the original form of gear and clutch member, and is rather on the wide side for the revised layout; spacers are necessary each side of the lever and these would be better if made into bosses integral with the lever each side. Whichever way is adopted the 3/16 in. dia. hole for a pin through the lever should be drilled at an angle to allow the lever to line up with the operating rod end. At the top (not shown on the accompanying drawing) the lever fork is engaged with the slotted end of a ¼ in. dia. b.m.s. bar threaded through the hole shown near the top of the engine channel columns. (See Part 3, page 278). On the nearside of the engine the bar, terminating in a fork end, engages with a vertical lever pivoted in a small bracket on the frame member, transverse movement of the lever moving the sliding road gear in or out of engagement with gear 'D'.

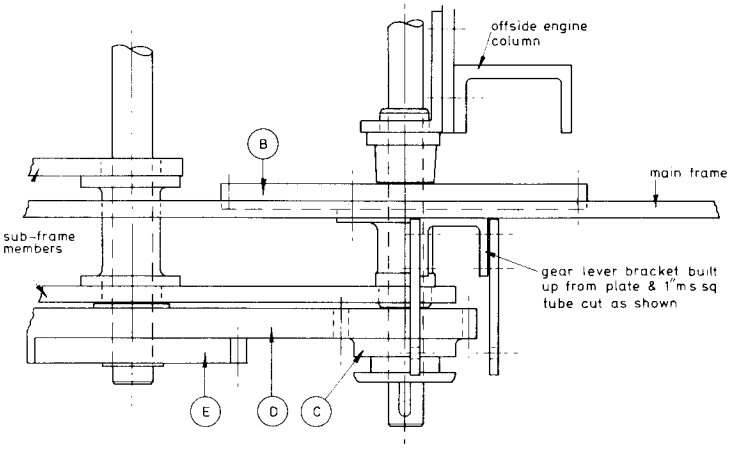
Gear 'B' is shown mounted on a carrier sleeve keyed to the shaft. This is to permit the gear itself being cut from a simple flat plate blank or an existing stock item such as a change-wheel being used; alternatively, the gear may be machined integral with the hub, all in one piece. Gears 'D' and 'E' are compounded and run free on the third shaft, retained in place by a No. 4 BA screwed pin and washer, the shaft not revolving. If stock gears are utilised it will probably be found more satisfactory to bore out the centres of both and remount on a common sleeve to ensure concentricity, followed by bolting the two together with six No. 2 BA setscrews.

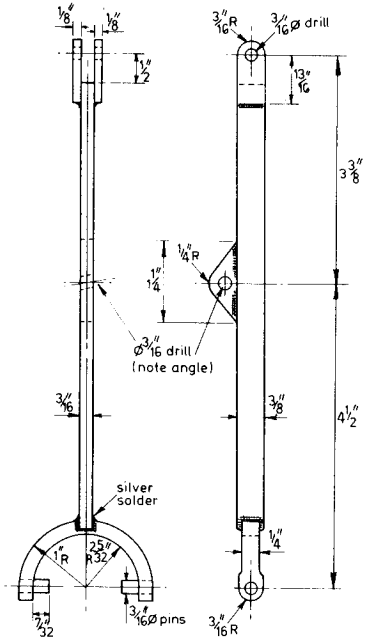
The gears supplied under arrangement with Crow Engineering of Melksham will be the correct integral compound form. As explained earlier in this series, the four shaft road gear layout supersedes the chain drive from a countershaft incorporated in the full size design, which proved far too high geared for practical use in 2 in. scale, and would undoubtedly have proved unsatisfactory in its original form in full size, too.

The keyway for gear 'B' should be milled to a length of 1 1/8 in., so that the key length is kept within the

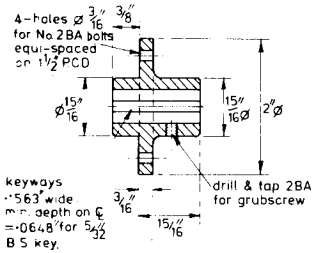


VIEW FROM ARROW "A"
with 3rd Shaft omitted

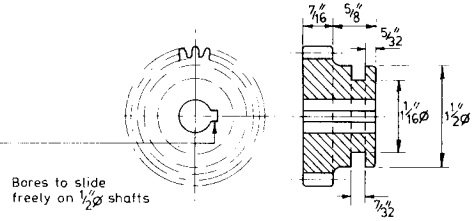




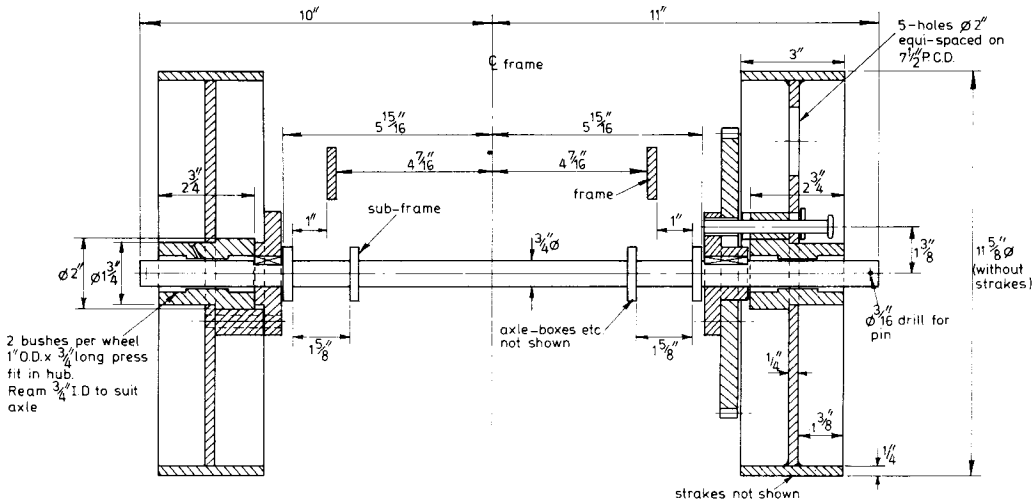
SLIDING ROAD GEAR LEVER: one off m.s



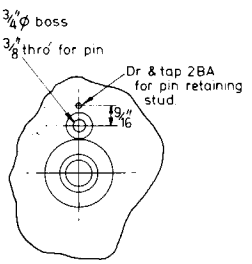
CARRIER FOR GEAR (B)
one off m.s

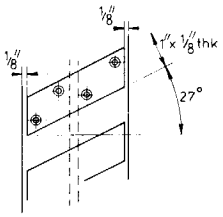


SLIDING ROAD GEAR: one off c.i. or m.s.



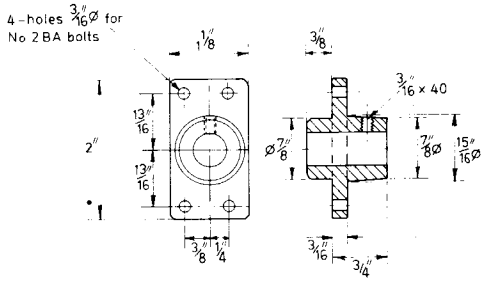
HIND WHEELS: m.s. roll & weld
STRAKES: m.s.
HIND AXLE: b.m.s. bar



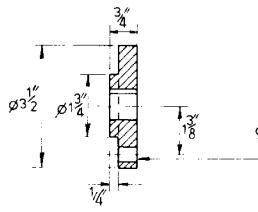


17-strakes equi-spaced on each wheel 4-1/8ø csk. hd. iron rivets in each. (strake csk.) N/S wheel strakes as shown, O/S wheel strakes to opposite hand.

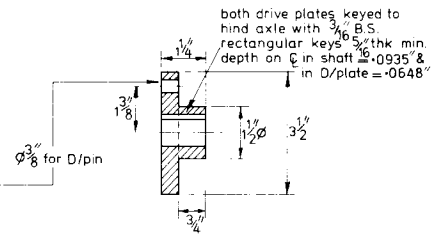
SECTION THRO' HIND AXLE



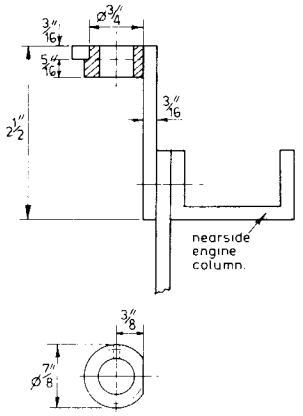
2nd SHAFT OFFSIDE BEARING
one off ph br or g.m.



DRIVE PLATE (N.S.) one off m.s.



COMBINED DRIVE PLATE (O.S.)
& FINAL DRIVE GEAR CARRIER
one off m.s.



2nd SHAFT NEARSIDE BEARING
one off g.m.

total length of the gear carrier; the similar sized key upon which gear 'C' slides should be secured in the shaft keyway either by a 1/16 in. dia. pin or a No. 8 BA countersunk screw. It is prevented from sliding out of the shaft when the gear is disengaged by the keyway ending 1/8 in. short of the shaft end. The two 3/16 in. dia. pins in the forked lower end of the sliding gear lever are turned down to a press fit in their holes and then peened over.

The second-shaft is some 12¼ in. overall length, and as the nearside end carries only the pump crank, I suggest that the two keyways be cut first and a little spare length left for cutting off on assembly after the pump crank has been fitted.

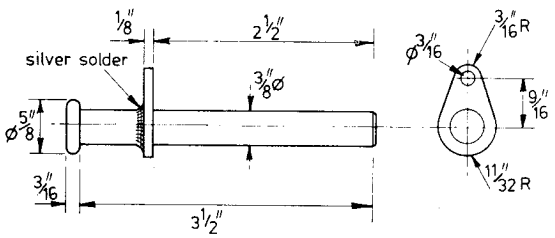
I suppose that, aesthetically, plate-type wheels are not as attractive as the more usual spoked type, tending to give an impression of heaviness. Certainly a number of makers have used them over the years, in various forms. The small Banbury firm of Barrows and Stewart exhibited a neat little traction engine at the 1879 Smithfield Show, fitted with very well proportioned wheels built up from wrought iron discs each with six shaped holes cut out to form the six wide, slightly tapering, spokes, and both Marshall and Wallis Steevens have used plate type rolls on their steam rollers which did not detract from the good looks of the machine.

At the other end of the picture, the American firm of O.S. Kelly, building the only cable-ploughing engines produced in the U.S.A. about 1890, managed to spoil the appearance of their engines with badly proportioned plate wheels made even uglier by having straight strakes on the hind wheels. Hopefully, the *Suffolk* hind wheels fall between these extremes, following the Wallis and Steevens pattern with five circular cut-out holes to relieve the flatness of the plate.

The wheels are rolled and fabricated from ¼ in. m.s. plate, the hub of 2 in. dia. m.s. bar being turned down to 1¾ in. dia. to form a shoulder against which the wheel disc abuts. Bushes are shown in each hub, but these, like the grease cup inlet holes, are in fact hardly necessary as normally all running is done with one or both driving pins locked in position and wheels running solid with the axle. (I remove the left-hand pin to save wheel scuffing when turning, and in fact find that the offside wheel alone gives sufficient tractive effort on normal hard surfaces; even with the pin out, the amount of movement within the hub hardly justifies bushes. However, this was the practice, so the choice is up to the reader).

Unlike the road-roller practice, each wheel has only a single disc, with a ¾ in. dia. boss welded as shown to carry the driving pin. Note that each hub extends from level with the outside edge of each wheel rim but stops short ¼ in. from the back edge. This is to allow as long a projected area as possible for the keys in both driving plates, without extending the overall width of the hind axle beyond the scale dimensions.

County Council Surveyors and the police used to keep a sharp eye open for damage caused by strakes biting into tarmac road surfaces, particularly by engines not fitted with compensating gear; the *Suffolk* wheel rims lack the slightly radiused outer edges which allow the strakes to curve downwards at each end, so noticeable a feature of Fowler ploughing engines, and would have been unpopular if used for much road-work. Just as well that the engine was intended for use off the roads, in the countryside.



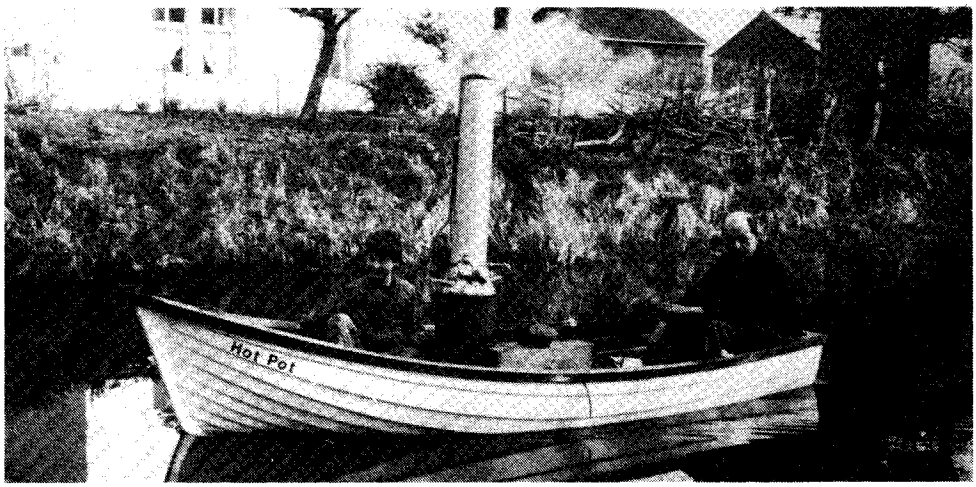
DRIVING PINS: 2 off b.m.s
(hind wheels)

The final drive gear 'F' is shown mounted on a combined drive and carrier plate keyed to the axle; the gear is bolted to the carrier flange with five equi-spaced No. 2 BA hex. bolts equi-spaced in relation to the drive-pin hole on 2¾ in. P.C.D. Again, this method is adopted to assist those readers who intend to use a flat ex-change wheel or intend to cut a plain blank from ½ in. thick m.s. plate. Alternatively the gear can, of course, be machined as one single component if desired, with large hub for the drive pin. The hind axle is shown extending further from the offside wheel hub than on the nearside end. This is to accommodate a swivel bracket which is part of the dredging arm assembly. Normally both wheels are retained in position on the axle by a 1 1/8 in. dia. × ½ in. wide collar of m.s. drilled for a No. 2 BA hex. headed setscrew, nut and locknut. No hub caps are fitted.

The strakes are held in place by four 1/8 in. dia. rivets through the rim. The round heads should be on the inside of the rim, rivets being hammered well down into the four countersunk holes on the outside of each strake.

No holes for the attachment of spuds have been shown, but these can be added in alternate strakes, alternating each side of the central ¼ in. thick plate, if required. They will not run out equally, owing to the odd number of strakes, but the usual practice was to fit one or two spuds to each wheel when in soft ground. One final point in connection with the gears. Gear 'B' should be fitted with a 2 BA grubscrew through the carrier hub to prevent lateral movement of the second shaft when the sliding gear is engaged or disengaged, in the event of any slackness in the key.

Continued



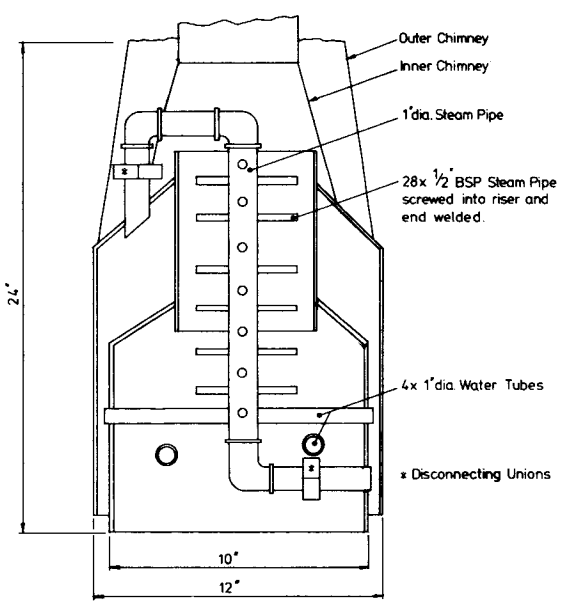
HOT POT

by J. J. Mather

I AM A member of Urmston and District Model Engineering Society and am a fanatic for driving my 5 in. gauge N.G. locomotive. However, after running my locomotive almost every Sunday, year in and year out, I thought that a change would be as good as a rest. I live in Preston, Lancashire, within a mile of the beautiful Lancaster Canal; this canal is one of the finest in England and runs through 40 miles of unspoilt countryside. The change I needed from Steam Locomotive was a Steam Boat. Information about small steam craft is not easily found, although the Americans are now publishing some interesting articles in their magazines. I had to work by trial and error with just a little help from *Model Engineer*, circa 1900-1907.

The hull was bought second-hand, with road trailer, in almost new condition. Fibreglass would not have been my choice but as it turned out it has proved to be very good. My first task was to fit a stern tube which I made from 1 ½ in. brass pipe with "Oilite" bearings to carry the 1 in. diameter brass propeller shaft. Here, I was a little afraid of cutting the hull to fit the assembly but, really, it was easy when using fibre glass matting and resin to fix the whole affair. The engine and boiler rest on a tray 2 ft. 6 in. × 1 ft. 6 in. The tray rests on two 4 in. × 4 in. pieces of wood which are glass fibred across the midway point in the hull. The connection between propeller shaft and engine is by means of a piece of ¾ in. steel water pipe which has a universal joint welded at each end. The far end from the stern tube runs in a ½ in. plummer block and then the joint between plummer block and engine is by means of a "Picador" coupling. This method allows for any small amount of misalignment to be taken care of, the result is a smooth drive.

