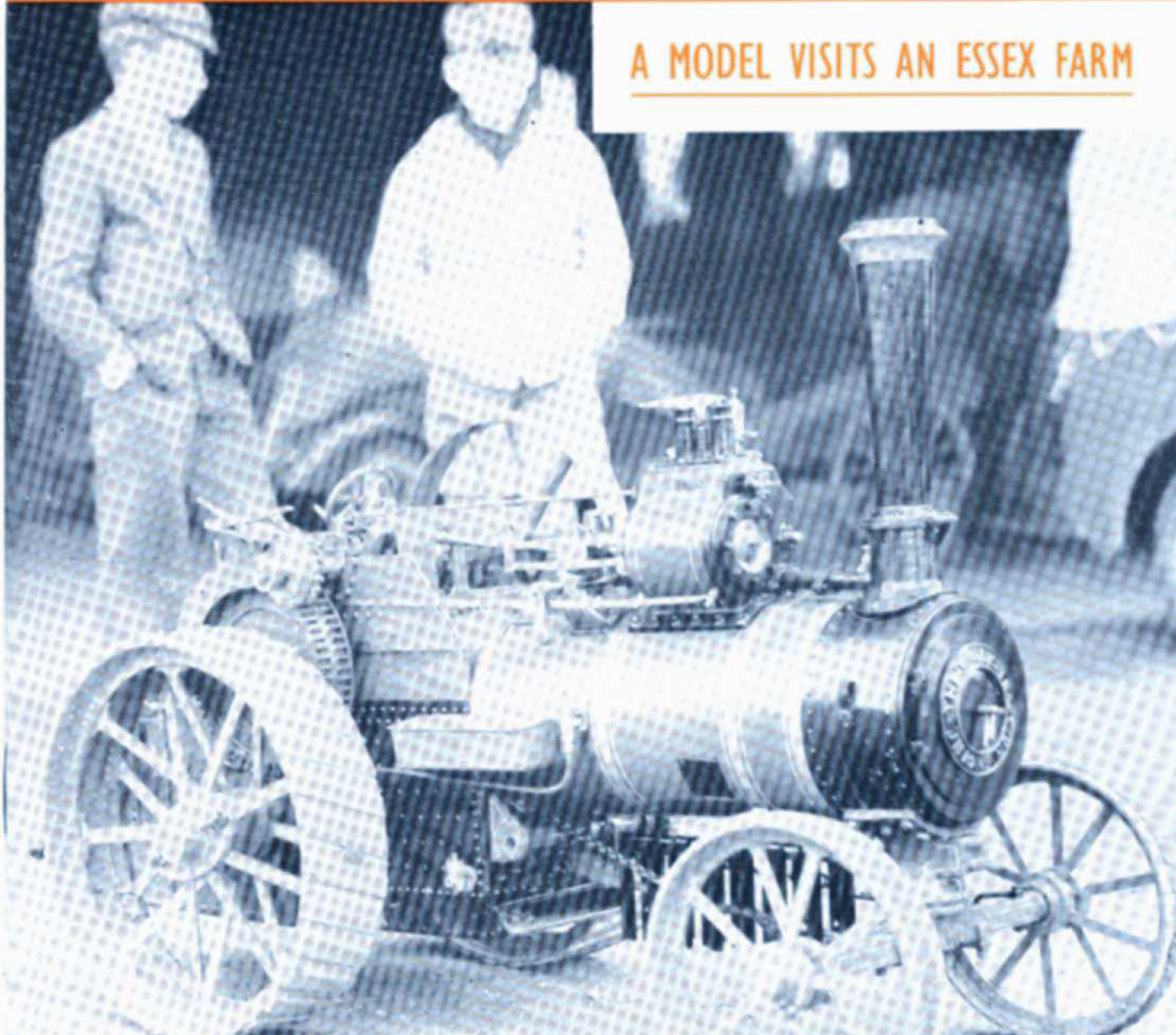
Model Engineer

THE MAGAZINE FOR THE MECHANICALLY MINDED

A MODEL VISITS AN ESSEX FARM



ONE SHILLING 6 APRIL 1961 VOL 124 NO 3117

Model Engineer

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

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COVER PICTURE

This quarter scale version of a Wallis and Steevens traction engine was taken to the farm which housed the original. *See pages 429 to 431*

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A WEEKLY COMMENTARY

Smoke Rings

By VULCAN

MR G. HONNEST-REDLICH director of Radio and Electronic Products and a pioneer well known in radio control circles, took some of his equipment along to the television studios last month to demonstrate in the " Science and Life " feature in the BBC schools programme.

Object of the feature was to show youngsters how valuable an aid radio has now become to mankind. Apart from its obvious service as a medium for public communications it is now an essential factor in aircraft control, and in the police and fire-fighting services.

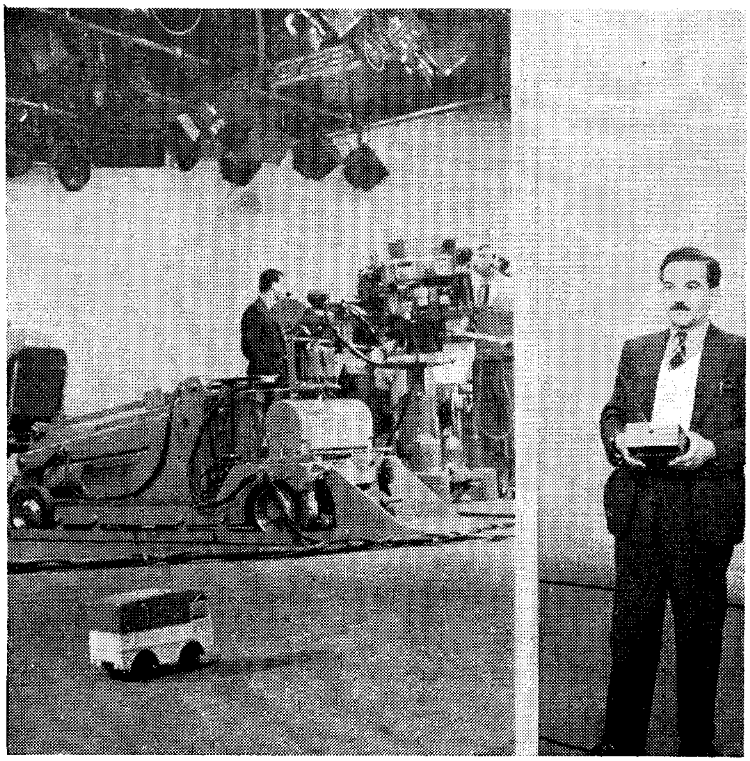
In these fields it provides a means of transmitting and receiving information. Now, with the rapid development of radio-control, it is being seriously considered as a method of transmitting commands.

Two objects—a model aircraft and a model van—were taken to the studio by Mr Honnest-Redlich and Mr Stewart Ewins. Faithfully to follow the aerobatics of a fast-flying model plane in the confines of a studio would be too exacting, so the aircraft was tethered while control of the rudder and flaps was demonstrated.

But the miniature van, modelled by its demonstrator, Mr Ewins, after a Rootes delivery van, was given the run of the studio and followed impeccably the commands given it through the invisible radio waves.

When I met Mr Honnest-Redlich a few days ago he told me that industrialists are taking an increasing interest in the possibilities of radio control.

While on the subject I would like to mention that an important new series on radio-control has been commissioned for MODEL ENGINEER. It is



Mr George Honnest-Redlich with the Dekatone equipment he used to demonstrate the radio-control of a model aircraft. The van, demonstrated by Mr Stewart Ewins, was controlled by a Tritone unit hoped that the first article will appear next month.

Richard—the first

FROM a reviewer of models to a model interviewer. Such is the bridge which Richard Dimbleby, BBC top-flight commentator for the plush occasion, has crossed in his 15 years with the Corporation.

This was revealed when the redoubtable Dimbleby was himself the subject of an interview in the Light Programme's " Let's Find Out."

How did it all begin? Richard explained that in 1936, when he was then in digs, the BBC relied on news agencies for their reports. He wrote to the Corporation asking why they did not employ their own reporters and interviewers. The BBC reply was to invite Richard to try his luck.

What was his first assignment? The Model Engineer Exhibition at the Horticultural Hall.

Models for sale

ON several occasions readers have asked for advice on the buying and selling of models, and various aspects of such transactions from either the buyer's or vendor's points of view. One often-recurring question is whether an amateur constructor who offers a model for sale is liable thereby to lose his amateur status, and become ineligible to enter a competition at the Model Engineer Exhibition.

In my view he is not in any way disqualified so long as the model was not produced with a view to sale. On many occasions, models entered in exhibitions have attracted the eye of a collector and have subsequently changed hands.

But it would be very undesirable for constructors to take advantage of an exhibition with the deliberate intent of increasing the market value of their models.

Rules not the answer

While it would be extremely difficult to lay down rigid rules, readers may be assumed that any unethical conduct would not be condoned.

Generally speaking, model engineers give very little cause for complaint, and the policy of the ME has always been against any attempts to segregate " amateurs " and " professionals " by rules which can create more injustice than they prevent.

This applies also to model engineering societies, in which members are drawn from all professions and classes; many of them would be much worse off if they excluded professional engineers, as is sometimes suggested. The true amateur is judged by his enthusiasm and general attitude.

Electric light

IN these days of the almost universal use of electricity about the only place without this twentieth century boon is the hamlet in a remote district.

Sometimes the agricultural workers in these areas spend their days in the fields toiling beneath high-voltage cables of the grid system and return each evening to a cottage lit by oil.

Yet one of the first applications of the new wonder light, when arc lamps were the latest thing and incandescent bulbs were still a laboratory dream, was in agriculture.

To apply the benefits of electric light to industry and business was an obvious development. But before arc lights could be employed to illuminate the workbench or shop counter, cables had to be laid from the generating station to the premises.

Out in the fields, remote from power stations, was a means of providing current for arc lights—a dynamo fitted to a portable engine. With the arc lamp set upon a tall wooden derrick threshers could work on in the dark autumn evenings.

I came across this interesting tit-bit while reading *The Social History of Lighting*, published by Routledge and Kegan Paul in 1958, and written by Mr William T. O'Dea, Keeper in the Science Museum, South Kensington.

Museum rally

THOUGH it is several weeks to go yet I am sure you will not mind being told that the Department of Science and Industry at the Birmingham City Museum and Art Gallery is to organise another traction engine rally.

This event last year was highly successful so the dose is to be repeated. A number of entries have already been received and it is hoped to provide various forms of demonstration.

Mr N. W. Bertenshaw, deputy director of the City Museum, hit on a winning idea when he organised his " steam weekends," at which visitors could see some famous old engines actually working in steam.

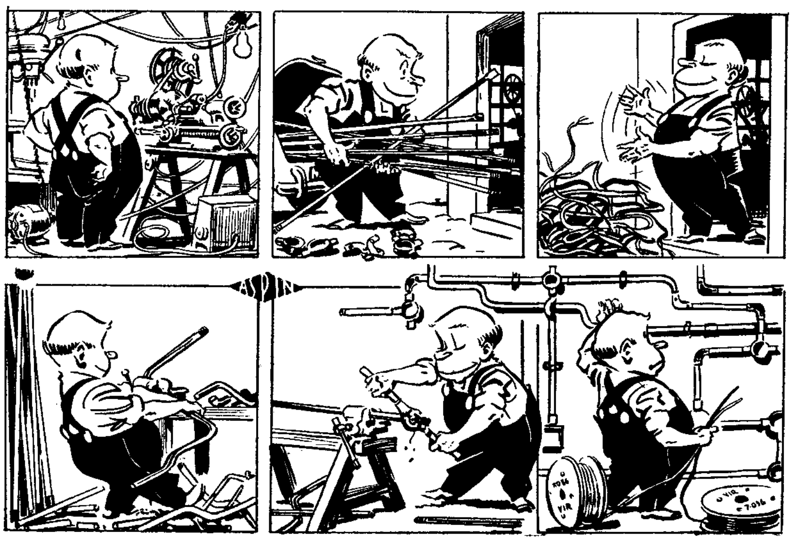
Those who attend the rally, which is to be held on May 14, will also have an opportunity of witnessing this spectacle as it is intended to couple a " steam weekend " with it. Time of both events will be from 12 noon until 5 p.m.

Mr Bertenshaw, and his assistant keeper Mr G. Wilding, are to be congratulated for the enterprise and imagination they are displaying.

Next week

An issue for the locomotive enthusiast. There will be further instalments in the SIRENA *and* ROB ROY *series contributed by Mr J. J. Constable and Martin Evans; Robin Orchard will be writing of the Caledonian Pugs in his Locomotive Library articles; and Mr E. A. S. Cotton writes of a* 15 *in. gauge miniature Swiss locomotive.*

CHUCK . . . . . . THE MUDDLE ENGINEER



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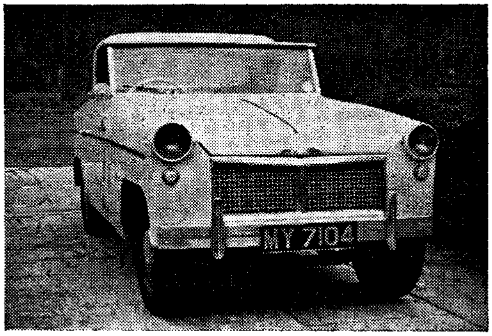


QUIET TO RUN and LOW ON OIL

HORACE P. CLAYDON concludes the two-part story of his home-made car engine

PINCH-BOLTS on the shaft take up less space than nuts, which would increase the crankcase volume, always an important point in two-stroke design.

I have also tested the efficiency of a nut and 10 deg. taper fitting compared with the pinch-bolt principle, and I have found that the pinch-bolt stood up to a greater torque.

Before turing down the mainshafts to $\frac{7}{8}$ in. dia. (the size of the main ball races) the other two cranks (Fig. 5) were finished, the 10 deg. taper holes being bored with the main end journals held in the four-jaw chuck, except for the rear flange fitting, which was left as the last operation between centres when the complete crankshaft had been built up, to make sure of a true running flywheel. A heavy-duty ball race is clamped in a special housing between engine and clutch housing to support the flywheel and clutch thrust (Fig. 5).

Six ball races

To save turning the main journals after complete assembly, which would have involved a long bifurcated turning tool, I did each one separately, using a three-point steady to centre each journal, with a Slocombe centre drill in the tailstock gripping the other end in the four-jaw chuck after it had been clocked to run true (Fig. 6). The job was then reversed in the lathe. I removed the other end crank while I was centring and finishing the journal to size.

The slot for the distributor drive was end-milled by clamping the crank firmly to the cross-slide. Six ball races support the crankshaft, two for each inside main journal, with glands between, and one at each end. A $\frac{1}{16}$ in. end-float was allowed for expansion between end bearings. Big-end roller races, $\frac{9}{16}$ in. wide, are held by thick washers machined from light alloy and pinned to the crankweb to prevent rotation, Fig. 5.

Balance weights are cast in light alloy, as the engine is almost self-balanced by the 120 deg. set of the cranks. Bronze or steel weights would tend to cause severe torsional vibration, with risk of fracture, in such a long slender shaft. Connecting rods I cast in light alloy from a wood pattern which I had left over from my steam engine. The outer shell of the big-end roller race is an easy fit and capable of rotation when hot, to even out the wear. The small end is not bushed, as the rod is a good bearing metal for the gudgeon-pin. I chose light alloy for the cylinder barrels because of its good heat conductivity, ease of machining, and weight. Again, centrifugally cast-iron liners are usually more reliable in quality than a sand-cast iron barrel, and light alloy is less resonant to mechanical noises.

My cylinders were first faced up both ends in the four-jaw chuck. Then the inlet and exhaust flanges were machined flat as they formed a good surface for clamping to the boring table of the cross-slide.

I drew in Hepolite liners with screwed rod while I was heating the cylinders over the domestic gas ring. Here I had trouble, for I had over-estimated the coefficient of expansion of the alloy cylinder, and it was only

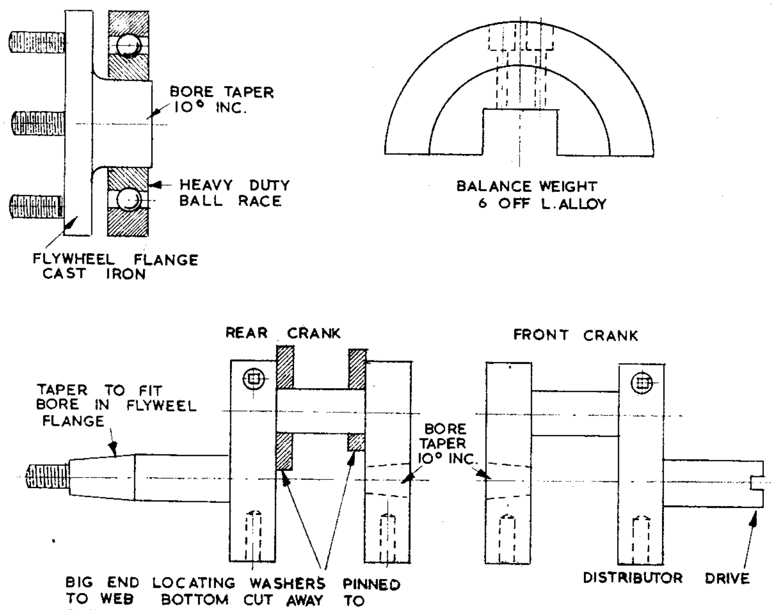


FIG. 5

after a great struggle and much overheating of the cylinder—the edges of the fins began to melt—that I managed to get the liner right home. Needless to say I made the other two an easier fit, about three thou interference. The bores were finished with a keen high-speed tool in a boring bar between centres, using medium backgear speeds and slow feed.

I made the ports by drilling, end-milling and filing. Transfer ports at 45 deg. to the cylinder axis were drilled out by having a lug cast on each side of the barrel to start the drill at this angle. False transfer passages were then attached to the cylinder by small setscrews. This eased the work of pattern making and coring, and also enabled the passages to be carefully streamlined and polished inside.

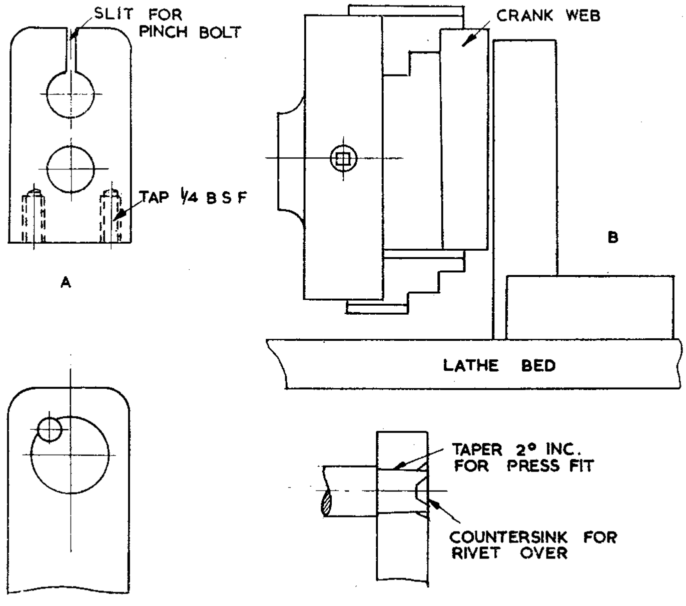


FIG 3

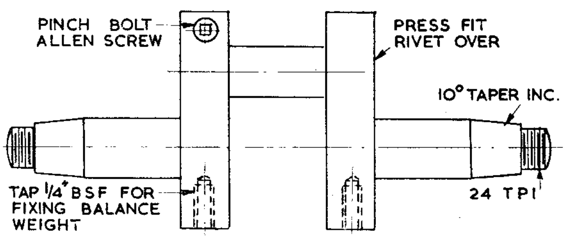


FIG. 4

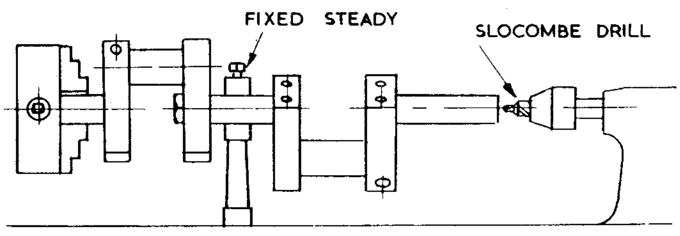


FIG 6

Low on oil

A Ford carburettor supplies the mixture through the induction manifold (Fig. 8). I had to experiment with jets and choke area for some hundreds of miles before I arrived at the ideal mixture control. Jets were specially made for the trials, and the choke area was made adjustable by drilling a $\frac{3}{16}$ in. hole in the side and inserting an adjustable rod held by a setscrew.

