Model Engineer

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Model Engineer

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Contents

Cover picture

Steam parade at Woburn Park—led on this occasion by T. Paisley's Burrell EMPEROR. *Barry J. Finch's picture from his* 1960-61 *album will turn readers' thoughts to sunny days ahead, when steam floats again over green acres and rustling trees*

Next week

" Sleuth—queen in any company " is how Edward Bowness sums up A. W. Littlejohn's latest model yacht for ME in next week's issue. Joseph Martin writes of the Ironclad MERRIMAC, *and W. G. Hudson opens a serial, " Back to the Tourbillon "*

Smoke Rings A weekly commentary by VULCAN

SHIP modellers will like the first of the new galleries opened at the Science Museum, South Kensington. Its theme is sailing ships and small craft.

The collection is presented in quite a fresh way. Besides the older models, the gallery contains a new shipbuilding section, largely composed of exhibits made in the museum workshops.

While the sailing ship models have been arranged according to period, the small craft are so varied that they have been grouped geographically. Each group is presented in a case of the shop-window type lit by fluorescent lamps and spot lights.

A central section shows a full-size figurehead and an anchor and gun, to give some idea of scale. It also includes various models, such as those made by prisoners during the Napoleonic wars, which can be regarded more as *objets d'art* than as technological exhibits. In this section and elsewhere seating accommodation has been provided in an attempt to reduce what has become known in the profession as " museum fatigue."

One of the most interesting exhibits is a dockyard scene made in the museum. Three contemporary models of about 1750, and one model made in recent years, illustrate shipbuilding, careening, berthing, and so forth. The Mediterranean Xebec and the *Great Harry* of 1540, made and presented by R. J. Collins, will interest readers who followed his articles in *Ships and Ship Models*.

Modern methods of display have been adopted throughout. Figures give scale to the models, certain details are shown at full size, and clearer labels are used. The groupings and settings are attractive.

With the new arrangement the museum has been able to bring out from store a great deal of interesting material that could not be shown before. In future there will be very little stored material. Students can have immediate access to records and objects which are in store at present.

Feudal fares

PARLIAMENT has been discussing the extraordinary anachronism under which Dr Beeching and his officers are said to be suffering.

It seems that under a conveyance entered into as long ago as 1899, between the former Great Western Railway Company and the Duke of Beaufort, the Company had to provide and maintain the little country station of Badminton in Gloucestershire, and stop a minimum of four passenger trains in each direction on every weekday, in case His Grace or his family or retainers wished to make a rail journey. British Railways are apparently bound by law to continue this arrangement, and in fact five main-line trains continue to stop at Badminton each weekday.

Again, in 1882, an agreement was made between the London and South Western Railway and Sir George Meyrick that one train in each direction would call at Hinton Admiral station every day to set down or pick up Sir George or members of his household. This facility has been used in quite recent times, though it involved delays of five minutes or so to Bournemouth expresses.

Another station between Hereford and Worcester was the subject of a deed in 1883. The arrangement, which provided that all passenger trains except specials or expresses were to stop near Lady Foley's estate, is still valid today.

These arrangements are, of course, legacies from the time when the old private companies had to accept various obligations in return for permission to run their lines through private estates. Perhaps our friends in the USA can tell us whether their Great Northern trains have to make a stop at Blackfoot, Montana, to pick up any Indian who wishes to enjoy the luxury of modern rail travel!

Bluebell time

THE Bluebell Railway reports another successful season during 1962, and has many plans for the future. It has reserved five vintage SECR passenger coaches and a dining car, and will try to get from Crewe an LNWR observation coach which ran on the branch from Llandudno Junction to Blaenau Festiniog. The possibility of obtaining a mobile crane is also being investigated.

Events for 1963 include the Ardingly branch public enquiry on March 27. Four days later another excursion from London is planned; LBSC E4 radial tank No 473 will be one of the engines to haul the train from Victoria. The famous Caledonian single No 123 will also be seen on the link-line.

The chairman and directors of the BRPL are to be congratulated on their enterprise. They deserve support.

Art's sake

THOSE who bewail the decline in skilled craftsmanship may take heart from the efforts to keep it alive which are still evident in the activities of the Society of Ornamental Turners. In the society's latest Bulletin, interesting articles and illustrations prove that the art of turning is worthwhile for its own sake, quite apart from the value of the finished product.

We learn how linked balls are made from a single piece of ivory or other material—a method whose secret was once believed exclusive to the mysterious Orient. A combination of turning and carving as a means of producing elegant representational sculpture, is illustrated by drawings and photographs of the actual work.

Other articles deal with the properties of wood, ivory and other materials for turning, the construction of a lamp stand in ivory and ormolu, and special apparatus for ornamental turning, old and new.

DIVIDING ON A SUPER SEVEN

M. E. TREVOR made three attachments for his lathe. He describes them in a two-part article

ABILITY to do simple dividing is an asset on any lathe. The three attachments which I have made can be used on a Myford Super 7 without the need of altering it at all. As they lock the lathe spindle, a milling or drilling spindle with an independent drive is essential.

My lathe has a bullwheel with 60 teeth, I had to find a point of attachment for the detent as I did not wish to drill any fresh holes in the lathe itself. The method which I chose can be seen in Photograph 1, and the parts in Figs 1 to 3.

The construction is simple enough, but the holes for the $\frac{1}{8}$ in. dia. dowels should not be drilled until everything else is finished. I cut and filed the base (Fig. 1) to shape from bright drawn mild steel, the material which I used throughout. The body I turned up from a piece of hexagon steel as I could employ a spanner for

Fig.1

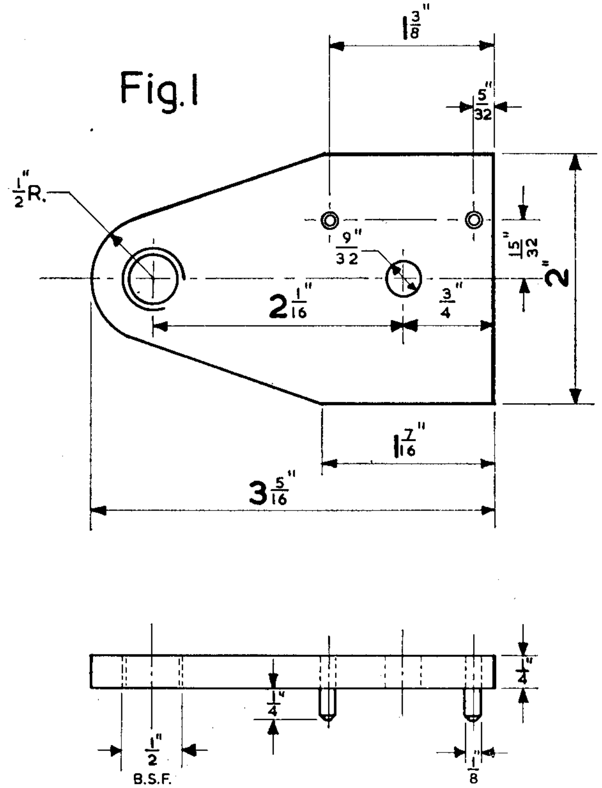


Fig.2

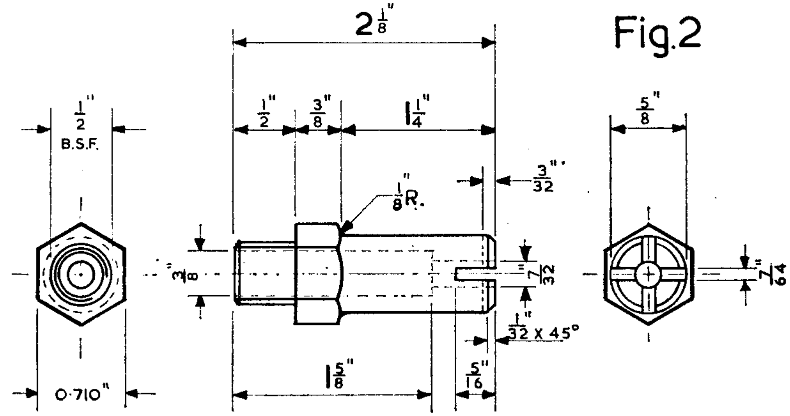
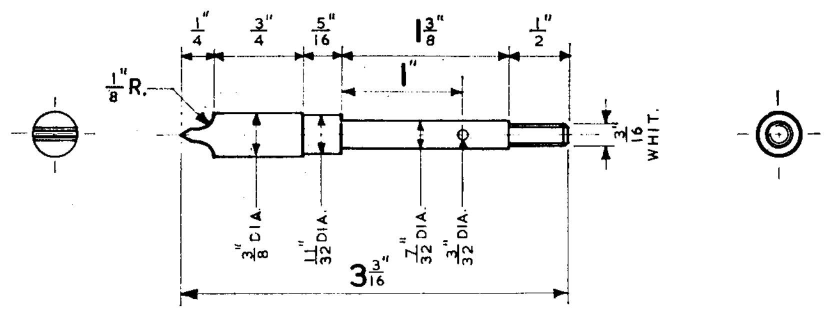


Fig.3



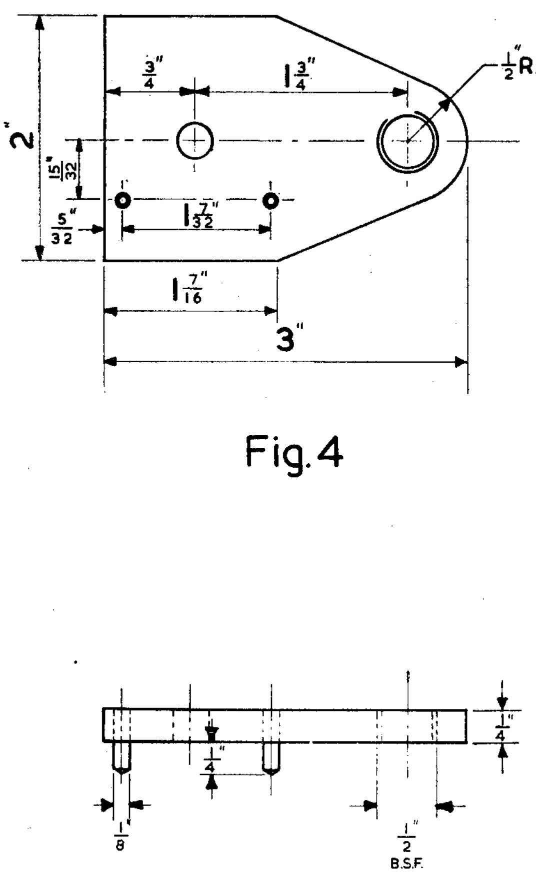


Fig. 4

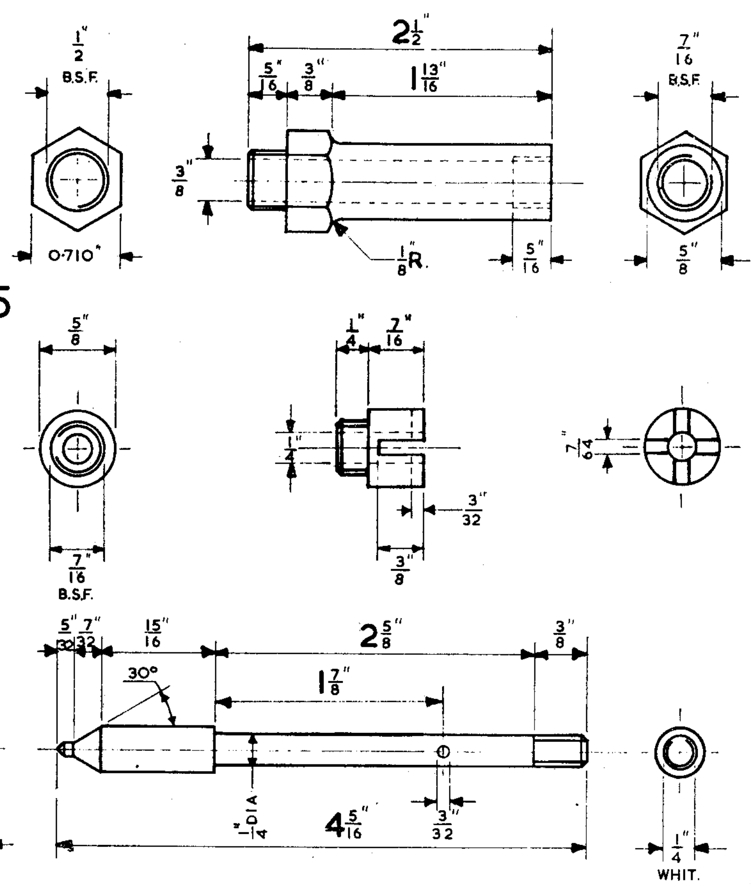


Fig. 5

tightening it up when I was adjusting the position of the detent in relation to the teeth of the bullwheel. I took light cuts off the bottom of the body until the two engaged accurately.

The bore of the body was reamed. A square shoulder produced by an end mill provided a seating for the compression spring. The four slots in the top of the body for the retaining pin were made with a small slitting saw; I held the work in a vice on the vertical slide during this operation.

None of the springs has been shown in the drawings because their strength is to some extent a matter of personal choice. The $\frac{3}{32}$ in. retaining pins do not need to be shown: you can secure them better if their middle part is knurled.

While the detent shown in Fig. 3 was a plain turning task, the part which is $\frac{3}{8}$ in. dia. must be a good sliding fit in the body, or the indexing will not be accurate. As most reamers do not cut full diameter right to their ends, I reduced part of the detent to $\frac{11}{32}$ in. dia. to prevent any possibility of binding. I formed the end that engages with the back gear wheel by machining with a $\frac{1}{4}$ in. end mill and filing.

The $\frac{3}{16}$ in. Whitworth thread on the end of the detent suited a spare knob which I had; it can be altered as you need. The two other attachments use $\frac{3}{4}$ in. dia. moulded knobs (bought in Euston Road) which have $\frac{1}{4}$ in. Whitworth threads.

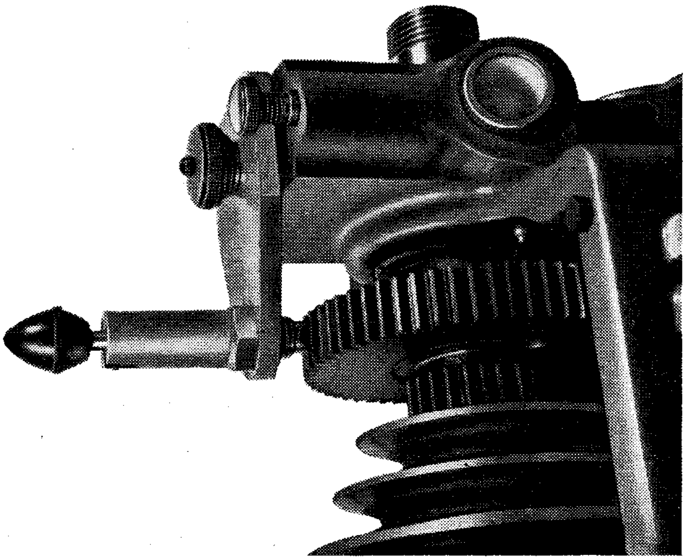
When all the parts have been completed and assembled, the attachment is placed on top of the oil reservoir of the lathe and its position is adjusted until the back gear wheel is properly engaged. Provided that the walls of the reservoir are thick enough, the holes for the dowels can be started with a No 31 drill in the position shown in Fig. 1. If there is insufficient metal they will have to be drilled wherever possible. Before any drilling is undertaken, the reservoir should be drained and filled with a piece of rag to exclude chips.

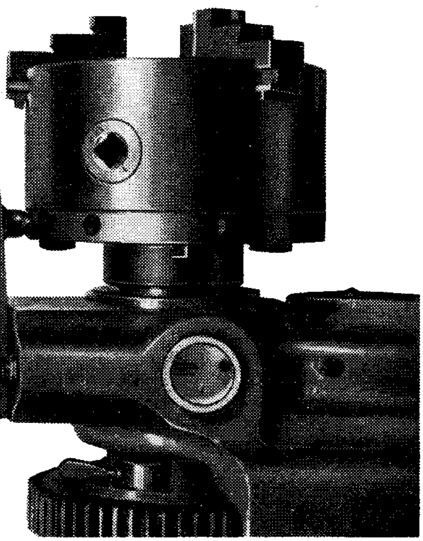
The holes should then be enlarged with just the end of a ⅛ in. reamer, to produce a tight push fit for the ⅛ in. dowels. As a No 31 drill is 0.005 in. under ⅛ in., you can also use it to give a force fit in the base for the dowels by again employing slightly less of the end of the ⅛ in. reamer.

At this stage I was able to divide by 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 and 60, but inevitably a project cropped up for which I had to divide by 8, and so I resorted to the old idea of using the chuck back-plate.

As photograph No 2 shows, I used a similar set-up turned the other way round. Details are seen in Figs 4 and 5. The main difference is a through hole in the body, and a detent with a conical end, turned to an included angle of 60 deg. I decided to drill right through the body so that the bore could be reamed throughout its length, although it complicated the construction somewhat.

★ *To be continued on March 21*





Photograph 1: This first arrangement employs the bullwheel. Photograph 2 on right shows the second arrangement. It engages with the chuck back-plate

Can You Help ?

Readers who can offer information to those whose queries appear below are invited to write c/o Model Engineer. Letters will be forwarded.

Canal Boats

Who can tell me about the Bridgwater Canal *Starvationer* and the horse-drawn *Ice Breaker* ?—F.R., Leeds.

Horse Emblem on Paddle Steamer

I read with great interest the letter from Mr John H. Meredith in Postbag on the engines made by Aveling and Porter of Rochester.

I am building a ⅜ in. scale model of the paddle-steamer *Medway Queen* of Rochester and have noticed that the same rampant horse emblem appeared on the paddle-box sides and on each side of the funnel.

How does this emblem come to be on a ship that was built in Troon, Scotland ? Was the steamer re-engined by Aveling when it was refitted after the war ?—R.C.J., Wood Green, London.

Domestic Boiler

I have always been interested in model engineering, but have had little practical experience of it. Now that I have a basement suitable for use as a workshop I should like to take up modelling as a winter occupation. It may sound a little ambitious but I would like to make a domestic boiler.

I am sure that some of the steam enthusiasts have ideas on how to produce an efficient one. External appearance need not matter, as the boiler would stand in a basement.

Perhaps someone knows of a book in which the construction of a domestic boiler is described ?—H.D.T., Forest Hill, London.

Britannia Lathe

Can any readers who own a 4¼ in. Britannia lathe give me some information on the gear clutch so that I can restore the cultch on my own Britannia to its original condition ?—W.A.G., Beckenham, Kent.

Field Gun of Waterloo Year

I am trying to get some general information, with drawings, on the RA cannon six-pounder of 1815.

So far, I have met with no success at all. Does any publishing firm or modeller have this information ?—G.C., Lincoln.

No bell-pushing in this school!

A. P. WEBSTER conceived and made a ringing device which works on its own—and is silent when the pupils and staff have left

FEELING once again the desire to make something, and casting around for a suitable project, I decided that a bell-ringing apparatus, or programme controller, would be of great use in my school. It would do away with the haphazard time-keeping which resulted from the belated pressings of the bell-push by any person who happened to remember the time.

The construction of this piece of apparatus with its many problems has been so interesting, and the results so worthwhile, that it may be of interest to others.

There had to be an absolute minimum of alterations to the present wiring system, as it was carried in a closed conduit buried in the plaster, and the cost had to be kept as low as possible in case the idea proved impracticable. The bells would ring at various times between the warning bell at 8.55 a.m. and the final bell at 4 p.m., the close of the school day. They had to be silent when the school was unoccupied.

Series of contacts

I had to design the apparatus in such a way that the programme could easily be altered and the bells could still be rung by a bell-push if this were necessary.