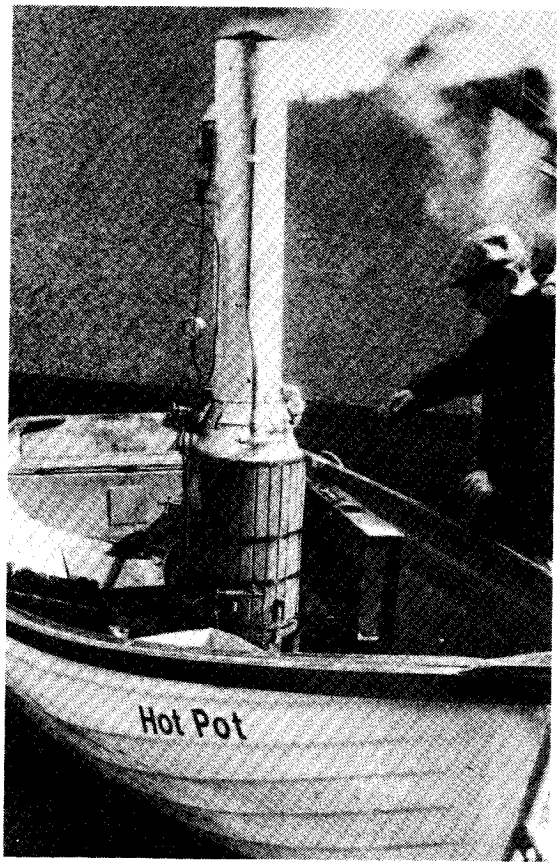
The first engine I made was a Stuart Turner No. 1. This was alright to a point but lacked that little extra power, but I must give credit to the No. 1 because it powered the boat for over 150 miles in our first season of Canal Cruising. The bearings are just a little on the small side for the work required. A fellow member of Urmston Model Engineers was invited for a sail, he was impressed but agreed that No. 1 was too small for the boat. He has built two fine locomotives and he said that he would like to build a Stuart Turner No. 5A



BOILER SECTION SHOWING
PORCUPINE HEAT EXCHANGER

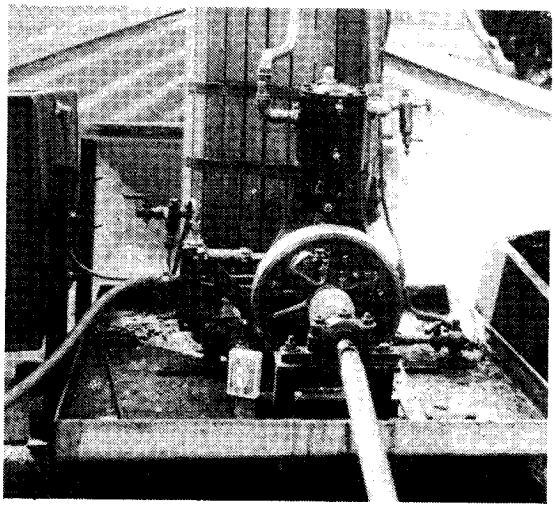
"just for fun" if I would buy the castings. Brian was true to his word and in a few months gave me a well made engine, neatly painted and wrapped up in Christmas paper.

The boiler is made from ¼ in. boiler plate which I had rolled by a local firm, this formed the boiler shell, the joint was first welded (3 runs) and then a 3/16 in. steel strap was riveted over the weld. The firebox is a piece of 10 in. steel pipe with ¼ in. walls and the 12 in. to 6 in. and 10 in. to 6 in. reducers are commercial



Hot Pot *under steam on dry land.*

steam fittings. Four "cross tubes" were fitted and then the affair for extra heating, known as a "Porcupine" was made. This is screwed together, all other boiler joints are electric arc welded. The water test was taken to 200 p.s.i. and only two small leaks appeared on the rivets. The working pressure of 80 p.s.i. steam, aired these leaks, in fact they make up in 15 minutes or so. A mistake which I soon found was the fact that the firehole is set about 1½ in. too low and also the cross tubes should have been 6 or 8 in number. However, the "Porcupine" adds the extra heating area and so the boiler is well able to maintain the full 80 p.s.i. against the engine. Evaporation rate is about 8 gallons an hour.

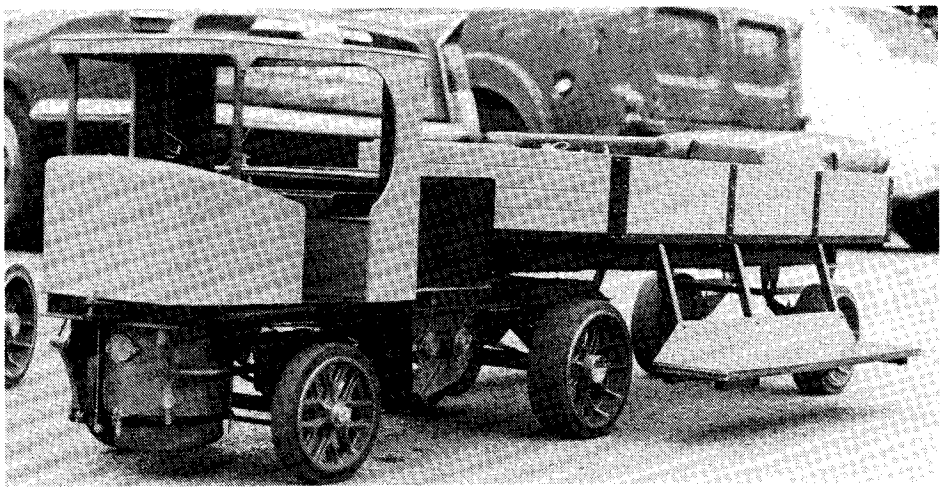


This photograph shows the Stuart Turner No. 5A engine and the propeller shaft bearing.

I have tried various solid fuels but I have found house coal to be the best, the fire on a large grate, unlike that on a 5 in. locomotive grate, burns at a lower temperature and clinker does not occur to the same extent. Soot is no problem because there are no flues or smokebox to block up. Steam is raised by natural draught in twelve minutes from cold to 20 p.s.i. using wood, the blower is then turned on and coal added, in a further five to six minutes the pressure is up to 80 p.s.i. When under way on the Canal with a light headwind the burning rate is about 10 lb. per hour. I think that, considering that no superheat or feedwater heating is used, the figures are quite satisfactory. Before adding the specifications of boat and power plant, I wish to thank Mr. B. Cantwell and Mr. K. Fenton for their help and advice. I would be pleased to hear from any other people who have, or are building, a small steam launch.

Specification

Engine:	Stuart Turner 5A 2¼ in. Bore × 2 in. stroke.
Lubricator:	Displacement type.
Boiler Feed:	½ in. Bore × ¾ in. Stroke pump from engine, feed direct from Canal. Jubilee ¾ pint injector. Jubilee 2 2/3 pint injector, feed from Canal via 4 gallon supply tank.
Working Pressure:	80 p.s.i.
Safety Valves:	2 pop valves 80 p.s.i. and 85 p.s.i.
Whistle:	1/6 scale USA locomotive type.
Propeller:	Bronze 12 in. × 8 in left hand.
Hull:	12 ft. 6 in. × 4 ft. 6 in. beam, in fibreglass.
Total Cost:	(including £250 for boat and trailer) about £450.



A TRAILER FOR THE CLAYTON

by Robin Dyer

WHEN DESIGNING THE *Clayton* steam wagon, one decision which had to be made was whether to make it fixed wheelbase or articulated. Although a scale of 2 in. to the Foot is a good size for storing and transporting, and can be stood on the bench for working on, it is a little small for carrying its driver — the man rather dwarfs the machine. For this reason I decided to make the wagon the tractor unit for an articulated set, an added bonus being that the wagon is short enough to be picked up single handed. (Although at around 70 lbs. it is no lightweight). Having the driver seated on a separate trailer seems to show the model off to greater advantage.

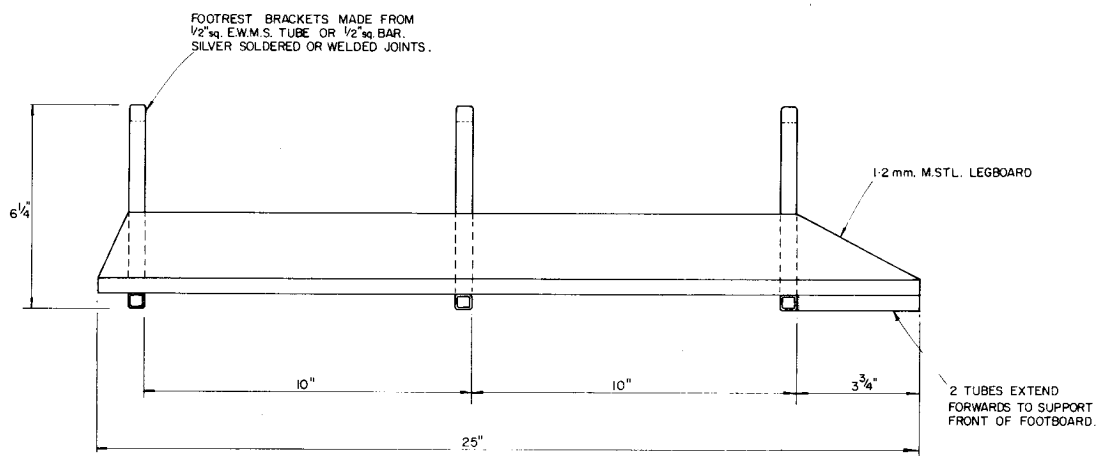
Many and varied are the trailers which I have seen, and the perches adopted thereon by their owners. In the main they have been hauled by traction engines and I have only seen two which were made up to look like a true trailer or living van. This is not intended as criticism as I know that many trailers are made to carry passengers; giving kiddies a ride is cruel hard work but tremendously rewarding. (As long as their parents realise that soot and sparks go hand-in-hand with the sight and smell of steam!). The biggest problem with model trailers is comfort; one's feet should be below or ahead of one's centre of gravity when leaning forward, otherwise one's weight has to be partly borne by a hand leaning on the model, usually on something sharp or hot, or both. Use two hands to drive the model and the back and leg muscles begin to protest. One trailer I know of requires that the driver sit cross-legged as if in meditation — the owner appears to be able to trundle around all day in this position, but when I tried it I soon siezed up and lost all feeling in the legs!

Clayton Wagons made one articulated unit in their batch of undertypes, this being delivered to John Penglaze, haulage contractor of Chipping Sodbury. By all accounts they were not very happy with it as they sent it back to the works after two years. The trailer of this unit was a massive affair with the chassis cranked upwards over the wagon chassis and with a tipping body. A beautifully detailed model of this rig was on show at the last *Model Engineer Exhibition* where it won the Bill Hughes award. Clayton's also produced a drawing of a simpler trailer with a high, straight chassis and fellow club member Bob Webb built this version for his own model *Clayton*. Thanks are due to Bob for letting me use his design, more or less unaltered, for the published version.

Construction

The chassis of our trailer is made from the same 1 in. × ½ in. channel section as the wagon and three lengths as sold by A. J. Reeves, of Marston Green, will be required. One length is sawn up to make the various cross-members, the other two lengths being used as is. The cross-members are strengthened with gusset plates riveted in position. Before securing cross-members 1 & 2 (numbered from the front) it would be as well to drill the holes for the release rod and coupling supports. Note that the frame spacing on the trailer is 6 1/8 in. whereas on the wagon it is 6¼ in. This is to enable all the cross-members to be cut from one length of channel.

The spring mounting brackets are folded up from 16SWG (1.6mm) mild steel and screwed to the chassis with 6BA fasteners. The trailer drawings refer to details on the wagon drawings where appropriate to

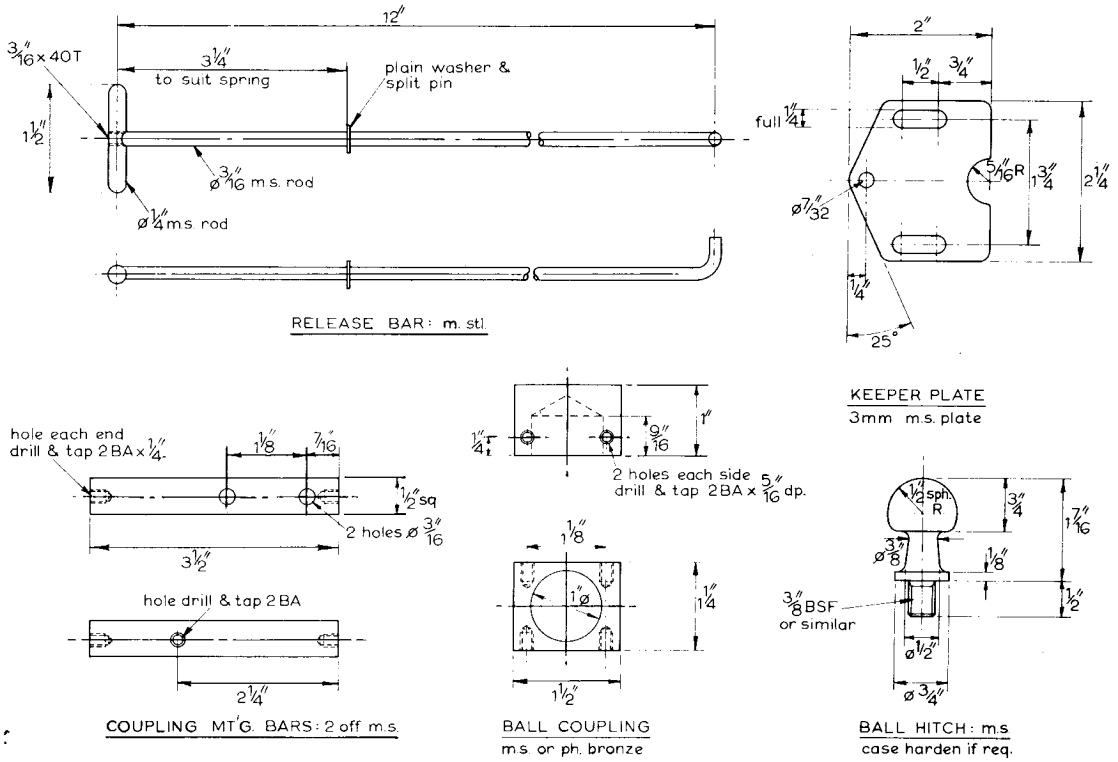


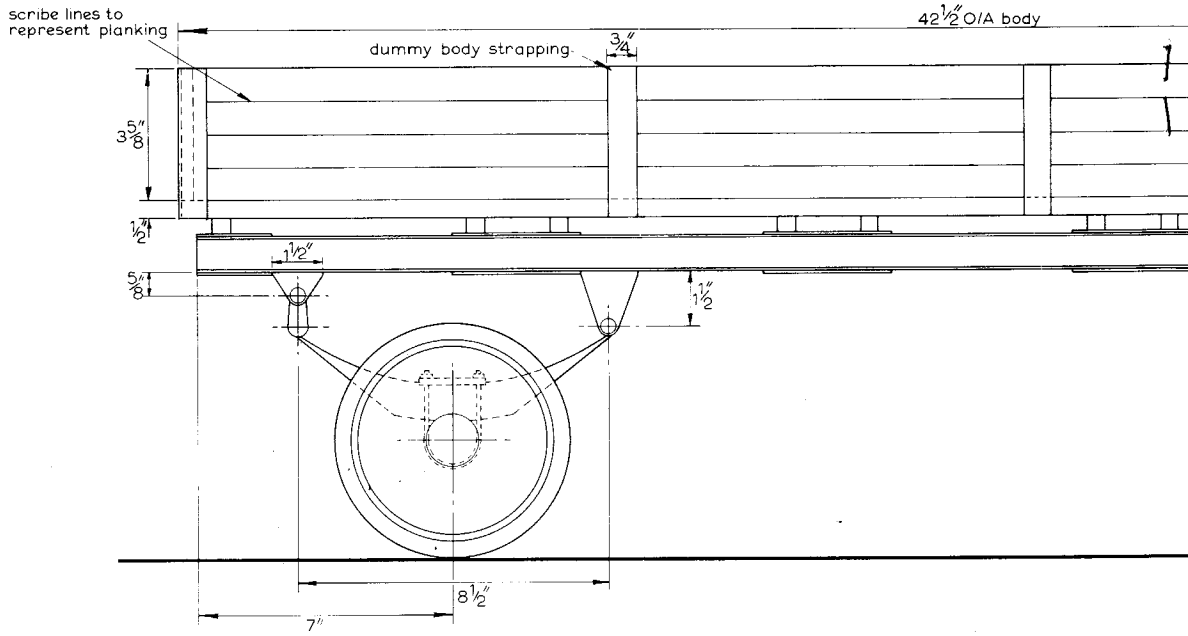
FOOTREST

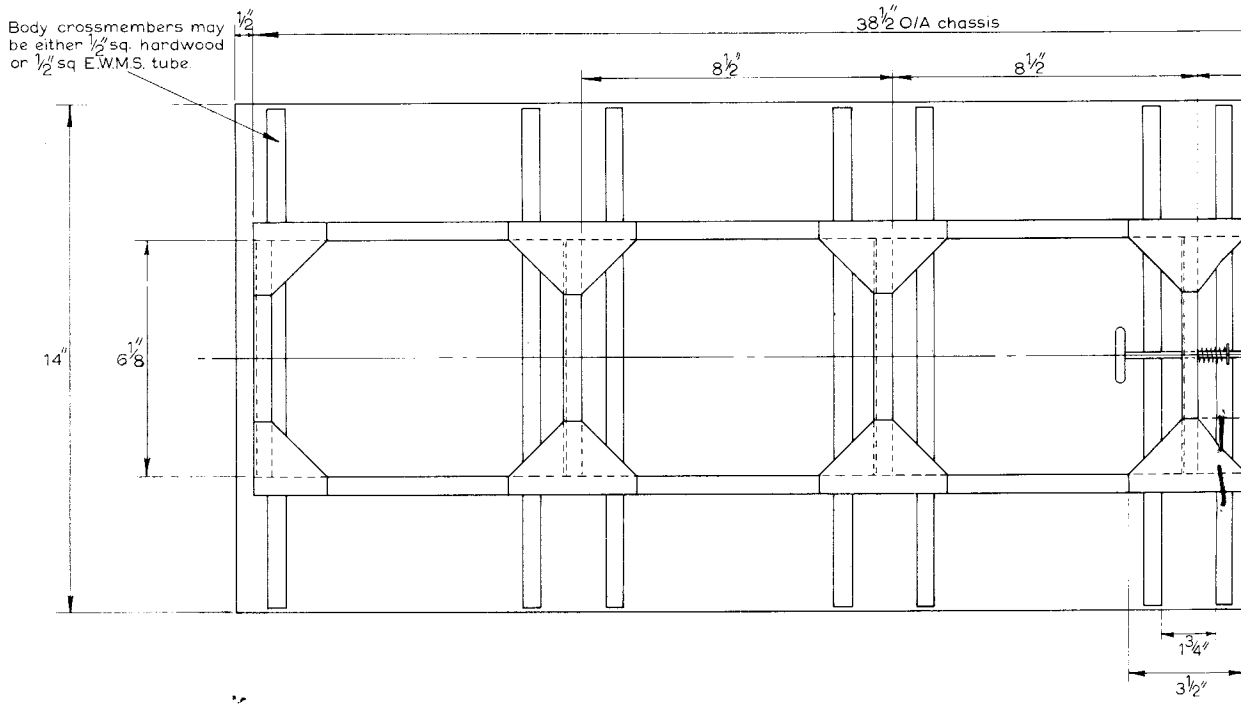
1 OFF L.H. & 1 OFF R.H.