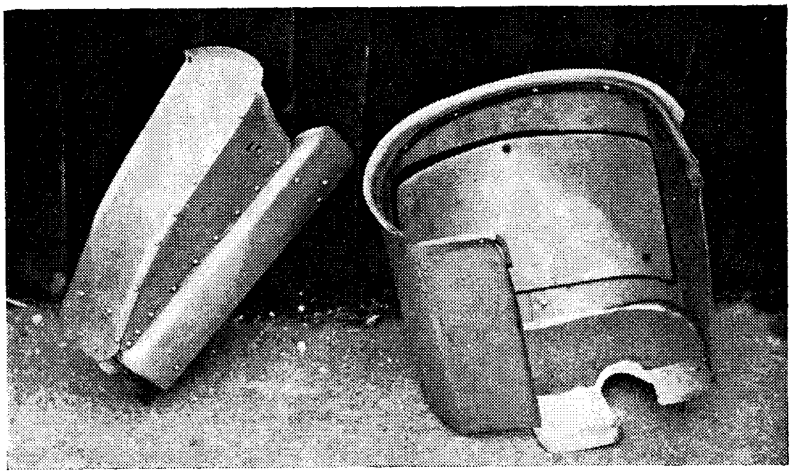
A petrol-oil mixture of 30-1 gave the best all-round results. This low oil consumption I attributed to the exhaust-heated inlet manifold, which tends to separate the oil from the petrol, and to the crank-chambers which receive extra heat conducted down the alloy cylinders, though unfortunately it somewhat reduces the breathing efficiency.

No unpleasant sounds

Exhaust manifolds are built-up from bits of gas barrel. They are arc-welded at the centre joint, but are push-fitted at the ends to allow for slight movement when hot. Large screwed elbows were useful for making the bends and for easy separation in cleaning. The system may not be best for maximum per formance, but with two expansion chambers, one near the engine and another under the chassis, a very quiet and flexible engine has resulted. It is quite free from the unpleasant sounds made by normal two-stroke cars, and baffle-plates are not needed.

I gave much thought to cylinder head design. The hemispherical type has given excellent results after some experimenting. At first I tried a 5 : 1 compression ratio. I later increased it to 7 : 1, with much improved performance, but this ratio caused pinking on full throttle. I soon found the remedy on examining the combustion chambers after a long run. The sharp edges round the plug holes, and the heavy carbon deposits from the 16 : 1 petroil mixture which I had first used, were flaking and became incandescent. I set to work with a scraper and smoothed off all the surfaces, until I arrived at a pear-shape with the plug in the corner, making the shortest possible distance from the transfer port. It gives excellent two-stroking at all loads (Fig. 8).

The distributor for coil ignition is a six-cylinder type from the breaker's yard. I ground off three of the contact-breaker cams to get the right spark sequence. Points are timed to open at



Engine covers

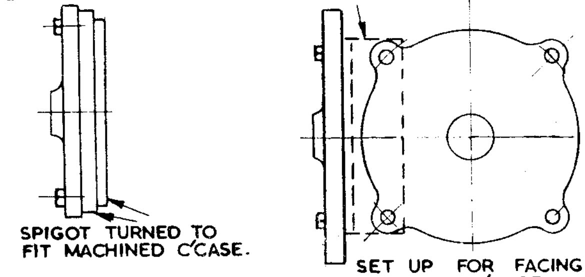


FIG. 7.

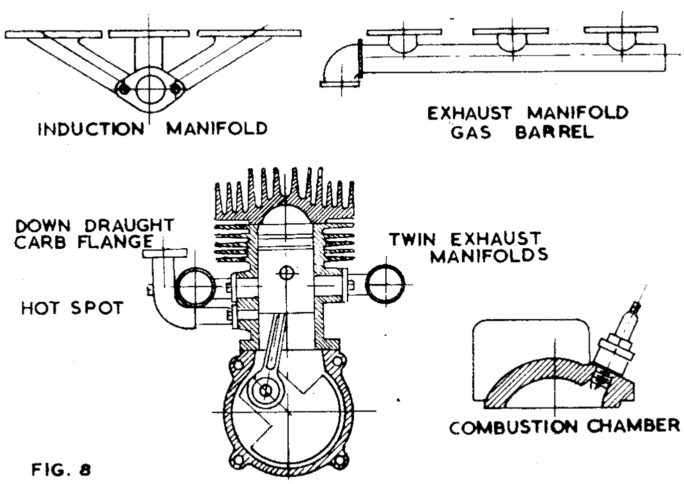
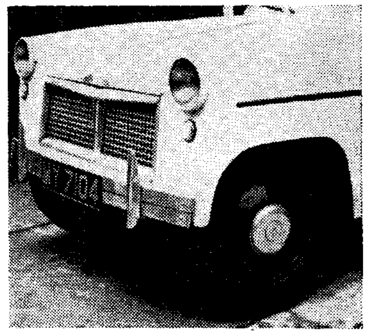


FIG. 8

$\frac{1}{4}$ in. b.t.d.c., spark plug gap 0.025 in.

Here are the general details: Port sizes, exhaust 1 in. wide × $\frac{5}{8}$ in. high. Inlet 1 in. × $\frac{1}{2}$ in. Transfer $\frac{3}{4}$ in. × $\frac{3}{8}$ in. Top gear ratio 5.3 : 1. Road wheel diameter 25 in. Maximum speed 45 m.p.h. Petrol consumption 45 to 50 m.p.g. Big-end roller races SKF type CRL 7. Main ball-races SKF, type RLS 7. Engine weight without clutch, flywheel, gears and carburetter, 40 lb. Transmission via propeller shaft to rear axle. Chassis, modified Singer 8 h.p. Body and wheels, home-made in light alloy.

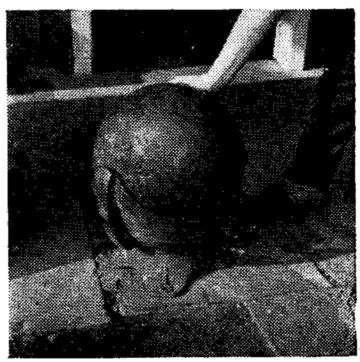
The car had covered some thousands of miles on steam before I fitted the petrol engine. To relate these experiences would be a long story.... ■

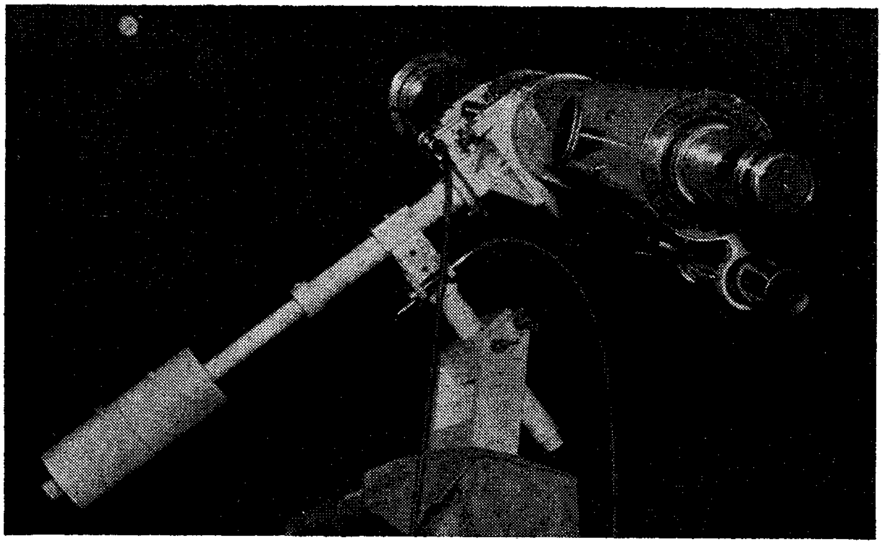


WHAT IS IT, AND WHY?

THIS ponderous piece of farm machinery, photographed at the Old Museum Village near Monroe, New York, consists of a hollow cast-iron ball mounted free to turn in a weighty base which has holes for spiking it to a plank. Its purpose is far less obvious.

It is a hog oiler. The base is filled with oil, and pigs rub against the ball of their own accord, so getting a coat of oil on their bodies. Present-day pig breeders can probably surmise, better than I, what kind of oil was used and for what reason? At least it is evident where the American expression "slick as a greased pig" came from.—HARRY WALTON, White Plains, NY.





LAURIE H. JOYCE,

in this second article, finishes the equatorial mounting for a $3\frac{1}{2}$ in. telescope

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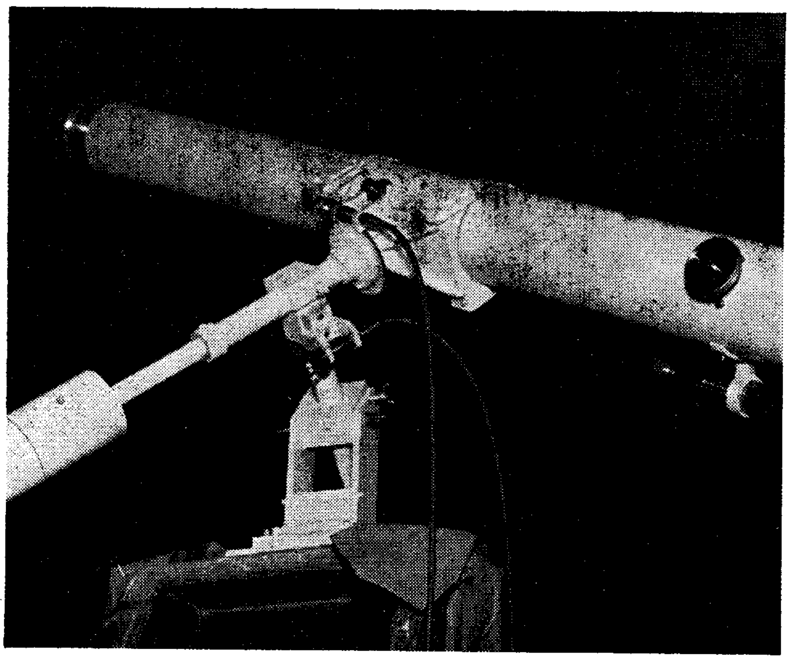
We set it to study the moon



TURN up a stub mandrel on which you can mount them to turn the outside and other end. Press them into the tubes, and check alignment by trying the shafts through. A reamer, carefully used, will help if the bearings do not quite line up; they must be free, without shake. The two collars are $\frac{1}{2}$ in. lengths of 1 in. dia. steel bored $\frac{3}{4}$ in. and drilled and tapped for a 2 BA Allan grubscrew.

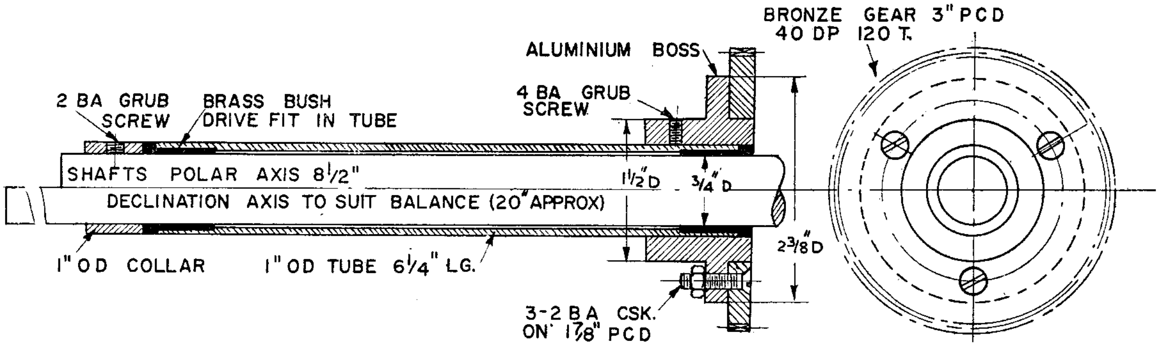
My polar axis mounting block was aluminium. It can be machined to $2\frac{1}{4}$ in. × $2\frac{1}{4}$ in. × $1\frac{3}{8}$ in. on the shaper, or on an angle plate in the lathe, or it can be mounted on the saddle for the use of a flycutter. Mount it in the four-jaw and bore it centrally a close fit over the tube. Put in a 2 BA grubscrew to prevent any movement, and drill and tap for the four $\frac{1}{4}$ in. Whitworth studs. Tighten the studs home, leaving $\frac{5}{8}$ in. protruding for wing nuts.

Gear bosses

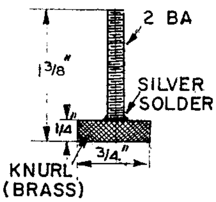
The two gear bosses were an aluminium casting, cut through the centre. A wood pattern consisted of $2\frac{1}{2}$ in. × $2\frac{1}{2}$ in. dia. stepped down to $1\frac{5}{8}$ in. dia. for $\frac{5}{8}$ in. each end.

A cored casting would reduce price and work in boring. Grip in the three-jaw chuck to clean up each end of the casting before cutting. When it is cut, grip it again in the chuck to bore out to a drive fit on the end of the tube. Face it off and shoulder it to fit the gear wheel, at the one setting.

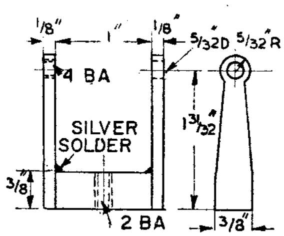
My declination axis mounting was a block of aluminium, which cleaned



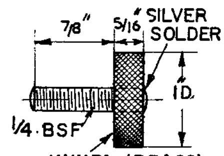
BEARING TUBE 2 OFF



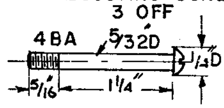
CLAMP SCREW 2 OFF



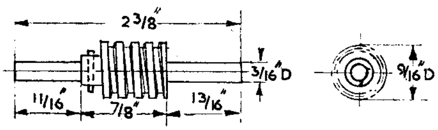
CLAMP BUCKLE 2 OFF



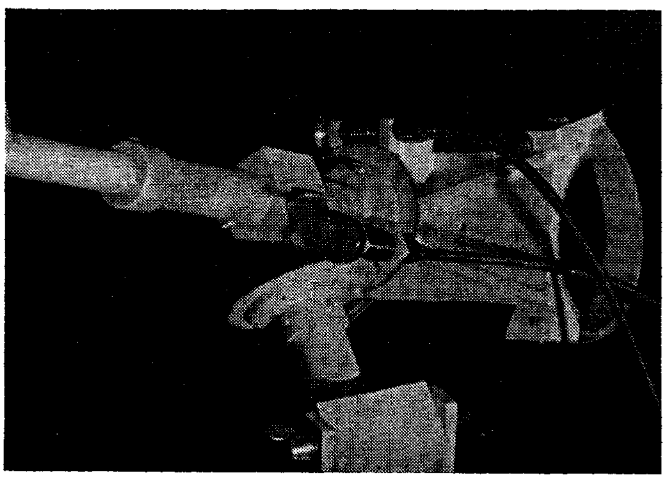
ADJUSTING SCREW
3 OFF

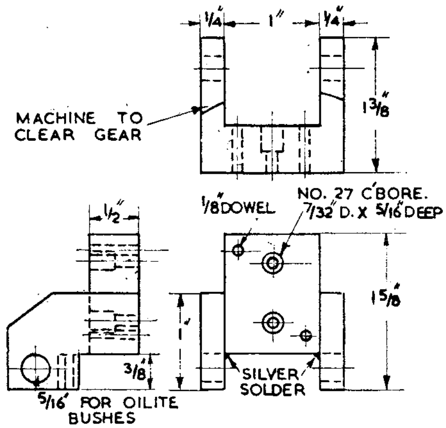


HINGE PIN 2 OFF
STAINLESS STEEL



STEEL WOPM 2MM PITCH





GEAR FRAME 1 OFF BRASS

up to the sizes shown. The steps on the sides are not necessary, but they were there. A $2\frac{1}{2}$ in. length of $1\frac{5}{8}$ in. square would be better and would give a little more support to the tube, but do not forget to allow variations to match on the gear frame.

After being squared up on the shaper, the block was set up in the four-jaw chuck to bore for the cross-tube. The gear frame was silver soldered together, and fitted to the mounting before it was set up again in the four-jaw to bore for the $\frac{3}{4}$ in. shaft—a drive fit. At the same setting I turned out the gear frame to clear the gear wheel. Grubscrews were again fitted for extra security.

I made up a pattern for the telescope support casting with $\frac{1}{4}$ in. plywood and deal blocks, and loosely dowelled on the shaped blocks at each end to help the moulding. The casting was clean. I drilled two holes through to screw it on to the catchplate of my ML7, bored it out a drive fit for its shaft, and faced it off. The lugs for worm shaft bearings I machined to a fairly close clearance for the gear wheel. I used a short piece of the $\frac{3}{4}$ in. shaft as a gauge for boring, about 5 in. long, and reduced by a couple of thou for $1\frac{1}{2}$ in.

Flycutting the casting

Then I used it to hold the casting while I flycut it for the diameter of the telescope, $3\frac{1}{2}$ in., and two thicknesses of $\frac{1}{8}$ in. felt. I set up the vertical slide facing the headstock with the bar clamped on, locating in one of the T-slots. Placing the casting on the bar and clamping it in line with the mandrel by the two Allan grub-screws, I brought it up to centre height. A packing fitted under the lower edge of the casting prevented it from twisting under the cut.

To a long boring bar, which I had made when I built my drilling machine I fitted a silver steel cutter. It was only 5/32 in. and it protruded about $1\frac{1}{2}$ in., but by taking light cuts I had no trouble at all and got a good finish. The ends of the bearers I filed square and drilled and tapped from the straps when they were made.

I first tried Meccano worms, but they did not mesh quite well enough. As the pitch of the wheel worked out at almost 2 mm., I cut two worms accordingly, from $\frac{9}{16}$ in. dia. brass rod, bored and reamed $\frac{3}{16}$ in., and fitted to silver steel shaft with $\frac{1}{16}$ in. taper pin. This was my first attempt, but by grinding a tool with angles to match the gear and 1 mm. wide, by taking light cuts and by frequent trying to the gear, I produced a very good result. The worms were then run in together, with pumice powder, which washes out much easier than emery or carborundum.

Finding the shaft centres

To get the centres for the shafts I just put the gears together and offered them up to the bearing lugs, marking them across. I drilled out for the Oilite bearings. So that there should be no end-play at all on the worm shaft, I turned the worms to length after the bearings had been pressed home.

The main shafts were now cut and fitted. If the casting and mounting are heated, the shafts will drop in and shrink on. The declination axis shaft is about 20 in. long, and will depend on the weights necessary to balance the telescope. Balance is critical for smooth operation. My weights were simply 3 in. lengths of $2\frac{1}{2}$ in. dia. steel, bored a sliding fit on the shaft and fitted with a 2 BA set-screw. I enlarged the slots so that they could be turned with a coin for easy adjustment.

