Model Engineer

THE MAGAZINE FOR THE MECHANICALLY MINDED

1½ in. SCALE *MIDGE*, BY G. AND P. WHEELER, AT THE NATIONAL MODELS EXHIBITION

MORE EXHIBITION FEATURES IN THIS ISSUE

ONE SHILLING 21 JANUARY 1960 VOL 122 NO 3054

Model Engineer

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

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At the Exhibition

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A WEEKLY COMMENTARY

Smoke Rings

By VULCAN

LAWRENCE EARL, now a sprightly 78-year-old, was for 45 years a driver on the LMS, rising to the premier status of top-link before he retired 13 years ago. I had the pleasure of meeting him during the Exhibition and chatting about some of his experiences.

What was the finest locomotive he had ever driven? Without doubt, he told me, the unique turbine driven engine which the LMS developed and which he took over on several occasions.

This, he said, was the most comfortable and powerful engine he ever handled. The absence of reciprocating motion made life on the footplate a joy. There was scarcely any jerky sideways movement—the most disturbing motion that a locomotive can develop—and it rode extremely well.

Tremendous power

As an example of its phenomenal power he told me of a journey he made with it over Shap with a 530-ton train behind the tender. At Clifton and Lowther, some miles before Shap, he was brought down to walking pace on a 1 in 126 grade. Yet when only a few miles farther on, the Turbomotive, as it was called, had worked the 530-ton train up to nearly 60 m.p.h. despite the continuing rising gradients. It breasted Shap unassisted at a little under 40 m.p.h.

Another astonishing run made by Mr Earl occurred on the day he was handling Silver Jubilee on the up Fylde Express. The engine failed at Crewe and No 5049, a Black Five, took over. The 24 miles from Crewe to Stafford were polished off in even time and Willesden, 152 miles from Crewe, was reached in 129 minutes. And this with 6 ft driving wheels!

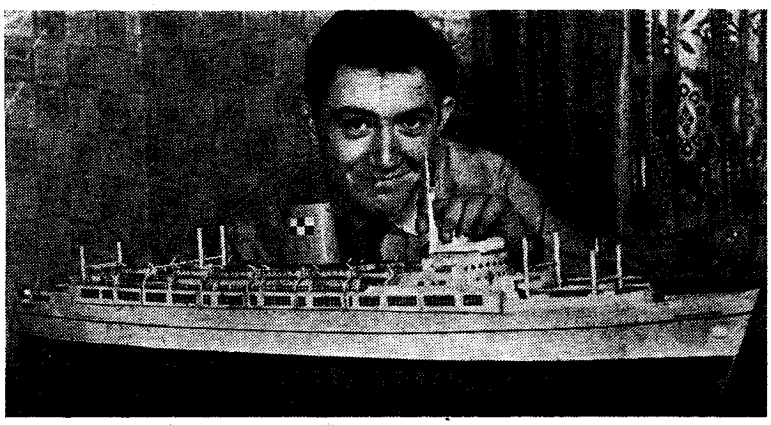
Speedster

Lawrence Earl confessed to me his liking for speed. Whenever safety permitted he would urge his steed to its fastest pace. But he pointed out that he had a constant regard to the comfort and safety of his passengers. Many times he was complimented by passengers for the efficient manner in which he handled the locomotive.

His highest speed? 100 m.p.h. This, strangely enough, occurred on a rising gradient. Between Bletchley and Tring in October 1935, No 60209 of the Princess class, with 300 tons behind, covered the 15 miles between these two towns in 9 minutes.

Mr Earl expressed great satisfaction with the Exhibition which he thought was one of the best he had seen.

Incidentally, Mr Earl could provide the answer to whether a locomotive can haul more than it can push. The Turbomotive was actually put to this test and proved to haul more than it could push.



Sea in his blood

EIGHTEEN-YEAR-OLD David Rowson, of Liverpool, spends most of his spare time on the waterfront watching the liners go by.

For to him they represent the means of achieving two ambitions—to sail to Canada and to be a ship's purser.