The first idea which I sketched out was vaguely planned round a series of contacts arranged on the dial of a clock; one circle wiped by the hour hand, and another circle wiped by the minute hand. By subtle interconnections the bells would be rung at stated times. But I discovered that when the connections were set for 9.30 and 10.40 they would also ring at 9.40 and 10.30, and for good measure go off at the same times during the night.

My second idea was to have a revolving drum driven by the hour hand of a clock, with a separate series of contacts for each time of ringing. An insuperable difficulty here was the huge drum that would be necessary for the contacts to be reasonably brief.

At lenght I thought of having a small drum revolving once an hour and drawing an endless tape between two contacts: a tape punched to allow the contacts to close whenever a bell was to be rung. This idea seemed worth pursuing. I pulled an old piece of 16 mm. film between my thumb and finger and decided to begin.

I had bought a Government-surplus synchronous motor of exceptionally sturdy construction with a final shaft which, when the motor was connected to the mains, revolved silently beneath the inscription "1 r.p.m." and an arrow showing the direction of rotation.

Essential gearing

My idea, then, was to use a motor with a shaft revolving once a minute, and a drum which would revolve once an hour. Suppose a 60-tooth wheel were to be mounted on the same axle as the drum, and the wheel ratcheted round tooth by tooth, by a gathering pallet operated by a simple crank on the 1 r.p.m. shaft?

The tape, of 16 mm. film, could be exactly 12 times as long as the circumference of the drum, and thus would travel completely round once every 12 hours. Owing to the ratchet method of driving the drum, the tape would be moving for half a minute and be perfectly still for the other half minute. This could mean that a punched hole in the tape would cause a circuit to be completed between two contacts, and thus ring the bells for 30 seconds in any minute decided upon in the 12 hours. Better and better!

But a 30-second peal on each of the 12 occasions that the bells rang during the school day would be too much for the nerves—even the iron nerves of a teacher. I suddenly realised that the 1 r.p.m. shaft could also carry a cam to close a second pair of contacts (in series with those separated by the tape) for any desired period from 1 to 30 seconds according to its shape.

I had to remember that the bells must not ring at night and on Saturday and Sunday. As the drum carrying the tape revolved once an hour, I reasoned that the minute hand axle of a slave-clock mounted nearby could easily be linked to the drum by two equal sprockets and a chain. The usual 12 to 1 reduction to the hour-hand axle would cause the axle to revolve correctly at two revolutions in 24 hours, or 14 times a week. So near, and yet so far!

I tried to apply the principle of a toothed dial ratchet round. Suppose a 14-tooth wheel were turned, tooth by tooth, by a ratchet operated from the hour-hand arbor of the slave clock? On the same axle as the 14-tooth wheel could be a kind of star, or cam-wheel, operating a third pair of contacts, in series with the other two, which could easily be arranged to close for any 12-hour period. And if these contacts were not closed at all on a Saturday or Sunday no bells could ring.

The theoretical circuit is shown in Fig. 1, where contacts *A* close when the hole representing the desired minute has come to rest between them; *B* represents the contacts which close for any number of seconds according to the length of the raised part of the cam on the 1 r.p.m. shaft, and thus ring the bells for any desired period from 1 to 30 seconds; and *C* gives the contacts which are operated by the star cam, closing for 12 hours and opening for 12, and not closing at all on a Saturday or Sunday.

Tentative assembly

I began to assemble on a stout plywood baseboard the various bits and pieces. The first thing to be mounted was the motor—*D* in Fig. 2—as the shaft was to be the heart of the matter, and the distance between the end of the shaft and the basebord would decide the relative positions of the other components.

The drum mechanism—*F*, Fig. 2—was next taken in hand. I decided that 30 frames of the 16 mm. film should represent one hour, as this would greatly help in the positioning of the punched holes which would allow contacts *A* to close. The circumference of the drum had to be exactly the length of 30 frames.

I mounted the drum, which was of seasoned mahogany a little thicker

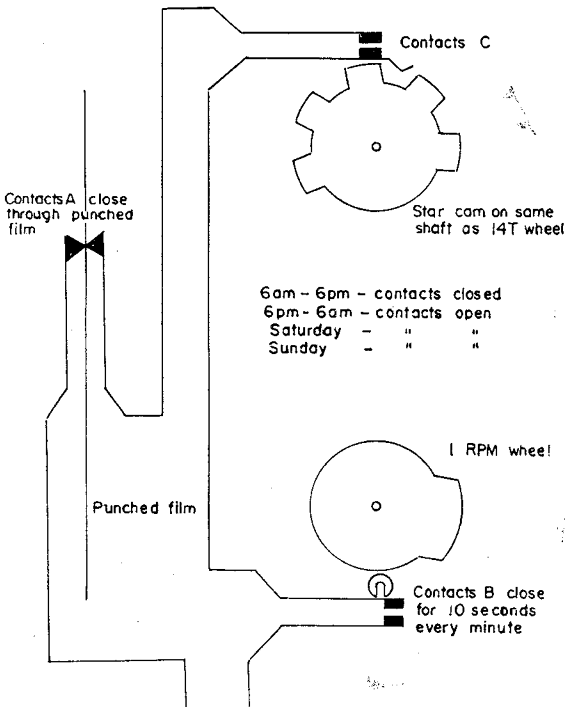


FIG. 1

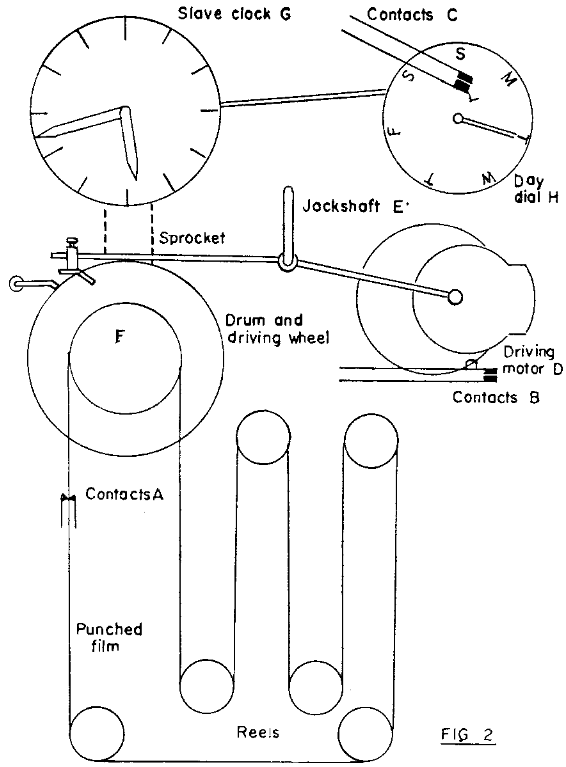
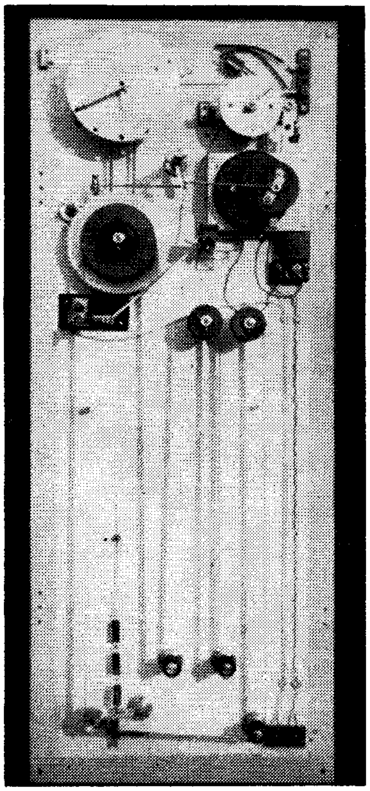


FIG 2



than the width of the film, on the brass tube on which it was to revolve. After turning it in the lathe until it was almost the exact size, I tested it by wrapping a piece of film round it. A little careful sand-papering (with the lathe bed suitably protected) reduced the diameter until the 30 frames exactly covered the circumference.

Film drive

The piece of scrap film was temporarily held in place by adhesive. Six pairs of brass tacks were driven part of the way into the drum at equal distances round the circumference, and precisely in the centre of the sprocket holes. The tacks were cut off $\frac{1}{8}$ in. from the drum and rounded. When the scrap film was removed, and the drum mounted temporarily on an axle, I found that it would drive the full film of 360 frames and pick up the sprocket holes in it unfailingly.

So that the drum would not protrude unduly from the baseboard I produced a jackshaft arrangement for operating the ratchet. For adjustment,. I made the ratchet movable along its rod. The throw at the eccentric end could be altered so that one tooth exactly would be gathered each time. A simple pawl prevented the drum ratchet wheel from moving backwards.

The basis of the slave-clock *G* was a derelict alarm clock, as I wanted only the end plates and the 12 to 1 reduction gears for the hands. I made a simple eccentric and soldered the centre to the hour-hand tube (or should it be cannon?) The eccentric was of such a throw that the ratchet which it operated would travel a distance slightly larger than the space between two adjacent teeth of the 14-tooth wheel. On the minute-hand axle (or should it be arbor?) a Meccano sprocket was secured, to be connected by a length of sprocket chain to an exactly similar sprocket soldered to the rear of the tube carrying the drum and the 60-tooth wheel (Fig. 4).

Gear frame

I wanted the 14-tooth wheel and the star contact operator on an axle running in a simple frame—two strips of brass separated by tubular spacers (Fig. 3). The star was shaped as shown in the diagram, and the eccentric set so that the contacts *C* closed during the 12 hours from 6 a.m. to 6 p.m., on Monday to Friday only. From 6 p.m. to 6 a.m. and on Saturday and Sunday the contacts would remain open, thus making the apparatus inoperative.

As the components were being completed, I considered their disposition on the baseboard, so that the finished apparatus should be as compact as possible. The long loop of film is accommodated within the base by being made to pass round rollers. These are turned up from anything handy; two are of *lignum vitae*, three are of ebonite, and one is of brass arranged on a swinging arm to keep the film reasonably taut (Fig. 2).

The terminal block near the bottom right of the baseboard has two terminals for the mains connections to the driving motor, and two terminals for the twin wires leading to the bell-push.

I would add that the sidelines of this venture were full of interest and challenge. The cutting of the 60-tooth and 14-tooth wheels involved the construction of a fly-cutter and a simple but accurate dividing head.

The ringer has worked perfectly. It needs no attention except for a drop or two of fine oil and the wiping of the film with a chamois leather once a year. ■

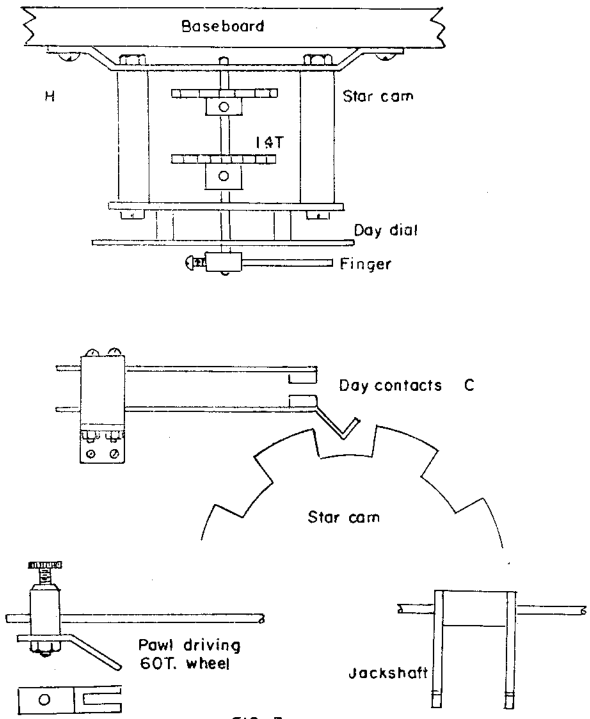


FIG. 3

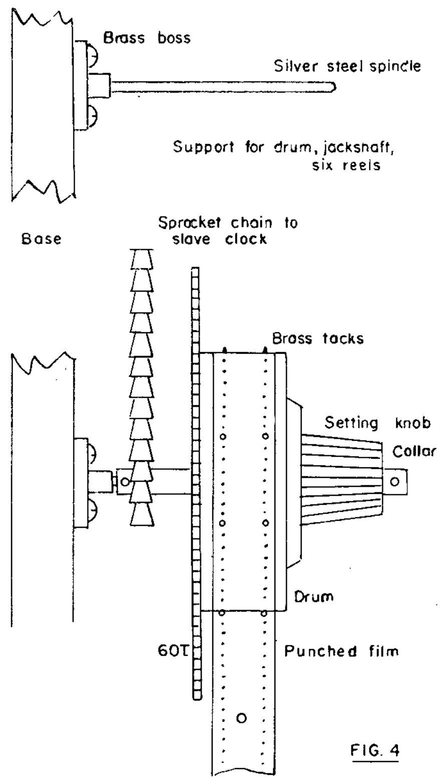


FIG. 4

BETWEEN THE LINES

MERCHANT VENTURER

The headboard of the Merchant Venturer, the Western Region of British Railways express that ran daily for ten years between London and Bristol, has been presented to the Merchant Venturers' Society.

"This headboard," reads the inscription, "was carried on the locomotive hauling the Merchant Venturer express which ran daily between London and Bristol for a period of ten years from 1951. During that time it covered a distance of some 750,000 miles."

FIFTY YEARS AGO

The advantage of electrification on suburban sections is, as a rule, a possible traffic increase. The steam locomotive with all its fine qualities is a costly machine to maintain, especially in districts where bad dust is found. It uses power and it also depreciates as long as steam is up, and it spends three to four times as large a proportion of its total life out of service as does the electric locomotive, which neither depreciates nor uses power except when earning revenue. Hence the total maintenance cost of the latter, assuming cheap electric power, is found to be sufficiently below that of steam locomotives to earn a sufficient percentage on the capital cost.—*The Railway Gazette*, 1913.

ONE, TWO, THREE—

When the branch line between Camden and Campbeltown in New South Wales was officially closed with a ceremonial last trip, the tank engine *Pansy* found the 1 : 19 gradient at Kenny Hill too much for her—until she took a mile-long charge.

Pansy had worked the line since 1912. She hauled a carriage with a tiny verandah and seats for 56.

TRANSPORT TRIFLE

At a dinner held at the Great Western Royal Hotel, Paddington, to celebrate the centenary of the Metropolitan Railway the menu included: *Crème Paddington, Widened Lines Supreme de Flétan Florentine, Poulet Farringdon Street, Petit Pois au Beurre Chilterns, Pommes Wembley Park, and Anniversary Gateau.*

MICROSCOPE

ON THE LATHE—5

THE parts of a microscope which are essential for use on a lathe are the objective lens and the ocular. You must have these to advance beyond the stage of the magnifying glass. But how you come by them, and how they are mounted and used, are matters of chance and choice which admit of wide variation.

When you have a microscope, you can use it for some jobs on the lathe without adaptation. For others, the tube with objective and ocular can be removed and mounted in a clamped holder of the sort shown at *A*. Alternatively, objective and ocular can be taken out of the tube and used with a home-made one, as at *C*. Again, this tube can be clamped in a holder, as at *A*, or it can be sweated to a shank, as at *C*. Thus these few basic parts can be used for several mountings on the lathe; they can be employed with stands for bench microscopes.

When you have no microscope, you can buy the objective and ocular separately, new or second-hand. Then you make other parts to suit. With a new objective and ocular, this keeps the cost down to a few pounds.

There are other ways of overcoming difficulties and reducing expense on special equipment. For many purposes, another lens can be used to save a microscope objective. You can use most low-power microscope objectives by screwing out the front glass to give reduced magnification; one objective can do the work of two. You are not limited to a definite length of tube between objective and ocular. Increasing the distance between them gives greater magnification. Thus, according to need, you can combine lenses and oculars, and reduce or increase magnification. Briefly, you can ring many changes.

Diagrams *A* and *C* illustrate simple holders for the topslide. The microscope can be pointed towards the lathe spindle or across its axis. By the first mounting, you true work through scribed lines or a centre dot. By the second, you observe a fine line on a centre finder—and adjust the job so that the line is steady.

The holder *A* consists of three parts: the cap and the base in aluminium, duralumin or brass, and the shank, which can be in any of these non-ferrous alloys, or in mild steel. I favour mild steel, to resist marks from clamping. The scrapbox may provide all the pieces, as there are no binding dimensions, except that the base should be about $1\frac{1}{2}$ in. wide, to provide enough length of channel for the microscope tube. To prevent scratches on a polished tube, you can wrap it in paper, having allowed for the thickness of the paper when you were machining the radius. The shank you can pack up like a lathe tool, to bring the microscope to centre height.

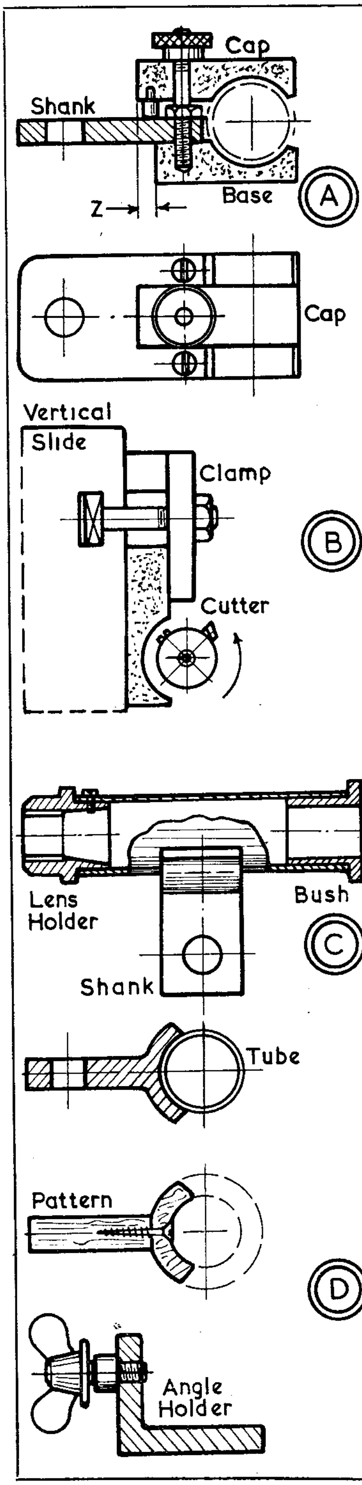
It is best for cap and base to be one piece of material for tooling the radii with a flycutter, as at *B*. The vertical slide should be adjusted firmly, and drawn upwards to resist the cut.

After this operation, the cap can be sawn from the base. Both can be finished in the independent chuck. Make the base shorter than the cap by dimension *Z*, to keep the microscope near the slide. Two screws and a stud with a shallow nut secure the base to the shank. The cap has a pressed-in reaction button.

The holder at *C* also consists of three parts—four, including the shank, which should be a casting in brass from a wood pattern. The three parts are the lens holder, which is threaded for the objective, the bush for the ocular, and the tube to join them—all in brass. The tube should be $\frac{3}{16}$ in. larger than the ocular. Then the push-in bush is machined with $\frac{1}{32}$ in. eccentricity. By rotating it, you move a cross-wire in the ocular to help in setting up. The bush is a good friction fit, and so is the lens holder, which is secured by small screws.

The pattern for the shank is made as at *D*. You tool the radius in the casting with a flycutter from the topslide. With care, it can be sweated to the tube to leave no solder showing.

Both holders can be used with an angle holder, or bracket, so that the microscope can be tilted at an angle to the work. ■



Continued from February 28, page 267

Ways of cutting screw-threads

THERE are several different methods of producing screw threads in the lathe, including the use of self-guided thread form tools, such as taps and dies, and single-point tools or chasers guided by some form of master or lead screw. For the popular standard threads up to about ½ in. dia., taps and dies give reasonably good results if they are properly used, and call for no special built-in lathe equipment.

With both these methods, tailstock holders provide axial alignment. The quality of the taps and dies, including true thread form and sharp cutting edges, has an important bearing on the successful production of threads.