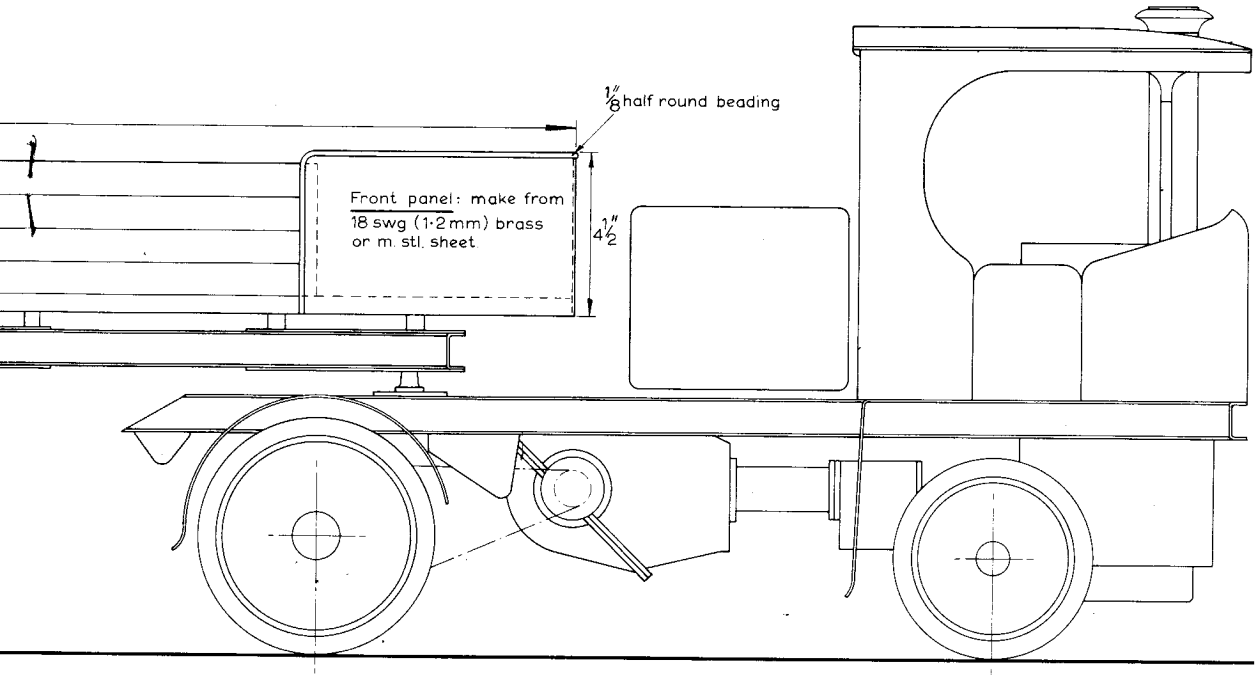
avoid duplication, and the first such items are the spring mounting pins and shackles. The springs themselves are similar to those fitted to the rear of the wagon except that the top three leaves, instead of being curved over at the ends, are cut back slightly, and the top leaves have eyes silver soldered on. The effectiveness of the springing will depend on the material used, all the springs on the wagon having been designed empirically (engineer's term for trial and error). Those on the wagon itself appear satisfactory but if the trailer springs appear to complain at the weight of two adults, the suspension can be rendered rigid by fixing a bar between the front and rear spring pins on each side.

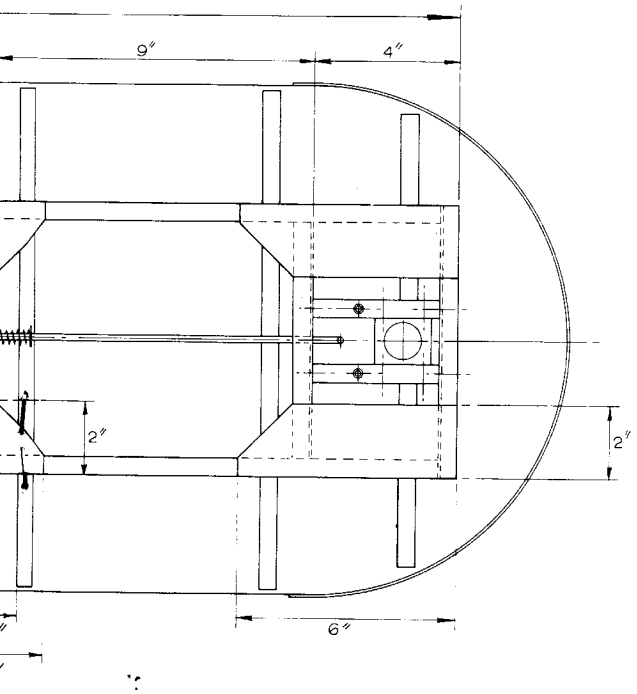
Turning our attention to the front end of the trailer, the coupling socket is mounted on the chassis via. two




scribe lines to represent planking
42½" O/A body
dummy body strapping
¾"
3 5/8"
1½"
1½"
⅝"
1½"
8½"
7"


Body crossmembers may be either ½" sq. hardwood or ½" sq E.W.M.S. tube
½"
38½" O/A chassis
8½"
8½"
14"
6⅛"
1¾"
3½"

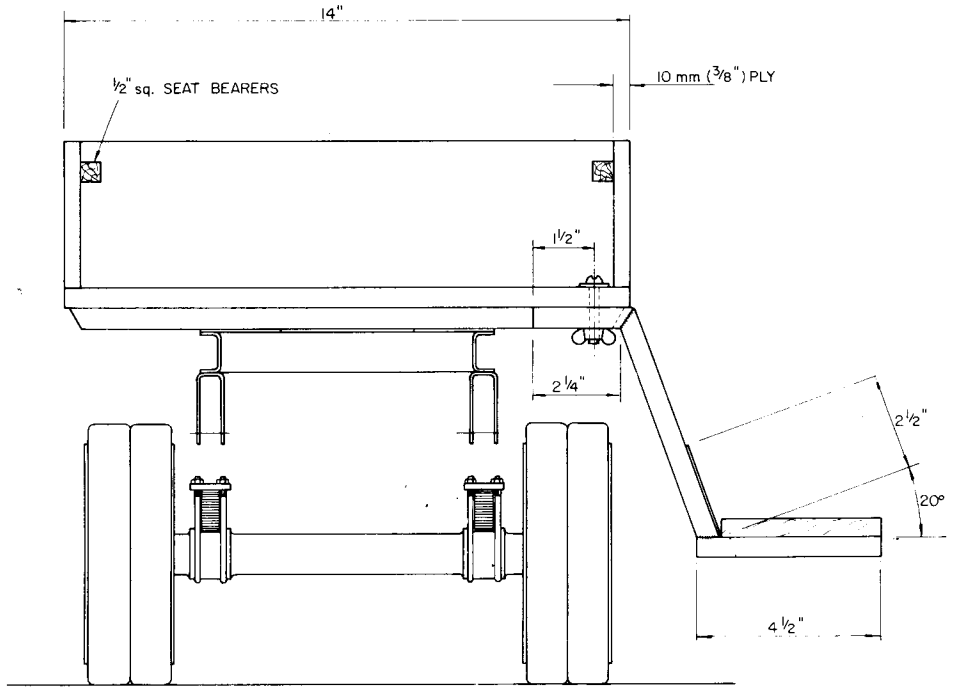




NOTE:- THE FOLLOWING CLAYTON WAGON CASTINGS & PARTS ARE REQ'D.:-

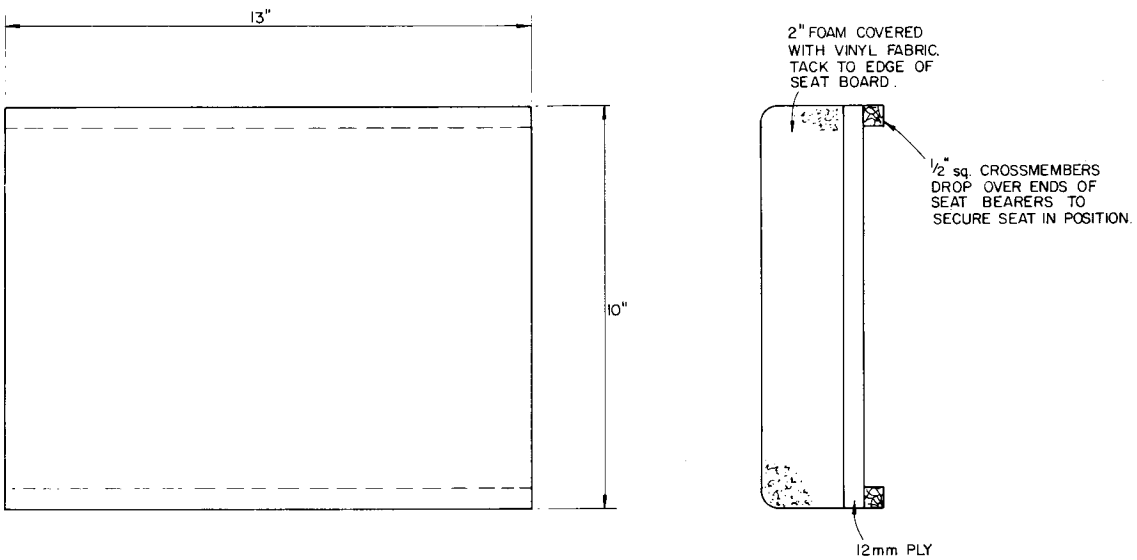
2 OFF REAR WHEEL
4 OFF REAR TYRE RING
2 OFF REAR HUBCAP
2 OFF AXLE COLLAR - NEARSIDE
3 LENGTHS CHASSIS CHANNEL SECTION

VIEW ON UNDERSIDE
with wheels etc. removed

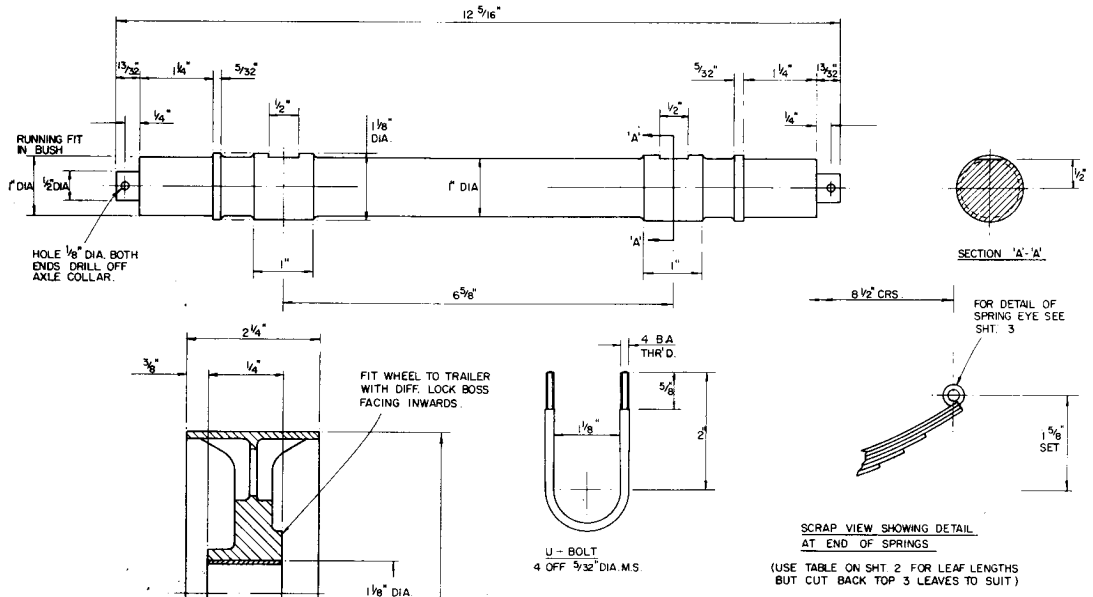


SECTION THRO' TRAILER

SHOWING ONE FOOTREST IN POS'N



SEAT 2 OFF



½ in. square support bars, these being tapped at the ends for securing to the first two cross-members. As to the coupling socket itself, this can be made from a piece of 1¼ in. square bar; it is not a very large piece and the Magpie habits of the average model engineer may come to the rescue here. It is surprising what forgotten treasures sometimes lurk in the darker recesses under the bench! A plain hole is shown for the ball hitch but a nylon pad in the bottom of the hole might make the pivoting action smoother. A keeper plate is required to prevent the trailer accidentally lifting off the ball hitch and this is kept engaged by a spring mounted on the pull rod. The end of the pull rod is bent through 90 degrees to engage a hole in the keeper plate, and the latter slides rearwards to release the coupling. The length of the shouldered screws should allow the plate to slide freely but without too much shake. The ball coupling itself — the part which is attached to the wagon — can be turned by manipulation of the cross slide and top slide handwheels, checking against a card or thin metal template, finishing off with files and abrasive cloth.

The bodywork of the trailer, as drawn, is pretty basic and is made from plywood with dummy strapping. The joints between planks is represented by deeply scribed lines made with a blunt scriber. The builder may care to incorporate much more detail, bearing in mind that a trailer, if used frequently, is going to lead a pretty hard life and will inevitably receive knocks and scratches. The two seat boards rest on ½ in. square rails secured to the inside of the side panels and are upholstered according to the requirements of individual behinds. Footrests are an essential, if unprototypical, requirement of a passenger carrying trailer and are made from ½ in. square electrically welded steel tube or square rod and can be brazed or welded according to resources. The footrests are secured to the underside of the platform with wing nuts and are removed and stowed inside the trailer for transport. Care should be taken to see that the front end of the footboards clear the rear mudguards of the wagon when turning a corner.

The wheels of the trailer are made from the same castings as the rear wheels of the wagon; although made in aluminium they are quite capable of carrying human cargo. They are fitted to the axle "inside out" as the differential locking boss is not required. The machined dimensions of the wheel are the same as for the wagon except that the bore is made a press fit for a standard Oilite bush. These are stocked by Reeves, who advise that the bushes be soaked in oil overnight before being pressed into position.

The rear axle is a much simpler affair than that on the wagon, being stationary, and can be clamped to the springs with U-bolts. The springs sit on flats milled in the top of the axle, the U-bolts are positioned each side of the spring and the ends are passed through clamping plates identical to those on the wagon, being secured with nuts on top.

A MODEL AVELING "DX" ROLLER

by J. Burlingham

Part II (conclusion)

From Page 956

I STILL HAD starting troubles when trying to start the engine by hand and this was finally traced to lack of petrol, due to there being insufficient suction when turned slowly to lift the fuel from the tank below the chassis, a matter of some inches, depending on the level of petrol in the tank. This was cured by fitting a non-return valve at the tank end of the fuel pipe. Starting drill is to blow down the petrol tank filler pipe until petrol appears at the primary air intake on the carburettor, then the feed pipe is full and will remain so and starting is easy. The fuel pipe can be seen in Figure 1 to the left of the forward/reverse lever. The disc just to the right of the final drive gear in this photo is the end of the silencer. The inlet valve can also be seen in its cage on top of the cylinder head. The exhaust valve is at 180 deg. to this and can be seen below the head in Figure 2. The inlet valve is operated by a rocker direct from its cam but the exhaust rocker has a short push rod.

I had misgivings when building the engine that it would be noisy and only run at high speeds and also overheat due to the small amount of water in the hopper. I need not have worried. Due no doubt to the low compression ratio of 3:1, two heavy flywheels and the ability to control the timing, the engine will run down to 600 r.p.m. and up to 2400 r.p.m. It runs better when given a bit of work to do. The exhaust is very quiet, even when the exhaust port is open to the air it is not excessive and the silencer, which really is just an expansion box and about 15 in. of tail pipe, really quietens it. The cooling water gets too hot to keep one's finger in, but up to now it hasn't boiled.

Attention was now turned to the transmission side of the job. After spending some time trying to improve upon E. T. Westbury's ideas, because I wanted to see the clutch cone on the offside rotating when the engine was running as per prototype, and trying to improve upon the friction type drive he specifies, I finally accepted that I couldn't improve upon the master's method without great difficulty. So I settled for a stationary dummy clutch and in fact the only change I made to the transmission was to put the large bevel wheel on the other side of its pinion to get forward gear with the lever forward. As described in *Model Engineer* forward gear was obtained with the lever pulled back.

The transmission is shown in Figure 4. The view shown is from above. Drive into the box is by 2:1 reduction chain drive, with an intermediate jockey sprocket to adjust chain tension and to provide a place for the starting handle. Figure 1 shows this. The cylindrical housing behind the large sprocket contains two ball races and a spring which presses a disc on the inboard end of the shaft against a friction wheel. Operation of the forward/reverse lever traverses the friction wheel across the surface of the steel disc, the wheel sliding on a square shaft. The disc is slightly dished in the centre so when the friction wheel is in the central position no drive is transmitted. But as the wheel is moved, drive is taken up in one direction or the other giving forward and reverse and a measure of speed variation. The snag with this arrangement is that the drive is turned through 90 deg. and so bevel gears are used to get back parallel with the rear axle. The bevels give a 4:1 reduction in speed and the final gear reduction to the differential is 5:1.

I was worried that there would be slippage with the friction drive but it was quite satisfactory. The friction material used is from a composition shoe heel, decided upon after some experiment with cork and rubber. An oil box is fitted to feed lubricant to three bearings. The dummy clutch can be seen peeping over the top of the gear box in Figure 4 and in entirety in Figure 2. The two rods carrying springs which can be seen on either side of the box in Figure 4 carry two of the four scrapers which are sprung against the rear rolls.