For most of the other fittings—the buckles, screws and flexible drives—the drawings and photographs should give all the information needed. The crank I included for use in turning the mounting quickly from one setting to another.

To make the base I used a 5 in. long piece of 4 in. × $\frac{1}{2}$ in. b.m.s. drilled and tapped as in the drawing. The adjusting screws were three $\frac{1}{4}$ in. BSF. Five holes were counter bored for 4 BA Allan screws for the supports, and the 4 BA tapped holes for spirit levels. The 21/64 in. hole was for the $\frac{5}{16}$ in. BSF Allan screw which clamps the whole fitting to the tripod.

The supports were cut from 2 in. × $\frac{1}{4}$ in. b.m.s. 6 in. long with a $2\frac{1}{4}$ in., piece of the same material between drilled and tapped 4 BA × $\frac{1}{2}$ in. to match the base.

The angle of the cutaway corner and the holes for the polar axis mounting depend on the latitude at which the telescope is used, as the polar axis must be parallel with the earth's axis—in other words, point to the Pole Star. A small amount of adjustment is provided by the curved slot for the upper bolt. Wing nuts give easy adjustment.

I fitted a secondary plate to the top of the tripod—6 in. of 4 in × $\frac{1}{4}$ in. b.m.s. drilled on the centre line at 2 in. from one end for a $\frac{3}{8}$ in. bolt through the tripod head, and with three countersunk holes for brass wood screws equally spaced around it on a $3\frac{1}{2}$ in. p.c.d. At 2 in. from the other end on the centre line a $\frac{5}{16}$ in. BSF hole was drilled and tapped for the clamping bolt. This brought the mounting back a bit to shift the whole weight more centrally over the tripod.

On completion I gave the telescope two coats of white enamel so that it could be seen a little easier on a dark night.

I think the photographs will show clearly any points which I have not covered, although they were taken from a step ladder. Those with the telescope completed were taken when we had set it up to study the Moon, which can be seen in the picture, and is not just a blur on the negative.

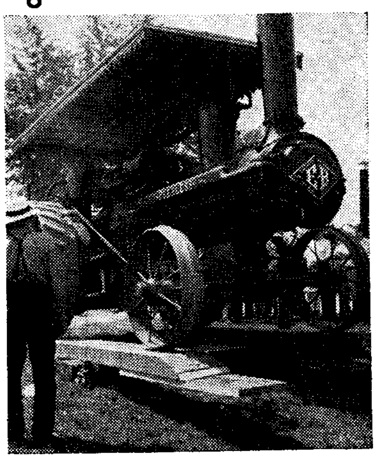
For the flexible drive I used an old car speedometer drive. The inner drive was 7/32 in. dia. I cut it to length with the emery wheel and cleaned it in *Trico* after squaring the ends, which I tinned with solder paint before I soldered on the ends. I managed to get all the small brass parts nickel-plated. To prevent rust the flex was given a couple of coats of enamel after the ends had been soldered on; grease would have been messy for the operator. ■

Could you balance a road engine on a teeter-totter?

It's a common event at the annual traction engine meet at Kinzers, in Pennsylvania. Those who qualify as experienced operators may attempt to run one of the engines on to this giant see-saw in such a way as to balance the machine across it. The trick, of course, is to avoid tipping the engine down in front.

Visitors to the meet are tempted by steam-cooked corn and hot dogs. The steam comes from a retired engine boiler, and with shoo-fly pie, a rich pastry that is a specialty of the Pennsylvania Dutch region.

The bearded driver in the photograph is not elderly, but one of the Amish, or Mennonites, who own many farms in this prosperous countryside.



Accuracy in CHUCKING

WORKSHOP HINTS and TIPS

By GEOMETER

GENERALLY, at a first chucking of bar stock in a self-centring chuck one expects slight eccentricity on checking with a surface gauge, or testing with a scraping cut. This is because the chuck grips over a range of sizes, and it is very difficult to eliminate from a screw the periodic errors which cause small variations in its pitch. The scroll of the chuck, which moves the jaws, is of course a type of screw.

On measuring machines and jig-borers where feedscrews must be to the highest standard of accuracy, there are special arrangements to compensate errors of pitch; or the errors are tabulated so that allowance can be made for them. Inevitably, then, in commercial chucks, there are likely to be small built-in errors, which for accurate work one should be prepared to avoid.

Accuracy at a first chucking—particularly when a self-centring chuck has been strained—can often be improved by packing at a jaw, or two jaws, with shimstock or foil of suitable thickness. Tinplate may also be used, and even paper when the jaws have considerable gripping surface and the diameter of the work is fairly large—otherwise concentration of pressure will cut through the paper. Similarly, in chucking hard, heavy pressure will mark the surface of the work, unless protective foil, preferably brass, is used as a sleeve round the work or as strips at the chuck jaws.

At a second chucking of bar stock, accuracy can be promoted by observing two points. One—the more important—is to dot the stock to No 1 jaw before unchucking, so that it can be replaced as originally fitted. The other is that in the original and every subsequent chucking one should tighten on No 1 jaw (or screw). Thus, one duplicates the original conditions, neither replacing nor tightening the work at hazard, however long the time between chucks.

From this comes the axiom of many turners: " Always tighten on number one." Then there is no doubt about which jaw (or screw) should be used.

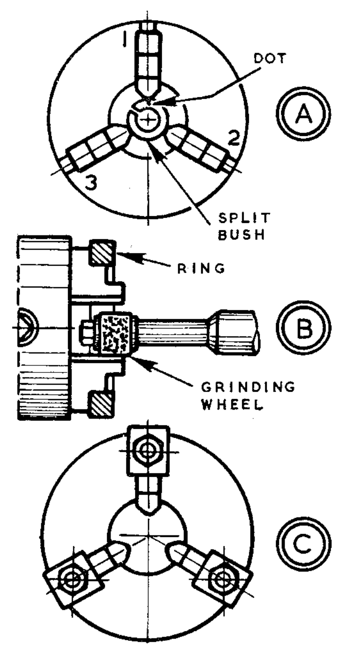
By combining this principle with that of the sleeve to protect work, the highest standard of accuracy is obtained at first chuckings. A piece of material, such as brass, is chucked, faced, centred, and then drilled and reamed, or bored. After dotting to No 1 jaw, it is removed and hacksawed along the side to make the split bush, *A*, in which bar stock or turned components can be accurately and safely gripped.

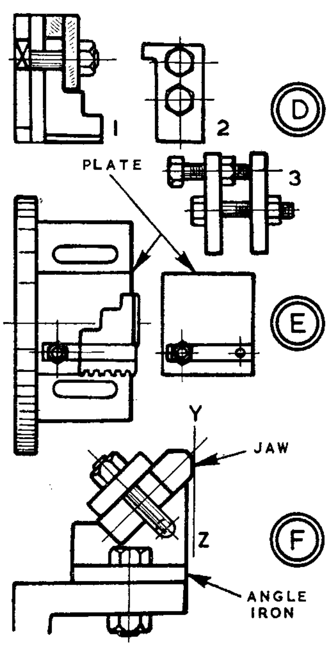
When such a bush is tapped in the bore, it can be used for chucking screwed components, though an unsplit, tapped mandrel serves just as well. In fact, mandrels of various types machined in the chuck and used immediately (or dotted for resetting) frequently provide the best solution to the problem of ensuring accuracy in chucking—or in rechucking for second operations.

Even with split bushes or mandrels, accurate chucking may not be possible when chuck jaws are bell-mouthed at the ends. It applies also to four-jaw chucks, whose jaws like those of the self-centring type can be trued by grinding. In the lack of other means, a tool post grinder can be used with a grinding wheel that will easily enter the body of the chuck. To hold the jaws of the four-jaw type, a ring is mounted at the second step, and the inside faces set spinning concentrically for grinding, *B*.

A ring outside the jaws will not, of course, serve for a self-centring chuck, because of the reverse thrust on the scroll. Each jaw must be separately clamped. It is done with a bolt in the tee-slot, a plate and a packing piece, *C* and *D*1. Alternatively, a hook clamp can be made for each jaw, *D*2 and 3. With either jaw holder, closing pressure should be applied to the chuck before final clamping.

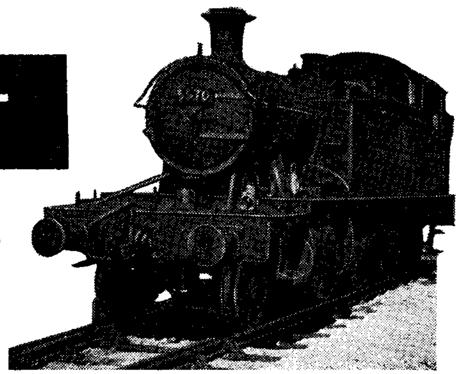
For grinding jaws separately, using a cup wheel, a set-up can be made on an angleplate on the faceplate, locating each jaw by its groove on a squared strip on a parallel plate, *E*, and then clamping; while to reduce width on chamfers, each jaw can be mounted in a pair of angle iron supports, *F*, and clamped through hook bolts for grinding on face *Y-Z*. ▣





Continued from March 23, pages 362, 363 and 364

FIREFLY



GWR 2-6-2 TANK ENGINE OF THE 45XX CLASS

Work on the ¾ in. scale model progresses to connecting rods and coupling rods

Designed by MARTIN EVANS for three gauges

AN ME STAFF FEATURE

Let us return to the ¾ in. scale *Firefly*. The next parts to tackle are the crankpins, which are all machined from $\frac{5}{16}$ in. silver-steel. There is really no need to harden them; the very large bushes to be fitted to the big-ends should last quite a long time.

The retaining collars for the driving crankpins and the trailing crankpins are similar. After they have been placed on their pins, a $\frac{1}{16}$ in. taper or split pin can be fitted. This is done, of course, before the pins are pressed home into the wheels.

Owing to the proximity of the crossheads and slide bars, the leading crankpin has to be much shorter than the others. The ideal retainers for the pins would be Allen screws, with the heads turned to the countersunk shape, as can be done quite easily in the lathe.

Eccentrics

Before the quartering of the driving and coupled wheels can begin, the eccentrics should be turned up and fitted. They are made from 1⅛ in. dia. bright mild steel; the material supplied for shafting is very suitable. A suitable length is chucked and a substantial parting tool is used, ground with plenty of top rake but with a small front clearance. A fairly low speed and plenty of cutting oil should give a good finish. Users of light lathes could use the tailstock for additional support to the bar, eliminating any possibility of chatter.

If each eccentric is machined with its flange to the left, the $\frac{3}{16}$ in. wide working face can be turned exactly to size and the eccentric be parted off with its flange oversize by a shade. The eccentrics can later be re-chucked to skim down the flange to the exact 1/32 in. thickness.

Mark out the axle centres as accurately as possible. One method is to leave a very small centre in the eccentrics on the flange side, chuck the eccentrics in the three-jaw, flange outwards, and mount a scriber crosswise under the lathe toolholder facing the job, packing it up until it is exactly at lathe centre height; clamp it firmly. Locate the scriber point in the centre of the eccentric as accurately as possible, move the saddle just clear of the eccentric, lock the mandrel, and move the cross-slide forward $\frac{3}{16}$ in. with the micrometer dial. The back end of the scriber can now be given a tap with a hammer, to make a suitable centre in the eccentric. The saddle must, of course, be free on the lathe bed.

Repeat for all the eccentrics, and then mount them in turn in the four-jaw chuck, setting the new centres to run truly. Check for side-wobble with a d.t.i. if you have one. Bore out to 0.495 in. dia. and ream ½ in. dia.

The eccentrics are held to the axle by 4 BA Allen grubscrews which should be as long as possible without fouling the eccentric straps. Quartering of the driving and coupled wheels can then be carried out, the axleboxes, eccentrics and so forth having been put in place beforehand. As I have dealt with quartering several times recently, I need not go over the routine again.

Our next parts to make, the coupling rods, will probably give us more hard work than any other parts of the engine. But there is nothing terribly difficult about them, and if they are made with care they are one of the most satisfying pieces of work to undertake. Swindon coupling rods are beautifully designed; there is no wasted metal anywhere and the curves around the crankpin bearings are worth the closest study.

My drawings are very nearly to scale, just a little more metal being allowed for safety's sake, especially in the thickness of the rods between bearings.

Some builders have trouble in getting the centres correct for the frames, particularly where an intermediate joint is involved. To tackle this problem I generally mark out the front section of the rods using dividers, drill the rods to suit the crankpins, and try them in place on the locomotive. At the same time the intermediate joint is made up and finished off and the rear bearing drilled, this being marked off from the centre bearing so that any inaccuracy in the intermediate joint does not affect the result.

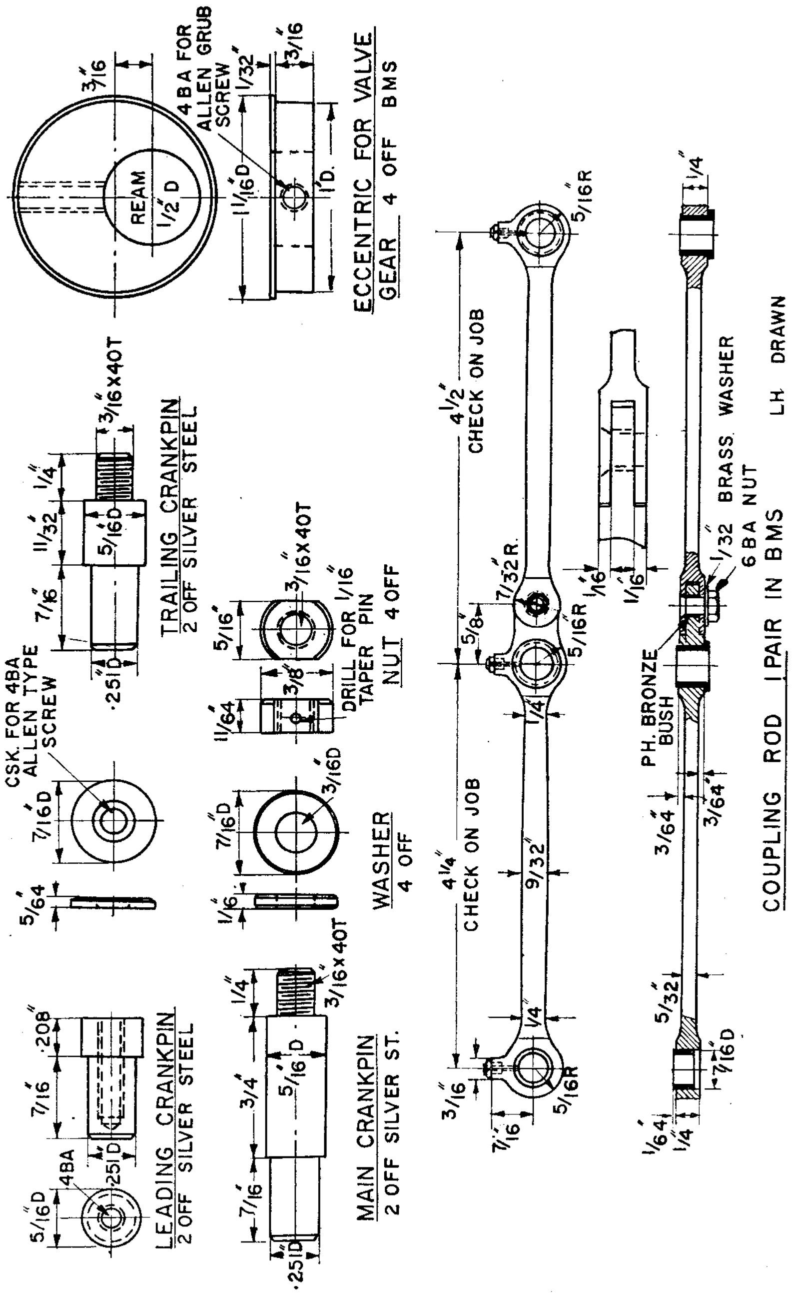
On the job itself it will soon be apparent if the holes are out; if necessary, they can be drawn over in the required direction with a round file. The holes are then opened out to $\frac{7}{16}$ in. dia. for the bushes. It is, of course, very important to have the axleboxes packed up to the correct running position before you try on the coupling rods.

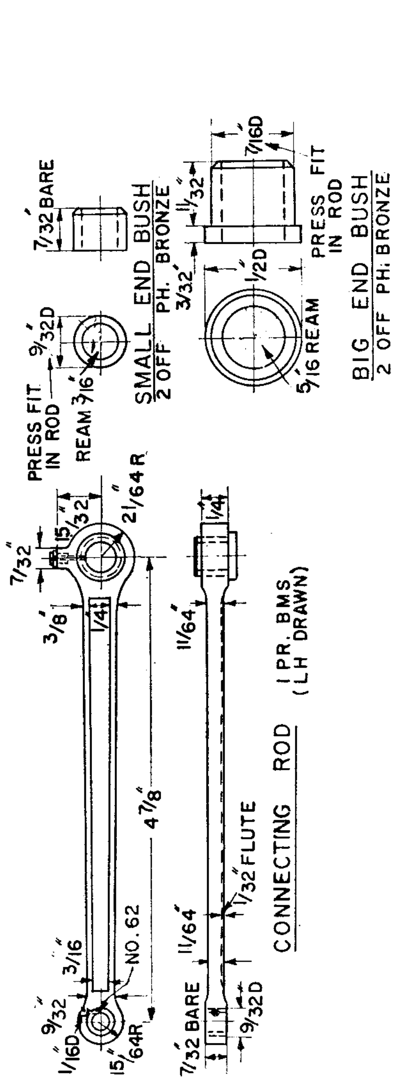
Fitting the bushes

The bushes should be turned from good quality drawn phosphor-bronze and made a tight press fit. If there is any doubt about this, a locking screw —a 4 BA Allen grub is suitable—can be put through the bottom of the rod. This is actually done on some full-size coupling rods such as those on LNER engines, though a flat key is always used as well.

To make a really good job of the intermediate joint, the tongue end can be bushed with phosphor-bronze. This bush would be ¼ in. dia. outside, a press fit into the front section of the coupling rod, ⅛ in. long, and reamed $\frac{3}{16}$ in. internal diameter.

railways that for fast passenger working the single-driver engine was essential, as it was thought that the friction of the coupling rods on even the four-coupled type would be excessive at speeds over 70 m.p.h. There is no doubt that, considering the valve and valve gear design of the period, the Singles were fast; the famous Dean GWR Singles and the Johnson Singles of the Midland did





A point to notice is that the main bush on the driving crankpin should be reamed a good working fit but the leading and trailing bushes can have up to 0.008 in. clearance. I do not know what the practice was in the shops at Swindon, but on the LNER it was customary to allow 1/32 in. clearance at these points; it allowed the rods to knock, setting up the well-known Gresley clank. Full-size rods are generally allowed wear of up to 0.030 in. before new bushes are fitted. This is generally done after about 100,000 miles.

At one time it was accepted on the over 90 m.p.h., though the equally famous Stirling eight-footers never achieved this speed. The large size of driving wheels on these engines was intended not only to get a better grip on the rails; it was also to lower piston speeds. But with modern lubrication the bogey of high piston speeds has been laid once and for all. The BR 2-10-0s have achieved a piston speed of 39 ft per second, a figure which would probably have caused old Pat Stirling to grab the bottle of Scotch ! In the same way, the extra friction of coupling rods has been put into proper perspective, with *City of Truro*'s somewhat doubtful 102.3 and *Mallard's* 126 m.p.h.