Taps and dies to cover all sizes and pitches likely to be required in the workshop cost a good deal. Most of the inexpensive ones are quite satisfactory, though naturally inferior to the high-class tools used in precision manufacturing practice. Sometimes the thread form is not perfect, and the thread may clog with chips or strip threads already cut. These faults can usually be corrected by attention to cutting edges, and use of a suitable lubricant. The torque required for cutting the coarser and larger sizes of thread may be excessive for a light lathe, especially if the tools are not working at their highest efficiency.

Neither taps nor dies can be absolutely relied upon to produce threads concentrically true with the work, as the holders, even though in true axial location, are liable to some deflection in much the same way as drills and other tailstock-mounted tools. But if the work to be threaded or tapped runs truly, and you take care in starting the die or tap, you should have no trouble in producing concentric threads. The end of the workpiece should be bevelled, or the tapping hole countersunk, at a fairly acute angle, to assist entry.

Long threads cut by solid dies may have a slight pitch error, which may prevent them from fitting properly in deep tapped holes; the pitch tends to be reduced, owing to the resistance of the metal to the die. Work of this kind should be screwcut if possible. Drunken threads, in which the pitch angle is not constant at all points of rotation, are usually caused by inferior, badly formed dies, or by faulty mounting of the dies in their holders, so that their threads are not truly axial.

Die and tap holders for the lathe vary in design. Usually they are capable of "floating" endwise, so that they can follow the pitch of the thread without constraint. Sometimes the holder is provided with a means of disengagement at a pre-set depth of thread. Caution is necessary when you are threading or tapping under power; the lathe should be run at slow speed, and kept under close control so that it can be stopped instantly at any sign of jamming. Many users of small lathes prefer to turn the work or the holder by hand, for sensitivity to torque and ease in backing-out as frequently as may be required.

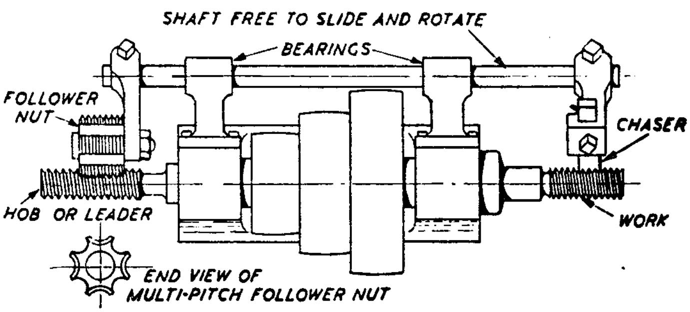
Most lathes designed for screwcutting employ the principle of the master screw in some form or other to control the pitch of the thread being cut. Early lathes often had a traversing mandrel, one capable of moving endwise, on which could be mounted a master screw of the required pitch. Provision was made for engaging the master screw with a nut or threaded segment, so that

FOR THE SCHOOLS

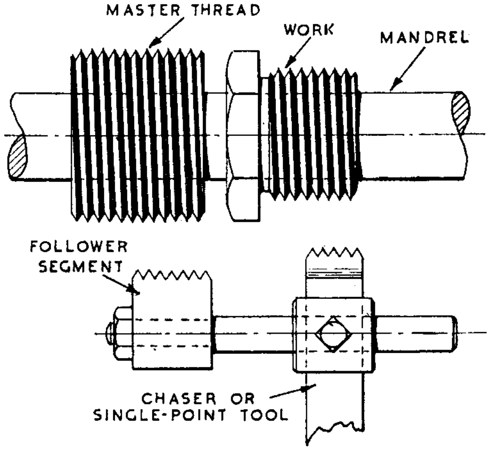
a point tool held stationary on the slide-rest would produce a replica of the thread on work held in a chuck or otherwise attached to the mandrel. While this method is simple and direct, the end movement of the mandrel is undesirable for general work, and this lathe is now obsolete.

Direct action of a master screw, or "hob," attached to the mandrel, was later adapted to control the traverse of a sliding tool in lathes with a normal mandrel. This method has been much used in industry, particularly for the production of screwed brass fittings, but it is not provided for in the lathes mostly used in model engineering, though it could be added as an attachment. A set of hobs, varying in pitch, is provided for mounting on the outer end of the mandrel, and to avoid the need for changing the follower nut for each change of pitch, the nut is usually made multi-sided and multi-pitched so that it can be rotated to bring the pitch to suit the hob into operation.

The follower nut is attached to a



Chasing attachment, with hob and follower (from Lathe Accessories)

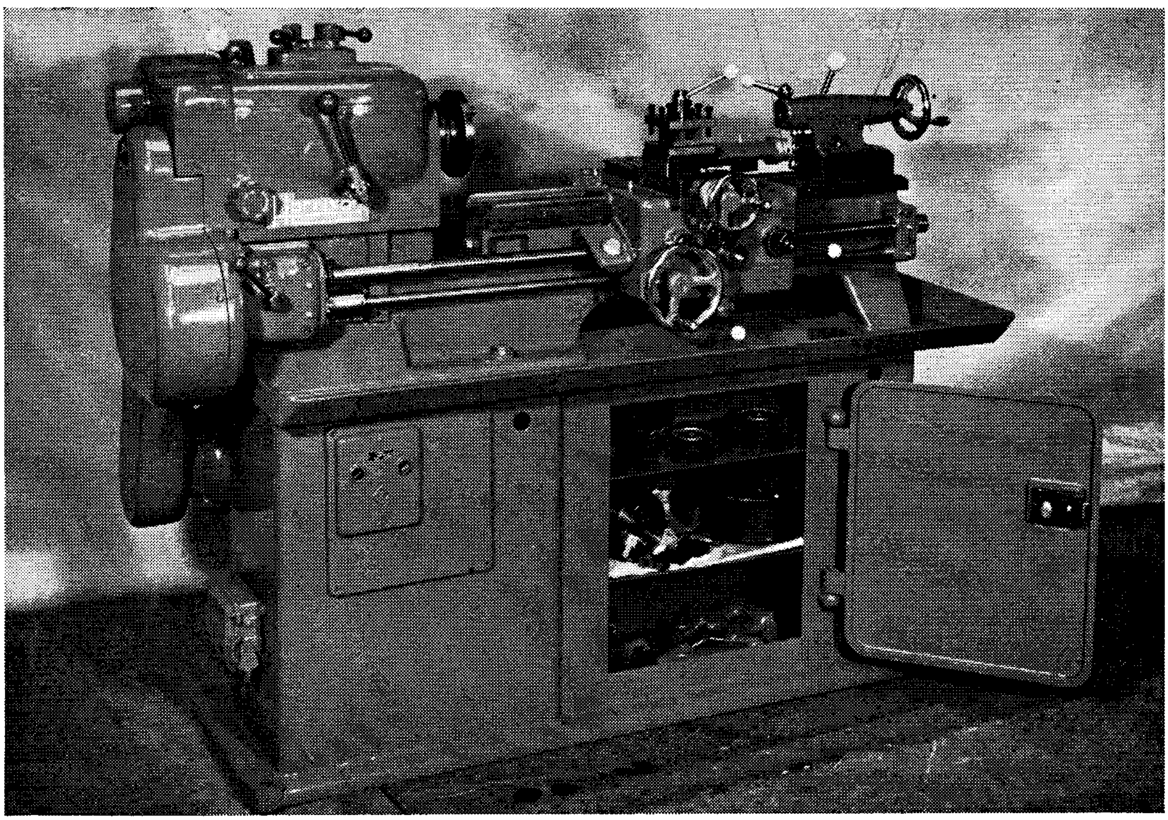


Improvised chasing device for copying an existing thread

swing arm on a bar, usually mounted at the back of the lathe and capable of sliding endwise. At the other end of the bar, another swinging arm carrying a cutting tool or chaser is similarly mounted. When the follower is swung into mesh with the hob, the tool is simultaneously brought into contact with the work. The depth of cut may be controlled by hand pressure, and several passes are normally required to cut the thread to full depth. A stop is usually provided to limit the depth and automatically size the thread in repetition work.

Adaptations of these direct pitch-copying methods are possible in lathes not equipped for screwcutting in the normal way. For instance, in making a screwed bush which can be mounted on a mandrel, another screwed bush, of the same pitch but not necessarily the same size, can be mounted in tandem on the same mandrel and used to control the traverse of a free-sliding point tool or chaser.

But these methods, useful as they are in emergency, have definite limitations; it is difficult, though not impossible, to apply them to internal threading, for example. The most versatile and generally applicable method of generating both external and internal threads, of an unlimited number of pitches, is by the use of a lead screw which can be driven through gearing, capable of being varied in ratio, from the live mandrel of the lathe. Of the many practical advantages in this method, not the least is that it enables threads up to the full effective sliding range of the

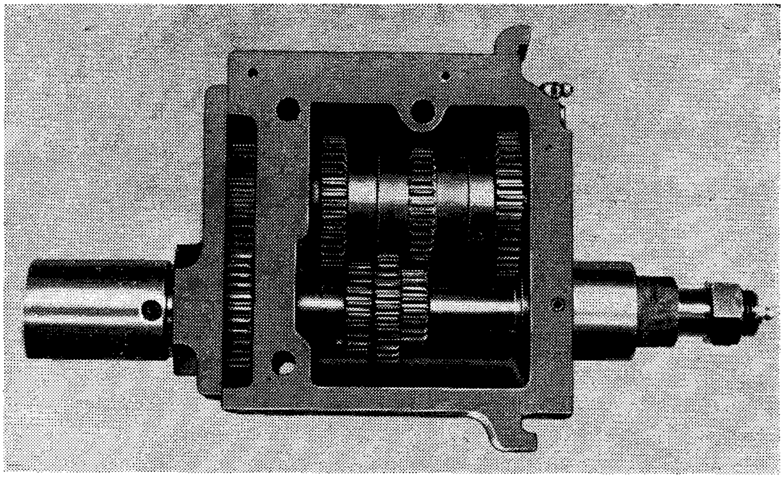


Harrison nine-inch swing all-geared engine lathe saddle to be cut just as readily as short threads. It eliminates the need for equipping the lathe with a *set* of master screws or hobs, and of changing them each time a change of pitch is needed. On the other hand it calls for a set of gear wheels in a specified ranges of sizes, and these must be arranged as required for cutting threads of various pitch.

Though the use of the geared lead screw is more or less correctly described as a "generating" process, as distinct from direct "copying" methods with a separate master screw for each pitch, ultimate accuracy of the screw cut in this way still depends on the accuracy of the lead screw itself. Any error in the pitch of the lead screw will be reproduced in the screw which is cut, and its magnitude will agree with the ratio of mandrel and lead screw. A bent lead screw may produce a drunken thread, by reason of the uneven movement of the saddle which it causes.

Other common errors in screwcutting can be produced by backlash in the clasp nut, and slack or rough action of the saddle or auxiliary slides. But on the whole the lead screw, intelligently applied, permits threads well within the accepted commercial limits of accuracy to be produced, even on lathes with much-worn working parts.

Many amateur lathe users—and, I have found, a few professional ones—have found screwcutting operations rather tricky, and have been inclined to avoid them except where they are absolutely necessary. While it is true that discretion is the better part of valour, the art of turning can never be regarded as complete unless it includes screwcutting, and no man can call himself a skilled engine turner unless he can carry out this work competently. In the training of machine craftsmanship, the ability to work out screwcutting gear trains, to set up the gears to give the correct ratios, and to perform all the other operations in the production of internal and external threads, is in my opinion essential.



Three-speed gearbox for screwcutting and self-acting feeds on Harrison lathe

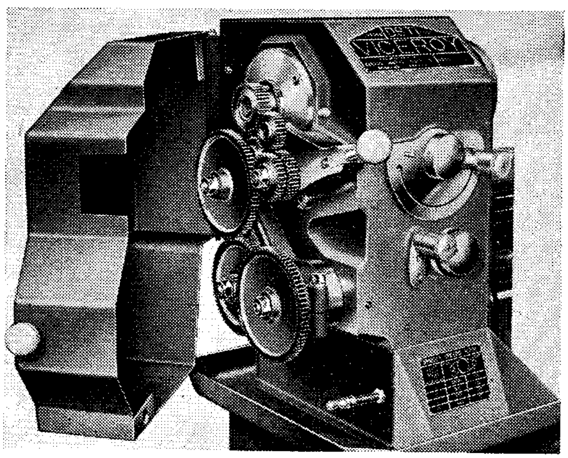
While most industrial lathes are fitted with gearboxes which reduce the operation of selecting gear ratios to the movement of a couple of levers, these gearboxes are rare in lathes used by readers of ME. In any event, you should know how to cut threads without relying on this facility. I propose to deal with the subject in my next article.

Harrison lathes

For over 60 years now, a range of light and medium-sized industrial lathes has been manufactured by T. W. Harrison and Sons Ltd, Union Machine Tool Works, Heckmondwike, Yorkshire. The present range includes lathes rated, according to the American system, at 9 in. and 11 in. swing, equivalent to 4½ in. and 5½ in. height of centres, with either 24 in. or 40 in. length between centres in either size.

Both lathes have all-geared headstocks with eight speeds from 35 to 750 r.p.m. or 45 to 1,000. This range can be doubled by use of a two-speed driving motor, giving 34-1,500 or 45-2,000 r.p.m. The mandrel is bored either 13/16 in. or 1⅜ in. dia. and is mounted in opposed Timken pre-loaded taper roller bearings at the front end and a single-row ball bearing at the rear.

The bed is normally plain, but a gap bed, as shown in the photograph, is offered as an alternative. It has a half-gap piece which is removable to give a maximum gap width of 4½ in. in front of the faceplate. Resistance to twist and deflection is a special feature in the design of the half-box section bed casting, which has inverted-V sliding ways, form-ground and induction hardened. Besides the lead screw, a separate feed shaft for self-acting, sliding and surfacing feeds is provided. A three-speed gearbox, together with the change wheels supplied, covers a range of 26 thread pitches, which can be further extended if required by additional wheels. ▣



Cluster and screwcutting gears of the Viceroy lathe by Denford Small Tools of Brighouse, Yorkshire

BEECHING PLAN

Dr Beeching's plan for British Railways has been sent to the Minister of Transport for study. Work on it began when Dr Beeching took up his appointment in mid-1961.

It will be studied by the Cabinet and then published.

Continued from February 28, page 283

Ransome's Colonial started without fuss

MANY details found in the compound machines are applicable to the singles, which could be supplied also as road locomotives. A typical single is seen in Fig. 8.

On the right are the main particulars of single-cylinder and compound road locomotives.

	SC		DCC	
	6 NHP	8 NHP.	6 NHP	8 NHP
Cylinder bore	8"	9"	6½" & 9"	7" & 10"
,, stroke	10"	12"	10"	12"
Flywheel, diameter	4' 6"	4' 6"	4' 6"	4' 6"
RPM, governed	160	160	160	160
Rear wheel, diameter	6' 3"	7' 0"	6' 3"	7' 0"
,, ,, width	1' 4"	1' 6"	1' 4"	1' 6"
Overall length	17' 3"	18' 6"	17' 3"	18' 6"
,, width	6' 6"	7' 3"	6' 11"	7' 6"
Height to flywheel top	9' 1"	9' 6"	9' 1"	9' 6"
Weight empty—tons	10	12	10½	13

There are several differences between some of the main dimensions in this table and those given earlier.

Complementary to Fig. 8 is the part-overhead view in Fig. 9. It shows further details of the single-cylinder engine from a vantage-point not always available. Needless to say, Figs 8 and 9 should be studied together.

Many of the traction engines made by this Ipswich firm were for export. Their lighter design, known as the Colonial engine, was specified for overseas. Compared with engines for the home market, its main differences were a fuel rack round

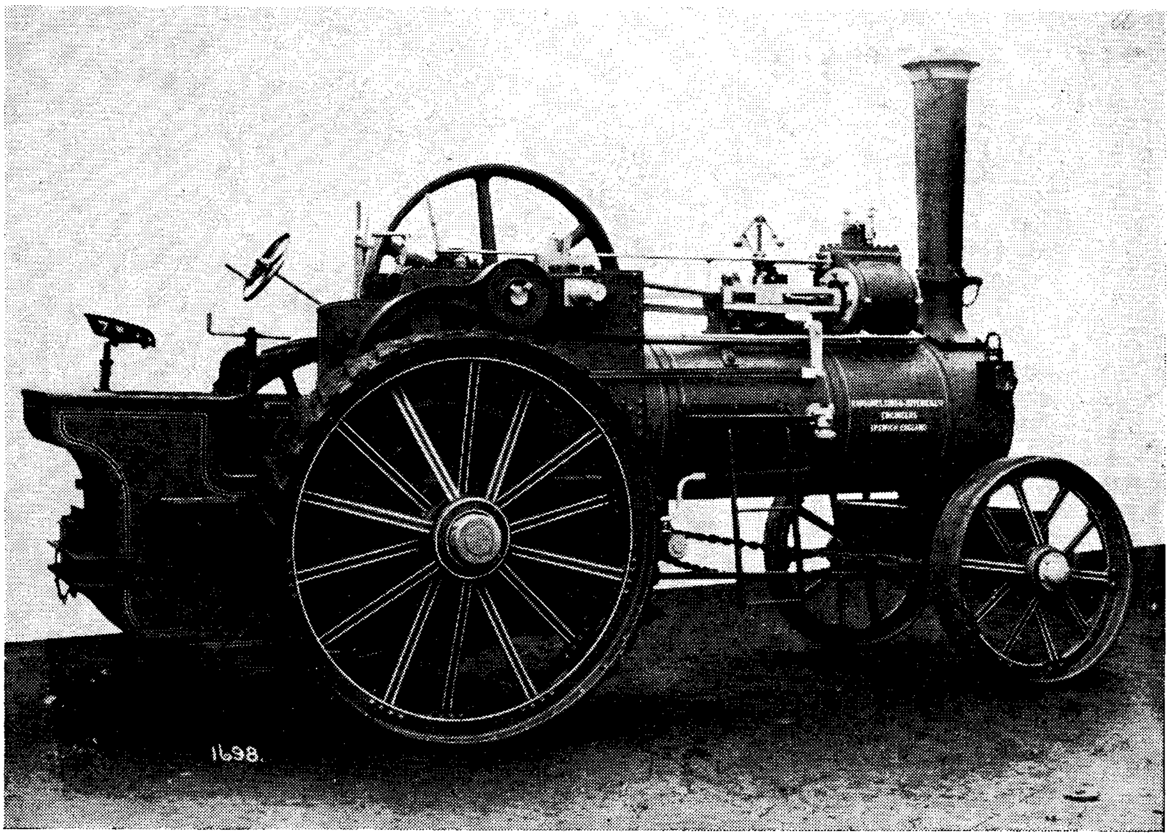


Fig. 8: Single-cylinder Ransome. (Picture by courtesy of Ransomes, Sims and Jefferies Ltd)

the top of the bunker to contain an extra stack of wood, a larger belly tank, extra wide road wheels for soft terrain, enclosure of much of the motion and gearing against dust in dry climates, and often extra large fireboxes for inferior and vegetable fuels.

A typical Colonial straw-burning single-cylinder engine with the dust covers removed to show details is seen in Fig. 10. Note the flywheel on the offside. Embodied in it is an expanding friction clutch by the manipulation of which the engine could be started and stopped as a vehicle, with the crankshaft rotating continuously. Why many other makers omitted this refinement I have not been able to understand. I once drove one a very short distance, and use of the clutch eliminated all the performance of starting—the sudden opening of the regulator when the crank was just off dead-centre, and the impact stressing of the poor gear teeth. Another advantage was that, after sufficient experience, a driver could creep out of a bad place with the crankshaft turning fairly fast, thus reserving all his attention for the road and the manoeuvre.

You will also see in Fig. 10 five cleats on the rear wheel rim drilled to take extra attachable wheels to increase the bearing area on soft ground and lessen the chance of getting bogged down. The combined width of the wheel would then be 3 ft.