Meantime he has satisfied his yearning for the sea by constructing a scale model (he is seen with it in my picture, page 63) of the Canadian Pacific liner *Empress of England*. It took him 17 months to build.

The Canadian Pacific Company were so pleased with it that they invited David to a meal on board earlier this month.

The model is powered by an electric motor.

Rollers for sale

GOOD examples of steam rollers are difficult to come by but I have heard from Mr Christopher Jennings, editor of *The Motor*, of two fine specimens that a friend of his is willing to dispose of.

One of them is an 8-ton Aveling roller, which is offered for £150, and the other is a 10-ton Marshall for which the owner is asking £200. They are both in good condition.

Mr Jennings can speak with some experience on the quality of the engines for he regards Mr J. Chaplow, of Helsington Mills, Kendal, the person who has them for sale, as "a steam roller owner of the best type."

In fact Mr Jennings himself purchased a 3-ton Wallis and Steevens Simplicity roller from Mr Chaplow about two years ago and it has given him magnificent service.

The Bluebell Line

AN editorial in the *Bluebell News*, organ of the Bluebell Railway Preservation Society, states that final negotiations with British Railways for the purchase of a section of the line between Horsted Keynes and Sheffield Park are now pending. Points to be discussed are the exact details of finance and the precise conditions of take-over.

Now another big step looms ahead. When transactions with British Railways are finished the society will in all probability still have to complete their negotiations with the Ministry of Transport to operate the line as a light railway.

The Ministry require that the society prove itself a body competent to undertake the running of a public line.

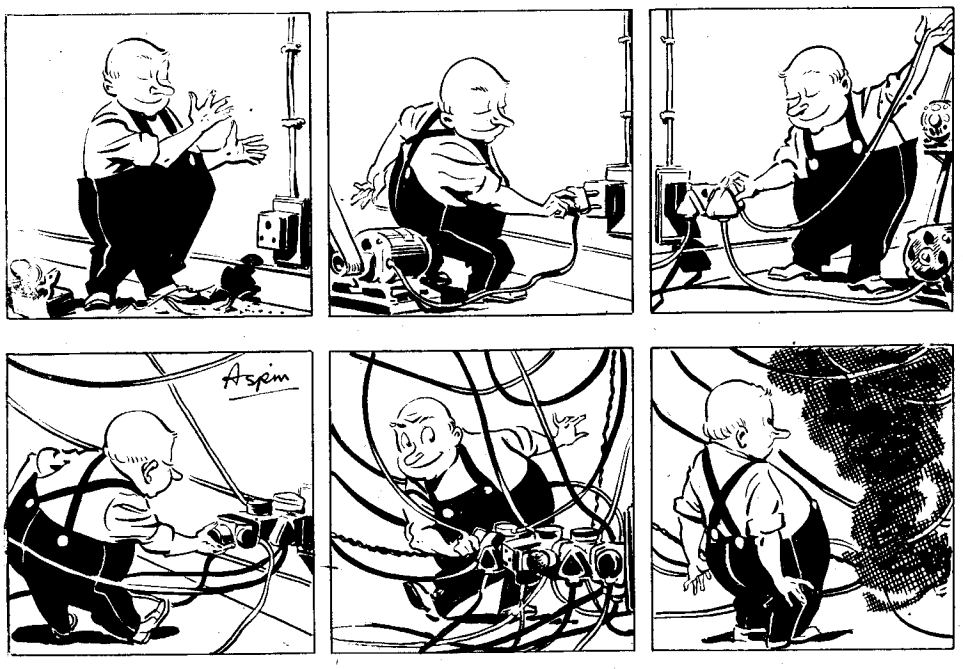
Cover picture

The 7¼ in. gauge tank locomotive, THE MIDGE, *built by Messrs G. and P. Wheeler and entered by them in the National Models Exhibition. The results of the competitions will be announced in our issue of January 28. Further reports of the models and some special features and attractions at the Exhibition will also appear next week.*

While these negotiations drag slowly on, the members of the society have not been idle. Repairs and renovations to the track and lineside buildings and equipment have gone ahead during the summer months and it is hoped that this work will be speeded up during 1960.