Readers have often asked why we never describe a model Single. Well, the lack of adhesion of the Single is very much against it for heavy passenger hauling; on the other hand, when I was driving one of the late H. P. Jackson's GNR Singles (in 3½ in. gauge) I found no difficulty in getting away with a load of about 24 stone (336 lb.).

Connecting rods

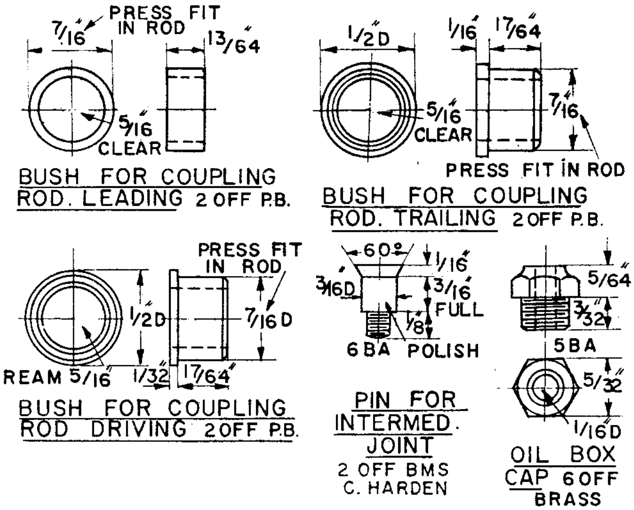
The connecting rods are really quite easy to make. There is no intermediate joint to bother about, and any *slight* inaccuracy in centres need not worry us as the pistons and piston rods have yet to be made. The material required is the usual 1 in. × ¼ in. b.m.s.

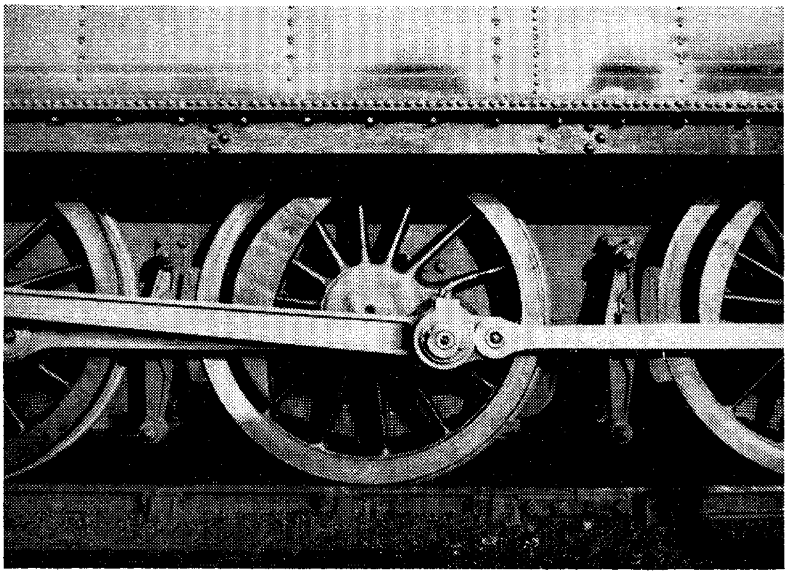
After the two bearings have been drilled ½ in. dia. initially, the blanks can be held down on to a piece of heavy steel angle bolted to the vertical slide, the flute being cut by a Woodruffe cutter 5/32 in. or 3/16 in. wide by 5/8 in. or 3/4 in. diameter. The taper flute can be achieved quite easily by removing one of the bolts and swinging the rod blank on the other bolt, clamping the free end at the needed angle.

The big-end bush is a really substantial one this time because readers tell me that no part of an engine in constant use shows signs of wear so quickly. Drawn phosphor-bronze is as good a metal as any; and lubrication should not be neglected.

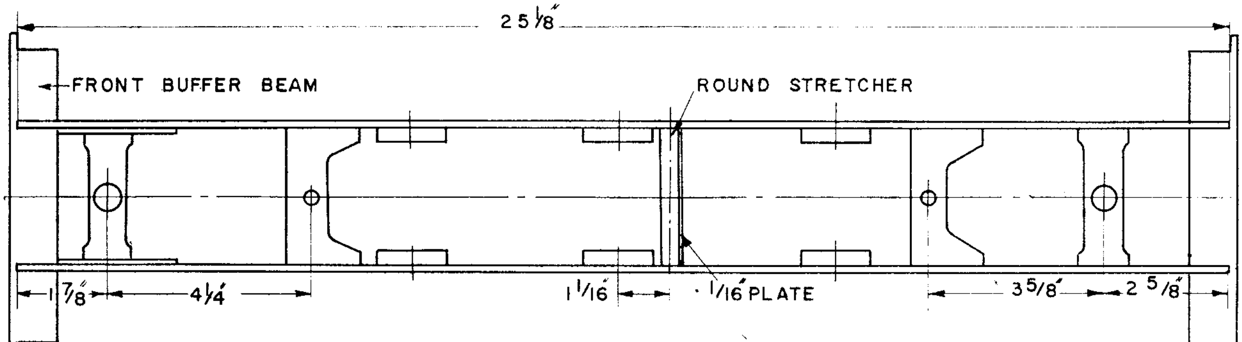
My picture gives a good idea of the shape of the big-end and the coupling rods on the 45XX class engines.

★ *To be continued on April 20*





Big-end and intermediate joint of a GWR 45XX



PLAN OF MAINFRAMES SHOWING POSITIONS OF STRETCHERS

For your BOOKSHELF

Russian Steam Locomotives, *by H. M. Le Fleming and J. H. Price.* (*John Marshbank,* 25*s.*)

VERY little is known in this country of the vast Russian railway system and this book is probably the first in the English language dealing exclusively with the steam locomotive of Russia.

Of the joint authors, it may be said that H. M. Le Fleming is well-known as an expert on the steam railway locomotive, while J. H. Price is editor of *Cooke's Continental Timetable* and is in regular contact with current train services overseas.

It may come as a surprise to readers that the Russian railways still rely more on steam haulage than on more modern forms of propulsion, though this will not apply very much longer as no new steam engines have been built since 1956.

Freight locomotives greatly outnumber express passenger engines in the Soviet Union. Conditions of passenger travel have not favoured high speeds, though the streamlined 4-6-4s built for the "Red Arrow" services between Moscow and Leningrad, are fast engines, the prototype having reached no less than 106 m.p.h. on trials.

The enormous 4-14-4 locomotive of 1934, well-known to many British enthusiasts, apparently proved a failure, being too heavy and too rigid for the track. For many years the mainstay of the heavy mineral traffic of the Soviet Union has been the 2-8-0, 2-10-0 and 2-10-2; the authors estimate that 2,400 engines of the 2-8-0 wheel arrangement were running in 1958, and no fewer than 12,700 of the 2-10-0.

Russia is one of the few countries in the world where the fully condensing locomotive is in extensive use; the many interesting experiments made in this field are described. Eventually over a thousand 2-10-0 condensing engines were produced for use in the waterless deserts of Central Asia.

Useful appendices include details of the builders of the steam locomotives in Russia, and some notes on locomotive liveries. The colour schemes of Soviet engines is highly varied; it includes black, bright green and even pale blue. The black livery is generally relieved by red, orange, or red and white lining, while the beading may be red and the handrails white.

Altogether this is an extremely interesting book, which fills an important gap in railway literature. The photographs are generally of good quality though most readers would probably like to have them arranged in sequence with the text rather than grouped at the end of the book. —R.M.E.

Subsunk, *by Captain W. O. Shelford* (*Harrap* 18*s.*)

CAPTAIN Shelford's *Subsunk* is a story of submarine escapes and of the author's efforts to improve escape training and equipment. It is a story of the incredible courage and fortitude of those who made the first escapes from sunken submarines.

Two disasters which were almost identical were those of K.13 and *Thetis.* K.13 was carrying out a preliminary dive in the Gareloch. She dived with her boiler room air intakes open. The flooding would have been confied to the boiler room but for the bulkhaed door which opened into the engine room.

The *Thetis* disaster was attributed to the blocking of the test cock indicator of No 5 tube with bitumastic enamel. The bulkhead door on the collision bulkhead had been changed from the quick-closing type fitted in *Triton* to the type closed by what the author describes as swivel clips.

Despite the rising flood of water, Lieutenant Woods and his helpers were able to push the door open against the rising flood and reclose it, getting one bolt secured. But water welled through into the torpedo stowage compartment.

When *Thetis* was salvaged the door was found to be properly closed and seated. Apparently the stop-valve of the large ventilation trunk on the collision bulkhead had been left open.

Captain Shelford describes the shiny black interior of an enamelled torpedo tube. What is still inexplicable is that the enamelling was contractors' work normally completed before the preliminary torpedo equipment rial, and inspected before testing began; and the testing included the correct positioning of all levers and cock handles and the unblocking of any holes found choked or partly choked with bitumastic enamel. In *Thetis,* for the first time since test cocks were introduced as indicators for rapid reloading, the enamelling was now begun until a week after the final torpedo trial.

An illustration shows the rear doors of submarines adapted for rapid reloading. They are copied from the rear doors of the German submarine U.141, surrendered in 1918. The interlocking mechanism was not adopted, although J.3 had narrowly escaped disaster in 1915 owing to the failure to provide an interlock.

The submariners considered that a test cock would meet requirements as the tubes would always be manned; they were not manned in *Thetis.* Two partial floodings and a major disaster were to prove the submariners wrong.

This is an excellent book.

The Railways of Britain: An Historical Introduction, *by Jack Simmons.* (*Routledge,* 30*s.*).

JACK SIMMONS is Professor of History at Leicester. Having enjoyed his biography of Southey and his *Parish and Empire,* I looked forward eagerly to his history of the railways in Britain. His affectionate essay on the Great Western in *Parish and Empire* would whet the appetite of any reader for more; it left me regretting that railway history, after a century and a third, was seldom written with a feeling for style and a sense of romance as well as with a command of fact.

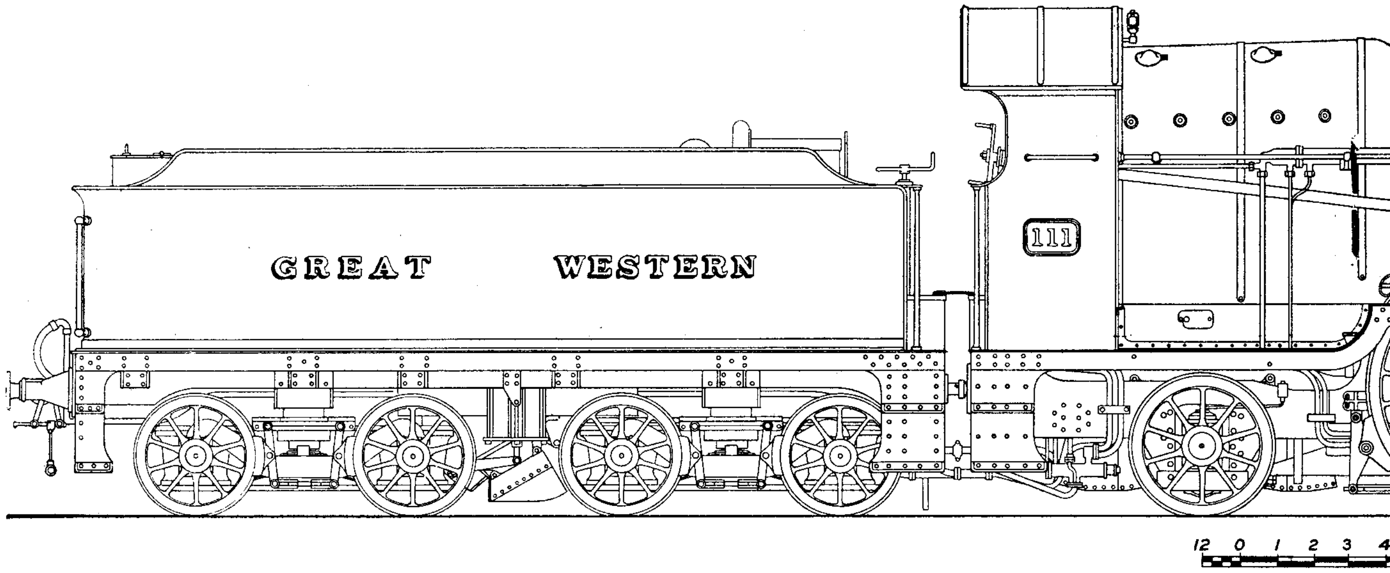
As *The Railways of Britain* covers in about 260 pages all the most important aspects of the story, Professor Simmons is inevitably denied the leisurely Betjeman eye which makes his essay on the GWR a delight to read. But he is still Jack Simmons: a modern historian paying tribute once again to a great Victorian achievement in a sound and lively work, never depressed by the weight of fact that it carries along the main-line from 1830 to 1961. He uses, as the preface tells us, two sorts of evidence, the written word and the object itself; one of his purposes in writing the book is to encourage the joint study of history and "what we are now coming to call industrial archaeology"—a field in which the model engineer, by recreating what has gone, plays a valuable part.

The book is a study of all that goes to make a railway system. Consequently the reader must not expect it to contain details of innumerable locomotives. He will find a chapter on engines and another on carriages and wagons; they are here with the works and permanent way, the buildings, the equipment and operation, and the human beings.

Professor Simmons is at his best when he takes the reader on three journeys, from Fenchurch Street to Rochester, from Derby to Manchester and from Glasgow (Queen Street) to Edinburgh (Waverley).

Some of us will cherish this well illustrated book for the information which it gives on railway literature and maps.

The dedication is to John Betjeman "who has done more than anyone living to quicken our response to the Victorian past." Jack Simmons means, of course, "anyone else"; his history will, I think, appeal to Mr Betjeman and to all who are summoned by steam.—J.M.



LOCOMOTIVES I HAVE KNOWN

Britain's first Pacific,

JANUARY 1908, was an important month in British locomotive history; it marked the completion of the first 4-6-2 express passenger engine for a British line. This engine, GWR No 111, *The Great Bear*, was only the third example of its type in Europe—though this seems to have been overlooked by most of its critics.

After the success which the 4-6-2, or Pacific type of locomotive has had in England and on the Continent, it is more than interesting to look back on the introduction and working of England's first—and for 14 years, only—example of the type. I witnessed the coming of *The Great Bear*, with the very considerable stir that she made; I watched her working for many years. I will admit that I was one of the many who fell for her; for there has never been a more impressive locomotive.

Why was she built ? There have been various replies to that question. I will tell you the story which I had from a director of the Great Western Railway. If he did not know, then nobody did !

In the early years of G. J. Churchward's reign at Swindon, his unorthodox and expensive designs and policies caused some uneasiness among the directors. Fortunately one of them was Sir Aubrey Brocklebank, who by training and reputation was an engineer. Alone among his colleagues, he understood and appreciated Churchward's revolutionary notions, and in time he succeeded in establishing peace and mutual confidence between the locomotive department at Swindon and the board room at Paddington.

It then occurred to one of the directors that, if the GWR Company was being supplied with the finest and most efficient engines in the country, what a splendid thing it would be if the GWR could claim that it had the *largest* engine. It would act as a spur to the intensive advertising campaign which was being launched. And so the directors consulted Churchward, and he told them flatly that if they wanted such an engine they could have it; but it would cost a tidy sum and they would never be able to use it. Nevertheless the directors voted in favour of having Britain's largest locomotive, and Churchward was instructed to build it, as cheaply as possible.

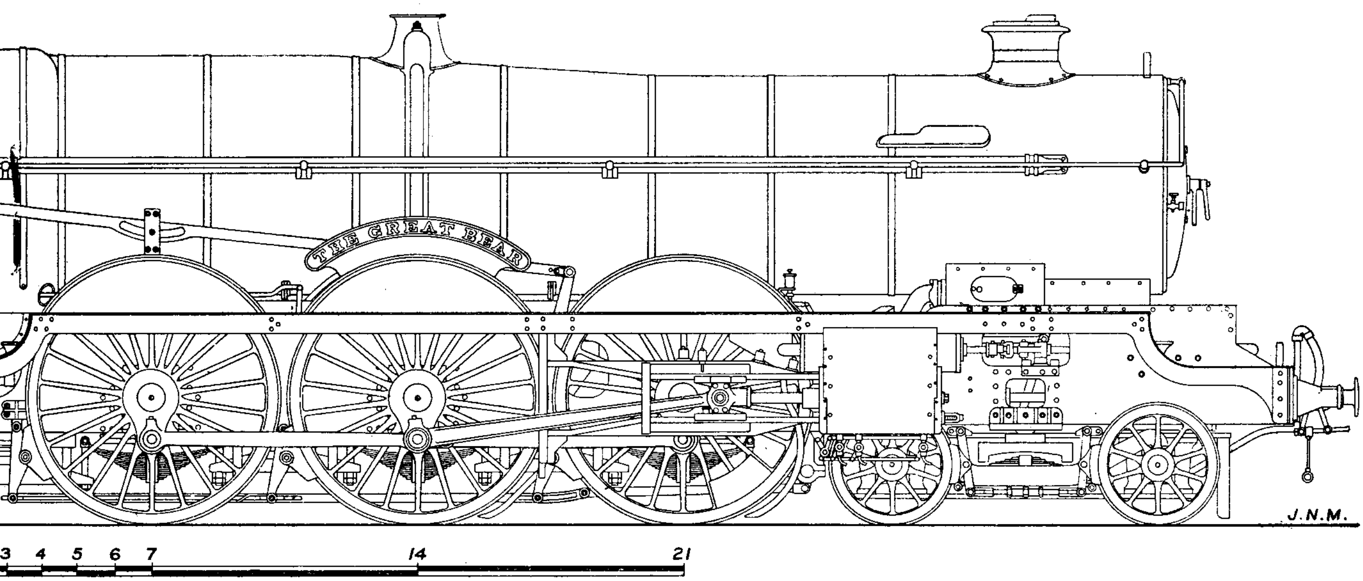
The design incorporated a bogie, coupled wheels, cylinder castings and motion of standard type, similar to those of the Star class four-cylinder 4-6-0s. The frames and boiler were, of course, special, and the trailing axle was mounted in radial axleboxes. The tender was designed and partly built as a six-wheeler; but before it was completed it was altered to be carried on two bogies, which, except for their shortened wheelbase, were the same as the standard engine bogie, without the side bearers.

The change involved an alteration to the position of the water scoop, which had to be between the two bogies instead of just behind the rear bogie centre. Permanent evidence of this change could always be seen, when the engine was on shed, in a large patch-plate covering the original position of the scoop in the bottom of the water tank.

When *The Great Bear* was completed, she was brought from Swindon to Paddington for the directors to see, and they expressed themselves thoroughly satisfied. They had by far the largest passenger locomotive in Britain, and they were well content; it was an unrivalled advertisement.

During the trip from Swindon, the leading footsteps, just below the smokebox, displayed a disconcerting tendency to scrape the edges of station platforms; and so they were removed. Then, for a few weeks, the engine was engaged in running trial trips.

To the traffic department she was an everlasting worry; she suffered many teething troubles, and she



...c, GWR No 111 *THE GREAT BEAR*

"I must admit that I fell for her." From the posthumous papers of J. N. MASKELYNE comes a tribute to a "Most lovable engine"

always appeared to be subject to the activities of an unusually large company of what were later called gremlins.

She was a holy terror for slipping. Her bulk and weight precluded her from running with safety anywhere but on the Paddington-Bristol main line. On one occasion she got as far as Newton Abbot via Bristol, and on another she worked through to Wolverhampton; but never again! She developed an annoying habit of jumping off the track at the approaches to Paddington departure platforms, in backing on to a train, and this led to her being barred from using Platform 1.

On a train, she was restricted to a maximum speed of 65 m.p.h., with the result that her performances could never be outstanding, especially on such trains as the Bristol two-hour expresses which she occasionally worked. But when the gremlins chose to take time off, she could work without trouble, and for a long while she was fairly regularly employed on the 6.30 p.m. Paddington-Bristol semi-fast train, returning on a heavy early-morning freight.