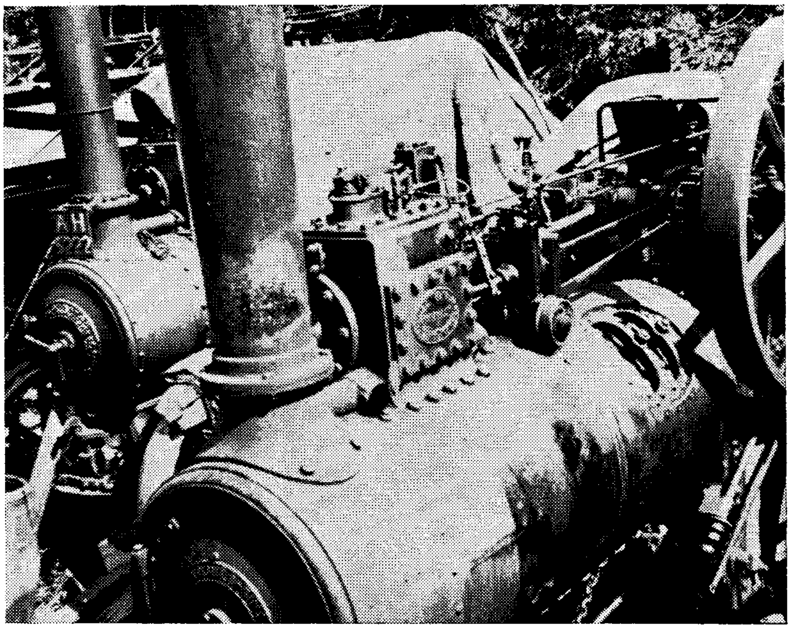
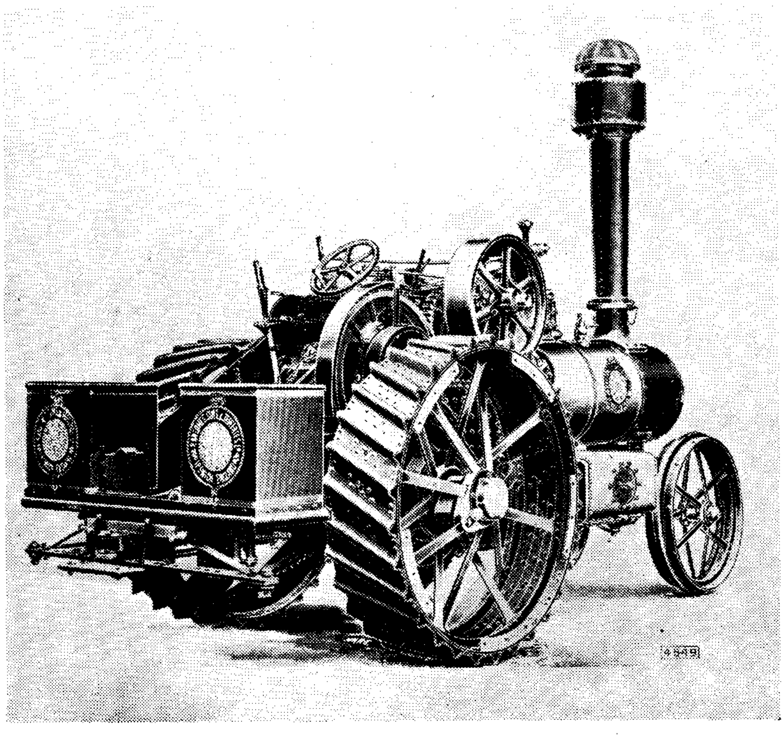


Fig. 9: Close-up of a Ransome single



Below, Fig. 10: A Straw-burning Colonial

When this engine was supplied compounded it was rated at 10 n.h.p., with cylinders 8 in. and 12 in. × 12 in. using steam at 180 p.s.i. The spark catcher was double. One part was formed of a ring of fine mesh in the chimney top—not in the smokebox; the other part comprised the bonnet, fixed in the ordinary way.

The Orwell Works had a lighter version of their ordinary general purpose traction—their Special Light Agricultural traction with a single cylinder. It was suitable for both home and abroad. The usual tender was dispensed with; twin pannier fuel boxes were cantilevered astern and a belly tank replaced the rear tank. The smallest engine in the range was the 15 b.h.p. machine with a cylinder 6 in. × 8 in.; the largest was rated at 35 b.h.p. and had a cylinder 8 in. × 9 in.

Several Ransome traction engines are preserved and appear at steam rallies. A few may still be derelict about the countryside waiting for enterprising enthusiasts to give them good homes. Anyone who undertakes such a task may count on interested help from Ipswich, where Ransomes produce machinery for agricultural and horticultural use.

★ *To be continued on March 28.*
The author is grateful for the assistance given by Mr H. H. Dawson and Mr L. Orvis.

Continued from February 28 page 283

Copper or steel for the boiler?

CANADIAN NATIONAL 0-8-0s all had wide firebox boilers. The barrel was made in two rings, the front part slightly tapered and the rear part parallel. The top of the Wootten firebox sloped downwards towards the backhead. Total heating surface without superheater was 2,291 sq. ft, and the grate area was 50 sq. ft.

As the taper and the back slope are not very noticeable, and would not have any appreciable effect on steam-raising capacity, I decided to ignore them in the $\frac{3}{4}$ in. scale boiler. This makes for very simple construction as a drawn seamless tube can be used for both the barrel and the outer firebox wrapper. At the same time, the back slope to the top of the firebox can be easily simulated by the lagging and cleading plates.

Simple design

I have further modified the design of the model boiler by arranging the throatplate at right angles to the barrel. If anyone wants a boiler that is large yet easy to make, he cannot do better than tackle the one shown in my drawings. Adding a short combustion chamber would probably increase the efficiency of the boiler a little, but the barrel is not unduly long, and with the adoption of $\frac{7}{16}$ in. dia. firetubes, instead of the more usual $\frac{3}{8}$ in. for this scale, steaming should be very satisfactory. In any event combustion chambers are best left alone by the novice, for if a leak develops in this region when the boiler is under test it is likely to prove very difficult to cure.

As the grate area of the $\frac{3}{4}$ in. scale boiler works out at no less than 23 sq. in., the use of coal of somewhat lower grade than best Welsh is not ruled out—a point that may appeal to builders across the Atlantic. The very large smokebox should also help by consuming some of the smoke.

For the barrel and firebox wrapper we shall need a length of $4\frac{1}{4}$ in. o.d. × 13 s.w.g. ($\frac{3}{32}$ in.) seamless copper tube. If you have any difficulty in obtaining the tube in this thickness, a thicker one—anything up to $\frac{1}{8}$ in.—will be quite in order. But on no account should anything thinner be used. Extra weight in the barrel and the outer part of the firebox makes no appreciable difference to steam raising, but it means that a more powerful blowlamp or blowpipe will be required for the brazing.

Some may wonder about the feasibility of using steel instead of copper for *Caribou's* boiler. The design is such that very little difficult bending is required, and if the flanging of $\frac{1}{8}$ in. thick steel does not frighten you there is no doubt that you can make a successful boiler in this material. There are two possibilities: the whole boiler can be made of steel, including the tubes and stays; or the outer shell and foundation ring can be of steel, with copper inner firebox, copper tubes, and stays of monel metal, run over with silver solder.

Some may raise the bogey of electrolytic action in a steel-copper boiler, but I do not think this need cause any worry, as before long all plates and tubes become coated with a thin layer of scale, which undoubtedly slows down any electrolytic action; at all events, several successful model boilers have been made in this way, and it is, of course, standard practice in full-size locomotive work.

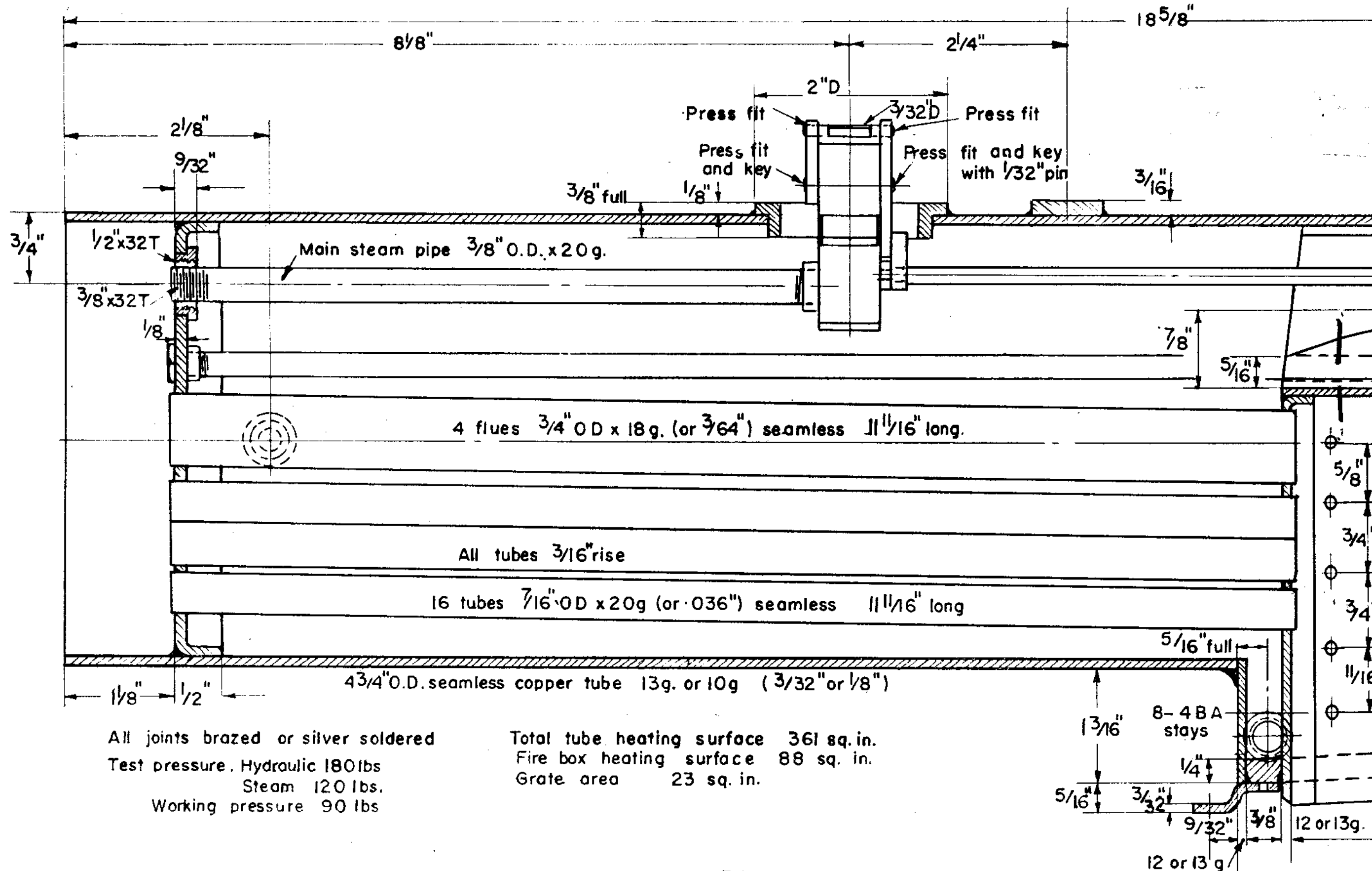
While a boiler all of stainless steel is a possibility, the flanging of the smokebox tubeplate, the backhead, and the firebox plates might defeat many of us. It is doubtful if seamless stainless steel tube can be obtained in such a large size as $4\frac{1}{4}$ in. though the firetubes and superheater flues would not present much difficulty. The thickness of plates made of stainless steel would not need to be greater than $\frac{1}{16}$ in., but all joints would have to be riveted up and then either welded or silver soldered with the special grades of solder and flux now on the market.

Having said all this about steel and stainless steel boilers, I must add that I much prefer an all-copper boiler myself, and strongly advise beginners to stick to this metal.

Construction

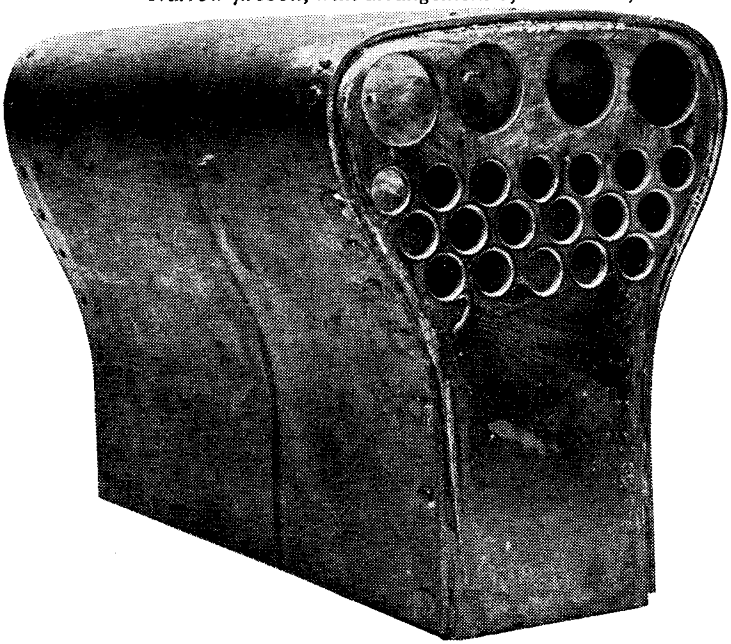
After the seamless tube for the barrel and outer firebox has been cut to length, the ends should be turned in the lathe. The easiest way is to saw out and turn a couple of hardwood discs a push fit into the tube. You can fit one of them with a bolt in the centre, and put a proper centre in this so that the outer end of the tube can be supported by the tailstock.

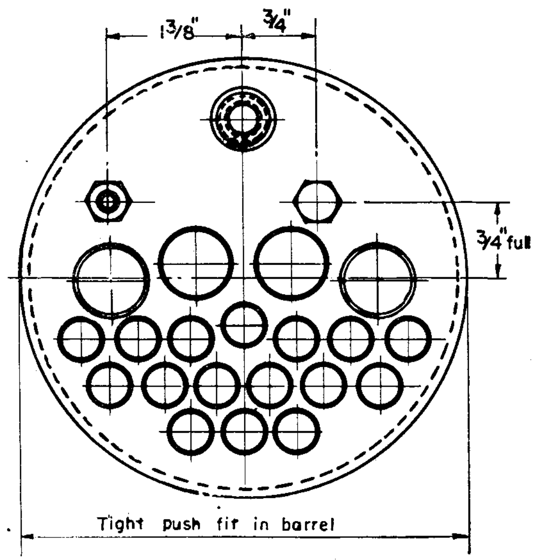
A saw cut is now made at $6\frac{1}{2}$ in. from one end down to just past the half-way mark, and another is made



BOILER

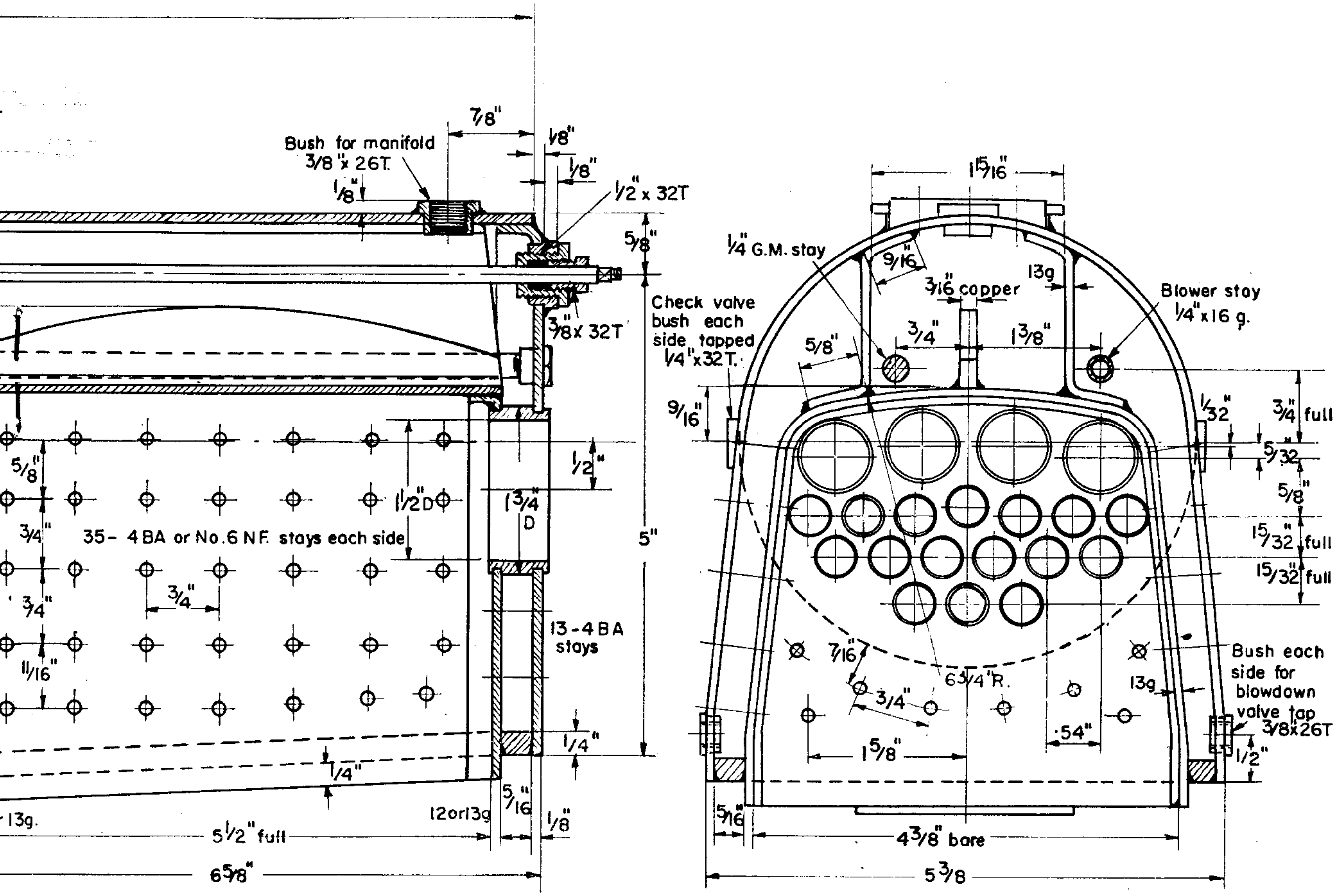
Narrow firebox, with arrangement of tubes and flues





SMOKEBOX TUBEPLATE

1/8" copper



down the longitudinal centre line to meet the middle of the first. The tube is annealed at this end and the sides are opened out to the shape shown in the end-elevation.

The throatplate can be made next. It is a very simple thing, cut from 12 s.w.g. (0.104 in.) copper sheet or the nearest to that size. Mark out the positions for the eight stays, and centre pop, but do not drill the sheet at this stage. The throatplate is arranged so that the pressure of the steam tends to force it against the cut edge of the barrel.

This joint can now be brazed. Many model engineering societies are now equipped with oxy-acetylene, which offers the obvious method. A good substitute is an air-town gas blowpipe of 1¼ in. dia., a Propane torch fitted with the largest kind of burner, or a combination of the two. It is possible for you to do the work single-handed, using a smaller size (say ¾ in. dia.) air-gas torch and a propane blowpipe, fitted with a medium-size burner. Those who have to fall back on a paraffin or petrol blowlamp will need the largest size, generally of five or six pints. Blowlamp users will find the work much easier if they have an assistant armed with another blowlamp, whose capacity need not be more than one or two pints.

With oxy-acetylene gear, the throatplate joint can be sifbronzed; otherwise B.6 alloy should be used, or Argobond, which has a melting range of 616-735 deg. C.

The smokebox tubeplate and the two firebox plates are cut out and flanged. Hardwood formers can be used, but a former with a steel backing makes a neater flanged plate. The positions for the tubes and flues are marked out on the firebox tubeplate and drilled about ⅛ in. dia.; the plate can be clamped to the smokebox tubeplate, allowing for the $\frac{3}{16}$ in. rise in all the tubes between the firebox and the smokebox. Then the drill is run through the second plate.