Membership has reached 500 but officials feel that at least 1,000 are needed by the time of the anticipated opening in May. Volunteers who would like to offer their services, or join the society, should drop a line to the headquarters at Sheffield Park Station, Uckfield, Sussex.

CHUCK . . . . . THE MUDDLE ENGINEER



Star exhibits in general engineering

By L. H. SPAREY

THE General Engineering Section is, this year, a most satisfying exhibit, especially as all the "stars" have, with a few notable exceptions, been grouped together on the Duke of Edinburgh Challenge Trophy stand. It is not proposed to deal in detail with these exhibits, as all of them have won high awards in previous ME Exhibitions, and have been adequately described elsewhere.

It is not possible, however, to omit mention of that extraordinary piece of general engineering, which won the Duke of Edinburgh Challenge Trophy, the Fowler road locomotive *Supreme*, by S. T. Harris (London). For many years I have speculated, unsuccessfully, on just what it is that makes a model superlative. I have compared the super with the good, and have found that the workmanship in both is often much the same. I can only conclude that by some stroke of genius or craftsmanship the winning model is not only well made but *looks* well made.

There we have it. Mr Harris's model possesses this elusive quality more than almost any model I have ever seen. It also demonstrates how a real craftsman can get away with unusual features. The chrome-plated metalwork—rarely seen on road locomotives of this type—looks absolutely right.

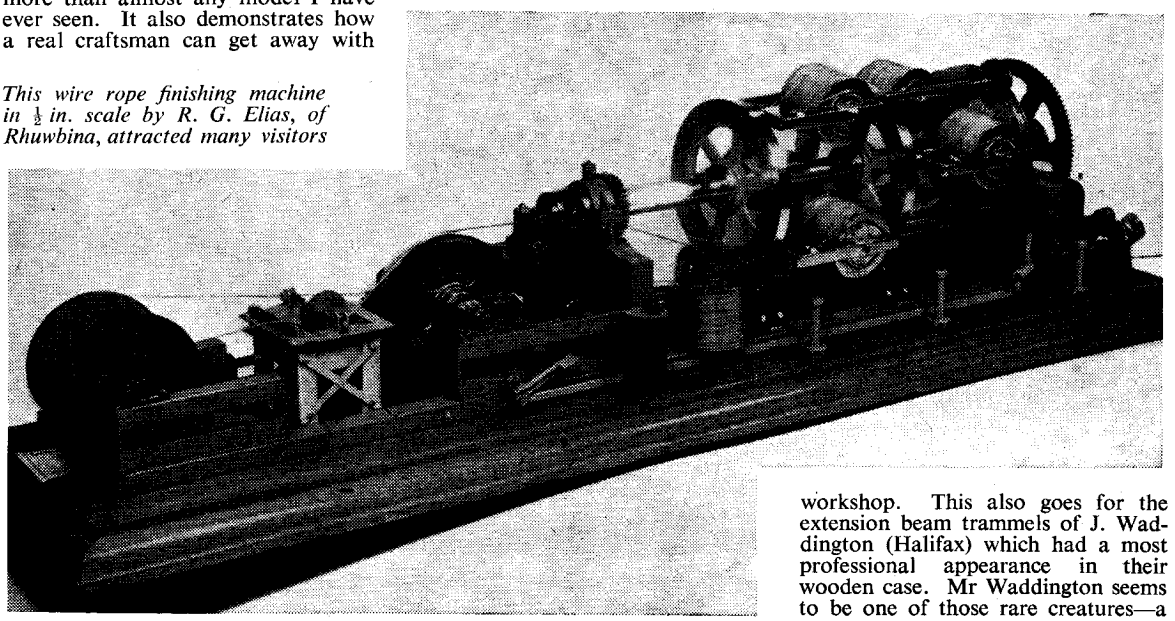
The Duke of Edinburgh stand displayed another exhibit which every modeller should study, the 1922 LCC tramcar by R. Elliot (London SE2). Its great quality is its reality. It is a most difficult thing to make this type of model look real, due, I think, to the large painted areas. Windows, also, are most difficult to portray—and a tram has plenty of them. Models of this type so often look clumsy and toylike. Even the very paint looks out of scale!