The model has attracted quite a bit of attention at two rallies, where it has been in the model tent, and I am quite satisfied with the finished product. It only runs along slowly, but quite realistically, most noise coming from the chain drive. It is very easily controlled and quite positive on the steering compared with the chain steering on my 2 in. scale traction engine. I should have mentioned that the model is scaled at 1½ in. to the foot, resulting in a length of 23 in., a width of 8 in. and a height of 13 in. It weighs 40 lb. and the total cost was less than £10 — mostly scrap being used. The only items bought in were camshaft skew gears, driving chain, 24 tooth sprocket and sparking plug. The project has occupied me on and off for about three years. The photographs were taken by Mr. B. C. Jackson of York.

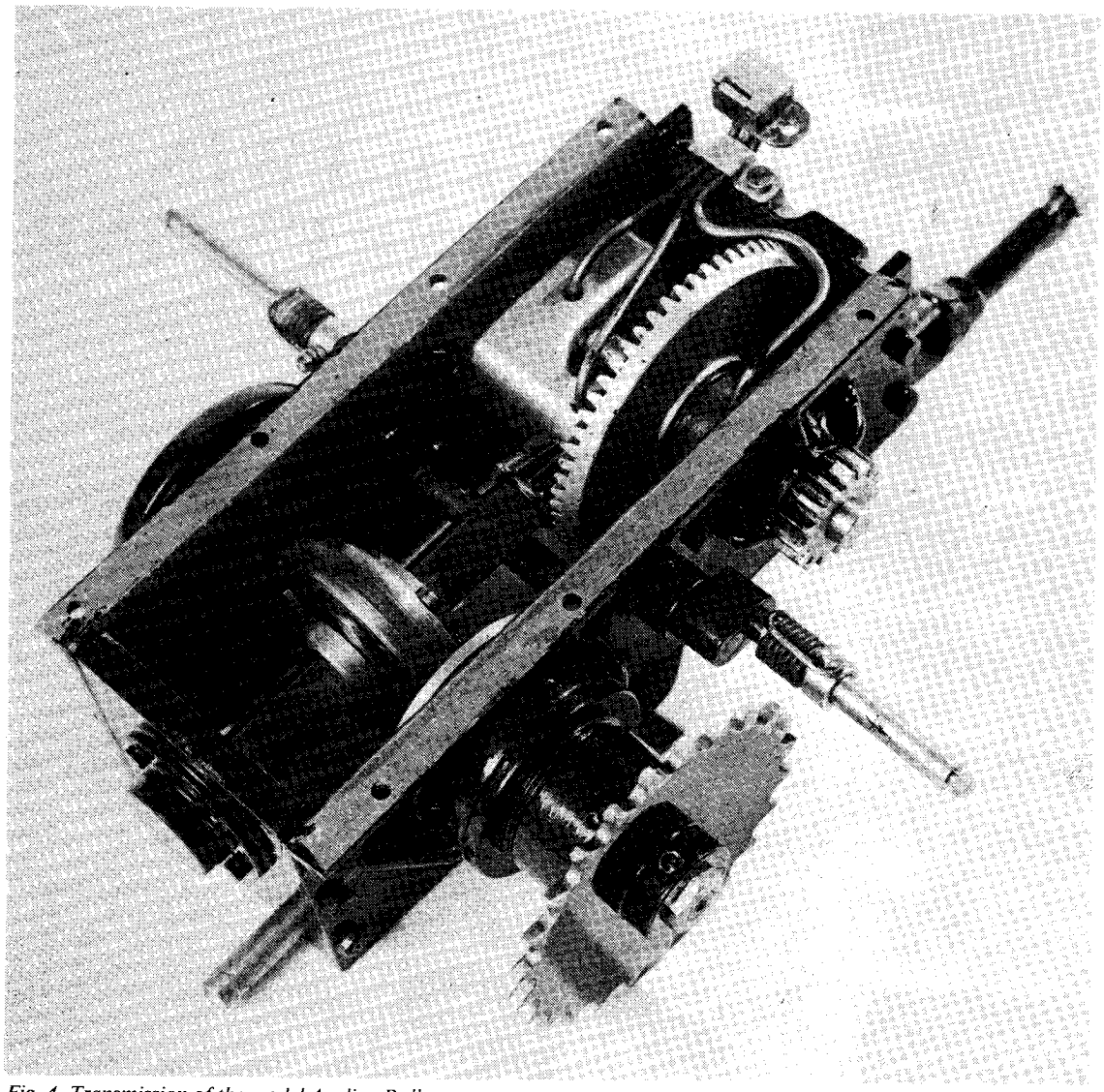


Fig. 4. Transmission of the model Aveling Roller.

MODEL ENGINEER HOT AIR ENGINE COMPETITION

To be held at the 1981 Model Engineer Exhibition

Closing Date for Entries for this popular Competition
is 24th October, 1980
Applications should be made to the Exhibition Manager

WARRIOR Mk II TWIN CYLINDER MARINE ENGINE

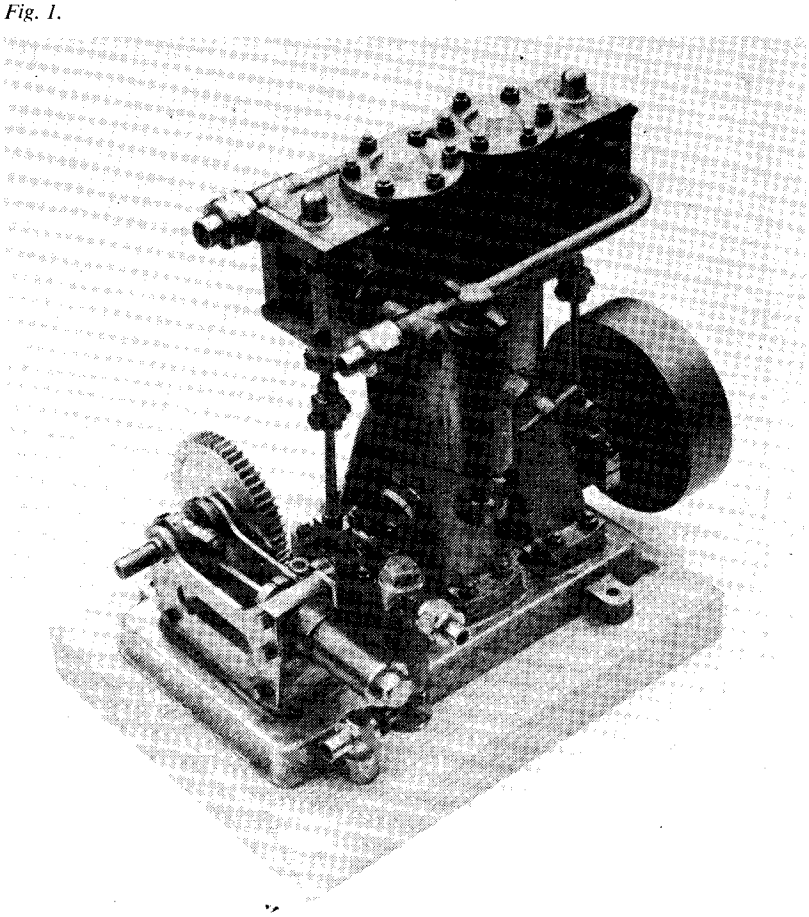
By J. P. Bertinat

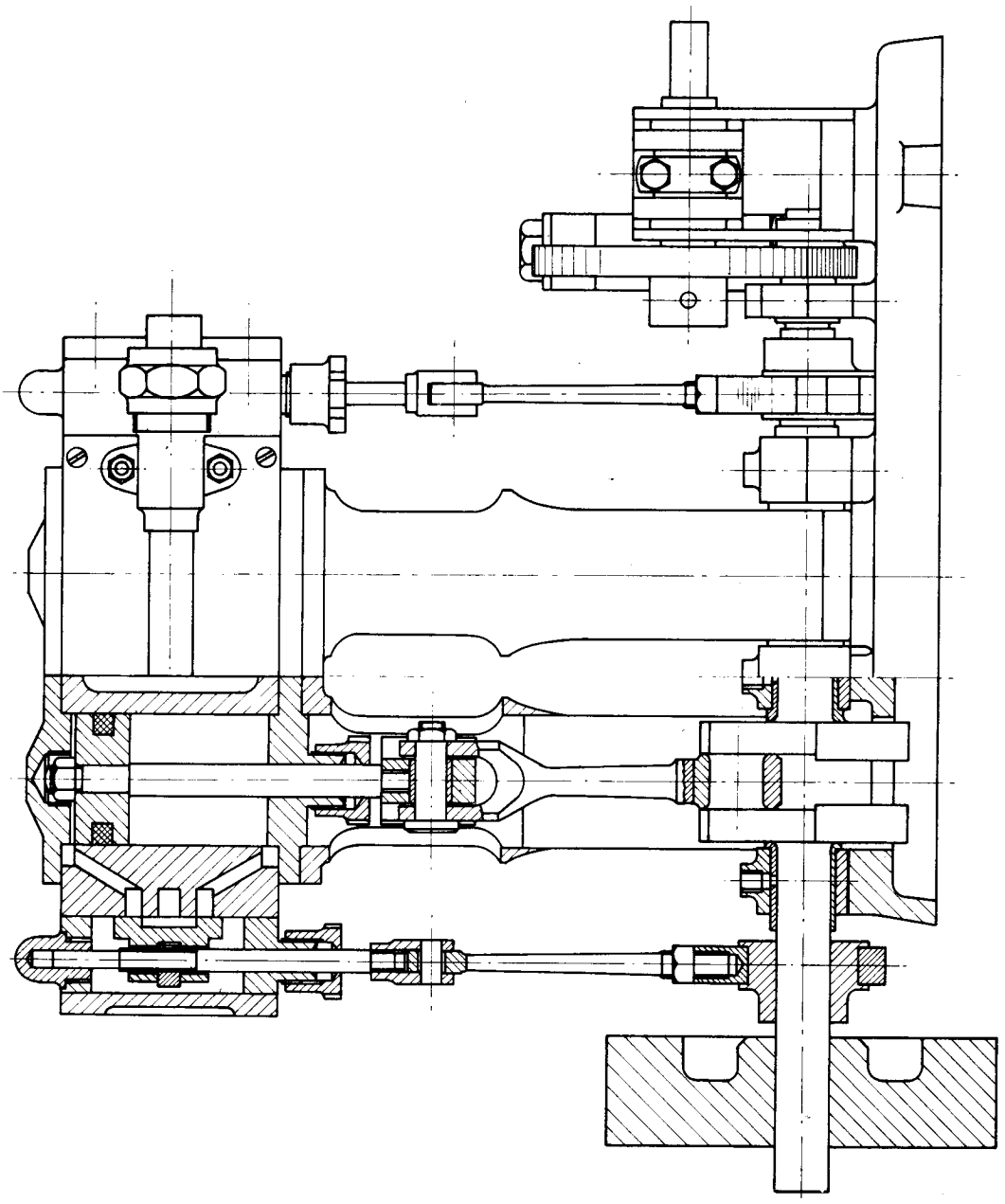
Part I

AS A SEQUEL to the series on the *Trojan II* single cylinder engine which appeared in the *Model Engineer* between 16/6/78 and 16/2/79, I have now modified and I hope improved the *Warrior* twin cylinder marine engine, the original design for which appeared in 1949. As with the *Trojan*, I have incorporated all the original main castings which are readily available from Reeves.

The completed engine in its modified form is shown in Figures 1 and 2. Its specification is briefly: twin cylinders, ¾ in. bore and stroke, with gunmetal cylinders and columns and an aluminium base; the latter is provided with an extension on which to mount a boiler feed pump in a manner that it appears as an integral part of the design rather than an afterthought. No design for the pump was originally given, but this will be rectified in the present series, on similar lines to the *Trojan* pump recently described. The engine readily lends itself to the incorporation of a link reversing gear and details of such will be given as a supplement to the main article; prospective builders of the engine should note that the valve details are slightly different to those shown for the non-reversing engine. As the engine originally appeared, the crankshaft and other working parts were on the light side for continuous hard work, but with a few relatively minor modifications it has been possible to produce a really sturdy engine from the existing castings. Slight modification of the base plate casting is desirable but not essential, and it is

Fig. 1.

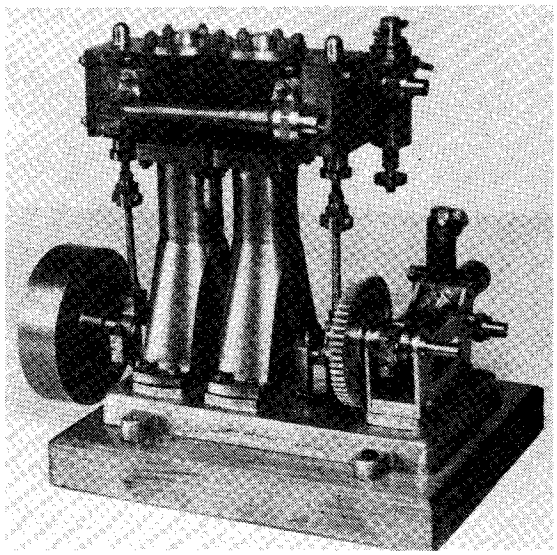




WARRIOR MK. II MARINE STEAM ENGINE
¾" BORE & STROKE

hoped that this modification can be introduced. The gunmetal cylinders eliminate any possible rust problems, and with efficient lubrication will give excellent service if only moderate superheat is used. Since many of the methods of machining employed are similar to those used on the recently described *Trojan*, detailed information will only be given for components which differ from those of the smaller engine.

The general arrangement of the engine is given in Figure 3. An unusual feature for a twin cylinder engine is the provision of a four bearing crankshaft, the additional outer bearing supporting the load produced by the feed pump pinion; the presence of the extra bearing creates no great difficulty, but extra care will be necessary when machining the crankshaft and when lining up the bearings (I am at present building the Reeves Triple Expansion Engine, and this has six crankshaft bearings to line up!) Were I starting afresh, I would have made the bedplate deeper in order to minimise the possibility of destroying bearing alignment by bolting the engine down to an uneven surface, but with care, the present casting is adequate.



The "Warrior" Mark II, Fig. 2. (Fig. 3 in next Part).

LBSC MEMORIAL BOWL COMPETITION 1980

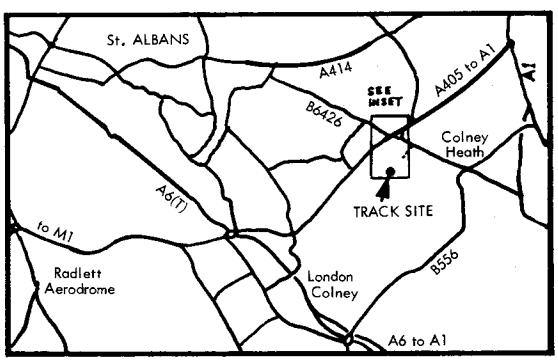
To be held on Sunday, 21st September, by permission of the **North London Society of Model Engineers** at the Society's track, Colney Heath. The Competition is for Steam Locomotives of 2½, 3½ and 5 inch gauges built to the designs of the late LBSC.

Prizes to be awarded are:
First Prize the Memorial Bowl and, providing six or more enter, additional prizes will be awarded as follows:

First: £15.00
Second: £10.00
Third: £5.00

Spectator tickets are free and are available from *Model Engineer* offices. The first thirty have car parking in the Society's grounds.

HOW TO GET TO COLNEY HEATH



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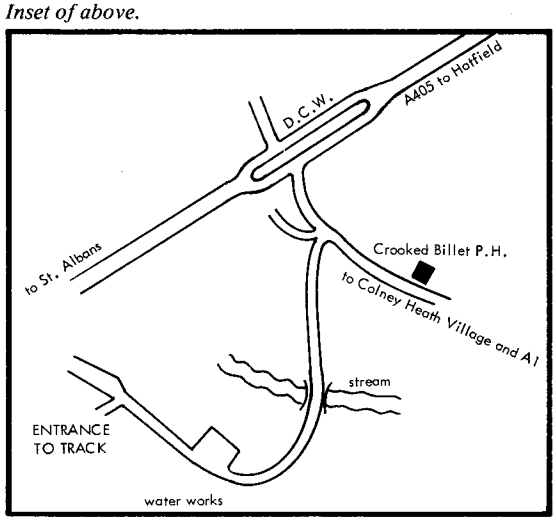


JOY VALVE GEAR

An Analytical Approach

By D. A. Webster

THE CONVENTIONAL APPROACH to the design of Joy valve gear, i.e. trial and error on a drawing board, has already seemed to me to have two serious disadvantages. Firstly, it consumes a good deal of precious time which could more fruitfully be spent actually making the bits and pieces. Secondly, whilst it is not difficult to make the various links to the correct length to an accuracy of 0.001 in. by co-ordinate drilling, to emulate this accuracy on a drawing board would entail a drawing at least 20 times full size. Using the following design method and a pocket calculator the links can be sized to a high degree of accuracy in less than five minutes, slightly longer with log. tables. When correctly proportioned, Joy valve gear is a form of Scott-Russell's parallel motion in that, if the die block were to be fixed on the weighshaft centre line, the point P (where the correcting link is fixed to the connecting rod) would be constrained to move in a straight line. This being the case, any mechanics text book will show that $b = \frac{(1 - a)^2}{a}$ and from Figure 1 it can be seen that $b - a = w$.