While the holes in the smokebox tubeplate may be drilled out and reamed the full size of the tubes, those in the firebox tubeplate must be left about 0.005 in. undersize. This can be done for the tube holes by putting a $\frac{7}{16}$ in. dia. reamer through for only part of the way. For the flue holes, the plate can be clamped to the lathe faceplate and the holes bored. Countersink the holes on the side opposite to flange.

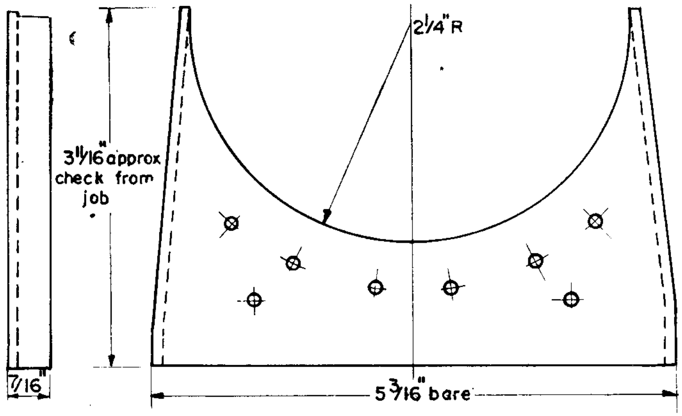
The firehole opening in the firebox backplate can also be bored in the lathe. If your machine is too small to allow the plate to swing, the opening will have to be cut away by drilling a series of small holes inside a scribed line. For the firehole ring, we shall need a short length of thick-walled copper tube, 1¾ in. outside dia. and 1½ in. inside dia. It is turned in the lathe to form a step, a tight fit in the hole bored in the plate; the step should protrude through the firebox plate by $\frac{3}{32}$ in.

Reverse the ring in the chuck and

turn a similar step to suit the backhead, the full diameter between the steps being left $\frac{5}{16}$ in. long. The firehole ring can then be annealed, pressed into the backplate, and lightly flanged over on the inside; it is brazed to the plate with B.6 or a similar alloy.

The firebox wrapper is cut in one piece from $\frac{3}{32}$ in. copper sheet; you can measure the length required very easily by bending a piece of $\frac{3}{32}$ in. dia. soft iron wire around the outside of the firebox tubeplate and then straightening it. Bending should be easy; one could not have an easier shape.

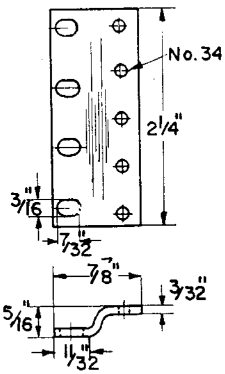
To hold the wrapper to the flanges of the plates, use $\frac{1}{16}$ in. dia. copper snaphead rivets at a spacing of about $1\frac{1}{4}$ in., plus an extra one or two if required, should the plate not lie closely all around the flange. Work from the middle outwards and down each side. Any excess length of wrapper can be cut off afterwards.



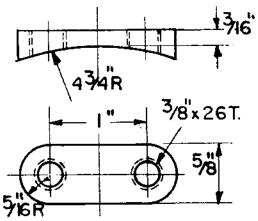
THROAT PLATE 12 G. COPPER (0·104")

There are three crownstays to support the top of the firebox. The centre one is simply a length of $\frac{3}{16}$ in. copper sheet $\frac{7}{8}$ in. deep and curved on the top edge. It is held to the crown by about five 6 BA gunmetal or phosphor-bronze screws, put through clearing holes in the firebox crown into tapped holes. The screws should be ample to hold the stay during the brazing.

The outer crownstays are cut from $\frac{3}{32}$ in. copper sheet. To be sure that they are made the correct length, you can put the firebox inside the outer wrapper and temporarily clamp it in its correct place in relation to the top of the boiler by putting a couple of strips of metal $\frac{5}{16}$ in. wide in the position which the foundation ring will eventually occupy. A scrap piece of $\frac{3}{32}$ in. thick copper can be bent to the required shape by trial and error. Then the stays are bent to match.

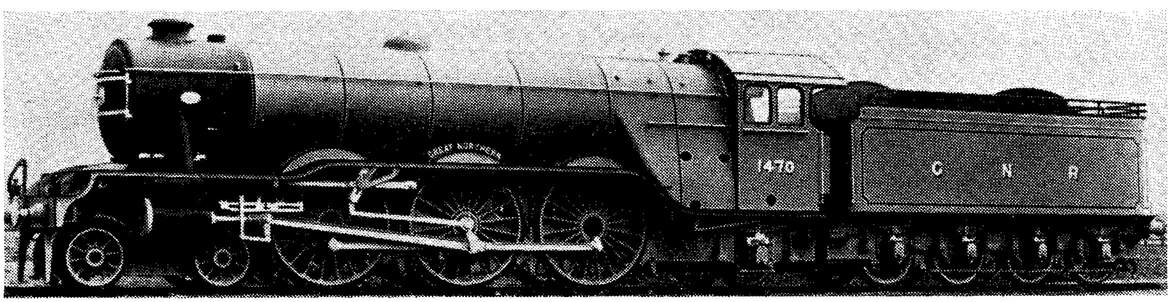


EXPANSION BRACKET
BRASS SHT.



SAFETY VALVE BUSH
COPPER OR PH. BRONZE

★ *To be continued on March* 28



Britain's Second Pacific Withdrawn

Towards the end of 1962, the first of Gresley's Pacifics, No 60113 (formerly 1470) *Great Northern* was withdrawn from service. No 1470 was built at Doncaster works in 1922, and was the second engine of the 4-6-2 wheel arrangement to be built in Great Britain. It was preceded only by the GWR Pacific *The Great Bear*.

Originally *Great Northern* was fitted with three 20 in. x 26 in. cylinders and short-travel Walschaerts valve gear, with of course Gresley's conjugation for the inside valve. The boiler working pressure was 180 lb. and the tractive effort at 85 per cent of the boiler pressure was 29,835 lb. Long travel valves were fitted by Gresley in 1928, and some years later a high pressure (220 lb.) boiler was provided.

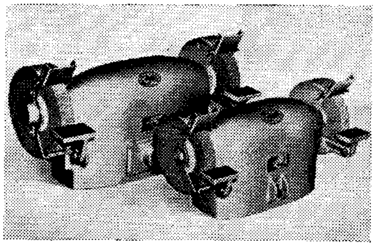
Towards the end of 1945, *Great Northern* was rebuilt by Thompson, who had succeeded Gresley at Doncaster. The boiler was replaced by one of the A/4 type, and the drive from the cylinders was divided, with three independent sets of valve gear. In the new form, No 4470 was not an unqualified success, most drivers preferring the Gresley A4 or A3 class for the fastest trains.

Around the TRADE

Motorised grinder

MODEL ENGINEER has received particulars of the Cordia grinders recently introduced from the Continent. The grinders are offered as bench models for wheels from 6 in. to 12 in. dia., and as pedestal models for wheels from 7 in. to 20 in. dia. They have powerful motors for either single-phase or three-phase a.c. supply and also for d.c., in all standard voltages.

The motor casings are clean and shapely. Built-in switches and



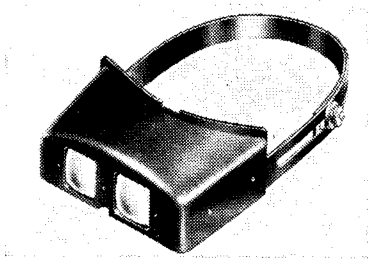
adjustable tool rests and wheel guards are provided. Attachments, such as spark shields, dust extractors and wet grinding equipment, may be obtained, and special models are produced for grinding carbide-tipped tools.

Cordia grinders are marketed in the United Kingdom by the Argall Machine Tool Co. Ltd, Argall Avenue, Leyton, London E10.

Binocular magnifier

FOR the inspection of intricate machinery or other fine detail, a magnifier with which both eyes can be used at once is a very great advantage, not least in reducing fatigue. In the past binocular magnifiers have generally been expensive, and often too heavy to be worn with comfort. A new lightweight headband magnifier has now been introduced by Ellis Optical Company, Mayday Road, Thornton Heath, Surrey. In addition to being light and comfortable, it is moderately priced in comparison with most others.

The lenses are of about 8 in. focus, giving a magnification of 2¼ times, with a wide field of view and good stereoscopic effect. They are accurately ground to prevent eyestrain, and are fitted to a hood of plastic material with an adjustable head-



band. The weight, complete, is 4 oz.

A sample magnifier submitted to ME, has been found very useful in many kinds of fine model work. It should be fully understood that short-focus magnifiers of any type are designed for close-up inspection only, and not as a substitute for spectacles or other prescribed aids to imperfect vision.

Always handy

SAMPLES have been received of two inexpensive and handy tools, obtainable from Woolworth's branches throughout Great Britain. The Rolls Pad Saw is provided with two blades, and is suitable for wood or metal. Its special feature is the comfortably shaped die-cast handle, designed to hold the special tapered woodworking blade, or any standard hacksaw blade, in any one of three positions. These provide a pistol grip for straight sawing, a file-handle grip for perfect control when cutting out circles or other intricate shapes, and a plane-handle grip for working in a cramped space.

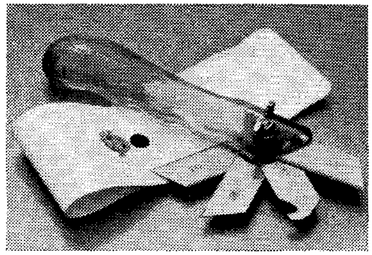
The Zip razor-blade plane also has a light die-cast body, and will take a standard slotted blade. The specially thin blades are not recommended.

A clamp plate with a wing nut holds the blade in position, and adjustment for depth of cut is made easy by slots in the sides of the body, which give access to the ends of the blade, and enable you to manipulate it without risk of cutting your hands.

This plane is particularly well suited to small work on model aircraft and boats in wood or plastic.

Trimming knife

A NEW trimming knife with a transparent Tenite handle containing four blades adaptable to various purposes in woodwork, leatherwork and other crafts, has been introduced by J. Stead and Co. Ltd, of Manor Works, Cricket Inn Road, London. The blades vary in thickness, the sizes being 0.013 in., 0.016 in., O.025 in. (hook type) and 0.032 in., so that they can be used as feeler gauges. They are clamped in the handle by a bolt and wing nut.



Spare blades are obtainable. The handle can also be used to hold a pad saw or other blade.

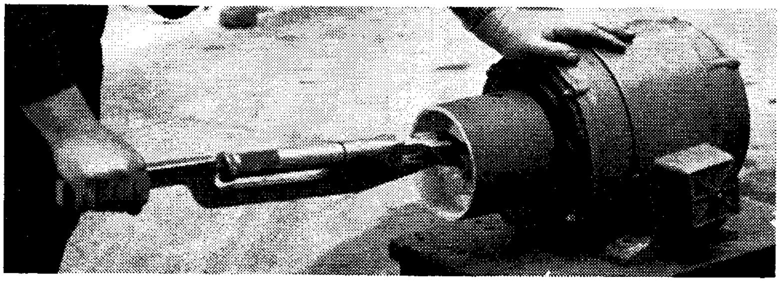
Steadfast tools are sold by all good tool dealers in Great Britain.

New tool

THE new tool illustrated below will be found of great value in the repair to motors, when pulleys must be removed to give access to the interior. It will deal with any gib-head keys up to ⅝ in. wide, yet is slim enough to be inserted into quite a small pulley. A screw adjustment brings it into the best position for developing the great leverage of which it is capable.

Factories will find the tool useful. As keys are fitted to machinery before the repair contractor has to deal with them, a new key fitted to a pulley or a gear must be withdrawn and filed or scraped several times to provide a satisfactory fit. With this new tool the task is very much simplified.

Write to H. G. Freeman, Balmoral Works, Matilda Street, Sheffield 1.



Continued from 28 February, page 278

How to assemble the superstructure

AT this stage of the construction some builders will have to cut away a part of the centre section of the poop deck to provide clearance for their power plant. The exact amount to be removed will vary according to the kind of equipment fitted for propelling the ship.

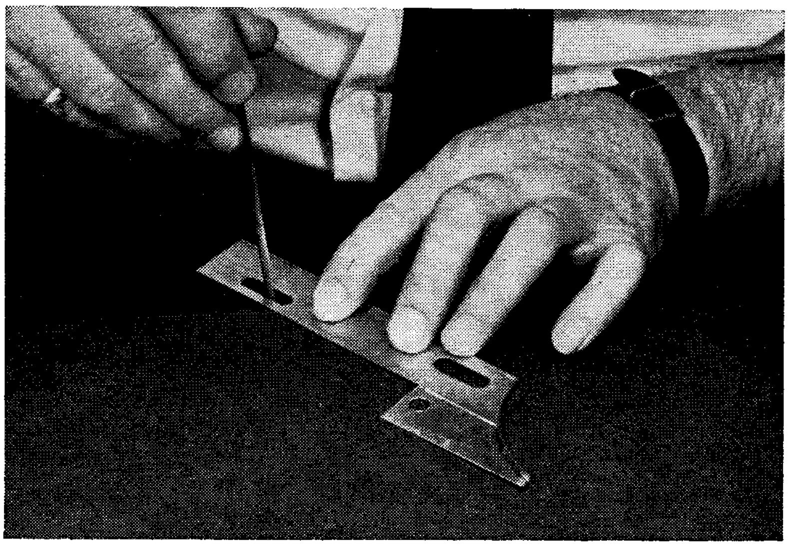
Those who prefer an electric motor to turn the propeller will probably find that things can be left as they are, but users of steam and internal combustion engines will soon discover, if they have not done so already, that they have a different problem.

More planning will have to be done for a satisfactory layout. Whatever the final result with either form of power, both will necessitate the making of at least one small hole to allow the exhaust gases and steam to pass out through the funnel. In deciding on the size of the cut-out, remember that it must be kept within the area to be covered by the deck house; otherwise, when you come to add this detail, you may find that you have a hole in the poop deck which was not intended to be there.

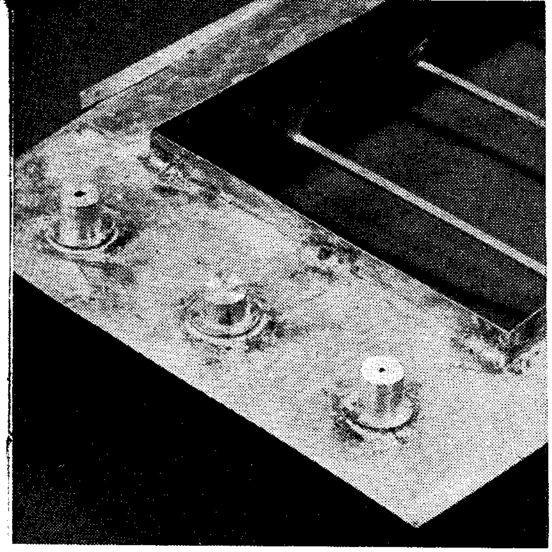
To guide those who are not too sure on this point, and to save anyone from committing a major disaster with his precious material, I will give the maximum dimensions which can be permitted for the cut-out. Beginning $1\frac{1}{8}$ in. from the forward end, the overall length must not exceed $7\frac{1}{4}$ in., and the sides will follow the curve on each quarter scribed $1\frac{1}{2}$ in. in from the edge.

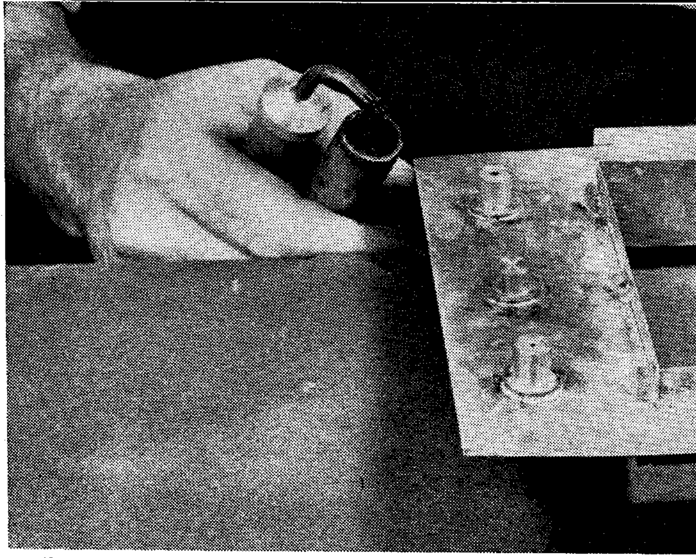
We can now press on to a further stage. Having fitted the poop deck and shaped the front of the superstructure, we need the forward section of the poop deck bulwark, including the part which curves gracefully down to join the bulwark on the main deck. I would emphasise the importance of this curve to the overall appearance of the vessel. A little extra care is essential if the same smart lines are to be reproduced.

To make this section of the bulwark we need four pieces of 1 in. × 21 s.w.g. brass strip, two 7 in. long and two $2\frac{1}{2}$ in. long. After the pieces have been cut, pair them off, one long and one short, and prepare to

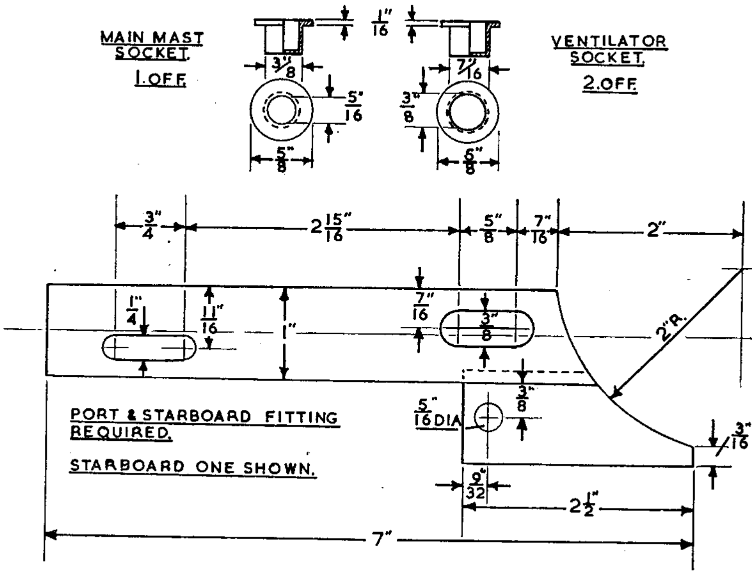


Top: Joining the two brass strips for the starboard fitting. They are turned upside down for the soldering work. Above: Here the finishing touches are made to the freeing port in the starboard poop deck bulwark





These are the pockets for the main mast and ventilators. They are soldered to the underside of the main deck



join them together with a little soft solder.

Although this is the simplest of tasks, we have to watch that we do not end with two parts exactly the same. Remember that the part has to fit into the pattern of the joins in our strakes. If you look at your model, you will see that the shorter plate will have to be joined to the underside of its partner if it is to conform to the same pattern.