Elusive quality

In the general engineering section proper, the star exhibit was, I feel, the single-cylinder launch engine by K. N. Harris (Rustington). Nobody was surprised that this engine won the Bradbury Winter Memorial Cup and the Championship Cup for the class. The model embodied the Stephenson double-bar link motion, and was complete with exhaust feed heater, flexible coupling and multi-collar thrust block—all to the highest standard.

The influence of W. J. Hughes was well shown by the display of traction engines and road locomotives, which bid fair to rival the steam railway engine as a prototype. Three ME Allchin traction engines were displayed side by side. To the non-expert there seemed not a straw to choose between them; workmanship and paintwork were well above average. They were a delightful trio. That of T. H. Allen (Hethe), by virtue of its subdued paintwork, had, I thought, the best appearance. Some of the larger road locomotives were marred by bad painting and lettering.

It is, unfortunately, too easy to pass over the small tools exhibits with hardly a second glance; their unspectacular nature belies the amount of skill which they entail. In this category may be placed the tools shown by J. T. Biggins (London SE9). I should like these in my workshop. This also goes for the extension beam trammels of J. Waddington (Halifax) which had a most professional appearance in their wooden case. Mr Waddington seems to be one of those rare creatures—a



This wire rope finishing machine in ½ in. scale by R. G. Elias, of Rhuwbina, attracted many visitors

model engineer who can do good woodwork.

An enviable accessory, displaying a typical northern solidity, was the dividing head by S. Coupe (Stockton-on-Tees) which was shown mounted on a Myford lathe cross-slide, together with three dividing plates. The rise-and-fall movement of cylindrical design seemed most convincing.

Particular mention should be made of the power hacksaw machine by R. Tilly (Christchurch) who is 16 years of age. This machine would have done credit to a modeller of any age, and the merit was enhanced by the fact that all the patterns and even the castings themselves, were made by the exhibitor.

As was to be expected, the tools designed by Duplex were well in evidence, and were typified by the engraving machine of J. Horniblow (Reading). The freelance hand-shaping machine by the boys of Class 3, Beech Hill Boys' School, Luton, was well able to hold its own as a sturdy tool, albeit that it paid more attention to utility than appearance.

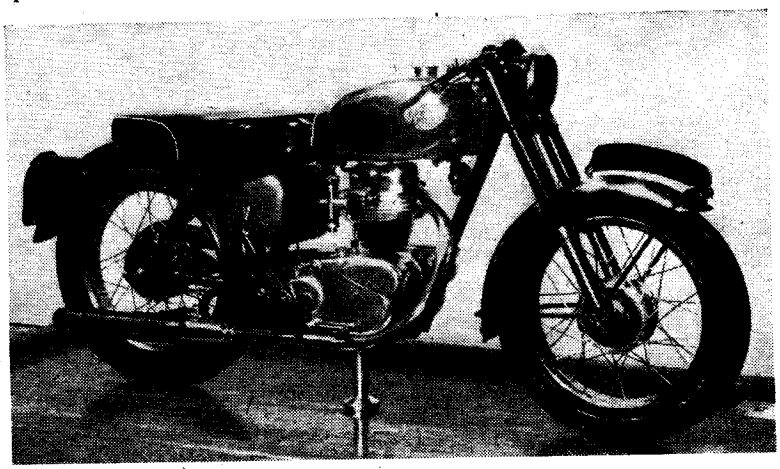
I.C. engines

Modellers of internal combustion engines always seem particularly disposed to experimental design, demonstrated this year by the opposed-piston engine of C. C. Brinton (Belbroughton). This engine design was based on the Rootes principle, but its plain, fabricated appearance was somewhat unsensational. Fortunately, one side of the case was removed, thus displaying some of the mysteries within.