There was one incident which was not calculated to enhance *The Great Bear's* already rather shaky reputation. The original tender tank filler was in the dome immediately above the top of the pipe leading up from the water scoop, and was closed by a hinged flap. One day, those mischievous gremlins got really busy and arranged that somebody should leave the flap unfastened after the tender had been filled at the running shed before a journey.

At the first water troughs the fireman dutifully let down the scoop. Very little water went into the tank; instead, a mighty cataract burst through the unfastened flap, poured over the back of the tender, brought down the vestibule connection of the leading coach and, before anyone could realise what was going on, flooded the coach to a depth of more than a foot! Compensation for aggrieved passengers cost a considerable sum, and it was some time before the locomotive design staff at Swindon regained the confidence of the higher-ups.

The Great Bear had four cylinders, 15 in. dia., 26 in. stroke, piston valves 8 in. dia., with a maximum travel of 7¼ in. Two sets of Walschaerts were between the frames, connected directly to the inside valve spindles and transmitting motion to the outside valves by horizontal rockers. The lap was 1⅝ in. and the lead ⅛ in., while the port length was 31½ in. and the effective widths 1¾ in. for admission and 3⅝ in. for exhaust.

Wheel diameters were: bogie, 3 ft 2 in.; coupled, 6 ft 8½ in., and trailing, 3 ft 8 in.; the wheelbase was 34 ft 6 in. divided into 7 ft plus 5 ft 6 in. plus 7 ft plus 7 ft plus 8 ft. Overhang was 3 ft 6 in. at the front and 6 ft at the back. The footplating was 8 ft 8 in. across at the front end and 9 ft at the back.

The boiler was truly a whopper, made in three rings, the front one 5 ft 6 in. dia. and the back one 6 ft, outside; the middle one tapered between the other two. The length of the barrel, between tubeplates, was 22 ft 7 in. and its centre-line was 9 ft above rail level; the working pressure was the usual 225 p.s.i. The firebox was a combination of Belpaire and wide types, 8 ft long and 6 ft 6 in. wide; its grate area was 41.79 sq. ft.

There were 141 tubes of 2½ in., 21 of 4¾ in., 84 superheater tubes of 1⅜ in. and, in the firebox, four water tubes of 3⅜ in.; a total heating surface of 3,400.81 sq. ft., including 158.14 sq. ft for the firebox. The chimney cap was brass, not copper.

● *Continued on page 432*

HIELAN' LASSIE

Injector steam valve, steam gauge siphon, clack-boxes, washout plug, blowdown valve : the $3\frac{1}{2}$ in. gauge Pacific advances a further stage

By LBSC

Continued from March 9 1961, pages 300 and 301

To make the injector steam valve, chuck a piece of $\frac{3}{4}$ in. round rod in the three-jaw. Bronze or gunmetal is best, but brass will do if nothing better is available.

Face the end, centre, and drill down a further $1\frac{1}{4}$ in. depth with a No 42 or 3/32 in. drill. Open out to about $\frac{3}{8}$ in. depth with a No 30 drill, and bottom the hole to $\frac{9}{16}$ in. depth with a $\frac{1}{8}$ in. D-bit.

Further open out $\frac{1}{8}$ in. depth with a No 21 drill, and tap the No 30 section 5/32 in. × 32 or 40—the 32 preferred, as it gives a much quicker opening and closing.

Do not run the tap in far enough to destroy the D-bitted seating. Turn down $\frac{11}{16}$ in. of the outside to $\frac{3}{8}$ in. dia.; turn down $\frac{1}{4}$ in. of that to $\frac{1}{4}$ in. dia. and screw it $\frac{1}{4}$ in. × 40.

Part off at $1\frac{1}{16}$ in. from the end. Reverse in the chuck, gripping by the reduced part, and turn down $\frac{1}{4}$ in. of the other end to $\frac{1}{4}$ in. dia. Leave it plain; do not screw it. Open out the centre hole to $\frac{5}{16}$ in. depth with a No 23 drill.

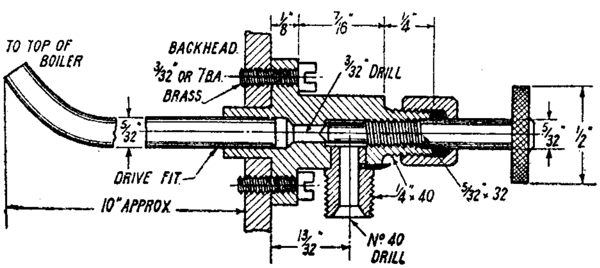
Next, at 13/32 in. from the shoulder, drill a $\frac{3}{16}$ in. hole, breaking into the central passageway just clear of the valve seat. In this, fit a $\frac{1}{4}$ in. × 40 union nipple, made as described for the whistle valve, and silver solder it in. Run the D-bit and 5/32 in. tap in again in case there are any burrs left on the inside. Drill four holes with a No 43 drill equidistant around the flange.

A piece of 5/32 in. rustless steel, phosphor-bronze or nickel bronze, $1\frac{1}{8}$ in. long, is needed for the valve pin. Chuck in the three-jaw, face the end, and turn down about 7/32 in. length to 7/64 in. dia.; then form a cone point on the end, either by slewing the top slide around to 45 deg. and turning it, or by taking a couple of sweeps with a fine file, held at the correct angle, across the end of the rod while the lathe is running fast.

Pull the rod a little farther out of the chuck and put about $\frac{5}{16}$ in. of thread on it to match the tapped hole in the valve. Reverse the pin in the chuck and file a square on the other end.

Turn up a little wheel from $\frac{1}{2}$ in. round rod (dural makes good hand-wheels). Drill four holes in it in lieu of spokes, and one in the middle, which can be square by driving a square punch through it. Drive the wheel on the squared part of the valve pin and rivet over slightly.

The gland nut is made exactly the same as a union nut, and so that too does not need any more detailing. Pack it with a few strands of graphited yarn. While you are on the job, make a similar valve pin, wheel and gland nut for the blower valve, and fit them.



Injector steam valve

Drive a piece of 5/32 in. thin walled copper tube into the end of the valve. This should be about 10 in. long, and bent so that it touches the top of the boiler shell when the valve is in place. It can be soldered in if you like, or silver soldered in doing the nipple; any way will do as long as it cannot come adrift from the valve.

At $\frac{7}{8}$ in. from the vertical centre line of the backhead, and about $\frac{1}{8}$ in. below the level of the regulator spindle, drill a $\frac{1}{4}$ in. clearing hole in the backhead. File off any burr, and then fit the valve to it, just as in fitting one of the cylinder covers, securing it with four 8 BA round-head brass screws and a 1/64 in. Hallite or similar jointing washer between the flange and the backhead.

The steam gauge siphon is a simple job. Chuck a bit of $\frac{5}{16}$ in. round rod—brass will do, for there is nothing to wear—face the end, centre and drill down $\frac{1}{8}$ in. depth with 3/32 in. or a No 42 drill. Turn down $\frac{3}{16}$ in. of the end to $\frac{3}{16}$ in. dia., and screw $\frac{3}{16}$ in. × 40. Part off a full $\frac{1}{4}$ in. from the shoulder. Drill a hole in the side with a No 32 drill, fit an inverted 1 in. swan-neck of $\frac{1}{8}$ in. copper tube into it, and silver solder. The other end of the swan-neck carries a union nut and collar for the steam gauge.

The steam gauge

A gauge $\frac{1}{4}$ in. or $\frac{7}{8}$ in. dia., reading 0 to 120 or 150 p.s.i., is suitable for *Lassie*. Most commercially made gauges have the end of the connecting screw squared off, instead of being countersunk for a union nipple—goodness only knows why—and so I have shown a flat collar on the end of the sawn neck. If you countersink the gauge screw, or if you get one that is countersunk, fit a cone to suit.

Drill a 5/32 in. hole close to the edge of the backhead, about $1\frac{3}{8}$ in. from the top of the firebox shell; tap it $\frac{3}{16}$ in. × 40 and screw in the completed syphon with a taste of plumber's jointing on the threads.

Now for the clack boxes or check valves. Chuck a length of $\frac{3}{8}$ in. round bronze or gunmetal rod in the three-jaw. Face the end, centre deeply with size E centre drill, turn down $\frac{1}{4}$ in. of the outside to $\frac{1}{4}$ in. dia. and screw $\frac{1}{4}$ in. × 40. Part off at a full $\frac{3}{4}$ in. from the end. Reverse in chuck, centre, and drill right through with a No 24. Open out to about $\frac{1}{4}$ in. depth with a $\frac{1}{4}$ in. drill, and bottom to $\frac{3}{8}$ in. depth with a $\frac{1}{4}$ in. D-bit. Poke a 5/32 in. reamer through the remnants of the No 24 hole. If you have no reamer use a taper broach, but only put it through far enough to true the hole at the bottom of the recess. Slightly countersink the large end; tap 9/32 in. × 32, taking care

Drill a $\frac{3}{16}$ in. hole in the side, just above the seating, in which is fitted the boiler connection. Chuck the $\frac{3}{8}$ in. rod again, face, centre, and drill down about $\frac{5}{8}$ in. depth with $\frac{1}{8}$ in. drill. Turn down $\frac{1}{4}$ in. of the outside to $\frac{1}{4}$ in. dia. and screw $\frac{1}{4}$ in. × 40. Part off at a full $\frac{1}{2}$ in. from the end. Reverse in the chuck, holding either by the threads, or in a tapped bush held in the three-jaw.

Turn the outside to the profile shown, and then turn down $\frac{1}{16}$ in. of the end to a tight fit in the hole in the side of the clack body. Squeeze it in and silver solder. After cleaning up, drop a $\frac{3}{16}$ in. rustless steel ball on the seating and, holding a bit of brass rod on the ball, give the rod one sharp crack with the hammer.

Take the depth from the ball to the top of the clack box with a depth gauge. Chuck the $\frac{3}{8}$ in. rod again and turn down the length indicated by the depth gauge to 9/32 in. dia., screwing it 9/32 in. × 32. Countersink the end sufficiently to allow the ball 1/32 in. lift. You can either part off at $\frac{7}{16}$ in. from the end, file a square or hexagon $\frac{1}{8}$ in. long on it, or part off at $\frac{7}{16}$ in. from the end, reverse in the chuck, and drill a $\frac{1}{8}$ in. hole about $\frac{1}{8}$ in. deep in the middle.

Making the cap

Chuck a piece of $\frac{1}{2}$ in. hexagon brass rod, turn a pip on it a tight fit for the hole in the cap, part off $\frac{1}{8}$ in. from the shoulder, squeeze it in the cap. silver solder, and then chuck the cap by the threads and chamfer the corners of the hexagon. That gives you a decent hexagon spanner-hold without the trouble of filing it. Smear the threads with plumber's jointing before screwing home the cap, but take care not to get it inside the ball chamber. Two clacks are needed.

Drill a $\frac{1}{8}$ in. hole each side of the backhead, about $\frac{1}{4}$ in. from the edge and $2\frac{1}{2}$ in. from the bottom. Open out with a 7/32 in. drill and tap $\frac{1}{4}$ in. × 40. Screw in the clacks with a bit of plumber's jointing around the threads. It does not matter about getting them parallel to the sloping backhead; they work just as well on the slant.

The wash-out plug is simply a slightly enlarged variation of the clack-box cap. The end is faced off flat, and the spanner hold can either be filed square or hexagon.

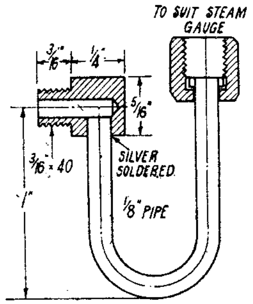
The blow-down valve is merely an outsize screw-down valve, like the injector valve, but without any gland. Chuck a bit of $\frac{1}{2}$ in. bronze or gun-metal in the three-jaw, turn down $\frac{5}{8}$ in. length to $\frac{7}{16}$ in. dia., face, centre and drill down a full 1 in. with the 7/32 in. drill. Open out and bottom with a 9/32 in. drill and D-bit to $\frac{9}{16}$ in. depth and tap $\frac{5}{16}$ in. × 32 or 26. Part off at $\frac{15}{16}$ in. from the end, reverse in the chuck, turn down $\frac{3}{16}$ in. of the end to $\frac{1}{8}$ in. dia. and screw $\frac{3}{8}$ in. × 32.

Drill a $\frac{5}{16}$ in. hole in the side, $\frac{3}{8}$ in. from the shoulder, just enough to miss the valve seat, and in this fit a socket. Chuck a bit of $\frac{3}{8}$ in. round rod, face, centre, and drill 9/32 in. for about $\frac{1}{2}$ in. depth. Tap $\frac{1}{4}$ in. depth $\frac{5}{16}$ in. × 40. Part off $\frac{3}{8}$ in. from the end, reverse in the chuck, turn $\frac{1}{16}$ in. length to a tight squeeze fit in the hole in the side of the valve body, squeeze it in and silver solder. Run in the tap to remove any burrs.

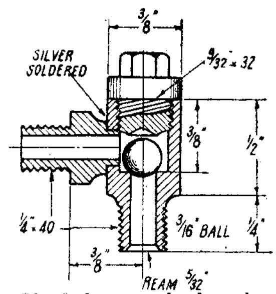
The valve pin is made the same as the injector steam valve, but a bit larger. Rod $\frac{5}{16}$ in. is used and the pin is $\frac{7}{8}$ in. overall, the end squared to take a spanner or box key. Drill a $\frac{1}{8}$ in. hole at each bottom corner of the backhead, $\frac{1}{2}$ in. from the bottom and $\frac{3}{8}$ in. from the side. Open out with a letter R or 11/32 in. drill, tap $\frac{3}{8}$ in. × 32, and screw the wash-out plug in the l.h. hole and the blow-down valve in the right. When the boiler is mounted on the chassis, a short bit of thin-walled $\frac{5}{16}$ in. pipe will be screwed into the socket to project down through the footplate and blow the contents of the boiler into the ash pit before it is washed out.

All boilers need a periodical wash out, just as in full-size practice; otherwise they fur up and lose efficiency.

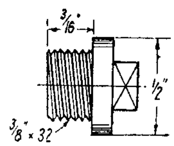
★ To be continued on April 20

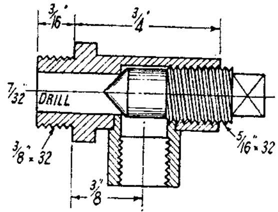


Steam gauge syphon

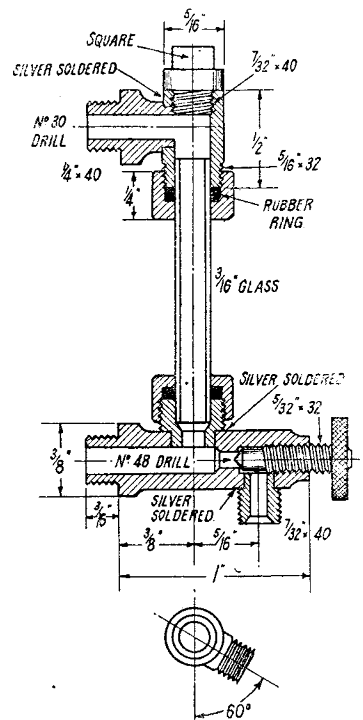


Clack box or check valve


Washout plug



Blowdown valve



Water gauge

JAMES WATT and the NEWCOMEN ENGINE

By IAN BRADLEY

THE genius of James Watt, together with his amazing faculty for pursuing matters to their logical conclusion, led him with distinction along many paths. In no field of engineering can one man have made so great a contribution as did Watt with his revolutionary improvements to the steam engine. Indeed, it has been said that when he had completed his scientific investigations on these matters little, if anything, remained to be discovered.

Matthew Boulton, afterwards Watt's partner in these enterprises, was also, in his way, a great man; and it was a direct result of Boulton's knowledge of affairs, combined with his ability to manage a large business organisation, that the steam engine eventually became a practical success.

In considering the engines of Boulton and Watt it is necessary, therefore, to know something of the men themselves and also to understand how far the steam engine had developed when the partners began to interest themselves in its manufacture.

James Watt was born at Greenock on the Clyde on 19 January 1736. His father's occupations were very diverse for he was at the same time a ship's chandler, shipwright, carpenter and undertaker as well as a builder and contractor. He was apparently a man of some substance for he held shares in several ships and was accustomed to take part in foreign trade. It will be seen, then, that James Watt himself entered life in fairly comfortable circumstances.

Unfortunately Watt suffered almost chronic ill-health from infancy. For this reason he received his early education at home, both his parents contributing their quota to little James's sum of learning. His mother taught him reading and his father writing and a little arithmetic. To amuse him his mother encouraged him to draw either with a pencil on paper or with chalk upon the floor. In this way the foundations were laid for the mechanical draughtsmanship which he ably practised in later life. At the same time that he was receiving instruction in the three R's, his father encouraged him to learn the use of a few simple carpentering tools and he soon became proficient with them. His inventiveness also became apparent, for he was often in the habit of taking his toys to pieces and of constructing new ones from their several parts.

As he grew older his health improved somewhat and he was able to go to school. Here he seems to

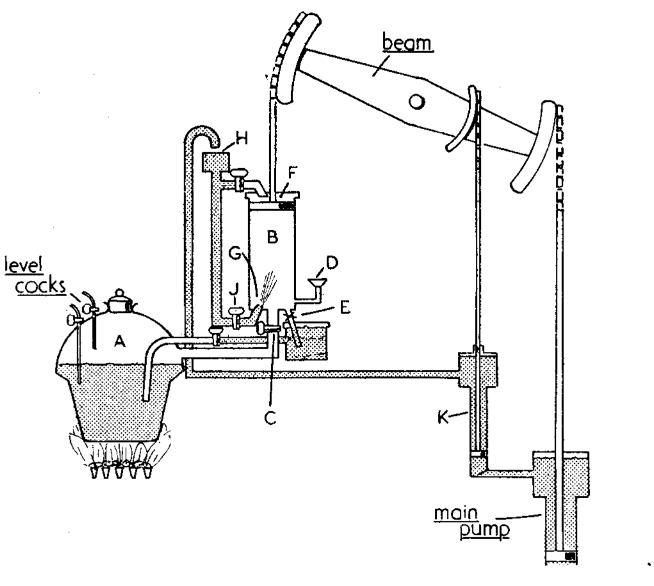


Fig. 1: Why Newcomen called his engine atmospheric

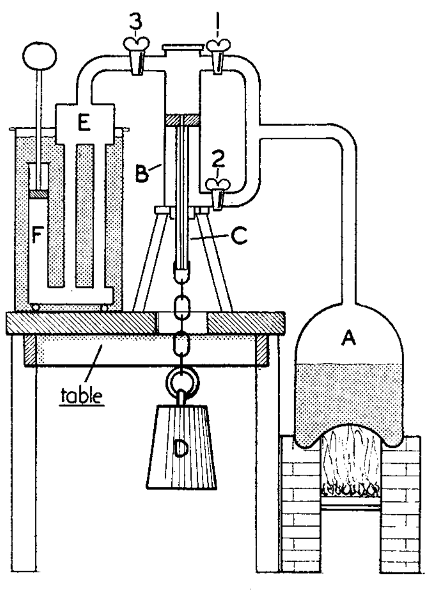


Fig. 2: With this apparatus Watt made many experiments to test his theories

have shown marked superiority in mathematics and great interest in scientific subjects.

At home he continued with his drawing and with the making of various articles in wood and metal, using a corner of his father's workshop which had been fitted up for him. His interest in science and the attention which he had paid to the uses of the many navigational instruments in his father's warehouses, suggested that the career of a mathematical instrument maker would fit in very well with his natural inclinations.