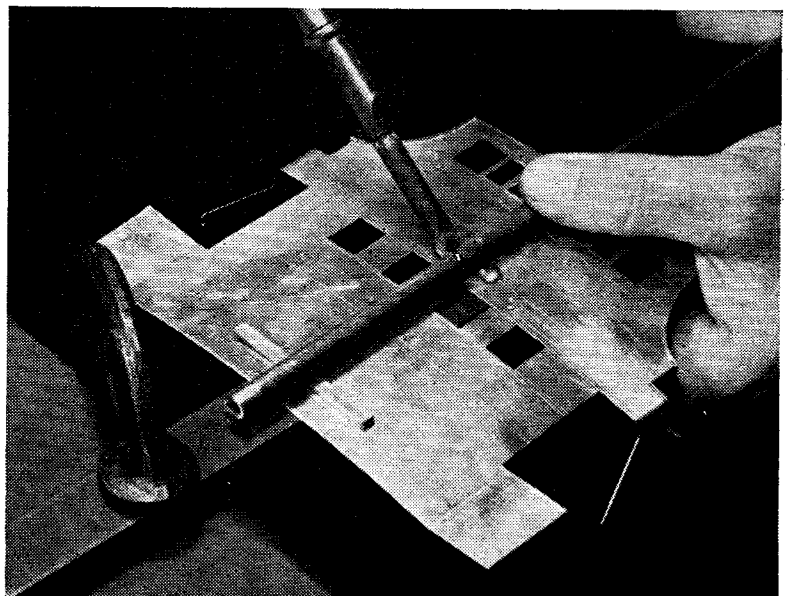
To be sure that the two parts are made correctly, one port and one starboard, place the small piece of brass at one end, as shown in the illustration, and solder in the normal way. The part seen in the photograph is for the starboard side. The part for the port side is made by placing the short piece of brass at the opposite end of its mating part and soldering as before. If you still wonder whether you have assembled them correctly, offer them up to the work after they have been soldered and check them in position.

Our next operation is to mark out the work to the shape and sizes shown in the drawing. Once again I must advise you to check the working before any metal is removed after it has been marked out. Pay particular attention to the $\frac{5}{16}$ in. dia. hole in the shorter piece of brass. This is the porthole which was omitted when we plated the hull, as I explained in the instalment on November 8.

My dimensions to give this porthole its location should bring it into line with those already fitted. If you find in checking that this is not so, make the necessary alteration before you drill.

To produce the two oblong cutouts, drill a hole at each end, with the diameter of the drill equalling the width of the piece to be removed, and then cut out the piece between

Below: While the main mast is fixed to the front of the superstructure, a packing under the tube maintains squareness

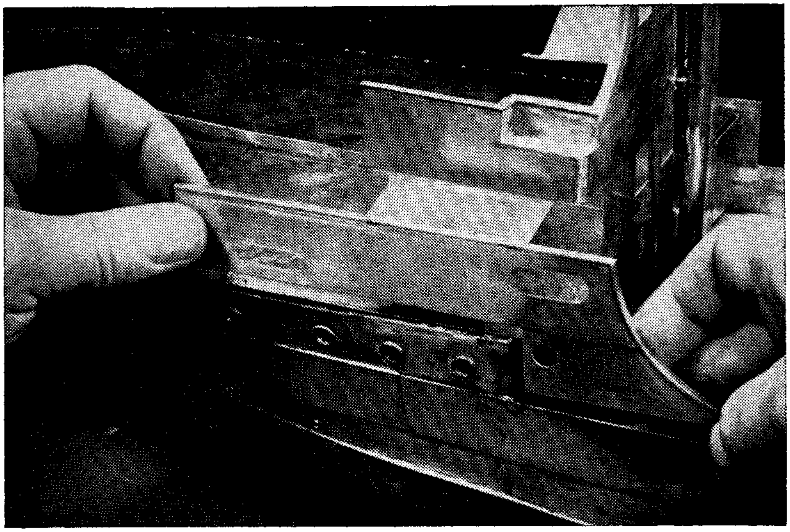


the holes with a piercing saw, cleaning the work up with a half-round Swiss file.

The illustration shows the part nearly completed for the starboard side. The final touch, before you fit it to the model, is to add the rail to the bulwark. This is represented by a brass strip of the size that we used for the window frames and the top edges of the superstructure, $\frac{1}{8}$ in. × 23 s.w.g. It is fitted in exactly the same way, with the outer edge about $\frac{1}{32}$ in. proud of the work.

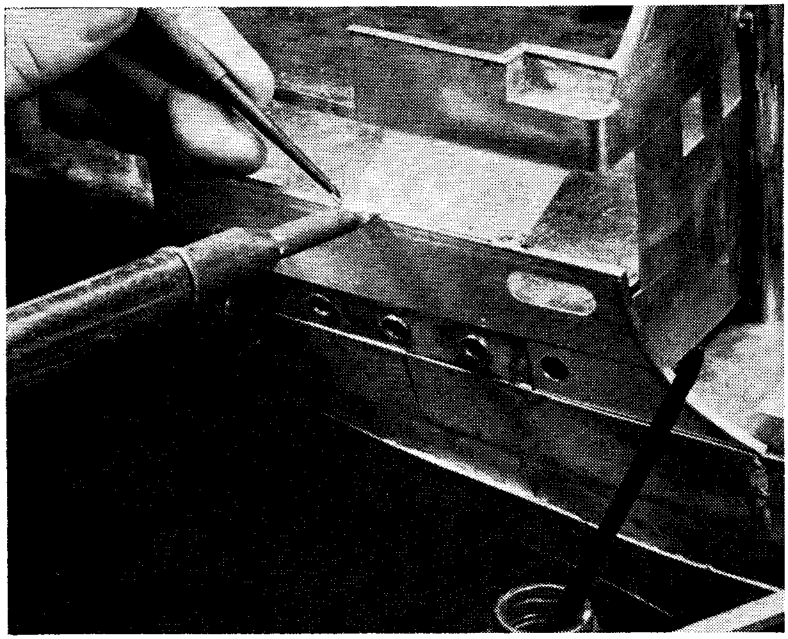
We are then ready to assemble into one unit the front of the superstructure, the poop deck, and the parts which we have just completed.

On reaching this point in the construction of my own model, I found that it was best to fit a part of the main mast. The correct assembly of the superstructure depends largely on the builder's eye, in seeing that all the parts are true. When we are working with such irregular shapes in thin material, and with so much attention to appearance, it is difficult to get a fix for squaring up. I decided to add the lower section of the mast to save the newcomer from nightmares. With $10\frac{1}{2}$ in. of $\frac{5}{16}$ in. o.d. × 21 s.w.g. brass tube firmly fixed to the front of the superstructure, it is surprising how much we are helped in lining up the curves and corners.



Part of the poop deck bulwark is fitted. Note that the lower section has to fit inside the strake and the upper one outside

To aid the support of the all-steel mast on the *Cranborne* a plate is welded between the superstructure and the mast just above the line of the windows of the Master's quarters. We can fit our mast in much the same way, but we have to have our own fixing at the base as it will be removable with the rest of the after end. Where the full-size mast is welded at the base we must make a socket into which the end of the brass tube can be inserted and withdrawn easily, and yet still be rigid enough not to overload the small supporting piece between mast and superstructure.



Soldering the broad stanchion from boat deck down to bulwark rails

While we are making the socket for the mast we may as well make two slightly larger sockets to accommodate the ventilators. The three fittings can then all be soft soldered to the underside of the main deck at one heating. My drawing shows the dimensions. For those with a lathe the fitting will provide another simple turning exercise. Others will have to fabricate them from pieces of tube. In fabricating them you can use a flat washer for the flange at the head of the bush and a similar washer to blank off the bottom. Use silver solder to sweat them together.

It is not difficult to persuade them to stay put in their proper position while they are soft soldered to the main deck. Make a spigot out of a piece of aluminium rod and poke it through the hole in the deck. Place the fitting over the top and it is then ready for soldering. Wood can be used instead of aluminium; it will burn when the heat is applied, but you need not worry because it is wanted only for this purpose. I found the Valtock lamp exactly the right tool for the soldering operation; play the flame on to the fittings rather than on to the thin material of the deck.

We next fix the $\frac{5}{16}$ in. brass tube for our main mast to the front of the superstructure. All that is required here is a small piece of 16 s.w.g. brass shaped to fit between the two parts with a clearance of about

● *Continued on page* 347

By PHILIP KERSHAW

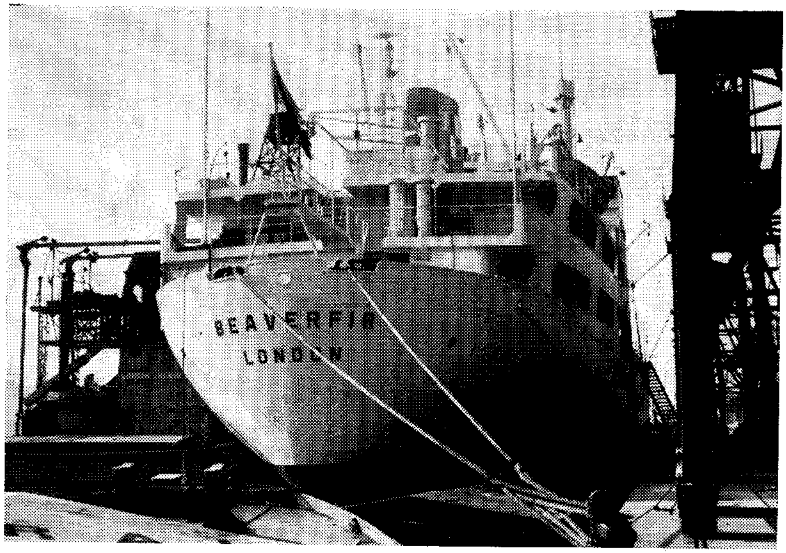
"All aft" is now the vogue

During the past five years an increasing number of ships has been designed with machinery navigating bridges and accommodation aft. For many cargo vessels, and particularly for bulk carriers, this is the most convenient arrangement and will probably become standard practice soon.

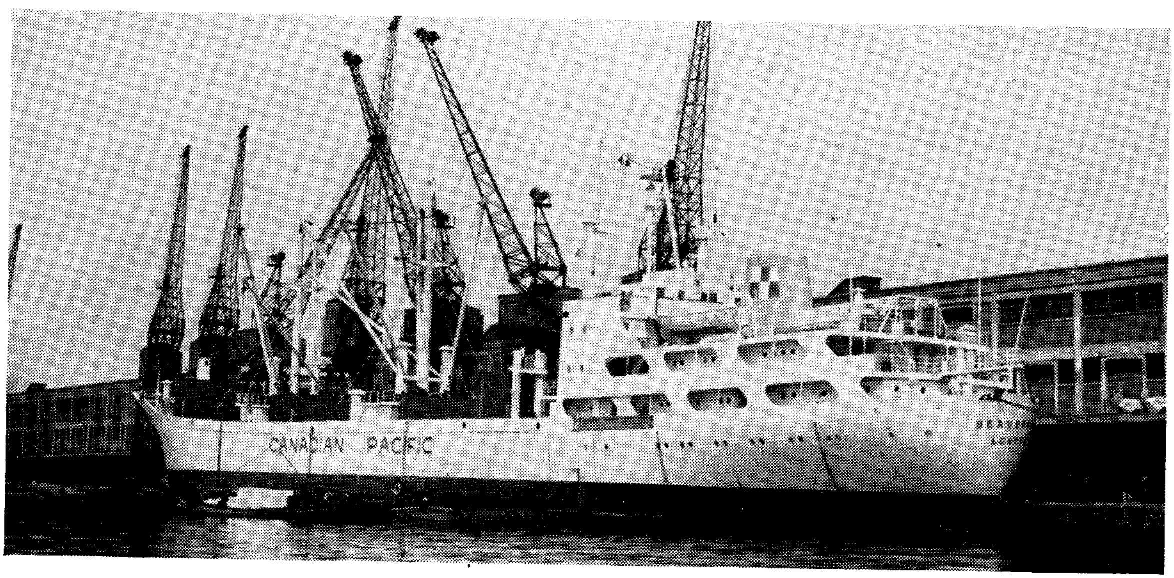
Last year several unusual "all aft" freighters were built in Scandinavia. The most advanced of them was the Norwegian 7,000-tonner *Besseggen*, launched in the Tonsberg yard in mid-September.

The novel feature of this motorship is that full advantage has been taken of her long, uncluttered forward deck to fit her with three powered cranes on railway mountings. Their track is laid on either side of the holds so that they can move smoothly fore and aft from just forward of the bridge to the forecastle.

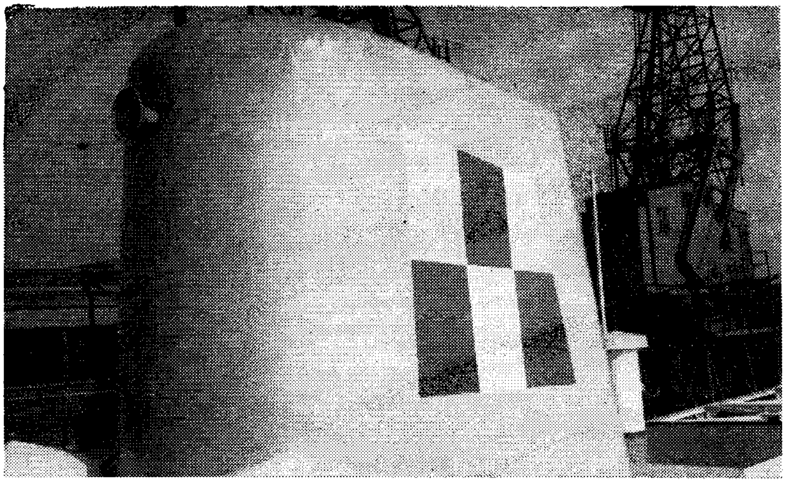
Unfortunately I was not able to visit the *Besseggen* on her first call in the Thames just after Christmas, but I have been aboard several other

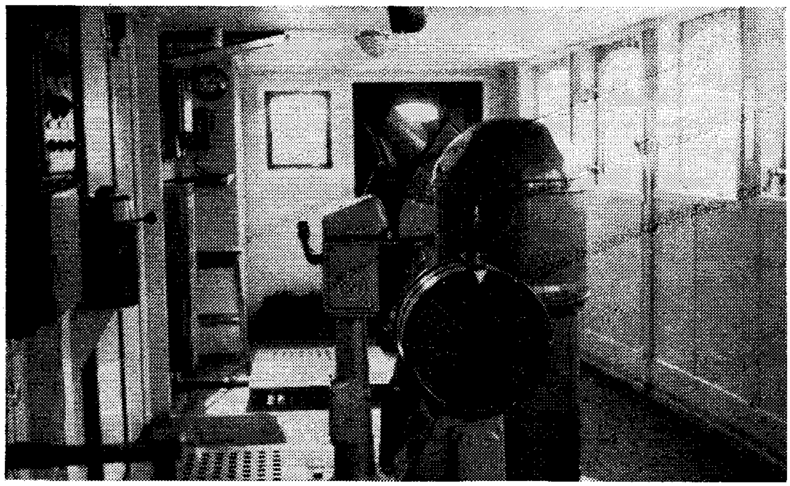


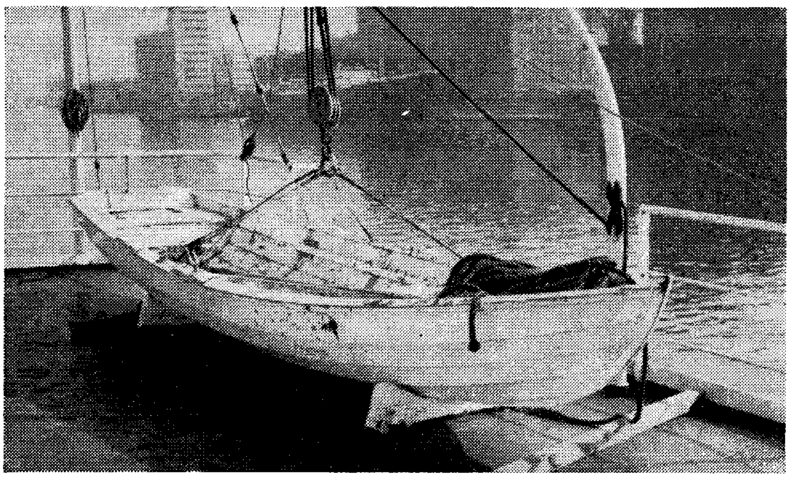
This picture of the BEAVERFIR, *a North Atlantic trader of 4,500 tons gross, shows her cruiser stern and compact superstructure. An elevator lies alongside (on left) to discharge a part-cargo of Canadian grain*



Here the BEAVERFIR *is unloading Canadian wood-pulp into barges at her discharging berth in the Royal Victoria Dock. Notice the owners' name, Canadian Pacific, painted in large letters amidships*







Top: Funnel of the BEAVERFIR. *Note the curved top. On each side is the red and white chequered house-flag of Canadian Pacific. See, too, the syren mounting at the left. Centre: Steering handle on its console. The compass is on the right and the engine-room telegraph in the foreground. Above: This is the general-purpose ship's boat, a typical clinker-built Norwegian skiff, carried under a goose-neck davit. There are two lifeboats*

" all afters " including the 4,500-ton *Beaverfir,* one of the latest North Atlantic traders of Canadian Pacific Steamships.

This fine-lined, white-hulled motorship was bought by the CPR while she was under construction at Sarpsborg in Southern Norway. She has an overall length of 373 ft 8 in., a beam of 50 ft 7 in., and a draft of 23 ft 4⅜ in. Her main engine is a six-cylinder Burmeister and Wain diesel, which gives her a service speed of about 14½ knots.

For the modeller, the deck arrangements are quite straightforward. The ship has a raised forecastle, a long fore deck and a compact superstructure which includes navigating bridge, officers' and crew's accommodation and machinery space. All cargo is carried forward of the bridge, and the ship has three holds served by four hatches, all with the latest sliding steel covers.

Two masts with derricks serve the forward holds, while in front of the bridge is a pair of king posts topped by light aerial masts. A post supporting the radar scanner is stepped on top of the wheelhouse.

Taking a closer look at the superstructure, I was interested to see that besides the two standard ship's lifeboats the *Beaverfir* carries a typical Norwegian clinker-built skiff under a goose-neck davit on the port side of the boat deck. This is not a lifeboat but is used for general tender duty in harbour.

The pale yellow funnel has the red and white chequered CPR house flag on each side. Masts, kingposts, ventilators and the superstructure itself are all painted white.

A detail worth noting is that, in common with most Great Lakes traders, this ship carries her owners' name — " Canadian Pacific " — in large letters on each side of the hull.

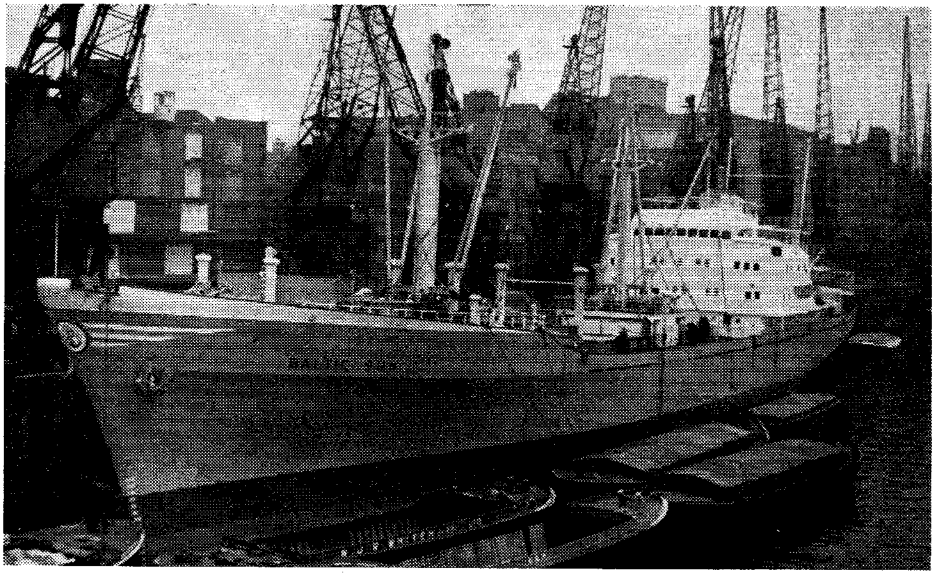
The wheelhouse is neat and well arranged, but one feature is missing: there is no wheel. Instead, steering is controlled by an inconspicuous handle mounted on a small console. Whether this gives the seaman on duty the feel of the ship in a seaway, I did not discover, but it may well be easier to use than the push-button steering devices fitted in some modern cargo liners.

At present the *Beaverfir's* regular run is from Continental ports to St John, New Brunswick, but she also serves Montreal, Quebec and Great Lakes' ports during the Seaway season, making occasional visits to London as cargo requirements demand.