Solving these two equations simultaneously gives

$$b = \frac{(1 + w)^2}{zl + w}$$

$$a = \frac{l^2}{zl + w}$$

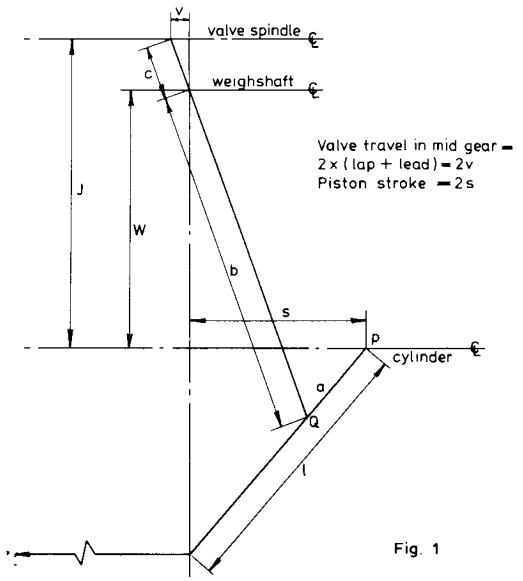


Fig. 1

Again from Figure 1 it can be seen that the fore and aft movement of the point Q (where the vibrating lever is connected to the correcting link) is: $\frac{2.s.\ (l - a)}{l}$

and so using similar triangles

$$\frac{h - w}{v} = \frac{w + \frac{a}{l}\sqrt{l^2 - s^2}}{\frac{s\ (l - a)}{l}}$$

Substituting for "a" and rearranging gives

$w^2 (- s - v) + w (sh - sl - zlv) + (shl - vl\sqrt{l^2 - s^2}) = 0$

This can readily be solved as follows:

Put $k = - s - v$

$m = sh - sl - zlv$

$n = shl - vl\sqrt{l^2 - s^2}$

then $w = \frac{- m \pm \sqrt{m^2 - 4kn}}{2k}$

Again from similar triangles $\frac{c}{v} = \frac{b}{\frac{s\ (l - a)}{l}}$

Substitute for b and a and rearrange

$$c = \frac{v\ (l + w)}{s}$$

Example: The latest design published in *Model Engineer* using Joy gear was Clayton Undertype Wagon. The basic dimensions are as follows:

Piston stroke = 1.5 in. therefore s = 0.75 in.

lap + lead = v = 0.070 in. (calculated from published length of links)

h = 1.3125 in.

The length l should be such that the angle of swing of the correcting link is less than 90 deg. i.e. $l > \sqrt{2}\ s$. In this instance it is 1.25 in. which is well in excess of $\sqrt{2} \times 0.75$. We can now calculate km and n

k = -0.82 m = -0.128125 n = 1.14297

Thus $w = \frac{+ 0.128125 \pm \sqrt{0.128125^2 + 4 \times 1.14297 \times 0.82}}{- 2 \times 0.82}$

= 1.10508 (the negative solution may be ignored)

Then $a = \frac{1.25^2}{2 \times 1.25 + 1.10508} = 0.43342$ in.

$b = \frac{(1.25 = 1.10508)^2}{2 \times 1.25 + 1.10508} = 1.53850$ in.

$c = \frac{0.07\ (1.25 + 1.10508)}{0.75} = 0.21981$ in.

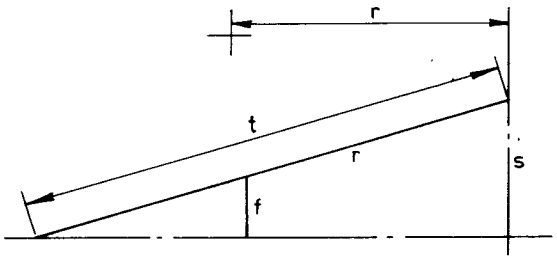
This can be compared with the published design as follows:

	Calculated	Published
w	1.105 in.	1 in.
a	0.4334 in.	0.5 in.
b	1.5385 in.	1.469 in.
c	0.2198 in.	0.344 in.

Readers who have already built the valve gear to the published design should not despair, the slight inaccuracies will only result in the chuff from one end of the stroke being slightly heavier than the opposite chuff.

Horizontal position of weighshaft

Point P should be chosen such that its total vertical movement is at least twice the required full gear valve travel.



t = connecting rod length
r = horizontal distance, weighshaft axis — driving axle axis.

$$\frac{s}{t} = \frac{f}{t - r}$$

$$\text{hence } r = \frac{(s - f)\,t}{s}$$

This valve should be regarded as a minimum, although if it is increased above this valve, it will result in increased top joint offset (see later).

Inside admission valves

The foregoing was generally for outside admission valves. For inside admission valves, the expression for a, b, c and r are still valid, but the coefficients for calculating w must be re-defined as follows:

$k = (v - s)$
$m = (sh - sl + 2\,lv)$
$n = (shl + vl\sqrt{1^2 - s^2}$

Outside Gear

There is, of course, no reason why the usual form of Joy gear, complete with anchor link, should not be used on locomotives with outside valve gear. It is, however, possible to dispense with the anchor links and lower end of the correcting link and control the correcting link by connecting point Q to a return crank on the driving axle. The lengths of the various links should be calculated exactly as for the conventional form, the diameter described by the return crankpin should be equal to the fore and aft motion of point Q,

i.e. $\frac{2s\,(l - a)}{l}$

Offset of top joint

When using a straight slide, the top joint of the vibrating lever must be offset to counteract the error which would otherwise be introduced by the angularity of the valve rod. Figures 3A and 3B show a valve gear designed to give no lap or lead movement. As the die block moves up and down the slide in mid gear, the point Z (the pin joint in the valve gear) must not move.

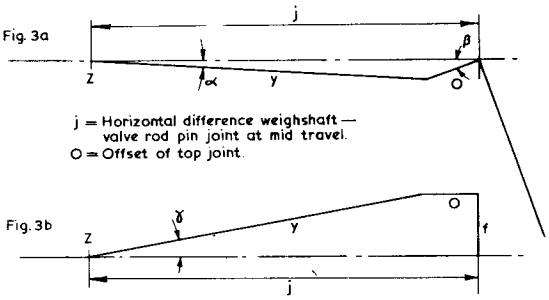


Figure 3A shows the gear at the position where the die block axis and weighshaft axis coincide, i.e. the piston is at top or bottom dead centre. In this case

$j = y \cos \alpha + 0 \cos \beta$
$y \sin d = 0 \sin \beta$

Figure 3B shows the gear at the position where the vibrating lever is vertical. In this case

$y \cos \alpha + 0 = j$
$y \sin \alpha = f$

Solving these four equations gives

$$0 = \frac{f^2}{2j\,(1 - \cos \beta)}$$

$$y = \sqrt{(j - 0)^2 + f^2}$$

and from Figure 1 it can be seen that

$$\cos \beta = w + \frac{a}{l}\,\frac{\sqrt{1^2 - s^2}}{b}$$

Using the Clayton as an example, j = 2.1875 in.
f = 0.42 in.

$$\cos \beta = 1.10508 + \frac{0.43342}{1.25}\,\frac{\sqrt{1.25^2 - 0.75^2}}{1.53850}$$

$= 0.94366$

$$0 = \frac{0.42^2}{2 \times 2.1875\,(1 - 0.94366)}$$

$= 0.71565$ in.

$y = \sqrt{(2.1875 - 0.71565)^2 + 0.42^2}$

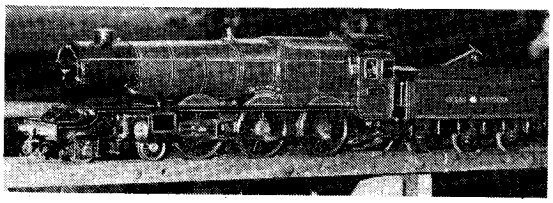
$= 1.53060$ in.

This large top joint is caused by the relatively short valve rod, but if it were not included, the valve position would be in error by 0.040 in. at mid travel!

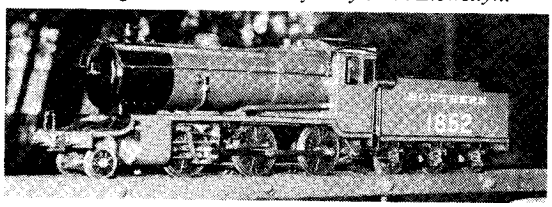
National 2½ in. G. Association Rally

by Laurie

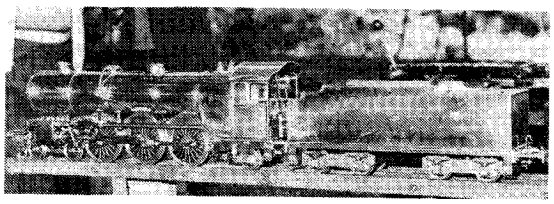
The Association usually has 3 or 4 Rallies per year and, because the support for them has grown considerably, these take place in the various regions of the country. We managed to get to the South Eastern Rally held at the Romford M.E.C. track where the host Club, with their usual excellent hospitality, entertained the visitors in what we might describe as less than favourable weather conditions. Undeterred by threatening skies, some sixty plus enthusiasts



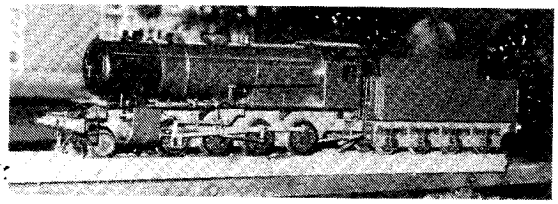
Above: George Barlow brought along his 2½ in. gauge G.W.R. King. *Below: A clean* Dyak *by John Llewellyn.*



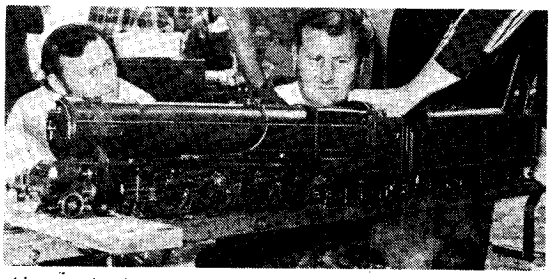
turned up and managed to get most of a day's running in before the evening deluge. A continental visitor, with his family, was Mr. Van Tomme from Antwerp whose intention is to have a scenic 2½ in. gauge line in his garden with half inch scale coaches to form the trains. He has materials for some 300ft. of track but does not envisage any passenger carrying although he showed considerable interest in the hauling capacities of the locomotives at this Rally.



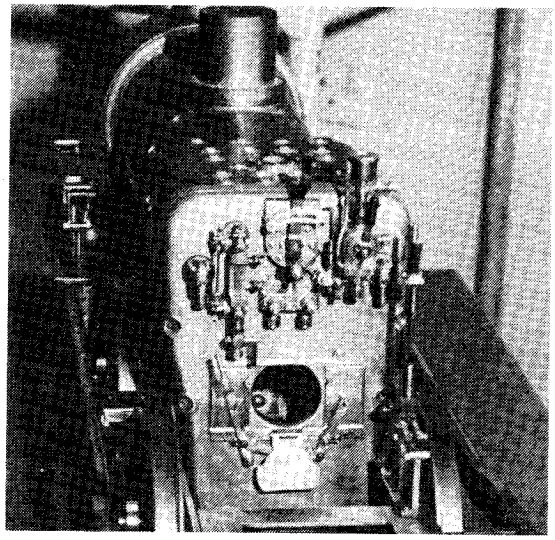
Above: Fayette *by "Inspector Meticulous". Below: A chunky* Austere Ada *by Geo. Williams.*



John Cook, Secretary of the Surrey S.M.E. brought along a model of the *Joslin* designed *Uranus*, a 4-8-4 locomotive which had been left to him by the late Ivan Quick. *Uranus* had taken 14 years to build and had only been completed shortly before its builder's passing; John was concerned to sort out a few teething troubles with the water feed to the boiler but, having got it going, he proceeded to lap the track at a good speed giving an indication of how it will perform when in first class condition. LBSC used to mention some of his friends by their nicknames and one of them is "Inspector Meticulous" otherwise Tom Glazebrook, who brought along a very good looking *Fayette.*



Above: Anxious moments for John Cook. Below: Fine detail on Alan Bray's Metro *backhead.*



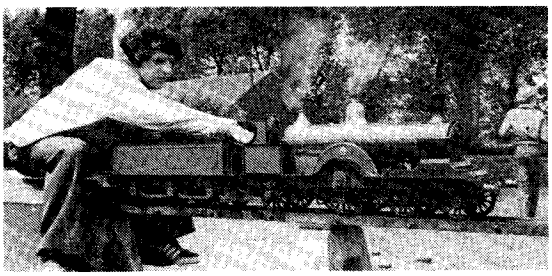
In the meeting room, where the good ladies of the Club indefatigably dispensed refreshments, was a selection of club members' work. Mo Furlong, a foundryman of vast experience and great talent, displayed some of his patterns and castings which Peter Dupen is putting in his G.E.R. 0-6-0. He also showed a fully detailed scale wooden mock-up of an inside cylinder block for a G.W.R. *King* to 1 1/16 in. scale; this he had done as an exercise to show, I think, how complex pattern and core-boxes would be for this. Alan Bray is building a 5 in. gauge *Metro* which promises to be an excellent well detailed job.

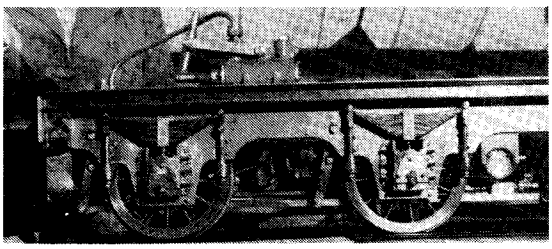
Guildford M.E.S. International Steam Meet and Exhibition

by Laurie

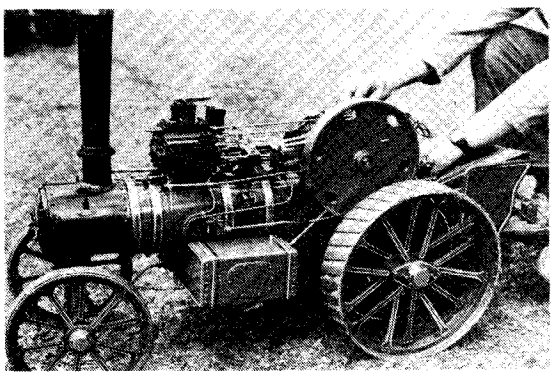
THE EXHIBITION, COUPLED with a Traction Engine Rally, was the culmination of 10 days of playing hosts to their overseas visitors. Guildford were both fortunate and unfortunate in that the weather over the week-end of 19th and 20th July was poor; visitors to the Exhibition flocked in, but running on the track was held up during the rainy spells. The traction engine display area was well churned up and a Simplicity road roller was kept busy flattening the ground which it did quite well! The very large marquee, which held the Exhibition, was well filled and Guildford consider this to have been a bumper year. It was also a bumper year for overseas visitors, some 70 to 80 having come from Belgium, Germany, Holland and Switzerland plus a few more from North America.

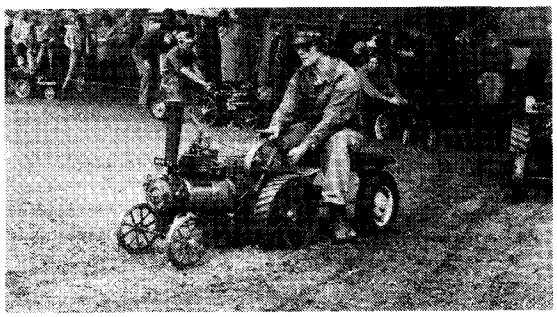
It will not be possible to detail all the good Exhibits in the show, a brief mention will have to suffice with a little more coverage of the models brought over by the Continentals. Guildford's Lord Mayor came to the Exhibition on the last day and was shown Charles Gumbie's ¼ scale working model of the clock which reposes in a tower above the Guildhall. Charles is, in fact, making 2 of these striking clocks and one will be permanently exhibited in the Municipal Offices. Some years ago, about 20 I think, Jim Bamford's twin cylinder Uniflow engine was described in these pages; the veteran steam engine has 90 deg. V cylinders with, what Jim calls "knocker" valves, and it is capable of 8,000 r.p.m. The "steam up" display, with about a dozen or more models running on air, had a Marshal



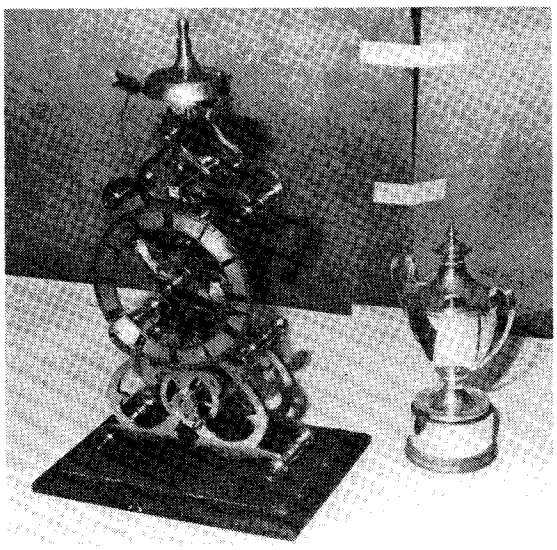


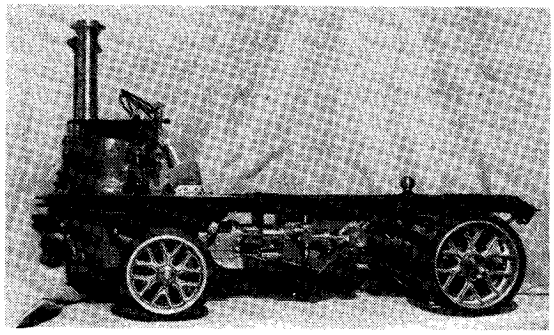
Upper: Les Nelson's Princess of Wales. *Lower: Fine detail on Alan Jensen's* Manor *tender. Below: Well-built Garrett compound in the parade.*



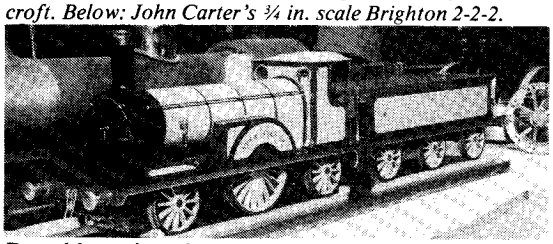


Above: Traction engines on parade. Below: Cup-winning Skeleton Clock by R. Woodley.