When he was eighteen, he went to Glasgow to learn his trade. His master, though a most competent workman, seems to have had little knowledge to impart, and on the advice of one of the professors of Glasgow University arrangements were made for him to go to London and see if he could find someone willing to teach him the art of mathematical instrument making.

In London he found at once that the regulations governing the employment of apprentices were to make his quest difficult. Finally he found a master who was willing to ignore his not being a freeman of the City.

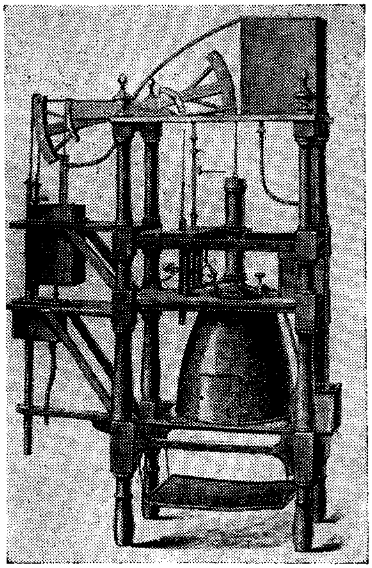
During his stay in London he dared not venture out much for the press gang was active, and he would have been in severe trouble had he been hauled before the authorities. They would have quickly established that he had no business to be apprenticed in London at all and he would probably have been packed off to sea.

This enforced confinement, and the close attention that he was now paying to his work, soon affected his health. As a result, he returned to Greenock in 1756, and went to Glasgow soon afterwards to begin in business for himself.

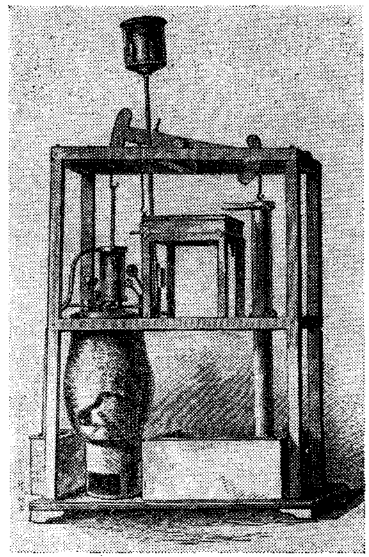
The 'closed shop'

The circumstances which had all but prevented him from learning his trade in London now combined to stop him from practising it. The trade guilds objected that he was neither the son of a burgess nor a man who had been apprenticed in Glasgow. Fortunately, an old friend, Dr Dick of Glasgow University, came to his aid and arranged with the authorities that he should set up his business in the university itself. Here the trade guilds were powerless to interfere, for the professors had complete authority.

This kindly act was of great benefit to Watt, who was thus brought into contact with all the eminent scientists on the staff. The authorities, on their part, soon found that they were entertaining someone who was much more than a first-rate mechanic. Watt's workshop rapidly became the rendezvous of all who were interested in science; professors and students discussed all manner of problems with him.



" Original model " in Science Museum



" Original model " in Samuel Smiles

It was at this time that Watt was given the university model of the Newcomen engine to repair and, in doing so, he laid the foundations for the improvements that were to revolutionise the steam engine.

The Newcomen engine was the only one in practical use. In Cornwall, where it was much employed, it was rapidly falling into disfavour because it could not cope with the increasing depth of the mines and was also expensive in operation. To appreciate the importance of Watt's improvements, we must understand how the Newcomen engine worked. The machine is not strictly a steam engine; indeed Newcomen himself described it as an atmospheric engine, for a reason that will become clear.

It will be seen in Fig. 1 that a boiler *A* is connected, by a main steam pipe, to the engine cylinder *B*. The main steam pipe has a valve *C* to regulate the steam supply, while the cylinder has a snifting valve *D* and an eduction valve *E*.

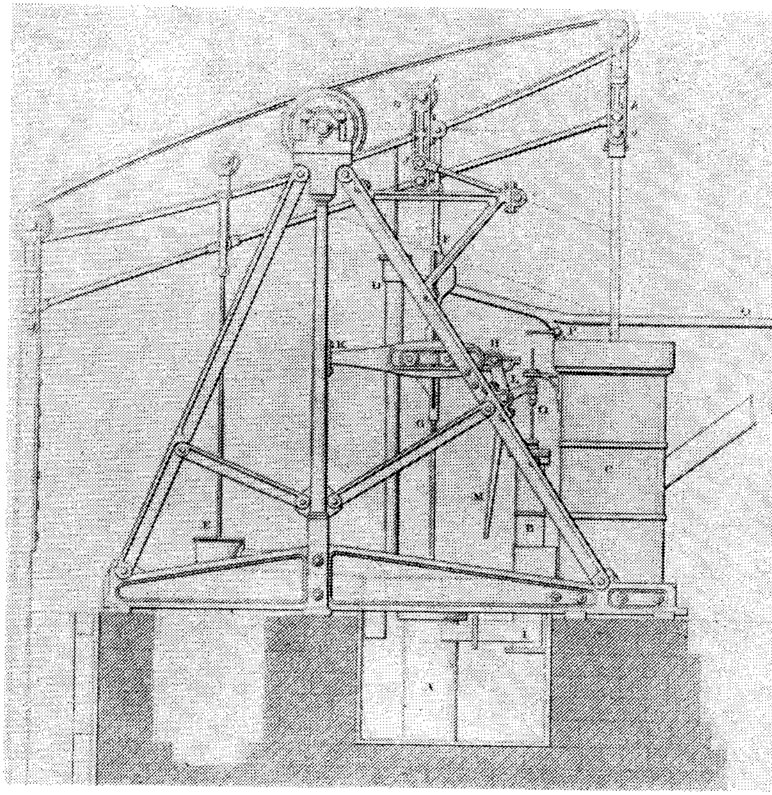
The cylinder is provided with a piston *F* and with a condensing water jet *G* fed from a cold water tank *H* which serves also to supply water to the upper side of the piston, thus acting as a water seal and preventing air from entering the cylinder during the working stroke. Control of the water jet is by the valve *J*. The cistern is fed from a feed pump *K* to the right of the drawing.

Let us assume that the engine is at rest. The piston will have been drawn to the top of the cylinder by the weight of the main pump. To start the machine, the engineman admits steam to the cylinder by the valve *C*. Because the cylinder is cold the steam at first condenses; the engineman then opens the snifting valve *D* to allow the water and air to escape. But the temperature of the cylinder rises, condensation stops and only steam escapes from the valve, which is then closed.

The condensing water jet is now turned on causing an immediate partial vacuum in the cylinder; and the piston is drawn to the bottom of its stroke by the weight of atmospheric air pressing upon its upper surface. As this is the actual working stroke of the engine, the reason why Newcomen called his device an atmospheric engine will now be understood.

As soon as the piston has completed its downward stroke, the engineer closes the condensing valve and opens the regulator. The steam is again condensed. As the cylinder gradually warms up, the condensation ends and the piston rises to the top. This happens partly because the pressure of steam balances the pressure of atmospheric air acting on the top of the piston, thus allowing the weight of the pump rod to draw the piston to the top of the cylinder; and partly because the pressure is enough to allow the steam to exert a little force on its own.

During this part of the engine cycle the condensed water is removed from the cylinder through the eduction



Atmospheric engine for pumping water

valve *E* and is allowed to fall into a tank which replenishes the boiler.

The engineer now closes the regulator and opens the condensing valve, thus causing the piston to perform its working stroke once more. Once the engine has been started from rest, the engineer has only to open and close the regulator and condensing water valves at the appropriate time to keep the engine going. This work was entrusted to youths who were called "cock-boys." They found it most tedious, and it was one of them Humphrey Potter, who was responsible for one of the most significant improvements ever made to the Newcomen engine.

Boredom's bonus

Observing that there was a very definite relationship between the position of the beam and the turning of the valves, Humphrey thought that it should be possible to connect straps between the beam and the valves and thus make the engine work automatically. He was right. After the straps had been attached not only did the engine work on its own and so allow Humphrey to slip away for a game, but the number of strokes that the piston could make in a minute was raised from six or eight to fifteen or sixteen. This discovery was valuable as it virtually doubled the useful work that the engine was capable of doing; and it is pleasant to recall that Humphrey grew up to be a highly skilled engineer.

Such, then, was the practical steam engine as Watt found it when he was setting up business in Glasgow University. He knew little or nothing about steam at that time, but he was persuaded by a student named Robinson, who later became one of the engineering professors and his lifelong friend, to undertake some investigations on the subject. While the Newcomen engine was falling into disfavour, intelligent scientists were beginning to think that there must be a greater future for the steam engine than merely pumping water; a service which it performed uneconomically.

Watt's thoughts were undoubtedly turned in this direction by his experiences with the university model of the Newcomen engine. He formed a very poor opinion of its capabilities; and the more he considered certain features in the Newcomen design the less he liked them. The repeated heating and cooling of the working cylinder seemed to him quite wrong. Whilst he agreed that the condensing principle was sound, he felt sure that the engine cylinder should be kept uniformly hot and that the condensation should be performed in a separate vessel connected to the steam cylinder by piping.

Deciding to put his theories to the test, he constructed the apparatus illustrated in Fig. 2. It consisted of a boiler *A*, a cylinder *B* and a piston with a hollow piston rod *C*. The rod was connected by chain to a test weight *D* and had a valve to remove the water formed when steam was first admitted to the cold cylinder. The steam could be admitted at will to either side of the piston under the control of the hand-operated valves (1 and 2) seen in the diagram.

A surface condenser *E*, fitted with an air pump *F*, was connected to the top of the steam cylinder and could be shut off from it by the third hand-controlled valve (3).

The purpose of the air pump was to maintain a vacuum in the condenser as well as to remove the air and water resulting from condensation.

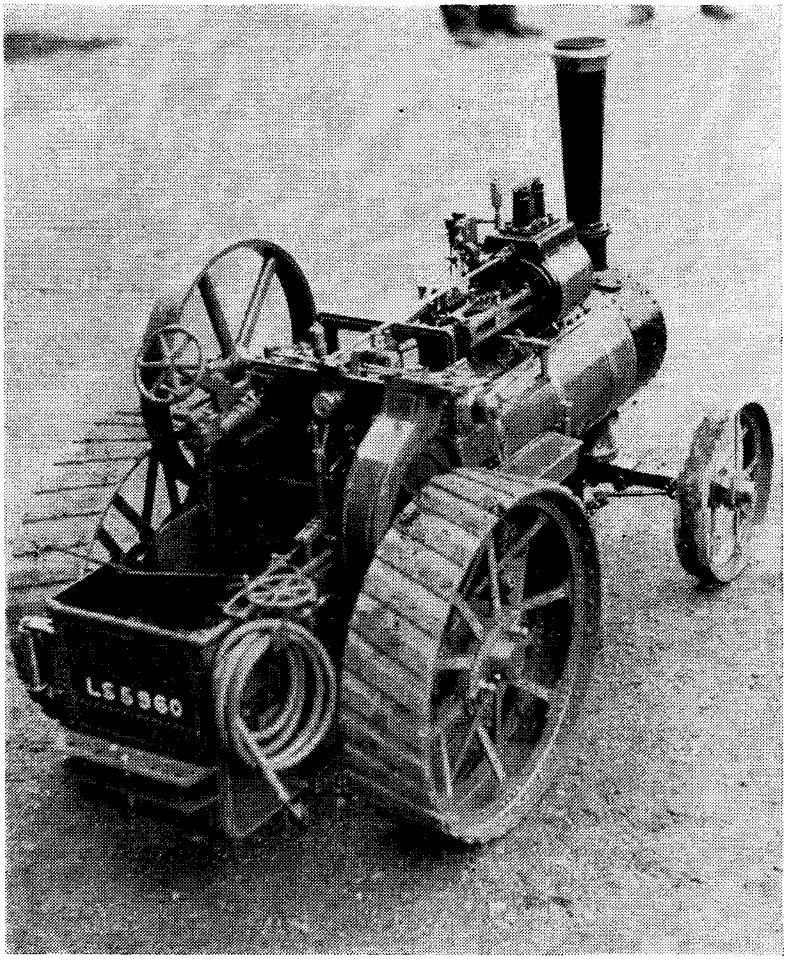
Steam was first admtted to the upper side of the piston, valves (2) and (3) being closed, until no more water issued from the valve in the piston rod. The steam valve (1) was shut while valve (2) was opened. The condenser air pump was operated and, as soon as the valve (3) was opened, the steam rushed into the condenser. The effect of condensation was to cause the piston to raise a weight of some 18 lb. Curiously enough Watt's own description of the experiments does not mention the opening of the valve (2).

The exhaustion valve (3) was now shut and steam was again admitted to the cylinder so that the cycle of operations could be repeated.

Watt carried out many experiments with this apparatus, and was able to calculate the consumption of steam in varying conditions. With the exception of the steam jacket for the cylinder the invention was not complete and needed only development from a laboratory experiment to make it a practical success.

Another article in this series will appear in the issue for April 20.

MORETON-UNDER-STEAM SEES A HUGE MODEL TRACTION ENGINE



MORETON in Essex, the scene of many friendly traction engine rallies in the past, must be largely populated by steam enthusiasts. Many of them turned out to see the trial under steam of the latest completed model by Mr L. N. Smith of Downham, Essex, whose fine 2 in. Burrell *Thetford Town* was shown at the last Model Engineer Exhibition.

From a back-garden foundry in Essex comes a Wallis and Steevens at 3 in. scale. "Everything about it looks massive," says L. C. MASON

His new model is a 3 in. scale version of a Wallis and Steevens 8 h.p. engine. It weighs about 4½ cwt, and to the worker in smaller scales, everything about it looks massive.

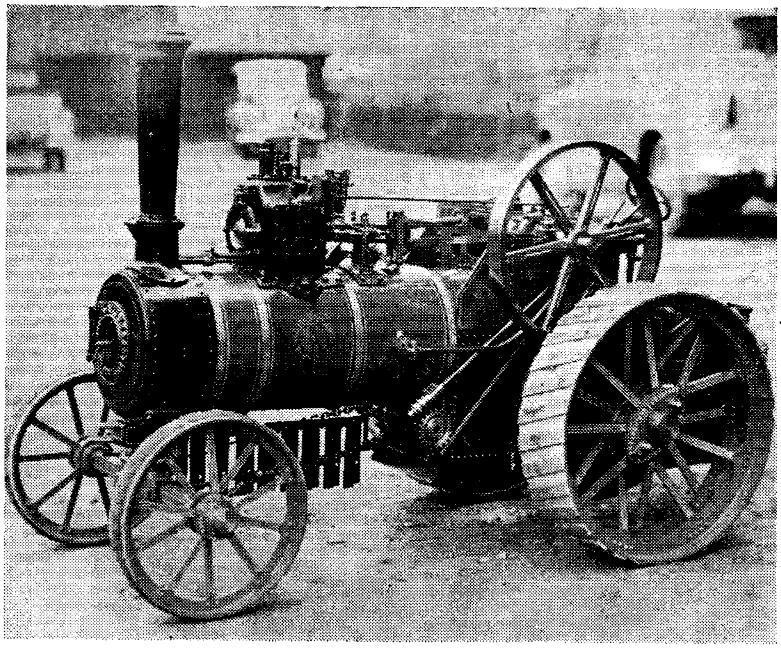
Its pulling power is in proportion, too. The weight of as many youngsters as could be crowded on to two soap-box Derby trailers hitched behind the official driver's truck made no noticeable difference to its performance—on rather soft, damp gravel.

Most of the castings—including cast iron ones—were produced by Mr Smith himself in a back garden foundry. The flywheel and cylinder block were cast by a commercial firm. Their size, and their total weight of 43 lb., made them too much for home production. The flywheel and the cylinder casting for a bore and stroke of 2¼ in. × 3 in. were machined on an old 6 in. lathe acquired especially to deal with the big machining jobs. As 18 in. rear wheel rims in steel or malleable iron would have been too costly or have involved too long a wait for delivery, they were cast in light alloy.

Big boiler

The boiler is a bigger and heavier job than most model engineers would care to tackle. It is rolled up from $\frac{3}{16}$ in. steel plate and, welded, is 18 in. long × 8 in. dia., and has twelve 1 in. tubes; an unusual arrangement designed to make for free steaming, and calling for the minimum attention to the fire.

Mr Smith was asked where the scale Wallis and Steevens transfer on the boiler came from. " It came out of a tin," he replied, " and was put on with a brush." This beautiful



Left: Steam had to be raised in the open as there was too little natural draught in the barn for the extension chimney

piece of paintwork added the finishing touch to a magnificent job. The building took a year and nine months. Readers may remember seeing in ME some photographs of parts early last year, soon after the work began.

Trial run

The first steam-up showed the exhaust nozzle to be too small as the blast was very fierce, producing vigorous blowing off. Slightly opening up the orifice made everything much more docile and manageable.

Mr G. F. Matthews, who owns the full-size Wallis, said he felt quite at home driving the quarter-size version, and it had the same snappy beat and feel as the big one.

By courtesy of Mr Matthews the trial took place on his premises, where he has a large gravelled area in front of the barn housing his two Wallis engines. Thanks to him, too, anyone interested was free to come in and watch. A number of people had been notified of the event, and some made quite long trips to be present. Before long, bits and pieces were being produced from modellers' pockets and car boots for comment and criticism.

A very fine model brought along was a nearly completed Burrell Devonshire engine to 1½ in. scale, the work of Mr Daniels and his son. After four years' work, it needs the tender, boiler lagging and certain small parts to be complete. The quality of the detail work should make it an engine worth travelling to see. When I commented on the beautiful finish and proportions of the steering wheel, I was told that it represented about a week's work. The whole job has obviously received the same care.

What would be the next model? Mr Smith confessed that he had not made up his mind. "There will be another?" I asked. "I expect so," he said. "Mustn't let the tools get rusty!" ▣

LATEST LOCOMOTIVE NEWS

THE latest details of withdrawn locomotives notes the demise of three more LNER Pacifics. These are No 60504 Mons Meg, 60507 Highland Chieftan and 60510 Robert the Bruce. Mons Meg is one of the A2/2 class; the other two are members of the A2/1.

The A2/1 class was a development of the A2/2 class and the V2 class and it was introduced in 1944 by Mr E. Thompson. Basically the design is made up of V2 parts fitted to a B1 front bogie. They are fitted with three cylinders, the outside ones driving the middle pair of coupled wheels while the inside one drives the front coupled wheels. The inside cylinder has a separate set of Walschaerts valve gear.

Mons Meg was originally one of H. N. Gresley's P2 class 2-8-2 locomotives. It was rebuilt in 1943 by Thompson because the eight-coupled rigid wheelbase of the P2s limited their use. They were altered to Pacifics and in doing so the boiler was reduced by almost two feet. The pressure was raised to 225 p.s.i. and the cylinders were sleeved down from 21 in. dia. to 20 in. Each of the cylinders retained its separate set of Walschaerts valve gear. The re-construction also made the locomotives some 5 tons 13 cwt lighter.

While some of the LNER Pacifics were being scrapped two others have received new smoke deflectors. The latest pattern to be fitted is a copy of those used on the German Federal Railways. They now adorn A3 class locomotives 60049 Galtee More and 60105 Victor Wild.—R.O.

Semi-rotary pump, 1737

What a manual from the France of Voltaire revealed to H. H. NICHOLLS

THE principle of the handy semi-rotary pump is far older than many people suppose, and was used more than a hundred years before Allweiler's appliance.

Belidor's *L'Architecture Hydraulique*, Book 2, 1737, chapter 4, has a plate describing the invention. As the old engraving is too faint to be reproduced, and the description is in French, I have drawn the section of the pump in clear black lines.