* * *

Bridge and engines are also placed

This is the BALTIC SUN, *the latest and largest ship of the United Baltic fleet*



aft in the latest ships of the United Baltic Corporation, the *Baltic Star* and *Baltic Sun*. Both are products of the Krogerwerft of Rendsburg on the Keil Canal, where several other UBC vessels have been built since the war.

The 1,500-ton *Baltic Star*, completed in 1961, has a length of 305 ft overall, with a beam of 42 ft 3 in. and a draft of 15 ft 11½ in. Her mast arrangements are somewhat unusual: they include a "goal-post" forward with two derricks, a mast amidships with five derricks, and another "goal-post" in front of the bridge, also with two derricks. Stepped on the after goal-post is a signal mast with halyards for house or signal flags.

As the *Baltic Star* is mainly intended for the Finnish trade, her hull has been strengthened for ice navigation. She is equipped with all the latest navigational aids and, like the *Beaverfir*, has a radar scanner mounting just forward of the funnel.

During a short visit to the ship in the Surrey Commercial Docks, I noted that the UBC "foul anchor" badge on the funnel was repeated on the stem. The hull is grey with white upperworks and green boot-topping.

The accommodation is pleasantly modern. Cabins for four passengers are provided; I gathered that they are usually fully booked during the summer season.

The *Baltic Sun*, completed last year, is 85 ft longer than the *Star* and with a gross tonnage of 3,531 is the largest of the Company's fleet. Her design includes a long forecastle, and she has two masts forward of the bridge with a goal-post abaft.

Soon after completion, the *Sun* entered the London-Gdynia trade, sailing fortnightly from a wharf just by Tower Bridge in the Pool. She has now been switched to Hull but will probably be seen in the Thames from time to time.

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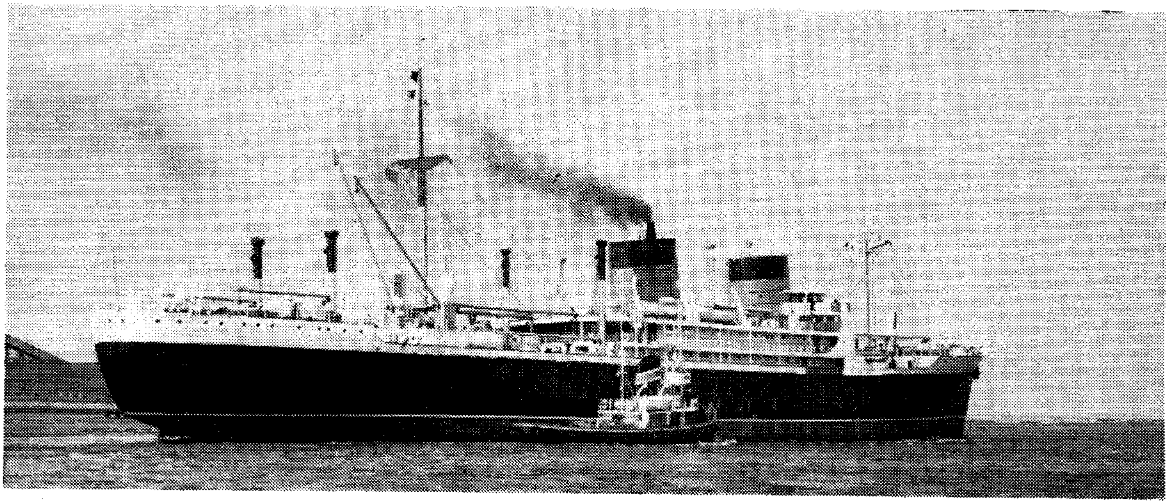
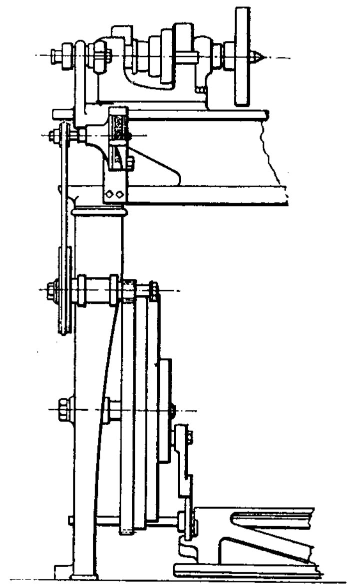
● *Continued on page* 347



Outward bound off Gravesend: the Cunarder ALSATIA *on one of her regular freighter voyages to New York. She is turbine-powered and has a speed of sixteen knots*

This one will be better



I USED the attachment until I had to dispose of the lathe during the bad slump of the early Thirties.

The universal shaft drive was inclined to sag and run out of truth when it was fully extended, and to give a rather jerky action when I was using a coarse-tooth milling cutter at slow speeds.

My only means of feeding the saddle along was by the handwheel at the end of the leadscrew. The handwheel also drove the mandrel holding the work-piece, and so the work was rather hard, especially as the machine had to be treadled at the same time to drive the cutter. Hand-feed was inclined to be uneven.

As the dividing head was on the lathe spindle, it was only possible to obtain three cutter speeds from the cone pulley; and, as the machine was treadle operated, it was difficult to maintain a steady slow speed, and speed range was not sufficient.

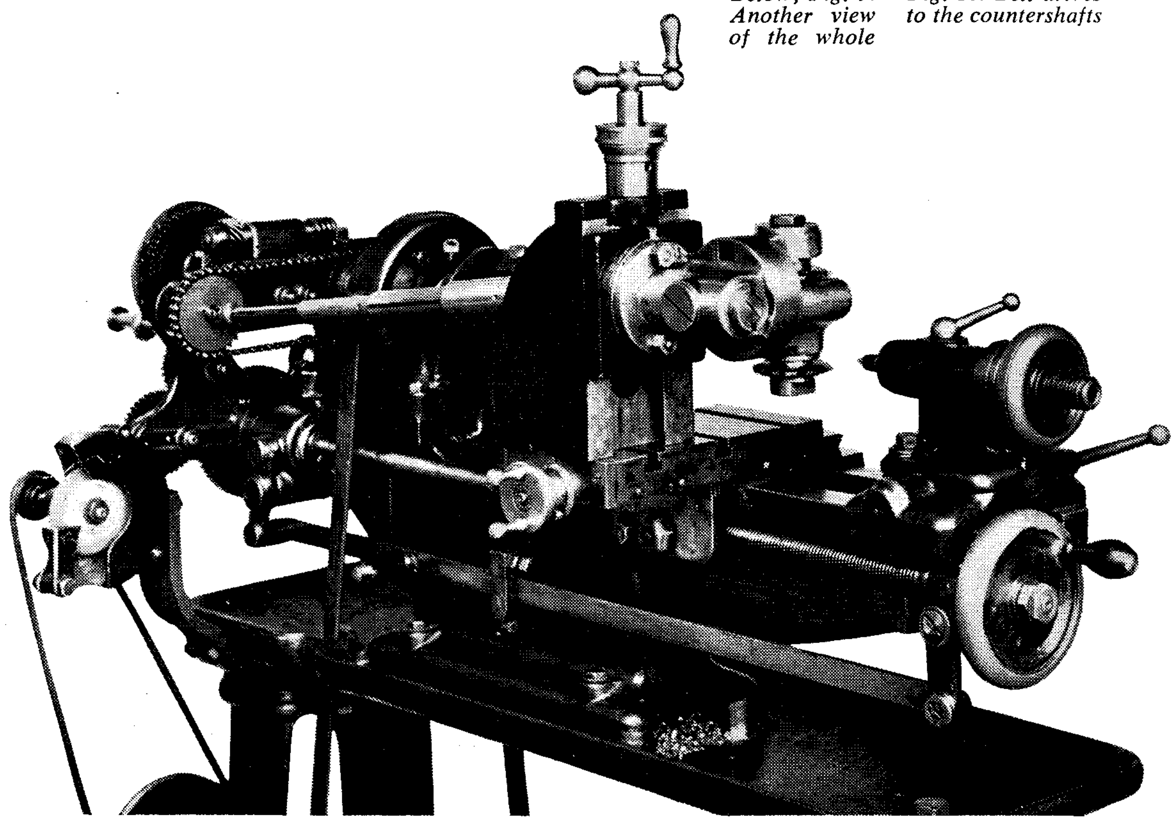
I am now at work on another, and better, universal attachment.

The vertical slide carrying the cutter head will be clamped securely to the lathe bed itself. With the cutter head capable of a vertical movement of 4 in., the cutter spindle will be able to swivel through 360 deg., thus giving any required helix angle.

Dividing head and tailstock will be

Fig. 10: Belt drives to the countershafts

Below, Fig. 9: Another view of the whole



Continued from February 28, page 261

mounted on an extended boring table and connected by a train of gears to the boring table cross-screw. This method will enable the full range of headstock feeds and speeds to be used for driving the cutter head and operating the saddle and cross-slide. With a motor-driven lathe and an automatic cross-slide feed, I should have, to all intents, a small universal milling machine.

My lathe is a $3\frac{1}{2}$ in. Myford Super Seven with a change feed box. An automatic crossfeed has already been fitted.

I wonder if anyone still has the attachment which I described 36 years ago? ▣

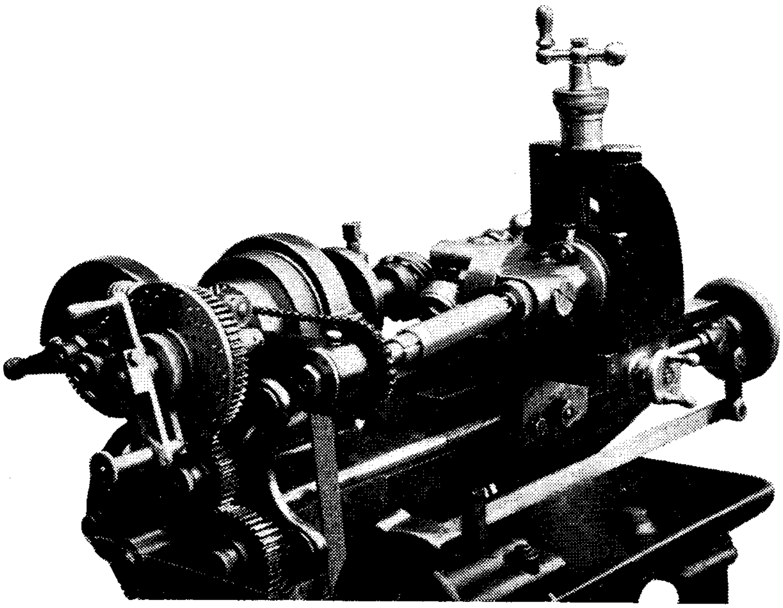


Fig. 8: In this end-view the dividing head is seen

MODELLING THE CRANBORNE . . .

Continued from page 342

$\frac{1}{16}$ in. The piece is soldered to the superstructure $\frac{3}{8}$ in. above the top line of the windows. A small bit of packing will be needed at each end of the tube during the soldering to maintain the right clearance and keep the tube square. The set-up is seen in the illustration.

We can now begin to assemble all our different pieces to form one unit. Begin by laying the poop deck in its proper place and then adding the front of the superstructure. Square up these parts in relation to the model, and put two small tacks of soft solder on the inside of where we would expect to find the Master's cabin and the poop deck. Do not solder all round at this stage in case you have an alteration to make later.

Now add the section of the bulwarks. The photograph shows the part being placed in position. The lower part, or the right-hand bottom corner as you look at the model fits inside the strake to a depth of about $\frac{1}{8}$ in. (it may be a little in excess of this) and the top part, the bulwark of the poop deck, fits on the outside to almost the same depth.

When it is positioned correctly, apply one small tack of soft solder inside the bulwark to the poop deck. This should hold it in position firmly enough while the broad stanchion down from the boat deck is soldered to the top of the bulwark rail. Once again only apply two small tacks of solder as shown in the last illustration.

You should see if everything is going together with the right effect. Correct any faults and try lifting the complete unit from the hull and refitting it. Apply any further solder you think necessary, and you are ready for the next addition.

★ *To be continued on March* 28

"If you sucks 'em slow"

IN these days of Planned Obsolescence and Convenience Living, it is rare to find any product advertised primarily on its length of life and historical associations. Once it was not so. One of the earliest memories of children brought up in a certain town in the North is of an old man of wild and feral aspect, bearing a wooden tray, who hobbled along the station platform before every excursion train.

" Mint 'umbugs," he called out, grasping his tray with a horny hand. " Mint 'umbugs, penny a packet. Our Sarah made 'em. She weshed her hands afore she made 'em. Last you to Bolton Abbey and back, if you nobbut sucks 'em slow. Mint 'umbugs, penny a packet. . . ."

Without the benefit of any of our present-day advances in the field of Consumer Research, this enterprising old pedlar had his customers' favourite prejudices absolutely taped, and consequently did a roaring trade.
—Nancy Blamires in the *Church Times.*

WHILE SHIPS GO BY . . .

Continued from page 345

Before 1914, when funnels were fashionable, it was not unusual for liners to have three, four or even five stacks. Today two-funnelled ships are rare, especially when they are cargo liners. The only British examples of the two-funnelled freighter, the Cunard Company's *Andria* and *Alsatia,* have been in the news recently on their sale to Formosan shipping interests.

Both were built by J. L. Thompson and Sons of Sunderland for the Silver Line. They were the *Silverbriar* and *Silverplane* until their purchase by Cunard in 1951. In each, the forward funnel is a dummy and is merged into the bridge structure, presumably to give the ships more impressive profiles.

This is certainly an effective arrangement. At sea the *Andria* or *Alsatia* could easily be mistaken for passenger liners very much larger than their 7,200 tons.

* * *

It is reported that the veteran paddle steamer *Consul* is to be withdrawn from service this year. The *Consul* was built as the *Duke of Devonshire* by Greens of London in 1896. She is powered by a compound two-cylinder steam engine and is 277 tons gross, with an overall length of 175 ft. Her owners are Cosens and Company, who have recently used her for local day trips on the Dorset coast. ▣

Readers' Queries

Polishing a panther

I have recently had some replica Garrett steam wagon nameplates and the panther emblem cast in brass to my order.

These castings, the largest of which is about 24 in. × 5 in., are very rough; the whole surface is like sandpaper.

Can you please tell me how I can polish them? The flat surface of the letters and the surround of the *Garrett* would file up, but how can I do the animal which goes above this and is far from flat?—J.L.T., Rushwick, Worcester.

▲ *The most suitable method of polishing the flat, raised surface of letters on nameplates would be by a belt polisher, or "linisher." Alternatively, a disc grinder would be suitable, with an appropriate grade of emery or carborundum cloth.*

For castings in relief, such as the panther you describe, it would be necessary to go over the surface with small abrasive wheels, such as those driven by flexible shaft tools. The use of a polishing buff would be permissible only after all visible roughness has been removed.

Pioneer

I have the opportunity of buying a 1 in. scale *Pioneer* tank locomotive without the boiler. I have been led to believe that the engine was described in ME during the early Thirties. Would you please supply the dates?

The wheel arrangement seems a little odd. There is a trailing bogie spare, so perhaps the engine was originally an 0-4-4, but the wheel base of the front two coupled wheels seems a little close and might produce yawing on the track. I suspect that the third pair of driving wheels may have been added to prevent this.—P.W., Woodbridge, Suffolk.

▲ *A description of the* 0-6-0 *tank locomotive* PIONEER *appeared in* MODEL ENGINEER *for* 12 *May* 1932. *A set of working drawings was then obtainable; it was withdrawn many years ago.*

The leading and driving axles were very closely spaced in this design, probably to allow for a long firebox without occupying much space in the cab. The design was intended primarily for the beginner.

Great Western models

Would you please send me the names and addresses of the firms from which castings and drawings can be obtained for 3½ in. gauge GW King class, a 3½ in. gauge GW 4-4-0 City class, and a 5 in. gauge GW 0-6-0 pannier tank?—A.M.W., Bristol.

▲ *Castings and drawings for a 3½ in. gauge King may be had from H. P. Jackson (Junr),* 13 *Glebe Avenue, Acomb, York.*

For a 3½ in. gauge GWR City, Kennion Brothers of 2 *Railway Place, Hereford, can supply the drawings.*

Drawings for a 5 in. gauge GWR pannier (5700 *class*) *can be had from PM Plans Service* (LO96) *at* 39s. 6d. *the set, post free. Castings may be obtained from A. J. Reeves and Co. Ltd, Bonds Limited, and W. K. Waugh of* 31 *Hillfoot Drive, Bearsden, Glasgow.*

Fairground music

Would you explain how a steam organ functions?

Is the power or wind for the notes of the organ derived from the engine?

What has the operator to do to change the tune?

Do the figures striking the triangle, drums, and so forth, work to a set pattern or do they change for every tune?—R.G., Morpeth, Northumberland.

▲ *The term "steam organ" is a misnomer because the bellows crankshaft pulley can be belt-driven from any suitable prime mover. True, in days gone by a small auxiliary steam engine was usually provided for driving the organ but examples of electric and petrol engine drives were not unknown at about the time of the* 1914-18 *war.*

Today electric drive is almost invariably used, and many fairground organs have had the old-fashioned bellows replaced by a blower fan in recent years. This arrangement gives a greater constancy of wind pressure and gets over bellows maintenance problems.

How the tune is changed depends on several factors. Most fairground organs using pin-barrels were made self-changing so that several tunes were played in a set sequence. Barrel drive was derived from the main drive to the bellows. Of the several "paper" systems employed the commonest is a music book in the form of folding layers of perforated cardboard sheets hinged together to form a strip. It can be purchased cut in accordance with a tune. Sometimes several tunes in succession are carried on one book.

Some smaller organs have the book glued as a continuous strip, containing, say, twenty tunes which play in rotation without attention. To change a book, all the operator does is to raise the lid of the keyframe and insert the correct end of the new book. When he closes the lid, the keyframe roller re-engages and starts drawing the book through. Drive to the keyframe is either by belt from the bellows crankshaft or by an independent electric motor.

The percussion instruments are operated from cuts in the music book in accordance with the tune being played. Sometimes where a lot of percussion effects are provided (as for figures with striking bells) they can be mechanically interlinked; but no two organs are exactly alike in this respect. Coloured lights changing with the registers were sometimes fitted to the largest organs.

The operation of fairground organs was described in more detail in a two-part article in MODEL ENGINEER *for* 31 *March* 1960 *and* 14 *April* 1960.

Shaping machines

We are wondering whether you can kindly tell us of any maker of a small shaping machine (either hand or power).

We have an idea that one was described some considerable time ago in ME. Anything from 4 in. stroke upwards will be of interest, or do you think we might drop across a secondhand one?—A.A.T., Ashton-under-Lyne.

▲ *Hand shaping machines are manufactured by the following firms: F. W. Portass Limited, Adept Works,* 141*a Nicholson Road, Heeley, Sheffield* 8; *Perfecto Engineering Co. Ltd,* 60 *Stanley Street, Leicester; and E. W. Cowell Limited,* 7*a Sydney Road, Watford, Herts.*

*Small power shaping machines are obtainable from Denford Engineering Co. Ltd, Box Tree Mills, Near Halifax, Yorks., and from Elliott Machine Tool Co., Victoria Works, Willesden NW*10.

For a secondhand machine you might try a firm such as T. Mallaby of Leeds.

Stirling for California

In *Manual of Model Steam Locomotive Construction* there is a picture of a ¾ in. scale GN Single, and I wonder if somehow I could get the prints for this model, and perhaps for other models in Martin Evans's fine book.

I notice that most books on locomotive modelling come from Great Britain, and I think that the hobby is more advanced, or perhaps more popular, in your country than in the USA. At any rate, I notice that most of the models pictured in British publications are very interesting and picturesque.

Keep up the fine work, and good luck.—L.B., Modesto, California.

▲ *Drawings and castings of the ¾ in. scale model GNR Stirling single can be obtained from H. P. Jackson Jun., 13 Glebe Avenue, Acomb, York.*

Readers in Britain are equally impressed by what is being done in the United States and Canada; and what could be more picturesque than an old American wood-burner in the style of the Civil War period?