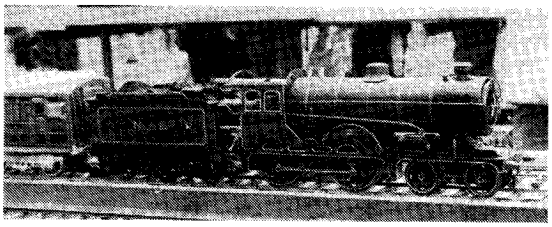




Above: Nicely made Clayton Undertype chassis by T. Cockcroft. Below: John Carter's ¾ in. scale Brighton 2-2-2.

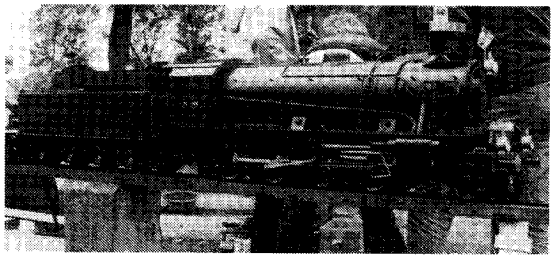


Portable engine whose appearance was typical of these work horses; plain and without frills, it looked a thoroughly workmanlike job. Outside on the grassed area, the "O" gauge section had their layout erected and, when the rain covers were removed, an excellent display of model trains was revealed. Peter McCabe is an enthusiast for this gauge and is also interested in live steam with radio control. His *Claud Hamilton* is a very nice job and could haul a good rake of coaches; he also has a live steam *Duchess* in "O" gauge.



Above: "O" gauge live steam Claud Hamilton. *Below: Don Allison's 5 in. gauge* Henschell.

Quite the most unusual exhibit was Swiss model engineer Hans Landerberger's 9½ in. gauge tank locomotive: in order to run it on 5 in. gauge track, he had made a special wagon for the smaller gauge and coupled its two bogies to pulleys on rollers on which the locomotive rested and from which belts took the drive to the wagon. It looked most peculiar as it trundled round the track as the locomotive's wheels rotated in the opposite direction to running! George Wildschut of Holland had a 5 in. gauge War Dept. "Riddles" design 2-8-0. George says the last one he knows of, upon which his locomotive is modelled, is No. 4310 of the Nederland Spoorwagen. His hefty model is a good and powerful hauler on the track. Rob Van Doort, genial European Secretary of the

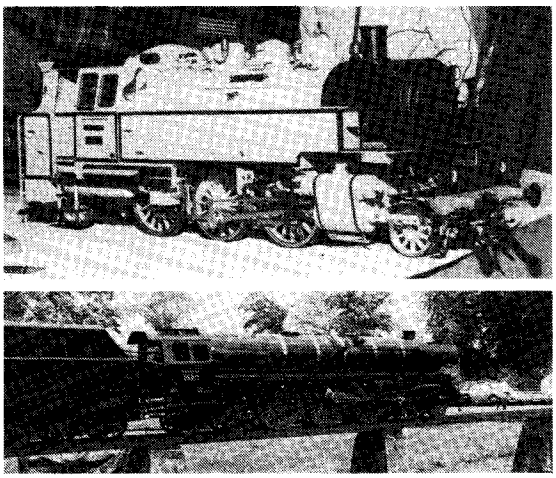


Top: 9½ in. running on 5 in. gauge. Above: The W.D. 2-8-0 from Holland. Below: Rob van Dort and his 0-4-0T.

Brotherhood of Live Steamers, brought along his 0-4-0T which seems destined never to reach completion. Apparently it started life as one thing and over a period of time has had considerable modifications and, although it appears finished, no doubt Rob's fertile mind will find something more to do with it.

We again saw Dr. Gumpert's 5 in. gauge *Big Lady* which has been here twice before. This huge 4-6-4 handles its loads with comtemptuous ease and has no trouble with boiler feeds since he attended to the injector arrangements (he reads *Model Engineer!)* a couple of years ago. Heinz Müller has almost completed a DB 2-6-2T in 5 in. gauge which is a very fine job indeed. We hope to be able to publish a fuller description of this locomotive in the course of time and, with luck, it should appear on the front cover in the not too distant future. The locomotive has been working and, although placed in the Exhibition marquee, Heinz and his friends put it outside on a steaming bay for me to photograph it. Some very strong hints have been made to him that it would be a very welcome addition to the Model Engineer Exhibition.

All of the Continental visiting model engineers and their families enjoyed themselves hugely, running their own locomotives and taking turns on those of the host Society and those of U.K. visitors. Luc Tenstedt had his 1½ in. scale *Highlander* LMS Class 5 running on a specially laid 7¼ in. gauge track giving rides to children and he offered the freedom of the footplate to several people. He originally built this locomotive for 200mm (7 7/8 in.) gauge but has recently converted it to 7¼ in. gauge which means he can now visit and run it on many other tracks. As the visitors took their leave, many were the compliments paid to the hosts and many promises were given to return to their next International meet.



Upper: Heinz Müller's very fine DB 64005. Lower: Dr. Gumpert's Big Lady.

Club Chat

The **National 2½ in. Gauge Society** held a most successful rally at the track of the **Wirral Model Engineering Society.** Quite a large turnout enabled members to see how the hobby in that gauge is progressing. Members travelled as usual from all over the country with many of the LBSC prototypes in evidence. There were also a number of models of non published designs such as Paul Wiese S.15. a 5XP and Dick Colbron's magnificent Selkirk to name but a couple. The news sheet for the 2½ in. gauge Society poses the question "Can one build a 2½ in. gauge locomotive on one of the new small lathes that are now in production?" The answer is "yes, very easily". Most have been developed now to such a degree that building quite large and sophisticated models on them is well within the reach of most modellers. It just needs a little thought when machining and the necessity to forget to a large extent the habit of being a slave to a three jaw chuck.

Without doubt June and July are the busiest rally months and quite a few have been held. I have spent several pleasant weekends visiting clubs holding rallies and it is nice to see that in spite of the weather there is a steady increase of visitors again. **North London Society of Model Engineers** are one that held a successful rally recently and although unable to attend I understand that the usual large turnout of locomotives was the result. Like all clubs the facilities which have for years been excellent have been improved still more and the site is the ideal place for a family day out. The Club with it's wide range of activities is having a busy summer and the marine section started with a pondside meeting at Bloomfied Park, Palmers Green. A good time was had by all and John Shrubsole gave a radio control demonstration ably supported by a drake and his mistress. The only casualty was David Rochat who tried to retrieve one of dad's boats and leant over too far. (Never mind mum he will not shrink). More meetings are planned and the orders are that boats will be carried and waders worn. **Rugby Model Engineering Society** held an exhibition earlier this year. Whilst the number of exhibits was largely lower than previously, the standard was much higher so that it looks as though it was a case of quality not quantity. The labour force got a bit stretched but in spite of this all was well. The 21st September sees the Club holding their own efficiency trials and members also hope to take part in those held by the **Midland Federation of Model Engineers.** Sad to report that Bill Childs, so long a stalwart of the Rugby Society, passed away earlier this year.

The **7¼ Gauge Society** held a weekend rally at the **East Herts Miniature Railway** track towards the end of June. It is interesting to see how more and more this gauge is catering for the narrow gauge prototype with the locomotive that is

big enough to sit in. A large variety of prototypes were running and there were visitors from as far away as Bournemouth. The Saturday evening was celebration time and a barbecue was held, some forty five people attending. Probably the most popular locomotive came from Malden and arrived complete with open wagon and caboose. There were some fears as to whether this massive prototype would get through the pointwork but finally all was well and very fine it looked, particularly as it crossed the new bridge over the pond. **Chingford and District Society of Model Engineers** paid a visit to the track of the **Derby Society of Model Engineers.** There was a very good turnout for this visit which is a repeat of an earlier one. The Derby track, which is ground level 3½ and 5 in. gauge, is popular with the Chingford members and deservedly so. It is most attractive with its signal box which controls all movements and the passing loops. Not to mention the track layout which forms a double loop with one loop passing over the top of the other on a bridge. So many tracks are just an ordinary oval formation, but this one means that once started the feeling is that of a journey rather than going round and round. They also have a most attractive turntable leading from the steaming bays and all in all it seems like a railway. Incidently the Club (Derby not Chingford) is due for an exhibition shortly and this should be well worth a visit.

Furness Model Railway Club have produced the 50th Issue of their journal The Turntable, and a very worthy journal it is. Packed with interest both about various aspects of the hobby as well as about prototype practice. The Club's eighteenth annual exhibition was held at Easter in the Town Hall and showed the usual wide variety of exhibits. The Club leans heavily towards local interest, and the old Furness Railway is always uppermost in their minds. It makes one realise that if all clubs were so minded then probably local historians would benefit no end from the Societies. Other clubs helped at the exhibition and one of note is the **Barrow Ship Model Society.** The Society which comes very much from a shipping town has a wide variety of very fine models. Exhibits came from as far away as Edinburgh and one nice feature this year was the very clear labelling of models which enabled visitors to ascertain exactly what was what. **Huddersfield Society of Model Engineers** have a strong interest in sailing but unfortunately the pond at Highfields, which is the main venue, has been leaking now for several months. It has therefore had to be drained and repaired. Members have worked very hard at the repairs but the regatta planned for the 8th June had to be cancelled. In the meantime volunteers are required to drive the new electric mower.

Hull Society of Model Engineers would like us to let people know that the Secretary is Mr J. M. Proud of No 1 Sixth Avenue, Ellerburn Avenue, Hull. The dates of the Club meetings are published in Club Diary and the venue is the Trades and Labour Club, 3 Beverly Road, Hull. The meetings start at 7.45 pm. **Basingstoke and District Model Engineering Society** are shortly hoping to be able to announce the opening date for their clubhouse. Most of the work is completed, leaving only the internal decoration, loft ladder, and the rain catchment tank with hand pump to be completed. The track opened in May with Laurie Lawrence performing the opening ceremony. **Andover and District Model Engineering Society** have a new Secretary, he is Mr J. W. Turner, 8 The Glade, Newbury, Berks. The Club is holding an open day on Sunday, 28th September. The track is 3½ and 5 in. gauges and there is plenty of room for traction engines both on grass and tarmac. All will be welcome.

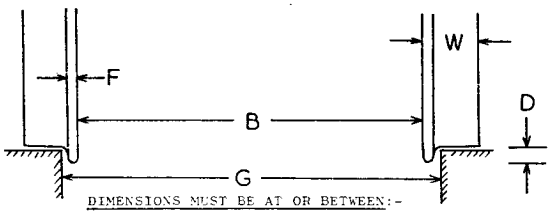
Very sad news from the **Southampton and District Society of Model Engineers** is that the Club locomotive, a 5 in. gauge Halton Tank on which many members had spent hours working, has been stolen. Unfortunately, although much work had been done, the locomotive was only just nearing the finishing touches and had never been set to work in earnest. One of the members has designed a passenger bogie which he feels covers all the needs of our hobby. Designed to be light and to use the fewest number of parts possible, it is fully braked and the brakes have only three moving parts. Sounds like the thing we are all looking for. How about an article for *Model Engineer* Mr Lockwood so that other enthusiasts can make use of your design? **Peterborough Society of Model Engineers** held a dinner and dance on 19th April. and the highlight was the presentation to the new President Fred Beard of his chain of office. Fred has a long and distinguished record in model engineering and at one time was engaged to repair models for the museums. His range of interests in the hobby is virtually unlimited and if you name it then Fred has probably made it. He has constructed several nice locomotives and his Black Bess is often to be seen at Southern Federation Rallies. The Secretary of Peterborough has sent a photograph taken during the proceedings, showing Fred wearing his chain of office, it is really only an old wheel casting with the blow holes filled in and supported by a lavatory chain but the theory is that the weight will keep his feet on the ground. I must say I didn't at first recognise the members of the Society as I have never seen them with clean faces before and I can only assume from the clothes that the local hire firm did rather well that evening.

Southern Federation Rally, 6th September, 1980

General information for visitors wishing to run on the Harrow & Wembley track

The Harrow and Wembley track is a multi-gauge ground level aluminium track capable of running mixed gauge trains of 3½ in., 5 in. and 7¼ in. There are eight sidings incorporating two steaming pits and an unloading ramp on one side of the running lines and 3½ in. and 5 in. gauge raised steaming bays on the other side.

Due to the multi-gauged points, the wheels of ALL vehicles must conform to the following chart and please check that all brake gear and spring hangers, etc., are ABOVE rail level on all vehicles.