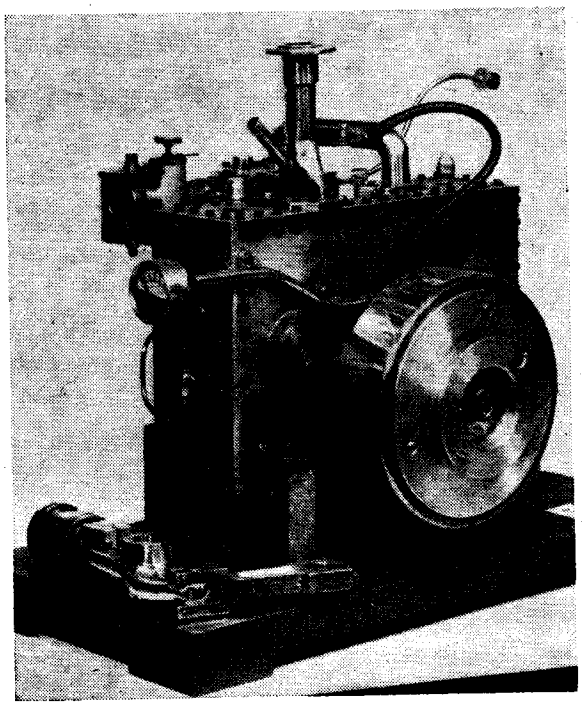
Every exhibition presents examples of Edgar T. Westbury's engine designs, and the Seal Major petrol engine from L. G. Curtis (St Albans) well upholds this tradition. At all times the Seal is a most impressive looking engine, and is even more so when thus shown as a full marine unit, with prop-shaft, tank and dural bedplate.

One of the most interesting models in the whole Exhibition was the wire rope finishing machine by R. G. Elias (Rhuwbina) made to ½ in. scale. Apart from its merits as a model, it was intrinsically interesting from a purely mechanical viewpoint, especially as Mr Elias was plucky enough to supply a crank-handle by which the machine could be operated, and shown in the actual process of producing a wire rope. The geared mechanism by which the spools were maintained horizontally during rotation, and the intricate rotating head could, and did, provide prolonged interest to visitors.

Hot-air engines are something of a rarity, and one built by a woman must be unique. Ann Carter (London SW16) has done just this, and a pleasing and well-made job it is too. Its black, subdued finish and straight-forward approach are qualities not usually associated with feminine taste, and seem to show that Ann has the skill of a practical engineer.



Above: H. W. Hooper, of Birmingham, was the builder of this 250 c.c. Royal Enfield Crusader motorcycle in $\frac{1}{16}$ in. scale



Left: C. C. Brinton, of Belbroughton, built this example of an opposed-piston engine based on the Rootes principle. It was shown without part of the casing

Clocks are always a fascinating subject, and the movement displayed by J. H. Wilding (Billinghurst), complete with chiming mechanism, served only to heighten the esteem which this class of engineering has gathered to itself. To know just what this means, one should inspect also the eight-day regulator clock by that master of horology, C. B. Reeve (Hastings). This superb timepiece shows mean time and approximate sidereal time. It is one of the masterpieces of amateur clockmaking.

Clocks lend themselves so much to elaboration of movements that one can be led into productions that are more ingenious than artistic. The cukoo clock in diorama setting with automata by T. S. Aikman (Kenton) fell into this category. When the hour struck, cottage doors opened, figures appeared, dogs and cats disported themselves, and the whole thing became a hive of activity which the tiny clock with the curious hands, set deep into a bleak mountainside, could scarcely sustain. The mountain