- Queries must be within the scope of this journal and only one subject should be included in each letter.
- Valuation of models, or advice on selling cannot be undertaken.
- **Readers must send a stamped addressed envelope with each query and enclose a current query coupon from the last page of the issue.**
- Replies published are extracts from fuller answers sent through the post.
- Mark envelope "Query," Model Engineer, 19-20 Noel Street, London W1.

Toy soldiers

I should like some information upon what materials are suitable (and where they may be obtained) for producing moulds, preferably flexible, for casting model soldiers in lead alloy.

In the past, I have used plaster of Paris, which fractures after an average of three castings, and a rubber substance called Vinamould, which melted upon contact with molten metal. I have dismissed the idea of growing copper moulds by electrolysis as being impracticable for the facilities at my disposal.

The quantities which I would ideally like to obtain would be 40-50 to a mould.

If you could give any advice upon this problem, I would be grateful.—L.E.R., Hornchurch, Essex.

▲ *It is not practicable to use flexible moulds for casting metals as they will not stand up to the melting temperatures of any metal likely to be suitable for this purpose.*

The only feasible form of permanent mould would be a metal die which could be produced by using a plaster cast as a pattern and making a casting in two halves from it.

Another possible way of producing permanent or semi-permanent moulds would be to electro-deposit a thin coating of metal on a plaster mould, but this would still be more fragile than is desirable.

Mottled surface

What materials and procedure are required for obtaining a mottled casehardened surface finish as on many engineering tools?—T.W., Luton, Bedfordshire.

▲ *Various processes are employed in obtaining the coloured or mottled surface on steel, including chemical compositions and oxidation by heating. Sometimes the steel is heated and quenched in a cyanide bath.*

There would be some risk in the adoption of this process in a small workshop as special precautions must usually be taken against the inhalation of poisonous fumes.

Screw pitches

I have a Myford ML7 with a Myford quick-change leadscrew gearbox, and I wonder if you could explain the terms used in the tables for setting up odd pitches into an adjustable quadrant. Two tables are shown in the instruction book—diametral pitches and module pitches.

Can you tell me the meaning of "diametral" and "module" as applied to screw threads, and how they can be related to threads per inch?—J.M., Gosforth, Newcastle on Tyne.

▲ *Diametral pitch and module pitch refer to screw pitches which are not normally used in ordinary screw-cutting practice.*

They define the pitch of gear wheels, such as worm wheels, which would call for the use of worm threads. The term "diametral pitch" is used to define the number of teeth per inch of diameter in a gear wheel, and module is defined as follows:

$$\textit{English module} = \frac{1}{\textit{diametral pitch}} = \frac{\textit{Circular pitch}}{3.1416} = \frac{\textit{Metric module}}{25.4}$$

Smallest radius

What is the smallest radius which you would recommend for a 12 in. gauge (2½ in. to 1 ft scale) Atlantic locomotive and tender?

I would also like to know the scale dimensions of the sleepers and the spacing for them.—J.B.H., Berwick-on-Tweed, Northumberland.

▲ *A minimum radius of 150 ft is recommended for your 12 in. gauge Atlantic. On the other hand, the engine should be capable of negotiating a 60 ft radius curve at slow speed.*

If you are laying your track on wooden sleepers, they should be made 2½ in. × 1¼ in. or 1½ in. × about 22 in. long.

Spacing of sleepers could be about 8½ in. centre-to-centre. This could be increased to about 9½ in. for economy, if desired.

Model gas turbine

Please can you tell me what would be the smallest scale for making a gas turbine work, and what would be the best fuel to use?

I am a toolmaker and can work to plus or minus 0.0001.

Thank you for an excellent magazine.—M.C., Ottery St Mary, Exeter.

▲ *Several attempts have been made to build working models of gas turbines, but up to the present none seems to have been completely successful.*

The major difficulties are not so much in accuracy of machining, as in obtaining suitable materials for withstanding the high temperatures, and of machining complicated shapes, such as turbine rotor and stator blades.

Any venture of this kind must be regarded as purely experimental.

Beam engine

I wish to make a model of an early beam engine but I have no information on the proportions, parallel motion, and so forth. Can you help me please?—H.R., Coopersale, Epping, Essex.

▲ *PM Plans Service can supply fully detailed drawings of two beam engines: the Vulcan, an A-frame type of the early 19th century, and the ME column beam engine, which is of a later date.*

Full details of the parallel motion and all other essential parts are included in the drawings. M17 (3s. 6d. for the Vulcan), and M23 (21s., 4 sheets).

POSTBAG

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

NEAR THE HORN

SIR,—While I was visiting our local locomotive sheds recently I saw a plate which I thought might interest readers of MODEL ENGINEER.

The plate was attached to a class 24 engine. It read: "The 2,000th locomotive delivered by North British Locomotive Co. Ltd to South Africa." The locomotive was named *Bartholomew Diaz* after the great navigator who rounded South Africa.

I found that the locomotive was delivered on 1 February 1950. How sad it is to hear that the North British Locomotive Company is ceasing to manufacture steam locomotives.

Port Elizabeth, South Africa. L. E. PAXTON.

ROB ROY

SIR,—I was surprised and flattered to find in ME of February 21 a picture of my *Rob Roy* chassis, taken when it was on show at the Manchester Model Railway Society exhibition just before Christmas. I should perhaps explain that my uncompleted model was in the loan section. As I am not a member of the society, it was not eligible for the award of a diploma; I happen to know the chairman and it was exhibited at his request.

I have called at Noel Street twice since I began the chassis and have received extremely useful advice from Mr Martin Evans and Mr Oliver Smith. *Rob Roy* is my first attempt after buying a second-hand ML7, my only machine tool. So far I have done all the drilling on the lathe. When I began I was unable to obtain bright mild steel for the frames, and so I made them of stainless steel. After such a harsh initiation everything seemed easy! I am now well on with the boiler and am hoping to finish in time for the next Model Engineer Exhibition.

A point which may be of interest to other beginners is that I provided myself with two Sievert 3 lb. bottles and two burners, including a No 3943. While these were adequate for small parts, the small bottle was unable to supply gas at a rate sufficient to produce enough heat for boiler brazing. A 10 lb. bottle of gas solved the problem. The deposit on a 10 lb. bottle is 50s., but the gas itself is cheaper, at 12s. 6d. a fill.

Please accept my best wishes for the continued success of MODEL ENGINEER.

Bowdon, Cheshire. L. A. GREEN.

STEAM ANTICS

SIR,—While I support and enjoy the traction engine rallies as much as anyone, I think it is about time that some rally officials gave serious thought to the ridiculous and often foolhardy antics that we engine owners are asked to perform for the amusement of the public.

At one rally I was asked to act as an imaginary plough with my engine and be wound up the field in gear by a ploughing engine. To my horror I saw that another seven engines were to be strung on behind!

Surely one engine would have sufficed? If you were a steam man you would know what the demonstration was trying to show, and if you were just a spectator you would be given a rough idea.

I have no time for the tearing about and the trials of strength. No one can tell me that they do an engine good. Sometimes they are downright bad.

After all, if you have a craze for speed you can go elsewhere and watch vehicles designed for it. Let's have events that show our skill (or lack of it) and legitimate demonstrations of engines doing the things for which they were built.

May I congratulate you on the excellent standard of ME, and especially on your traction engine features?

Owlswick, Buckinghamshire. CHRIS EDMONDS.

CARIBOU

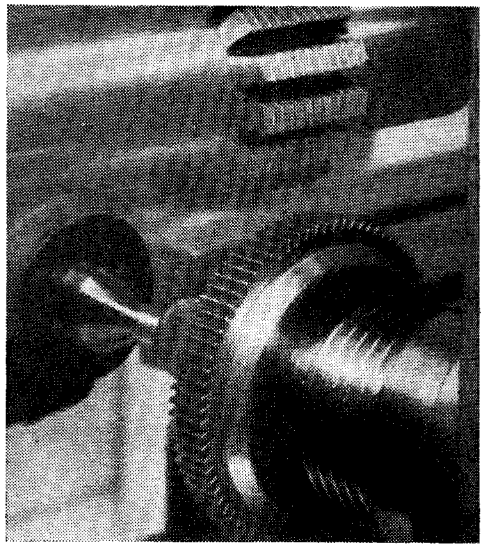
SIR,—I like *Caribou* very much, but would it be possible for you to publish a simple modification to enable us to build it as a 2-8-0? This would, I think, make the engine much more stable at speed.

London NW1. W. H. GREEN.

HOBBING

SIR,—My two pictures are of hobbing carried out on my ML7, which I thought may be of interest to readers. The freshly cut gear of 3 per cent nickel steel has 80 teeth and is 48 d.p.

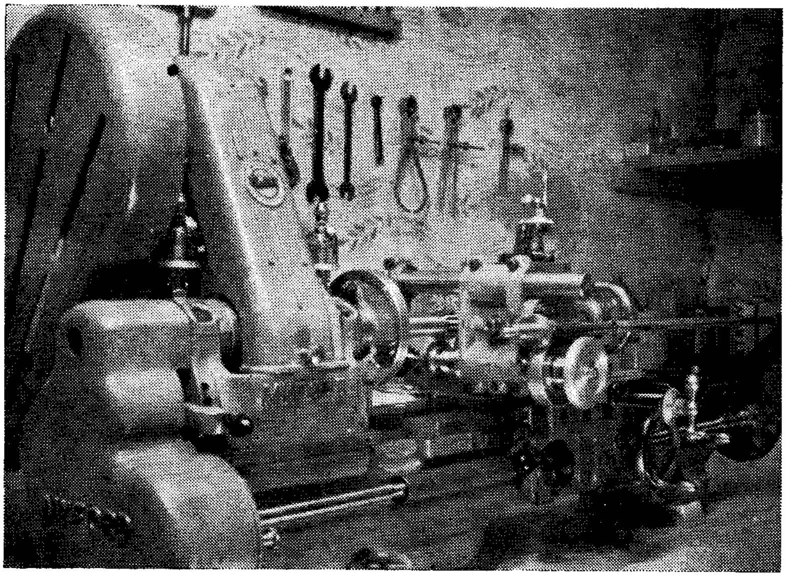
The standard Myford dividing head has an extended worm shaft to



take a universal jointed telescopic drive shaft which is driven from the leadscrew extension through sprockets and chain (1-75 ratio).

For cutting the 80-tooth wheel the lathe change wheels are set up as for cutting 80 threads an inch. For cutting an eight-tooth pinion, the smallest practical size for this hob with a 20 deg. pressure angle, the change wheels are set up as for cutting eight threads an inch, and so on.

In cutting small pinions, the lathe change wheels are inclined to complain a bit because gearing of the change wheels is "up." There is a further "up" gearing at the



Noel D. R. Price in New Zealand has a gear-hobbing set-up on his ML7

sprockets and then a 60-1 "down" gearing in the worm gearing of the dividing head.

It would be better to have an 8-1 reduction in the dividing head (which is not really a dividing head, but a work head, when it is used like this) and a 1-1 sprocket gearing from the leadscrew to the telescopic drive shaft.

I should be able to cut helical gears with this set-up, but as yet the need has not arisen.

Let me thank you for a fine little magazine.

Greymouth, NOEL D. R. PRICE.
New Zealand.

LMS CRABS

SIR,—The 2-6-0 LMS engines (the Crabs) were a purely Horwich design done by Billington, their chief draughtsman, who might have had a big influence on later design but for his early death.

Most of them were built on a huge frame jig—the idea of H. P. M. Beames, another distinguished LNW engineer fated to remain a deputy CME. They had stiff crocodile slidebars (GW style) and bronze crosshead slippers originally, but, as these caused several failures through their running hot, the MR solid crosshead, white-metal lined, was substituted and an inch was sliced off the back of the slidebars. Clearances were increased and we were told that this cured the trouble—I wonder!

The Royal Scot was a purely LMS design. The three-cylinders idea came from the MR compounds: the four-bar inside slidebar and crosshead arrangement repeats the compound idea. The boiler descended from the MR 0-10-0 Banker. The motion (outside) came from the LMS 2-6-4 tank and the valve settings from the SR River class tanks. The lifting of the radius rod by the slotted end derived from Gresley's 2-6-0 (I did the 2-6-4 LMS motion myself).

Ashford knew what Derby were doing, as the chief draughtsmen had both worked on the old MR. But the persuasion to use long travel gear on the LMS design came from a chief draughtsman of the Furness Railway, who had been moved to Derby. Otherwise, the 2-6-4 LMS and the Royal Scot would have had double-ported admission valves, like the 30 Garratts and many No 2 Pass. engines on the LMS

Hastings, E. A. LANGRIDGE.
Sussex.

FLAME ENGINES

SIR,—Edgar T. Westbury's article on flame ignition engines brought back memories to me. I made one of the BEEC engines, and it worked, after a style. I can remember my father bringing a friend up to see it performing.

The date must have been late 1914 or early 1915. What happened to the engine I do not know, as it had disappeared when I returned from service overseas.

We were living in Great Marlborough Street, close to Noel Street and the present ME office.

I had the use of a very old lathe. Almost all my engineering knowledge came from ME.

The cylinder was bored and piston turned by the makers of the castings.

Cranleigh Road, A. J. HARROW.
London.

SIR,—The article by Edgar T. Westbury on flame-ignition gas engines interested me very much, but after reading it I feel it a pity that anyone owning such models as the one illustrated should convert them to another mode of operation, thus destroying their identity. Surely it would be better to offer them to someone who would gladly enough preserve them as they were intended to be?

These engines are representative of a period (I would say 1880 to 1890) when a working model gas engine was a modern contrivance, acceptable enough as long as it did not infringe the Otto patent.

Infringement was avoided by the employment of the non-compression principle, and by the firing of the charge during a reduction of pressure in the cylinder and some way from the inner dead-centre.

When we consider these points and overlook the rather crude details, the model is imposing enough. I think that there is a strong case for not adapting it to four-cycle operation.

Mr Westbury comments particularly on the crude directions issued with the sets of castings supplied by the Leek firm. It seems likely that the castings may have been of foreign origin with the makers' directions crudely translated and abridged.

I feel compelled to disagree with Mr Westbury in some of his observations. Flame ignition (unless one specifies open-port flame ignition) was not confined to engines of negligible compression, nor was it abandoned because of lack of economy. The real reason for the later adoption of tube ignition was the continual cleaning necessary with the flame transfer ports, and the difficulty of lubrication and compression-tightness being maintained with the valve, whether slide or rotary.

Mr Westbury says that separate gas and main inlet valves were always found on what we can call "full-size gas engines." This is correct enough, but the impression is given that the need for two such valves was later found to be fallacious on the same engines.

No gas-engine man of any knowledge would agree to dispense with the separate gas valve.

Hemel Hempsted, Hertfordshire. K. C. GRAY.

[*Edgar T. Westbury writes: I have never urged the owners of model flame ignition gas engines to convert them to work on the Otto four-cycle principle; the desire to do so originated with readers who had castings or unfinished engines which they wished to adapt to more efficient working models. There is a good deal to be said for retaining the identity of these engines, though as they do not appear ever to have been built in full size* in this particular form, *it is doubtful if they have much historical significance. The nearest approach to an engine employing similar principles, which had any extensive commercial application, was the Bisschof engine, but its unique mechanical design puts it in quite a different class.*

Whatever the reason why flame ignition became extinct, it is certain that the practical advantages of hot tube ignition were realised quite early in the development of gas engines, and much of the development with this, and other details of design, was pioneered by Crossley Brothers. Separate gas and air valves have always been standard practice on gas engines, having been originally adopted to suit the methods of governing employed; but a single inlet valve for admitting pre-mixed gas and air, produced by the equivalent of a carburettor, has been proved to give equally satisfactory results in engines which run on gaseous or liquid fuels.—EDITOR.]

CENTRING

SIR, — Geometer's article on "Centring Methods" on February 7 reminded me of a useful trick in truing up centres which are in error. When a shaft has been centred by any of the approximate methods mentioned by Geometer (those which do not use the steady rest) it will often be found that, in the lathe between centres, a slight error causes the shaft to run out of true by a few thou. Usually this is of no importance as the first cut removes the run-out error.

When the run-out is important, mark the high side of the shaft with chalk as shown by an indicator, and remove the shaft from the lathe. Then, with a small triangular scraper (mine is made from a small file ground smooth at its tip), remove some of the material from the conical part of the centre hole toward the high side already marked with chalk. Enlarge the pilot hole slightly, and run the same centre drill into the scraped-out conical hole—just enough to true-up the hole from the scraping operation.

Repeat this process until the indicator shows the run-out to be within acceptable limits. If the truth of both centres is important, they should both be checked against a dead or tailstock centre.

ROGER W. CURTIS.

Bad Soden-Taunus, Germany.

OIL PUMP

SIR,—As I was not getting a good result from my oscillating oil pump I decided to make another. This time I did not position the ports in the stand by measurement. I drilled the port in the cylinder in the way specified except that the hole was taken right through.

Then I assembled the little pump (without the tank), placed the crank at the 9 o'clock point, put the drill through the cylinder port, and made a countersink on the port face of the stand. I repeated this with the crank at 3 o'clock and had the two ports marked spot-on.

The unwanted hole in the cylinder had to be sealed; I used the tip of a 9 BA brass screw and a spot of solder.

Geelong, Australia. V. J. O'TOOLE.

STEAM AFLOAT

SIR,—I was interested in the Smoke Ring about steam cars on February 28. Although I have had no practical experience of steam engines, I can understand the difficulties of correlating the various parts of the plant for the demands of power and speed. The excise duty on any liquid fuel used in road vehicles is another reason why we may regard steam cars as being only for the most ardent enthusiasts.

There is, in my opinion, one place where steam could hold its own, and that is on the water. I had many years of experience with motor launches of from 18 to 24 ft, and I have always thought that there could be a market for a simple steam plant. The only refinement I should require would be a dynamo and battery to operate a blower as I would certainly consider solid fuel.

In a boat the demand for power is usually steady, and on a run of an hour or so stoking would be a pleasant change from the monotony of steering. I frequently trolled at minimum speed for an hour or two, and had so much trouble with the plugs oiling up that I eventually left the plugs without screw terminals so that I could change them while the engine was running.

Another objection to motor engines is that the exhaust fumes are blown inboard with a following wind. Some of the modern air-cooled diesels are highly reliable and economical, but they are so noisy that if their fuel consumption were 1,000 miles to the gallon I would not have one.

There is now a greater interest in boats than ever before, and as the sea is so easily reached today by people living well inland Mr Westbury might like to design a small marine steam plant for a launch of 18-25 ft. Some good ships' lifeboats are still to be had from time to time.

What a pleasure it would be to enjoy the smooth silent drive of a well-made steam engine, with a funnel just tall enough to take the boiler fumes clear!

Beaumaris, Anglesey. H. A. JONES.

TO LAMORNA

SIR,—Mr Eric Coleby of Hitchin, Hertfordshire, asks for practical advice on removing the contents of a workshop.

Assuming that Mr Coleby will also be moving the contents of his house, I think I could give him some very good advice from my own experience when I removed my workshop and household effects from New Barnet, Hertfordshire, to this delightful spot. As I had lived in the same house for 30 years and had a workshop nearly all the time the collection which I had kept can be well imagined, but it was moved without a hitch—a 300-mile haul.

Perhaps Mr Coleby would like to get in touch with me—particularly if he is coming to this part of England?

Lamorna, Cornwall. G. A. FLANAGAN.

SATISFIED

SIR,—Reading *The World of Model Railways* at Christmas I was quite carried away by the descriptions which it gives of railway enterprise in earlier days. I had supposed the book to be concerned entirely with small-gauge layouts. What was my surprise, therefore, to find that it contained an amazing number of facts about railways and live steam in general, together with many fascinating stories, all of them new to me.

In particular, I enjoyed Mr Martin's account of the branch and short lines in Britain and America. It seems to be that this book should appeal greatly to ME readers in the United States and Canada.

Plymouth. R. L. BUSH.