DIMENSIONS MUST BE AT OR BETWEEN:-

G	B	W	F	D
3 1/2"	3 9/32	13/32-7/16	1/16 - 5/64	1/8
5"	4 5/8-4 11/16	9/16	3/32	5/32
7 1/4"	6 13/16	13/16	1/8	3/16

CLUB DIARY

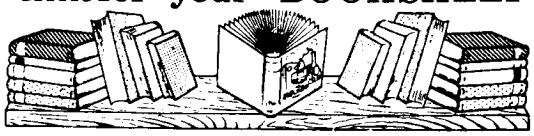
SEPTEMBER

5 Vale of Aylesbury M.E.S. Monthly Meeting.
5 Romford M.E.C. Competition Night.
5 M.E.S. of N. Ireland. Cregagh Library, Belfast. 7.30 p.m.
5 Rochdale S.M.E.E. Bits and Pieces. Springfield Park at 8.00 p.m.
5 Brighton & Hove S.M.E. Club Auction, London Road Station. 8.00 p.m.
5 Huddersfield S.M.E. H. L. Senior — M. Finnis.
5 Stockport & District S.M.E. Bits and Pieces at Parish Hall, Cheadle Hulme.
6 Ickenham & District S.M.E. Running for Public at Society's H.Q. 12.00 noon - 5.00 p.m.
6 King's Lynn & District S.M.E. Portable track — Grimston School Fete. 2.00 - 6.00 p.m.
6 Harrow & Wembley S.M.E. Southern Fedn. Autumn Rally, Ground level 3½, 5, 7¼ in. track.
6 Stafford & District M.E.S. Visit to Bristol S.M.E.E. Ashton Court. 2.00 p.m.
6/7 Brighouse & Halifax S.M.E.E. Steam Weekend, Ravenspring Park. 7¼ in., 5 in. and 3½ in. enthusiasts.
7 Ascot Locomotive Club. 10.00 a.m. to 1.00 p.m. Site Work at Heatherdown. 3.00 to 6.00 Informal Steam-up at Heatherdown.
7 St. Albans & District M.E.S. Marconi Flower Show Exhibition.
7 Bristol S.M.E.E. Public Running.
7 Cambridge S.M.E. Public Open Day — 3.00 p.m.
7 Ipswich M.E.S. Open Day.
7 Cannock Chase M.E.S. Steam Up. Cannock Park. 1.30 p.m.
7 Chelmsford S.M.E. Public Running 2.00 - 5.00 p.m. Waterhouse Lane, Chelmsford.
7 Worthing & District Society of Model Engineers. Public Running Day, Field Place. 2.00 - 5.00 p.m.
7 Colchester S.M.E.E. Invitation Day — Clubhouse. 7.30 p.m.
7 Furness Model Railway Club (M.E. Section). Park Railway. 2.00 p.m. -5.00 p.m.
7 Guildford Model Engineering Society. Running Day for Members.
7 King's Lynn & District S.M.E. R.C. steering, scale and functional. B.I.S. pits. 10.30. 25p.
7 Norwich & District S.M.E. Public running.
7 Malden & District S.M.E. Track Day.
7 Rugby M.E.S. Public running.
7 Stafford & District M.E.S. 1980 Midland Efficiency Trials, County Showground, Stafford.
7 Staines S.M.E. & C. Invitation Day. Phone call or letter.
8 Bedford M.E.S. Annual Tool Sale.
8 King's Lynn & District S.M.E. Club meeting. 7.30 p.m. St. James School.
8 Peterborough S.M.E. Club meeting. 7.30 p.m. Lincoln Road Clubhouse.
8 Wirral M.E.S. "Solar Heating". F. Stephen. 7.30 p.m. Victory Hall.
9 Basingstoke & District Model Engineering Society. Meeting (evening).
9 Guildford Model Engineering Society. Executive Committee Meeting.
9 Sutton Coldfield & N. Birmingham M.E.S. Talk by Mr. Williams of Severn Valley Railway.
10 Andover & District M.E.S. Red Rice Track.
10 Cannock Chase M.E.S. Details for Club Trial. Lea Hall Club. 7.30 p.m.
10 Harrow & Wembley S.M.E. Meeting. St. Andrews.
10 Southampton & District S.M.E. Model Traction Engine discussion. Please bring any relevant drawings or "Bits and Pieces" from the smallest item to a complete engine.
11 Leyland, Preston & District S.M.E. Meeting — Roebuck Hotel, Leyland. 8.00 p.m.
12 Huddersfield S.M.E. Cleaning Night.
13 Maidstone Model Engineering Society. Visit to Sutton Model Engineering Club Track.
13 Malden & District S.M.E. Steam and Chips.
13 Ascot Locomotive Club. 10.00 a.m. onwards: Visit to Heatherdown by Harrow & Wembley and North London Societies.
13 Wirral M.E.S. Annual Outing.
13/14 Chelmsford S.M.E. Portable Track at Traction Engine Rally. Billericay.
13/14 Tyneside S.M.&E.E. Open Day at Exhibition Park Track. Visitor's locomotives welcome (current boiler certificates please).
13/14 W. Washington L.S. Meet.
13/14 Willesden & W. London S.M.E. Public Running, Roundwood Park, Harlesden Road, London NW10, 12.00 - 6.00 p.m. Brent Show.
13/14 Huddersfield S.M.E. Club Weekend.
14 Bracknell Railway Society. Miniature Railway Public Running. 3.00 - 6.00 p.m.
14 Worthing & District Society of Model Engineers. Portable Track at Amberley Chalk Pit Museum Rally.
14 Harrow & Wembley S.M.E. Public Running.
14 Ascot Locomotive Club. 10.00 a.m. to 1.00 p.m. Site Work at Heatherdown.
14 Vale of Aylesbury M.E.S. Stand at Farm Fair, Amersham.
14 Harlington Loco. Society. Public Running Day and Exhibition.
14 Leyland, Preston & District S.M.E. Celebratory Open Day. Worden Park, Leyland.
14 Cannock Chase M.E.S. Club Trials. Cannock Park. 1.00 p.m.
14 Sutton Coldfield & N. Birmingham M.E.S. Non-Steam Rally.
14 Romford M.E.C. Track Event — Henderson Trials.
14 Stafford & District M.E.S. Visit by North Staffs. M.E.S. to club track. 2.00 p.m.
14 Brighton & Hove S.M.E. Vintage Sunday — Bluebell Railway.
15 City of Leeds S.M.E.E. The work of Louis Raper. Talk by George Eveniss arranged by Gibson Mack.
16 Chesterfield & District M.E.S. General Meeting.
17 Harrow & Wembley S.M.E. Club meeting at track.
17 Bristol S.M.&E.E. Traction Engine Evening by Richard Beel and Co.
17 Guildford Model Engineering Society. First Bits and Pieces Evening.
18 Hull S.M.E. Tool Grinding Experiences. Trades & Labour Club (Room 3) Beverley Road, Hull. 7.45 p.m.
18 Railway Films. Worthing & District Society of Model Engineers by Dave York from Crawley Society at Field Place. 7.30 p.m.
19 Romford M.E.C. Films from the British Transport Library.
19 Brighton & Hove S.M.E. Railway Inn Signs — J. Whicher, London Road Station. 8 p.m.
19 Rochdale S.M.E.E. Canal Restoration: J. T. Noakes. 7.30 p.m. at Technical College.
20 St. Albans & District M.E.S. Water Carnival, Welwyn Garden City.
20 Westland M.E.S. & Yeovil College & D.M.E.S. Joint festival of Modelling Exhibition. 10.30 a.m. - 5 p.m.
20 Wigan & District M.E.S. Club Night.
20 Witney & West Oxfordshire S.M.E. Annual Barbeque.
20 Chesterfield & District M.E.S. School Autumn Fete.
20 Brighton & Hove S.M.E. Barbeque, Hove Park. 7.30 p.m.
20/21 Crofton Pumping Station. Crofton Beam Engines in Steam.
20/21 Chesterfield & District M.E.S. Papplewick Steam Days.
20/21 Stockport & District S.M.E. Exhibition, Community Hall Woodford, Bramhall, Stockport. Saturday 10 a.m. - 9 p.m. Sunday 10 a.m. - 6 p.m.
21 Ardeer Recreation Club. Film Night.
21 Ascot Locomotive Club. 10 a.m. to 1 p.m. Site Work at Heatherdown.
21 Norwich & District S.M.E. Public running.
21 Bristol S.M.E.E. Public running.
21 Chelmsford S.M.E. Public Running 2-5 p.m., Waterhouse Lane.
21 Furness Model Railway Club (M.E. Section) Park Railway 2 p.m. - 5 p.m.
21 Guildford Model Engineering Society. Last Public Open Afternoon.
21 King's Lynn & District S.M.E. Public Running Day, Walks Track 2-5p.m.
21 North London S.M.E. LBSC Memorial Bowl Competition — Colney Heath.
21 Stafford & District M.E.S. Visit to Kinver M.E.S. 2.00 p.m.
21 Staines S.M.E. & C. Public Run.
21 Worthing & District Society of Model Engineers. Public Running Day, Field Place 2-5 p.m.
21 Willesden & W. London S.M.E. Public Running, Roundwood Park, Harlesden Road, London NW10. 3 p.m. - 6 p.m.
21 Worcester & District S.M.E. Public running at Diglis track, Waverley Street, Worcester at 2.30 p.m.
22 Bedford M.E.S. Model T/E Building. Ray Newman.
22 Peterborough S.M.E. Club meeting 7.30 p.m. at Lincoln Road Clubhouse.
23 Basingstoke & District Model Engineering Society. Official Meeting (Evening).
23 Sutton Coldfield & N. Birmingham M.E.S. Discussion on Track Construction.
24 Harrow & Wembley S.M.E. Meeting, St. Andrews.
24 Andover & District M.E.S. Red Rice Track.
24 Cannock Chase M.E.S. 'O' Gauge to Full size. With Slides, Films. Speaker Mr. A. Glaze, Lea Hall Club 7.30 p.m.
25 Leyland, Preston & District S.M.E. Roebuck Hotel, Leyland, 8.00 p.m. — Meeting.
26/27/28 Furness Model Railway Club (M.E. Section) N.M.R.A. Convention, Blackpool.
27/28 Great Western Society, Didcot. Replica "Rocket". "Evening Star" operation. Open 11 a.m. - 5 p.m.
27 Ascot Locomotive Club. Visit to Southampton & D.S.M.E.
27 Brighton & Hove S.M.E. Track day Hove Park, 2 p.m.
27 Harrow & Wembley S.M.E. Club Exhibition, Longfield School, Dukes Avenue, N. Harrow.
27 S.M. & E.E. Talk "The Khaki Railway" K.N. Catchpole, Marshall House, 2.45 p.m.
27 Southampton & District S.M.E. Visitors' end of season Open Day.
27 Vale of Aylesbury M.E.S. Railex — portable track.
27/28 Malden & District S.M.E. 7¼ Week-end & Visiting Clubs.
28 Harrow & Wembley S.M.E. Public running.
28 Ascot Locomotive Club. 10 a.m. to 1 p.m. Site Work at Heatherdown.
28 Andover & District M.E.S. Open Day. Red Rice Track.
28 Chelmsford S.M.E. Public Running 2-5 p.m., Waterhouse Lane, Chelmsford.
28 Cheltenham S.M.E. Public Running Day.
28 King's Lynn & District S.M.E. S.R. Scale & Functional 11 a.m. B.I.S. Pits Lake.
28 Peterborough S.M.E. Visitors Day 11 a.m. Visitors welcome to run on track.
28 Birmingham Society of Model Engineers Ltd. Visit to Broomy Hill Water Works, Hereford.
28 Harlington Loco. Society. Public Running Day.
29 Lancaster & Morecambe M.E.S. Meeting. The Lancastrian Marton St. Lancaster. 7.30 p.m.
29 Willesden & W. London S.M.E. Building Torquay Manor by Ray McNuff. Kings Hall Community Centre, Harlesden Road, London NW10 at 8 p.m.
30 Chelmsford S.M.E. Monthly Meeting, 7.30 p.m. Bring & Buy Sale. Clubhouse.
30 Stafford & D. M.E.S. Club Night, talk by Mr Inmms on the Ashford Locomotive Works. 7.30 p.m. Doxey Arms.

OCTOBER

1 Witney & W. Oxfordshire S.M.E. C. R. Amsbury talks to us on Model Boiler Fittings.
1 Bristol S.M. & E.E. On the table.
1 Peterborough S.M.E. Committee Meeting 7.30 p.m. Lincoln Road Clubhouse.
2 Hull S.M.E. Lantern Lecture. Old slides by J. M. Proud. Trades & Labour Club (Room 3), Beverley Road, Hull. 7.45 p.m.
2 North Devon S.M.E. Brains Trust — General Question Night.
2 Worthing & District Society of Model Engineers. Informal Bits & Pieces at Field Place. 7.30 p.m.

.....for your BOOKSHELF



Locomotives Large & Small
Edited by Don Young
Published by Saunders the Printers (IW) Ltd, Cross Street, Shanklin, Isle of Wight.
Issued Quarterly at Annual Subscription of £3.50.

We have seen the first three issues of this new magazine from the Don Young stable and it lives up to its name in that the contents are only about large and small locomotives, plus perhaps, a little about the people who build them. A good proportion of the contents is written by the Editor, Don Young, in his usual homely and chatty style which makes for easy reading. On the constructional side, only his designs are being described and currently appearing are a Hunslet N.G. locomotive and 5 in. gauge 4-4-0 *"Glen"* supported by well printed line drawings and photographs in several cases with reasonably clear text. The magazine is on A4 size paper and this allows adequate presentation of the line drawings which is particularly noticeable in the issue containing a fold out page. Printing and presentation of the text is clear with few editorial "boobs" and the Times Roman type size used does not strain the eyes.

D.E.L.

British Diecasts — A Collectors' Guide to Toy Cars, Vans and Trucks
by G. M. K. Thompson
Published by Haynes Publishing Group, Sparkford, Yeovil, Somerset BA22 7JJ
160 pp. Price £8.40, hard covers.
This book will serve as a very useful guide to collectors of British diecast vehicles. It covers the ranges of toy and model vehicles produced by Dinky Toys, Spot-On and Corgi, along with Lesney's Matchbox Models of Yesteryear. Separate chapters are devoted to each manufacturer and each chapter starts with a short history of the Company's development from early, very basic, models through to the current, more sophisticated examples. There then follows several pages of good, clear photographs (many specially taken for this book), each with a detailed history of the model and its variations and date of introduction. Also, each model has been given a "rarity value" to enable the collector to establish a relative value and identify the most collectable vehicles. Altogether a most interesting book with special appeal for collectors.

L.M.W.

Locomotives I Have Known
by J. N. Maskelyne
Published by Model and Allied Publications, Argus Books Limited, Argus House, 14 St. James Road, Watford, Herts.
199 pp. Price £12.50, hard covers.
This book is a well executed combination of "Locomotives I have known" and "A further selection of locomotives I have known". It has been compiled by completely integrating both books and is now arranged in roughly ascending order of locomotive size. Each railway company and its locomotives is dealt with in individual sections and as a tribute to the Author's special affection for the "Brighton" line this has been treated separately from the rest of the Southern lines. The Author's own superb drawings are reproduced along with a detailed general specification. Each locomotive type is also accompanied by some fairly comprehensive historical notes based mainly on the Author's own observations and recollections. The combination of the two original books into one volume has created an extremely valuable historical record of the early years of our railways and is surely a fitting tribute to a well known and much admired railway historian.

L.M.W.

Vertical Milling in the Home Workshop
by Arnold Throp, C.Eng., F.I.Mech.E.
Published by Model and Allied Publications, Argus Books Ltd., 14 St. James Road, Watford, Herts.
74 pp. Price £1.95, soft covers.
Most model engineers use some form of vertical milling, whether it be on a proper vertical milling machine or using a lathe and vertical slide set-up. In his book, Arnold Throp concentrates on the purpose-made vertical milling machine and gives good, clear advice on the many types of job which can be accomplished on this versatile machine. The first chapter follows the evolution of the vertical miller from the early 1800's up to the present time. Separate chapters then deal with milling flat surfaces, slitting, keyway cutting, boring and profiling. The book also gives advice on using dividing heads and rotary tables as well as notes on cutting speeds, chucks for milling cutters, work holding, etc. There is a very wide range of operations which can be done on a vertical milling machine and the book includes many descriptions and examples. Each description is accompanied by photographs which clearly illustrate the methods and set-up used. The examples given cover work on model locomotive parts, gears, cutting tools, stationary engines and so on. This book should prove to be a useful addition to the model engineer's library, even if a vertical milling machine does not reside in his workshop.

L.M.W.

WHAT'S IN STORE

Where possible, the items reviewed are seen and tested by "M.E." staff. However, where this is not possible reviews are given solely on the information received from the manufacturers and we cannot accept responsibility for products which do not measure up to the claims made for them.

Nathan Shestopal Ltd.

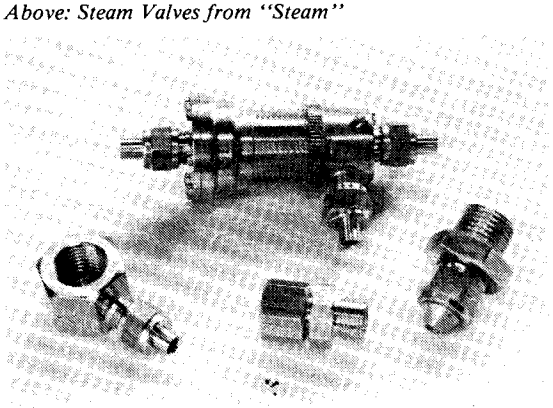
We have received this Company's catalogue which shows a wide variety of tools and materials for watchmakers, horologists, jewellers, model and precision engineers. The catalogue ranges over abrasives to weights and weighing scales; in between are such items as blowers (that is a similar sort of thing to a barber's puffer) and very useful for blowing tiny swarf out of injector cones in the making. There are small tools by the dozen, small lathes, staking tools, division plates, burrs, etc., etc. Also will be found Diamantine which Don Gordon has mentioned in his articles and (if a Poole reader sees this) miniature needle files for the finest of work. Nathan Shestopal are at 1 Grangeway, London NW6 2BW, telephone 01-328 3128, and this catalogue is price £1.00 inclusive of post and packing.

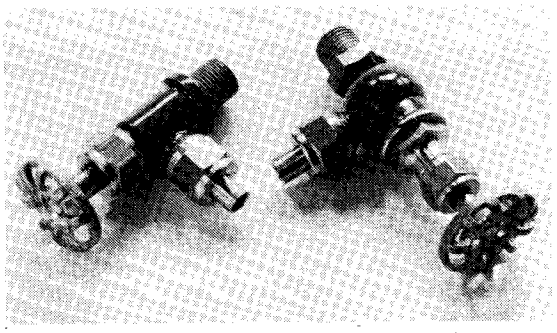
Steam (en France)

Quite the most prestigious catalogue ever received by us is that of *Steam* whose address is B.P. No. 15, 02140 Verins, France. This Company began trading four years ago and now has an impressive range of products. We have samples of various steam fittings; the photographs show some of them, which are well made and finished although not all of the steam valves are of the captive type. Mons. J. P. Delaby, the proprietor, also sent a Pressure Regulator which, in the delightfully phrased covering letter accompanying the samples, he describes as follows:

"which should interest the steam boat modellers. It is sold tested by steam and changed if not working as said. This regulator is fitted between the gaz tank and the gaz burner (ex-Camping-gaz); the knurled screw on the body regulate the working pressure of the boiler from 3 to 5 bars (before the opening of the safety valve). When the choosen pressure is obtained, the flame of the burner slows down and the small screw regulate the wright flame which must now be slow; when the pressure goes down, the flame burns fast again". And so it does.

Below: Pressure Regulator and Fittings.
Above: Steam Valves from "Steam"

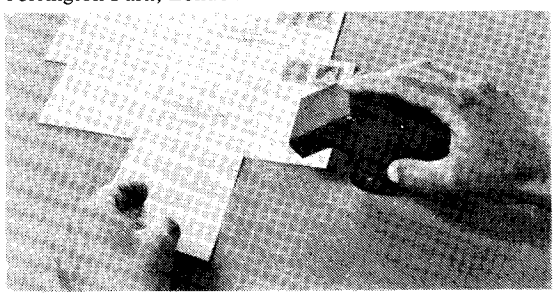




Steam lists a range of locomotive plans and castings, some from Model & Allied Publications Ltd., Plans Service and some of Continental Locomotives which should be of particular interest to French model engineers. He also has stationary engines, a four pillar "Bourdon" and one suitable for a boat. Included in the catalogue are tables of reference converting Imperial data into metric and a French/English dictionary of live steam terms.

Scriptomatic Hand Addresser

Launched in the U.K. just over a year ago, the Scriptomatic Model 5 Hand Addresser — "baby" of the world-famous range of Scriptomatic addressing units — is said to be proving remarkably successful among the vast number of small-scale mailers for which it was developed (those with lists of only up to around 50 or 100 names). These include small businesses and charities, shops, club secretaries, doctors, dentists, churches, schools, travelling salesmen and many other users. The Scriptomatic Model 5 comes in kit form, is hand-held, has a claimed speed of 60 addresses in 10 minutes — six times faster than a typewriter — and costs only £49.45 including VAT, although the manufacturers state that essential price rises must come soon. Scriptomatic say the Model 5 ends forever the tiresome chore of repetitive typed or handwritten addressing. Saves the user considerable time, effort and money. Yet is easy to use by anyone. Just two simple movements with Hand Addresser and a firm black address — or short message up to six lines — appears on blank envelopes, label, wrapper or any paper surface. Key to whole process is the unique low-cost Scriptomatic master card. Address is typed *once only* (or written with ball-point pen). User can then address from it again and again. Clean to handle, prepared in seconds, it doubles as a record card and lasts for years. The kit contains Model 5 Hand Addresser, 200 master address cards, file tray, applicator. Larger mechanised Scriptomatic addressing machines, using same compatible master cards, are available as mailing needs expand. Contact Scriptomatic at Scriptomatic House, Torrington Park, London N12 9SU.



Post Bag

The Editor welcomes letters for these columns. Pictures, especially of models, are also welcomed. Letters may be condensed or edited.

Valve Functions

SIR,—Re: "Valve Functions" (Postbag, 6th June). In view of points brought out in this discussion, might I recommend as required reading, especially for those submitting articles on miniature locomotive construction, two excellent handbooks on Valve Gears, one on Stephenson, the other on Walschaerts, by your correspondent D. L. Ashton and available from Reeves and Co. Authoritative information on this subject is rather inconveniently dispersed in the literature, but Mr. Ashton has successfully ferreted out and included such details as are relevant and necessary for understanding and correctly designing valve gears.

Winterborne Zelston, Dorset — H. S. Gowan

Stephenson's Valve Gear

SIR, — May I beg space to clarify one or two matters following Keith Wilson's reply to my assertions on valve gears (June 6 issue), since neither his use of capitals nor the addition of fabricated reasoning make his statement less erroneous.

Confusion arises from the lack of distinction between

(a) Required valve events, about which there will always be legitimate controversy, and

(b) The valve gear itself, about which there is not and cannot be any controversy. It is a finite mechanism and should be designed to produce exactly the events asked of it.

I see little point in perpetuating the old mystery accorded by some to valve setting, as this only serves a machiavellian purpose in ensuring that the poor novice remains in his appropriately ignorant state. Having decided on events and designed the gear geometry necessary to produce those events it merely remains to set the valve on its spindle into a position agreeing with the geometry. Sadly, most drawings for models do not state the designed events — I suspect because the designer is unsure of them.

In my booklet on Stephenson's valve gear I explain how both equal leads and equal cut-offs have been achieved since the gear's invention. It follows logically that valve setting should be carried out according to, and at the critical positions stated in, the design criteria. This doesn't have advantages or disadvantages to prove, disprove or subject to haphazard experimentation; it is simply common sense. Advancing eccentrics on Stephenson's gear will not cover up a slight discrepancy without introducing several more. In full size they were keyed on to the axle in the designed position and that is exactly what should also obtain in a model. It is a mistake to think that subsequent fiddling with gear or valve can cure a design fault, as one or two C.M.E.'s found to their cost.