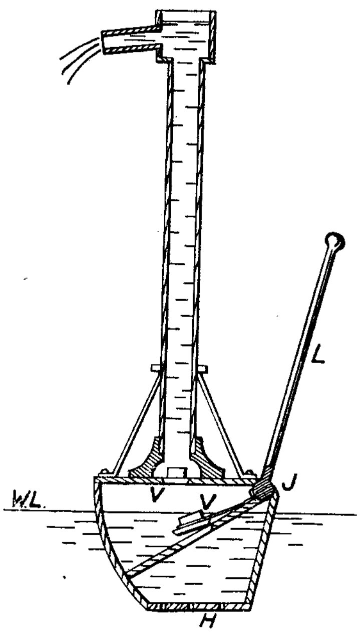
WL is the water level, *H* the holes by which water enters the pump, *L* the lever of iron fixed to the vane to move it, *J* the joint between the moving axle and the wooden box, and *VV* the valves.

Low efficiency

As evidently the pump was made of wood, wear at the joint *J* must have been excessive, and a continual supply of grease could hardly have kept the joint tight. The efficiency of the device must, therefore, have been low. A greased leather flap would have been needed at the joint between the vane and the case, to provide some sort of a seal as the vane moved; at the sides it must have leaked a good deal.

The valves are the common clacks found in country pumps.

Here, then, is the germ of the semi-rotary pump, an idea which, like many others, had to wait for perfect design and application. The cylinder-boring machine was used in Britain in about 1775. It is a great puzzle why this machine should have been so late in coming, because Belidor shows how the old wooden water mains were bored, and if a man could buy a brass cylinder of only 12 in. in diameter in the early part of the eighteenth century, he could have made good use of it, without having to wait for the more difficult task of making a cast iron one; the machine for the hardwood water pipes would easily have bored a brass cylinder.



Section of vane pump, Belidor Book 2

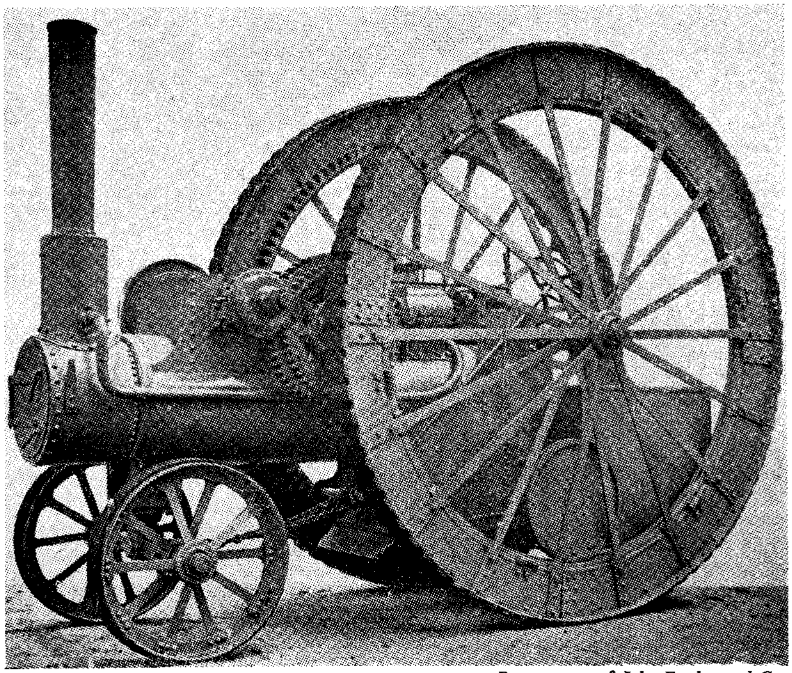
Anyone who examines Belidor's book should look well at the illustrations; if he cannot read the French text, he will still be amazed at the skill that had been attained in France at that period.

Advent of the crank

That Belidor's work was not well known in England even as late as 1781 is shown by the fact that a patent for the use of a cranking mechanism—to turn the reciprocating motion of a steam engine into rotary motion—was granted in 1781 to the owners of an atmospheric engine, and in consequence James Watt had to adopt his Sun and Planet wheels in the rotative engine of 1782, when in Belidor's book the use of a crank appears in several drawings. If someone had objected to both patents, and had been able to prove that this French manual had been known in England for about 40 years, he could have pleaded that the use of a crank in mills and in machinery generally was common knowledge and not patentable.

Belidor is in the library of the Science Museum, South Kensington; my set, rather imperfect, turned up at an auction sale years ago. When you see a "desirable residence and contents" to be sold get an "order to view"; rare old mechanical books turn up in the unlikeliest places, and can often be bought quite cheaply. ▣

T. L. COOK takes us to the days in the West when traction engine drivers were seasick on the plains



By courtesy of John Fowler and Co.

PRAIRIE STEAM

To trace the history of the rather outsize traction engine illustrated here we must go back to the turn of the century—to 7 November 1885, when the last spike was driven on the Canadian Pacific.

With the railway running across Canada tremendous areas of land became accessible. This was true of the great stretches of prairie in the West where it was already known that the climate was favourable to the growing of wheat.

As such very large areas were unsuitable for cultivation by oxen, horses and manpower, the first big demands were made for steam power.

The steam-cable cultivation common in Britain and on the Continent used a pair of powerful steam traction engines with cable drums underneath the body. They were set at opposite sides of the field at a high point, and the plough or other implement was hauled by the cable backwards and forwards across the field. The operators became skilled at manipulating the gear, and the great weight of the engines provided ample stability.

In the firmer, drier soil of the Prairies the solution proved to be direct haulage by tractors. They were developed to a high pitch of efficiency.

The driving wheels were often as much as 8 ft dia. and 4 ft wide. Ploughs and other implements 20 ft wide or more were hauled, often coupled together with 20 or so arranged in echelon behind the tractor drawbar. There is an interesting collection of these old monsters in the University of Saskatchewan at Saskatoon.

Large wheels improved the performance, but a diameter of more than 8 ft was found to be impracticable. The tractor illustrated was an experimental one built by John Fowler and Co. of Leeds in about 1884 with driving wheels 12 ft dia., believed to be the largest ever fitted to a traction engine, road locomotive or to any other self-moving vehicle. Unfortunately this tractor was not a success and the experiment was never repeated.

While the larger wheels would undoubtedly have given a good performance, and excellent adhesion on soft ground, the weight would have been excessive. It will be seen from the picture that the ingenious provision made for side thrust at the periphery of the wheel almost at ground level would create a good deal of wear and tear, particularly in mud. This would also apply to the drive on the rim of the wheel which, although it relieved the stresses on the wheel spokes, would be working at near the ground.

Trouble was also experienced, I believe, with the flicker of light as the spokes passed the driver's head. It became intolerable and gave the driver all the symptoms of seasickness. At the same time mud picked up by the rims might fall on his head.

Despite these difficulties and the abandonment of the design, we must not forget the courage and enterprise of the engineers who were prepared to make these experiments. They undoubtedly laid the foundation of businesses whose names are familiar to us.

The main trouble with large steam engines was the supply of fuel and water. On the prairies this was a great problem. Many experiments were carried out, some with the burning of wood and straw to reduce costs. But the only real solution was the internal combustion engine. ▣

LOCOMOTIVES I HAVE KNOWN

Continued from page 423

In working order, the weights were 97 tons for the engine, 45 tons 15 cwt for the 3,500-gallon tender, totalling 142 tons 15 cwt. Sixty tons were available for adhesion. The total length over buffers was 71 ft 2¼ in.

Originally the cab roof was longer than I have shown it; it was shortened after an unfortunate fireman got the long pricker so tightly jammed between the rear firebars, and cab roof that it took three men to release it!

With all her faults and foibles, and in spite of the gremlins, *The Great Bear* was a most lovable engine. Many regretted the day in January 1924 when she was taken out of service to be converted into a 4-6-0 of the Castle class and renamed *Viscount Churchill*; for, in her time, as Britain's first Pacific, she had made locomotive history, and she ought to have been preserved. ▣

READERS' QUERIES

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

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

Dim about the clutch

In *Lathe Accessories* page 87, Fig. 74, Edgar T. Westbury describes a simple wiring diagram which can be fitted to some lathes to help with screwcutting.

I can see how it works all right, and would very much like to use it on my lathe, a Portass S type. The only thing I am a bit dim about is the clutch. It has only one slot in the sliding collar and one drive pin in the leadscrew. Will it engage when the light comes on, or would I have to modify the clutch, to make it engage in many positions ?

I have made the collars from an old gear lever knob, and I thought of having a little brass setscrew in each just a bit proud of the o.d. of the collars to enable the brushes to make good contact, instead of having just metal inserts I have some little blocks of Paxoline, and some 0.010 brass shim for the brushes. Would this be springy enough or would clock spring be better ?

▲ *It is important in any type of screwcutting lathe that engagement can only be allowed to take place in one position of leadscrew rotation. In the curcumstances, the clutch should on no account be modified to make it capable of engagement in a number of positions.*

In using this type of indicator, the lathe saddle should always be run back into the same position, such as in close contact with the tailstock when the work is being machined between the centres. The clutch should then be engaged at the earliest possible moment after the indicator light has flashed. To avoid delay in engagement, the contact on the leadscrew may be made capable of rotation, so that it has only a small distance to travel before the clutch dogs line up.

Paxoline will be suitable for mounting the brushes, but a somewhat thicker material would be better.

Not in line

For many years I have been using a Wade (CAV) lathe. I have recently acquired another small plain lathe of sturdier construction which seems to have better possibilities. Its capacity is $2\frac{1}{2}$ in. × 7 in. and the headstock mandrel and tailstock are bored No 1 Morse taper. The drive is by flat belt to a two-step pulley which incorporates a thrust ball race. The bed is $1\frac{1}{2}$ in. round solid bar with a rectangular guide keyed into the underside.

When the back-centre is brought up to the head-centre, the two centres are approximately in line; but with the tailstock at the extreme end of the bed, the centre of a rod held in the chuck rotates about 1/32 in. to the side of the back-centre.

The bed extends right through the headstock casting and is held in position by a substantial pin. I am wondering if it would be foolish to loosen the bed in the casting and then attempt to reset the headstock in line with the bed.—G.T.J., Stoneleigh, Surrey.

▲ *It seems that there is a definite error in the alignment of the mandrel and tailstock centres. As the round bed is presumably socketed into the headstock casting, it may be found difficult to correct this. You might test the parallel alignment by taking a traversing cut. If it does not come out perfectly parallel, it proves the misalignment.*

Correction could possibly be made by reboring the headstock bearing, using a boring bar set in true alignment with the bed. This, of course, would call for the use of a lathe or boring machine large enough to take the headstock and bed assembly; if the mandrel at present runs in the cast headstock, it would necessitate either fitting bushes or making a new and enlarged mandrel.

You do not state whether the tailstock is held in alignment with the bed by a key or other device, but round-bed lathes usually have some means of swinging the tailstock to align or offset the centres, and this could be used for adjustment in turning parallel work between centres.

Jubilee clock

I am having difficulty in getting the pendulum of the ME Jubilee clock to work. The trouble is the timing of the contact. With the setting recommended and the backstop positioned against the face of the relevant tooth, the detent will not gather the next tooth, because the impulse lever fouls the lower column of the riding wheel unit; and if it did, it would gather two teeth on the next swing owing to too great an arc.

Altering the position of the backstop enables the correct gathering of teeth to be performed, but also alters the angle of the tooth on which the detent rides on its swing to the left. The result is that the contacts fail to clear, or if they do, contact on the swing to the right is either not made or is made too near the centre of swing, making a very short impulse accompanied by a loud thump and vibration.

This is my first attempt at clockmaking. I have been a reader of ME for more than 25 years, and have made a number of models and workshop devices, but this is the first time that I have been stumped and have had to ask your assistance.—R.G.S., Wootton, Isle of Wight.

▲ *A number of clocks has been made to this design, and no trouble has been reported with the timing of the contact. It is agreed that with the particular impulse movement a good deal of experiment is necessary to get the contact mechanism to operate correctly.*

The clock, when it is fitted with the components as designed, will work on 3-$4\frac{1}{2}$ *v.; the lower voltage is usually preferable as it avoids wear and tear on contacts.*

As clearly stated in the articles, the design is an experimental one, on which development is still continuing; it is hoped further articles may be published soon.

QUERIES SERVICE

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

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

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

Power for garden workshop

I shall shortly be returning to the UK, and shall be setting up a small garden workshop. I shall not be able to have power laid on owing to the situation of the shed. The question will arise of how to drive a lathe, drilling machine and saw bench. I have a 1½ h.p. Lister D engine, which if rated to a higher speed than 600 r.p.m. will develop about 3 h.p. I have considered belt drives, but I am limited for space. I think that the answer is electrification, which would be required in any event to provide light. My query is: would a 24 v. d.c. generator and batteries be suitable, providing, of course, that I could obtain a motor of about ½ h.p.? The alternative would be a d.c. generator of 110 v., for which motors can be obtained fairly cheaply. An a.c. alternator of 230 v. would be rather expensive, but the fractional h.p. motors are fairly cheap to obtain.—H.H.C., Ghana West Africa.

▲ *There are some advantages in using your engine to drive the machines through the medium of a lineshaft and individual clutches or fast and loose pulleys, but as you will require an electricity supply for lighting it is practicable to use individual electric motors though with some loss of efficiency.*

A 24 v. d.c. generator with a storage battery would be suitable as it is possible to obtain generators and motors for this voltage on the surplus market, and the car accumulators could be used for storage. The generators and motors are mostly short-rated and might not be suitable for continuous running at full output.

A 110 v. generator would have advantages if current is to be transmitted over any considerable distance, as the loss through line resistance would be less. It would call for a considerably greater number of storage cells and would, therefore, be more expensive.

The disadvantage of alternating current is that the generator would have to be run continuously, which might not always be convenient, but in other respects it should be suitable. Alternating current generators must be run within fairly close limits of their proper rated speed. In any event the wattage of either of the generators would depend on the total load of the circuit, though with using storage batteries a temporary overload could be sustained for short periods.

It would not be advisable to run your engine for any great length of time at a higher speed than it is normally rated, and you will find that in actual practice a generator of 1 kw. will need at least 2 h.p. to run at a full output, so that with your estimate of 2½ kw. not less than 6 to 7 h.p. is recommended.

Model Engineer EXHIBITION

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

Spares for Atlas

Can you please tell me the address of an agent from whom I can get spares for an Atlas lathe? I have just had one given to me. The leadscrew, the self-act gear and the gear chains are missing.—S.A.L. Wimbledon, London SW19.

▲ *The British agent for the Atlas lathe is the Acorn Machine Tool Co. Ltd. of 610-614 Chiswick High Road, London W4. It is probable that the firm would be able to supply a new leadscrew and other spares for the lathe.*

Ploughing engine

I would very much like to construct a working model of a Fowler steam ploughing engine or, failing this, a haulage and winding engine. I would be most grateful if you would tell me where to obtain drawings and castings.

I have recently completed a 3½ in. gauge locomotive and I would also be grateful for any advice you could give me on painting and lining it. I have tried to obtain line and number transfers without success.—J.R., London EC3.

▲ *There would seem to be no drawings or castings for this project. Mr R. Palmer, 13 Firgrove Road, Southampton has made steam ploughing equipment and if you wrote to him he might be able to help.*

As a general rule, it is necessary to dismantle completely a 3½ in. gauge locomotive for painting. Any good quality paint can be used, with the appropriate undercoat. Three or four thin coats should be applied, with a coat of varnish after lettering and lining.

If possible, the boiler should be stoved to make the paint more resistant to heat.

No lining or number transfers are obtainable but PM Plans Service can supply transfers for the British Railways Lion at 2s. 6d. a pair and crests in 3½ in. gauge at 2s. a pair, or in 5 in. gauge at 4s. 3d. The letters LMS in 3½ in. gauge at 2s. and GWR (Worthing) in 3½ in. gauge at 2s. 6d. are also supplied.

Moorcock

I am building the boat *Moorcock* by Oliver Smith. I would like to know how wide the frames should be, when she is built to ½ in. scale by the shipyard method. I cannot find T-section brass of 16 s.w.g Would 21 s.w.g. brass plating be too heavy? I want her to be strong but not too heavy as I am going to fit radio-control. About how much plating would I need and how much T-brass?—P.M., Plymouth.

▲ *The T-section brass should be $\frac{3}{16}$ in × $\frac{3}{16}$ in. × 16 s.w.g. Approximately 30 ft is required for the frames and deck beams. The number of frames needed can be determined by fitting one at each frame station shown on the drawing.*

Brass sheet of 21 s.w.g. is quite suitable for plating the hull. Sheets measuring 3 ft × 2 ft are easily obtainable and two of them should be sufficient. The size of plate depends on individual taste, but as a useful guide it can be cut so as to span each frame allowing for ¼ in. for overlap.

Tyzack Zyto

I have just bought a second-hand Tyzack Zyto, on which all the various slides are graduated. Unfortunately I do not know what these graduations mean; could you please tell me?—J.E., Chiswick, London W4.

▲ *The usual arrangement is to graduate the slides in increments of 1/1000 in.; this can quite easily be checked.*

First, measure the pitch of the feedscrew in threads per inch either with a screw pitch gauge or by advancing the slide for an exact number of turns, and measure the distance of the slide rest. Having found the movement per revolution of the slide, the number of graduations of the index should then be counted. Divided into the movement per revolution, they will give you the indicated distances per graduation.

For instance, if the screw has 10 threads per inch and the index is graduated in 100 parts, these will represent 1/1000 in. Some feedscrews have been made with 12 threads per inch and graduated in 80 divisions. This gives a little over 1/1000 in. per graduation which, though not accurate in measurement, is quite useful in general work.

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

EIGA GROUPS

SIR,—May I add to the Smoke Rings of January 26, on the subject of apprenticeship training?

Until 1953, opportunities for apprentice training were mainly confined to the larger firms. In that year the first EIGA group was formed to enable smaller and specialist firms to provide comprehensive apprenticeships by pooling their training resources.

There are now 21 EIGA groups. Between them they cover most of the industrial areas of the country. Over 700 training places have already been provided and expansion continues steadily.

Many of the smaller firms are still somewhat wary of embarking on long-term training programmes. Those who have taken the first step are convinced of the benefits to their companies, quite apart from the contribution which they are making to the national skill.

New EIGA groups can be established in any area where a minimum of 12 to 15 firms wish to participate. EIGA training is based on carefully prepared syllabuses, and is supervised by professional engineers with wide experience. The high standard of examination results and the low wastage are probably the best measure of its success.

Head of Training K. M. WARD.
EIGA.

EIGA is the Engineering Industries Association Group Apprenticeship administered from 18 *Thurloe Place, London SW7. Kensington* 6216.—EDITOR.

THAMES STEAMER

SIR,—Mr D. Haley seeks information on Thames passenger steamers [Postbag, 1 December 1960], and a reply from Mr H. C. Bateman was published in ME on December 29.

If Mr Haley wishes to follow this matter further he will find a complete account, which will answer his query, in Volume XIII, 1905, pages 64-66, giving names, builders and speed on trial of the first steamer delivered. According to this account Mr Bateman is not correct as to the names and builders.

Those interested in model boat building will find a splendid account of a model of one of these vessels given by Mr C. Blaydel in Vol. XX MODEL ENGINEER.

Further to this there is an illustrated account of Thames passenger vessels covering 1844-1900 in *Country Life* for 22 December 1960.

Blackburn, ARTHUR PRESTON PEET.
Lancs.

WARNING

SIR,—In "Electric drive for drilling spindle," on February 9, the two-pin socket is shown with the pins live.

This, of course, is safe for 24 v. working as described, but if a mains motor is used there is just a chance that the same plug and socket would be followed. This arrangement would be potentially lethal, and so readers should be warned.

London SW1. (DR.) ROBERT CUTLER.

JAMES NASMYTH

SIR,—The other day Postbag had a letter of mine on biographies of early engineers. I would like to add a piece of information which I have found accidentally.

The preface to the autobiography of James Nasmyth, edited by Samuel Smiles, 1883, edition published by Harper and Brothers, has this paragraph: "Mr Nasmyth, nevertheless, kindly furnished me with information respecting himself, as well as his former master and instructor, Henry Maudsley, of London, for the purpose of being inserted in *Industrial Biography or Iron Workers and Tool Makers* which was published at the end of 1863. He was of the opinion that the outline of his life there presented was sufficiently descriptive of his career as a mechanic and inventor."

The text does not make it clear whether "his career" referred to Nasmyth or Maudsley.

Birmingham, R. V. HUTCHINSON.
Michigan.

STEAM TO OIL

SIR,—An interesting old engine stands in a stackyard at Glen Parva, Leicestershire—a steam portable converted, expertly, to a Hornsby single cylinder oil engine. The original steam engine may have been by Hornsby, as the name is cast in all the wheel hubs.

The boiler, stripped of lagging, appears to be the main oil tank. A pump, eccentric driven from the crankshaft, delivers to the engine from the boiler. Exhaust pipe goes into the smokebox.

We read on the nameplate: *The "Hornsby-Akroyd" Patent Safety Oil Engine No.* 118 *Protected by Patents throughout the world, manufactured by R. Hornsby and Sons Limited, Engineers, Grantham, England.*

Wigston Magna, C. J. DYSON.
Leicester.

Four miles south-west of Leicester, in a stackyard at Glen Parva, is an old steam portable engine converted to oil

CALL BOY

SIR,—A. N. Buchanan in his letter "The Boy Between" on February 9 is quite correct about the "Call Boy" on the old penny steamers. As the steamer approached the pier, they would call: "Ease her," and "Stop her"; if the boat was stopping too short, the cry would be: "Send her on a bit," "Stop her" or "Starn." The calls were delivered in a throaty or nasal tone which only these small Cockney boys could produce.

Another thing which I can plainly recollect at 70 is that one or two of the boats were driven by oscillating cylinder engines; the others, of course, had diagonal ones. As I was born and bred in Battersea (my father was an engine driver on the LBSC Ry., Battersea sheds), whenever I earned a few coppers by mending the neighbour's saucepans or kettles or putting in a new tap washer, I used to go straight to Battersea Pier for a trip to Westminster and back. A run on the boats held more attraction for me than all the sweets you could have produced.

There are still traces of the entrance to Nine Elms pier, within a hundred yards of the original terminal station building, of the old LSWR, before it was extended to Waterloo.

Camberwell, London. BERNARD T. SMITH.

GWYNNE EIGHT

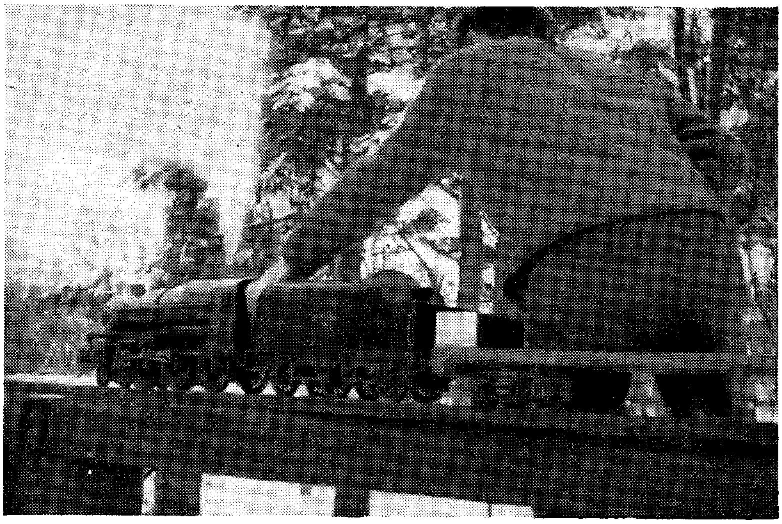
SIR,—I have a very clear recollection of the Gwynne car. It was called, I believe, the Gwynne 8 although I must admit that until now I had no idea it was manufactured by Gwynnes Pumps Ltd. I remember how much, as a small boy, I admired the sleek streamlined appearance of the Gwynne 8, owned by a friend of the family. One might call it the forerunner of the popular sports car of today—it certainly had sporting tendencies. What a pity its life was so short!

Bedford. R. C. BRITTON.

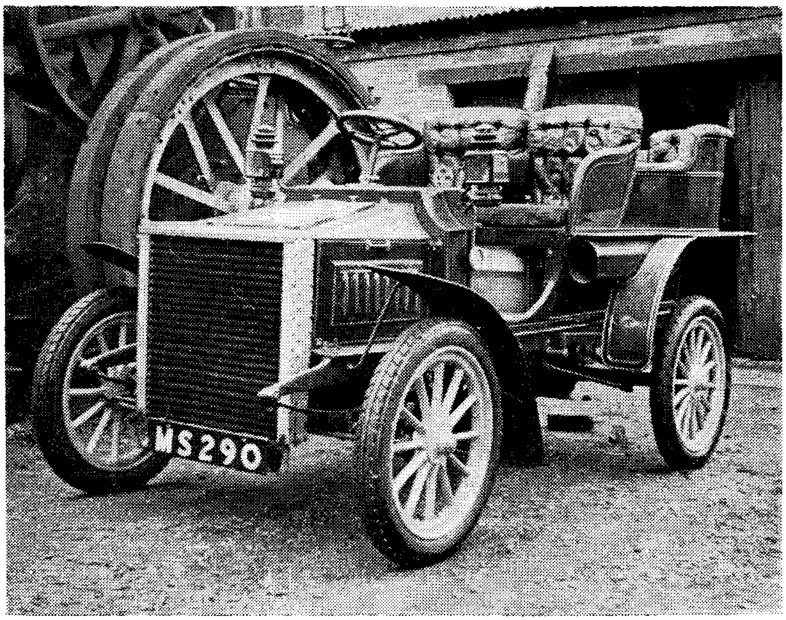
CALEDONIAN

SIR,—I notice an enquiry from L.W.J., Blackheath, Birmingham, in Readers' Queries of March 2. It reminded me that I have photostats of Messrs Neilson's drawings (date 1886) which I would be glad to lend L.W.J. if he will write to me at St Brydes, Dunblane.

No 123 had her valve-chest between the cylinders, as you rightly say, and it was obviously a struggle to get everything in, even on the full-size engine. So tight was the work that the designer had recourse to two sets of ports for each cylinder, one above and one below the valve spindle line.



Above: Alex S. Wilson of Dunblane has modelled No 123, which passes through Dunblane sometimes. Below: White steam car owned by a friend of Mr Wilson



The top exhaust port discharges into the Y-shaped blast pipe and the bottom exhaust ports have had to be led round the outsides of the cylinders (the frames are cut away here to clear) and then joined up at the Y-pipe.

I got the drawings some time ago, through the kind co-operation of the local stationmaster when I was intending to make a ¾ in. scale model. But I was a bit puzzled how to pack everything into the valve-chest, while at the same time not reducing the cylinder bores too much.

Another unfortunate thing is that the diameter of the boiler shell is, of course, limited by the width between the driving wheels.

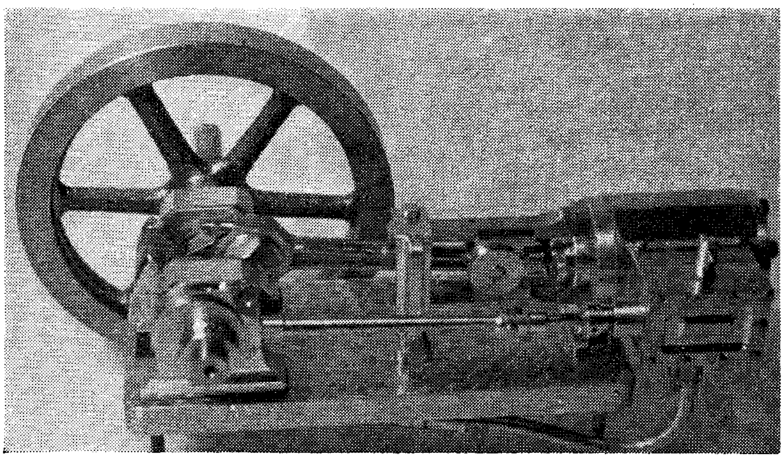
In 1 in. scale it might just be possible to make a satisfactory working model of No 123, and I am hoping to try this some day. I would not like to discourage L.W.J. from trying the engine in O gauge, but it is only fair to tell him that the work will not be easy, bearing in mind that "the impossible just takes a little longer."

There is one good thing about 123 which will appeal to all lazy modellers (I am one); there are no coupling rods!

I think that steel drivers might be better than cast-iron (even supposing castings are obtainable) as there would probably be less wheel slip on steel rails.

The engine was, I believe, either the first or nearly the first to use steam-sanding, as without it she would certainly have had a struggle to get started on wet rails. She is still in occasional use and goes through Dunblane at infrequent intervals, but I have not yet had an opportunity of a close-up look, because she is always travelling at high speed through the station on her way to Edinburgh or Glasgow.

Dunblane, Perthshire. ALEX. S. WILSON.



"I was amazed at the power such a small engine could have"

POWER

SIR,—I enclose photographs of a small steam engine which I have finished. It has a cylinder of $\frac{3}{4}$ in. × 1 in. stroke. The crank axle, which is $\frac{3}{8}$ in. dia., runs in ball bearings, and the big end of the connecting rod has half-shell bearings of brass. The screws are 6 BA with castle nuts and split pins.

As I had recently bought an ML7 and bench drill I was going to build a *Doris* $3\frac{1}{2}$ in. gauge engine, but before starting on such a long term project, I tested my equipment and ability by doing as much vertical-slide rest milling as possible. The engine is more or less true to full-scale with fluted connecting rods, slide bars with a motion plate, and so forth. The crankshaft is turned from the solid and is properly balanced by separate weights.

I was amazed at the power such a small engine could have. With compressed air of 30 p.s.i., you can grip the $\frac{3}{8}$ in. end of the shaft with your fingers as hard as you can, and she will not stop! With 3 lb. of air she just ticks over.

The only castings used are the flywheel and cylinder block. I would be pleased to give more details if any reader is interested.

I end by saying how much I enjoy reading MODEL ENGINEER; I always look forward to Thursday when I can buy it. I wish you every success.

Highbury, London. J. TABONE.

STEAM MELODY

SIR,—I have read with great interest the article "Melody and Steam at Laurel Farm" by Mr Anthony Beaumont in ME of February 9. I am a great admirer of fair organs of all kinds and of showman's engines and steam engines in general.

Mr Beaumont states that in his opinion, the Marenghi surpasses the performance of Mr Albert Becquart's Hooghuys organ. I hope that he will not mind my pointing out that the two organs cannot be compared. The Hooghuys organ is a 70-key piano-forte organ, without counter melody or other registers, whereas the Marenghi is a 98 key, and probably has 18 or 20 registers, so that there is very much more opportunity for variations and orchestration.

I have met Mr Becquart and have seen and heard his famous centre engine and organ at close quarters. The engine is now driven by compressed air, and is quite different from the centre engines used in England; it is placed along the truck instead of across it.

Mr Becquart has four organs. Two are of the 70-key type, with the same gamma, and so the books are interchangeable. The other two are big 85-key dance-hall organs, also made by Hooghuys.

The pneumatic system used in Hooghuys organs is entirely different from the one employed by Cavioli, Marenghi, Mortier and other makers, and is far superior too, because it works far more rapidly than any other make. Hooghuys organs can play rock-'n-roll and other music with ease.

I am well acquainted with Mr R. C. Hooghuys, who lives here in Zeebrugge. He has a very fine 85-92 key organ which is a pleasure to listen to, and he is always very pleased to give a recital to anyone interested. If any MODEL ENGINEER reader, who may visit these parts in 1961 would care to hear it, they should just drop me a line at Evendijk West 34, Zeebrugge, and I will arrange things with Mr Hooghuys.

I hope that Mr Beaumont will not think I am criticising Mr Cushings's Marenghi, which looks very fine; I only wish that I could hear it play.

Who cuts the music in England now?

May I say that I very much enjoy MODEL ENGINEER, especially articles on steam tackle of all sorts. Long may your fires burn, and may you never drop the lead plugs!

Zeebrugge, Belgium. ALAN S. BURTON.

SIR,—I was much interested to read Mr Beaumont's article on Mr Cushing's collection. I, too, had the pleasure of "looking and listening" at Laurel Farm last year and I would endorse all that Mr Beaumont has said about the hospitality shown by Mr and Mrs Cushing.

I would like to make one observation about the Savage centre engine mentioned in the article. This is a Savage No 5112 and is probably the oldest workable example in existence. It is in no way altered from the original design as Mr Beaumont suggested, as the flue pipe was fitted to the side of the hollow smokebox pedestal and ran horizontally under the centre truck of the roundabout, whether it were dobby horse or galloping horse, and into the hollow pole about which the machine rotated. In some machines the exhaust steam was carried into the horizontal flue, and in others it was carried separately to the centre pole. The second method was the more usual.

Cove, Hampshire. W. E. SUMMERHAYES.

CLUB NEWS

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

PIONEER VALLEY

CALLING all live steamers in North America. . . . The Pioneer Valley Live Steamers Spring Meet will take place on May 19, 20 and 21. Mr G. G. Hall, the secretary, tells me that the large and extensive layout is equipped for locomotives of $\frac{3}{4}$ in. and 1 in. scales—$3\frac{1}{2}$ in. or $4\frac{3}{4}$ in. gauges.

Since MODEL ENGINEER is read by live steamers all over America, Mr Hall has asked me to give the details of how to reach the track site at Hillside Road, Southwick, Massachusetts.

Visitors heading in from the north, east or west should make for Westfield. When Westfield is reached they should change on to route 202 which will take them out to Hillside Road. As they approach the site, Pioneer Valley notices will direct them to the track.

Those approaching from the south should head for Southwick on route 202. This route takes them to the centre of Southwick where they change to route 57 for Hillside Road, and the directing signs.

Details of the meet can be obtained from Mr G. G. Hall, 88 Meadowbrook Road, East Longmeadow, Massachusetts, USA.

The Fall Meet of the Pioneer Valley Live Steamers is on October 12, 13, 14 and 15.

LIVING AT SOUTHPORT ?

Mr F. R. Cosgrove, the secretary of Southport and District Live Steam Club, has written asking me to inform readers that the club is still flourishing. He feels that there are probably many model engineers in the town who do not know of its existence.

If you live in Southport and want to join, write to Mr F. R. Cosgrove at 102 Eastbourne Road, Birkdale.

VISITING WORCESTER

There are to be two open track days at the Worcester and District SMEE track this year. The first will be on Sunday April 16 and the second on Sunday May 14. The track—a continuous $\frac{1}{8}$th mile circuit suitable for both $3\frac{1}{2}$ in. and 5 in. gauge locomotives—is at Waverley Street, Diglis, Worcester and is easily reached from the city centre.

Information may be had from Mr Paul W. Hughes, the secretary, at 83 Bath Road, Worcester.

Mr Hughes would be glad to hear from intending visitors and would like them, if possible, to bring their own driving trucks.

GRIMSBY'S PROBLEM

Grimsby and District SMEE is faced with a problem. Members have heard that it is possible that the site on which their track stands may soon be needed for development. Should they carry on developing the site, hoping that when the time comes the council will find them a new one, or should they find another site and build all over again ?

It is a disturbing problem. The Grimsby men do not intend to sit back and wait. They are going to hold a meeting of members, and discuss the problem, and act.

I wish you success, Grimsby.

WOLVES TO GO

More bad news comes from the Midlands. Only a few months ago Birmingham SME had to close its Campbell Green track and search for a new site, and now Wolverhampton MES has to move. From Whitsun the track will be closed and dismantled as the site is needed for development.

This is the third track to close because of development in less than a year. Surely the local councils can be a little more co-operative and find alternative sites for the clubs ?

I appeal to model engineers in the Birmingham and Wolverhampton area to let the Wolverhampton MES know of any sites suitable for a multi-gauge track.

BIRMINGHAM'S LATEST

Birmingham SME may be trackless, but there seems to be no waning of locomotive interest in the society. During the winter another locomotive was added—a fine 5 in. gauge version of Mr J. I. Austen-Walton's LMS 0-6-0 3F which was described in MODEL ENGINEER. It is complete in every detail and even the cab has been made as near to scale as practical. The pipe work is good enough to impress a skilled plumber.

When the society gets a new track this beautiful engine will no doubt be showing its paces.

Secretary: Mr R. Phillips, 92 Gilbertstone Avenue, South Yardley, Birmingham 26.

CHELMSFORD'S DOZEN

At the annual meeting of Chelmsford SME, secretary R. M. King reported a very successful year. The new permanent track had been opened by the mayor and since then the society had held the 12 meetings which the council asked for each year.

A slight profit had been made but it was necessary to increase the publicity for the track if the society were to be able to keep it in good shape. All things considered, the year had been a good one, and the credit for it should go to the members who had put great effort into building the track and headquarters.

The office of president has now passed from Mr D. Wyatt to Mr J. (" Pop ") Sigrist. There is no other change.

Secretary: Mr R. M. King, 2 Upper Roman Road, Chelmsford.

CLUB DIARY

April 5-8 Nottingham SME. Exhibition at The Victoria Baths, Nottingham.

April 5-9 Rotary Club of Broadstairs. Hobbies exhibition at the Charles Dickens School, Broadstairs.

April 6 Croydon SME. Slide show entitled Wales to Croydon by Mr K. G. Dunton, at the Lindfield Club, Lindfield Road, East Croydon at 8.30.

April 6 Sutton MEC. Track work.

April 6 Huddersfield SME. Talk by Mr. C. S. Woollard on "The Great Eastern," at the Highfields HQ at 7.30 p.m.

April 6 Romford MEC. Bits and pieces evening at the Red Triangle Club, Romford at 8 p.m.

April 6 Eltham and District Small Locomotive Society. General discussion at the Beehive Hotel, Eltham.

April 7 Coventry MES. Model night and sale at the Centre Ballroom, Holyhead Road, Coventry.

April 7 Warrington and District MES. Film show by Mr Smith.

April 7 Rochdale SMEE. General meeting at Lea Hall, Smith Street, Rochdale at 7.30 p.m.

April 8 Bristol SMEE. Meeting at the James Room of the YWCA.

April 8 City of Leeds SME. Track meeting at Temple Newsam.

April 10 Clyde Shiplovers' and Model Makers' Society. Annual general meeting at the Highlanders' Institute, Elmbank Street.

April 10 Historical Model Railway Society. Lecture by Mr J. H. Scholes, curator of BTC Historical Relics on "Transport Treasures" at Keen House, Calshot Street, London N1.

April 10 Welling and District MES. Meeting at Welling Library at 8 p.m.

April 10 Sutton Coldfield and N. Birmingham SME. Talk on ship modelling by Mr F. A. Pariser at the Swan Inn, High Street, Erdington.

April 11 City of Leeds SMEE. Track meeting at Temple Newsam.

April 12 Harrow and Wembley SME. Radio-control demonstration at Heathfield School, Harrow at 8 p.m.

April 13 Sutton MEC. Track repair.

April 13 Rugby SMEC. Model night.

April 14 Thames Ship Lovers' and Ship Model Society. Combined meeting with the Greenwich SMS. Lecture by Dr R. C. Anderson on Galley and Oared Men-o'-War at Charlton House at SE7 at 8 p.m.

April 14 Thames Shiplovers' and Ship Model Society. Meeting at Oddi's at 7 p.m.