In the current model situation the unfortunate builder is usually left to guess when to tighten a grub screw. Then, as the link suspension is rarely correct he proceeds to set the valves on dead centres quite unaware that he is probably drawing the cut-offs apart to such an unacceptable degree. The net result of all the factors could, of course, be a good runner, but in my experience it too often results in lumpy running and the inability to notch up. The ball here is firmly in the designer's court.

Keith Wilson asks if I can be persuaded to release the results of my studies. If my articles in *Model Engineer* and the booklet specially written for model engineers are insufficient contributions perhaps I should couple an apology with renewed endeavour. I am always willing to help where I can.

Manchester — D. Ashton

Tramway Locomotives

SIR,—I was very pleased to read Mr. David Gould's article about the Kettering Furnaces Tramway System. The article was concluded on rather a sad note; however, from that system two locomotives survive; the first Kettering Furnace No. 3, an 0-4-0ST No. 859/1883 at Penrhyn Castle near Bangor and Kettering Furnace No. 8, an 0-6-0ST No. 1675/1906 at Market Harborough, Leicestershire. The other outstanding 3 ft. gauge tramway was the Scaldwell Ironstone Tramway which closed in 1963. Our Museum has "Scaldwell", an 0-6-0ST built by Peckett's No. 1316/1913, also the smaller 0-4-0ST "Handyman" built by Hudswell Clarke, is owned by the Midland Railway Trust.

Dorking, Surrey — Richard Marner, Hon. Curator, Brockham Museum Trust

Grasshopper Beam Engine

SIR,—Regarding Mr. D. W. R. Waudby's unfinished Grasshopper beam engine *(Model Engineer* issue 3633 — page 638), I feel pretty sure that from its appearance and dimensions it was being built to the design of Henry Muncaster that appeared with drawings in the *Model Engineer* of May 10 and May 17 1934. There was never a "series" of articles dealing with a Grasshopper in the 1950's —or indeed at any time since the war. There was, in the issue of March 31 1949, a design for an Easton and Ames grasshopper, and several models to this design have appeared since, but it differs from Mr. Waudby's model in a number of respects. I don't know if Mr. Waudby has access to 1934 *Model Engineer.* If not, and with your permission Mr. Editor, I could let him have Xerox copies from my own volume.

London N20 — T. W. Pinnock

Mr. C. Cole's Side Lever Paddle Engines

SIR,—Mr. Cyril Cole was surprised to see Mr. Hann's letter in the May issue of the *Model Engineer.* It is not widely known that Mr. Cole suffered a stroke five years ago when his side lever paddle engine was half built. The project was stopped for over a year. Although seriously handicapped, Cyril's grim determination to finish the job prevailed and the model was completed for the 1979 Model Engineer Exhibition. Readers will be interested to know it has now been placed in the National Museum of Wales, Cardiff, with Mr. Cole's two cylinder Tandem compound marine engine, and should

be on show shortly. Research and construction of the side lever paddle engine has been fascinating and Mr. Cole has agreed to give details for an article to be written shortly.
Bury St. Edmunds B. A. Linger

Tower Bridge Engines

SIR,—Imagine my surprise and delight when I received my regular copy of *Model Engineer* this week, to see the lovely cover picture of Tower Bridge. Due to a train of thought a week or so ago I started to think and wonder about the massive steam engines, pumps and hydraulic gear that were used to lift the road sections. Now electric pumps, etc, I believe. Being a "steam man" — I served my apprenticeship on the old L.N.E.R. at Stratford London works — I have been wondering where I could get details of the Tower Bridge steam engines and pumps. I have gathered up a few little snippets of information but now wonder if you could produce an article in the *Model Engineer*. Perhaps some pictures, details, sketches, or what can be obtained. I read that two pumping engines (1894) are preserved. Also I am told there is an article in "The Engineer" — Tower Bridge, by J. E. Tuit (1894) Volume 76! I have not seen this at all. Hoping you can come up with something. Thank you for a fine, interesting and useful magazine. I first started reading the *Model Engineer* over 50 years ago!
Paignton J. Pitchford

(We have been in contact with the Superintendent Engineer of Tower Bridge who has promised to let us have some details of the old steam engines. — Ed.)

Leather Tool Holder

SIR,—For many years I had what may be termed a tool holder i.e. a chrome leather case, a zip on three sides with a pocket inside and the usual tool loops, not to be confused with the plastic type now on the market. I believe they were or are Post Office issue and possibly B.B.C. to their technicians. To date I have not found who the makers are. Can you please help. I am a reader of *Model Engineer* since 1957 and enjoy it very much even though the late Claude Reeve and John Wilding together with Attachment Making hold my interest.
Co Routh, Ireland G. Campbell
(John Wilding is a contributor to Horological Journal—Ed.)

Contents of *Model Engineer* and Don Gordon

SIR,—The past two issues are I feel a matter for congratulation. No. 3635 beside the usual articles has the start of a Clock Making series and long may it run. I for one would be pleased to have one describing the making of a Grandfather; the last was by Geo. Gentry back in the 30s. This issue 3636 contains the Jones engine, a "Diesel" and the first of a series on Marine model engineering. Regarding the Diesel could this not be expanded with dimensioned drawings? Think of the number of Dads — and Grand-dads — who would be delighted to make an electrically propelled version for the children which they could drive themselves. The Marine articles by Mr. Gordon are more than welcome. In 50 years of reading the *Model Engineer* I can recall nothing on marine subjects like them. I hope you can persuade Mr. Gordon to keep going for a long time; he might turn out to be the LBSC of the ship world, but there is one small plea I would like to make and that is that he treat his readers as less knowledgeable and explain some of his terms. What, for example, are Garboard strakes, deck stringer plates and waterways and how do you silver solder the pieces to the keel: in the jig or what? Also the tools need amplification. How does that roller run around the frame bending jig and how are the channels folded in figure 3? This series appears to be written by a master of his subject, but please write for the interested reader like me who, although keen to try, knows little about ships. At the moment too much is condensed into too few words with practically no dimensioned drawings at all.
High Wycombe A. O. G. Usmar

Contents of *Model Engineer*

SIR, — As a regular reader of the *Model Engineer* for nearly thirty years I have noted with some concern the recent efforts by many correspondents to have the specialised nature and high standard of this periodical altered to suit their individual needs, and I wish to add my voice to those who would prefer the publication to remain much as it has been particularly over the past decade. This is not to say that I do not sympathise with those who would like to have a book that provides for a wider range of interests or which sets out to instruct beginners to engineering or any other craft, but in my opinion the vast majority of readers must be people for whom the *Model Engineer* is almost like a trade journal, and without it these craftsmen would not only lose their most valuable source of inspiration, ideas, and assistance, but also their strongest link with fellow model engineers in other countries of the world.

Many times over the past thirty years the continuing series of articles on locomotive construction has been criticised, and possibly this is the reason why in recent times we have been provided with plans and constructional information on such things as traction engines, portable engines, steam road rollers steam driven agricultural machinery, and steam road vehicles. Personally I consider this a fairly comprehensive assortment, and if this trend continues with perhaps the inclusion of a steam breakdown crane and a steam excavator then the critics will have little further cause for complaint.

More recently there has been similar criticism about articles on workshop aids and accessories, but I believe that the "magic" of steam and the versatility and essential nature of the model craftsman's workshop equipment are of paramount importance in this journal, and that this is the reason why successive editors have continued to provide articles based on these things as the mainstay of the publication. I would also like to point out that during the past thirty years, in addition to the main subjects already mentioned, the proportion of articles on machine tools, pattern making, engineering techniques, photographic apparatus, I.C. engines, clocks, hot air engines and general interest items has been just about perfect, so I for one have few complaints about my association with *Model Engineer* over that long period of time. Indeed, I am eagerly awaiting the next contributions by George Thomas, whose practical designs for workshop accessories and whose descriptions of workshop techniques have been so useful and so excellently presented, and I hope it will not be long before the good things we were promised will be forthcoming.

Now having said all that let me show that I too am capable of displaying the human failing of discontent by expressing the annoyance I feel every time a constructional article appears without fully dimensioned drawings of those parts that are required to be cast, or when plans from the *Model Engineer* Plans Service contain the same serious fault. I realise that this does not concern U.K. readers so much

because castings are generally available at reasonable cost, but in Australia with a high rate of exchange and an import duty of 34%, the purchase price of items imported from overseas is prohibitive, and for this reason many model engineers find it necessary to make their own patterns and have the castings made locally. This means that special scales must be made to measure the drawings that are printed in the *Model Engineer* or on the prepared plans, and this is time consuming and annoying. Could I therefore suggest that in future all drawings be fully dimensioned so that extra work by overseas readers will not be necessary, thus allowing better production times to be achieved.

Melbourne, Australia — Frank Birchall

Left-hand Drills

SIR,— In the issue dated 20/4/79 (p. 465), I wrote "Never having seen a left-hand drill, . . ." and I am sorry that my words, not strictly true and carelessly used, should have prompted a number of kind readers to write to me on the subject, four of whom have actually gone to the trouble of sending samples for my inspection. Yes, of course they exist — they are listed by all the major drill manufacturers but their purpose appeared to be unknown to most of my correspondents. As far as my experience goes, they are used in multiple-spindle drill heads in which it is sometimes impossible to arrange for the gearing to give the same direction of rotation to all spindles and, as a result, some of them must be provided with left-hand drills.

New Milton, Hampshire — Geo. H. Thomas

Screwcutting

SIR, — The letter from Mr. N. G. Savill in Post Bag of 20-30th June issue of *Model Engineer* has prompted me to write this letter. I suggest that most of the information required in order to produce satisfactory screwcut threads has been given in the article by Mr. George Thomas in the 6-19th July issue 1979. Really the only difficult and tedious part of the operation is producing an accurate screwcutting tool using a bench grinder in lieu of a tool and cutter grinder, but I find that this can be accomplished satisfactorily by the careful use of simple jigs and templates made from hardwood and brass shimstock to assist in obtaining accurate angles. A flat can be ground on the tool using a guide and then finished off to the correct width of the flat accurately. Once the tool has been made and honed to razor sharpness with an Arkansas oilstone the rest of the job is a cake-walk, but without a razor sharp tool a perfect thread cannot be produced.

For making external screwcutting tools I use ¼ in. square × 2½ in. long HSS toolbits as I find these easier to manipulate, for small internal tools I use tips of 1/8 in. Stellite rod silver soldered on to silver steel of suitable diameter for the job in hand. One other requirement is a handle for the lathe spindle as illustrated in the above article. My original handle was too cumbersome and the one I now use was made to the dimensions given by Mr. Thomas but with some modifications. For cutting short threads and for threads not so short, for cutting up to shoulders and for delicate parting-off jobs I find the handle is absolutely indispensable. Adequate torque has always been transmitted to the spindle by finger tightening the cross-pin which is 1 1/8 in. long.

The necessary information to determine the widths of flats on tools for various threads can be found under the heading Screw Thread Systems in Machinery's Handbook. Tabulated under Whitworth Threads values of h/6 are given, if these figures are multiplied by 1.0412 the resultants are the widths of the flats required on tools for those particular threads. A short article by Mr. B. L. Buckland in *Model Engineer* issue of 5th December 1975 tabulates the calculated amounts that the angled topslide should be fed in for a selection of different threads. He does mention however that a hard chaser should be used to finish off the thread, acting on advice from Mr. Thomas I have abandoned this procedure for external threads and round the tops using a genuine Swiss file of 4 or 6 cut.

I don't wish to set myself up as an expert and have written this letter in the hope that anyone rather timorous of attempting to screwcut a thread will hesitate before reaching for the screwing tackle and try making a screw-cutting tool instead. If the tool is a success then the rest of the operation should prove to be a comparatively straightforward job, always assuming that the cuts are put on the topslide with restraint. Many threads after all cannot be cut with screwing tackle however sophisticated it may be.

Finally I should like to say how much I and I'm sure countless other readers, enjoy the contributions of Mr. George Thomas. He always has something new and interesting to write about and the quality of the photographic illustrations is really outstanding.

Lancs. — E. Taylor

(The Editor uses a Moore & Wright screw cutting gauge, M & W No. 200 for checking the angle ground on a tool. It cost about 1/6d years ago — Ed.).

Machining P.T.F.E.

SIR,—The article on the *"The Whippet"* hot air engine in *Model Engineer* issue 3635, June 1980, mentions the dangers of overheating P.T.F.E. It may not be realised that smoking tobacco whilst machining P.T.F.E. can have serious consequences. If a scrap of the plastic alights on the lighted tip of a cigarette the poisonous fumes are immediately drawn into the lungs and illness results. In all careful workshops it is now strictly forbidden to smoke whilst machining P.T.F.E.

Bournemouth — E. R. W. May

Machining Ferobestos

SIR,—I read with interest Mr. Abigail's article on a small bending tool in the July 4th issue of *Model Engineer* and would like you to pass on to him a comment about the use of Ferobestos for the formers. By all means use this material but as it contains asbestos fibre, also use some means to prevent breathing the dust which will be created during machining or sawing. Probably the best method would be to use a flexible connection from a domestic vacuum cleaner (preferably one with a throw-away paper bag filter), fixing the nozzle as close to the source of dust as possible. Failing that, keep the cut dampened — say with a paint brush well wetted with water. This would be a bit messy and obviously any surplus water and sludge must be mopped up and the rags thrown away afterwards. Products containing asbestos can be machined and used quite safely providing that sensible precautions are taken to prevent excessive exposure to respirable fibres which, incidentally, are the ones which are too small to be seen by the naked eye.

Stockport, Cheshire — G. S. Helps

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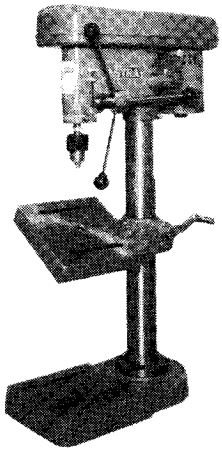

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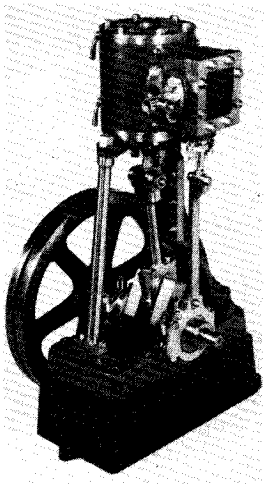

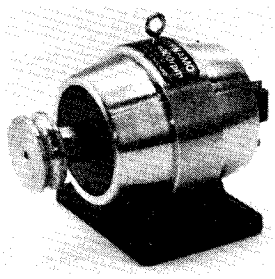

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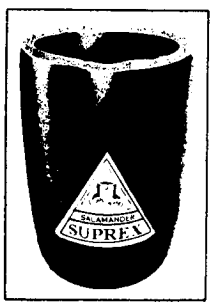

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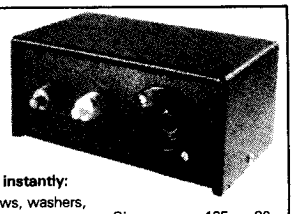

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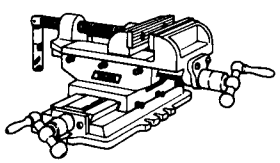

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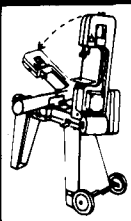

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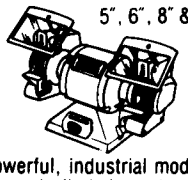

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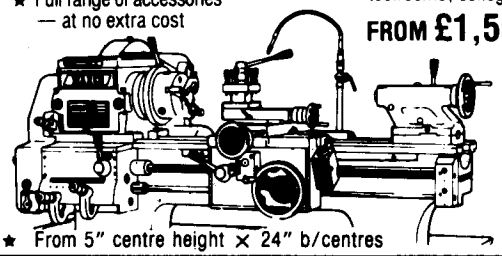

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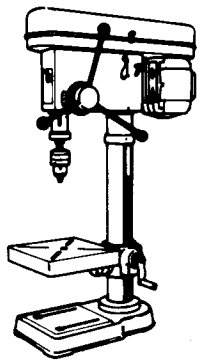

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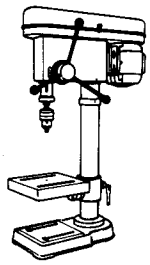

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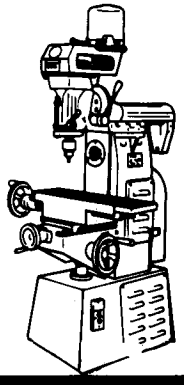
★ Tilting table

ONLY £82

COMBINATION MILL CH2

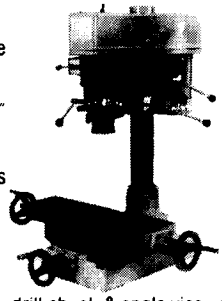
★ Vertical/Horizontal Turret Mill — ideal small workshop or model engineer.
★ Single phase motors 2 × ½hp.
★ Table 440 × 140mm (17½" × 5½" approx.)

ONLY £1,200



WARCO RANGE OF MILLING & DRILLING MACHINES

MAJOR

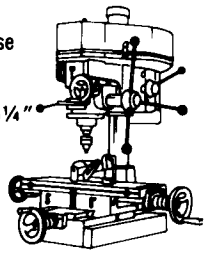


★ 2hp single phase reversing motor
★ 3 Morse taper
★ Table 23½ × 9⅛"
★ 12 speeds 80 to 2,500 r.p.m.
★ Versatile — mills drills, taps

ONLY £748

c/w milling cutter, drill chuck & angle vice

MINOR



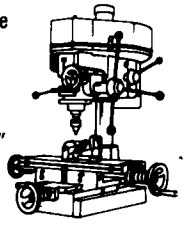
★ 1 hp single phase reversing motor
★ 3 Morse taper
★ Table 20½" × 6¼"
★ 8 speeds 100 to 2,136 rpm
★ Versatile-mills, drills, taps

ONLY £570

c/w milling cutter, drill chuck & angle vice

ECONOMY

Built to same high quality standards as its bigger brothers. Well engineered, rugged.



★ ½ hp single phase motor
★ 3 Morse taper
★ 8 speeds 140 to 1,570 rpm
★ Table 17" × 7½"
★ Versatile — mills and drills

ONLY £400

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