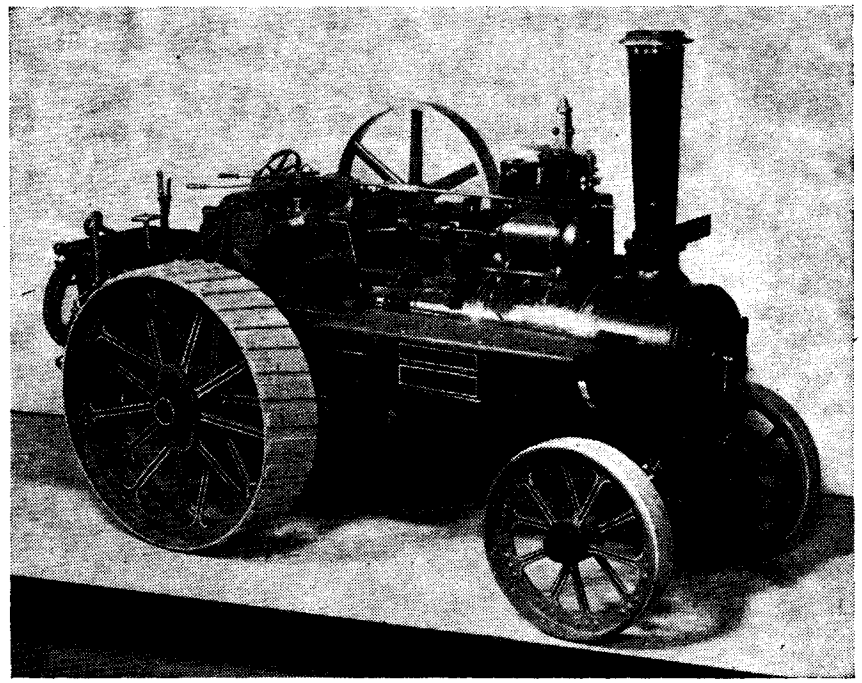
environment, in shades of brown and khaki, provided a most bleak and dismal setting.

Models fall roughly into two groups; working models and those made only for show purposes. The latter are concerned only with external appearance, and for this reason must be judged on a very high standard indeed. A model of this type which almost reached the peak was the 250 c.c. Royal Enfield motor cycle, which could stand almost all the examination one could give it. The tedious and intricate work which such a model entails has been admirably carried out by H. W. Hooper (Birmingham), but there was a certain "woolliness" about the paintwork. Nevertheless, a nice little model.

Into this class fell also the suit of armour by A. P. Cook (London SW17). It is extremely well made, and appears to be a charming piece except for the sword handle. This is closely wound with what appears to be enamelled copper electric wire. The whole appeal of this interesting little figure is instantly ruined when the eye encounters what might well be a small electric coil in some modern piece of apparatus !

The model racing car class, which was not too well supported, was saved by two extremely good models —the diesel-driven Miller railcar by that master of technique A. Weaver (London NW4) and the stripped, Austin 7 railcar by T. W. Pinnock (London N20). These cars made up in quality for what was lacking in quantity, especially in the paintwork, lettering and perfection of detail.

On this stand, other race cars, complete with model drivers, served only to confirm the curious fact that miniature human figures kill any model stone dead ! Unlike painting, where the addition of human figures add life to a picture, small, static humans in a model make it lifeless and toy-like. This was again demonstrated in the model of the GER Wood Street signal box, a delightful little scenic exhibit, rendered dead and unreal by the platelayers repairing the track.



ME Allchin traction engine in 1½ in. scale by T. H. Allen, of Hethe

Two interesting exhibits, bristling with optical and mechanical problems, were the pair of binoculars by A. McRae (Fort William) and the set of three prismatic telescopes of A. E. Bowyer-Lowe (Letchworth). In appearance these instruments looked somewhat better than those of professional standard, and were doubtless as optically efficient.

That hardy annual, the Coronation Coach, turned up as usual; this year, perhaps, a little better made than is customary, but still bearing its warning of the dangers of gold paint ! A nice set of silver salad servers and a jam spoon, with inlaid ebony handles, drew attention to a too neglected side of amateur craftsmanship.

The general craftsmanship class also provided a set of three pieces of antique furniture, which made not only a pleasing little group but also a pleasant change from the mechanical. The wheelback chair was exceptionally delicate and well handled.

Two exhibits which suffered from too small a scale was the Macmillian cycle of 1839—the prototype of all modern bicycles—and the Baron von Dresden cycle of 1819. Bicycles, even wooden ones, are a difficult subject for the modeller, and a larger scale would have made these exhibits more imposing, and have given better facilities for representing some of the finer details.

The modelling of fairground equipment is always a safe bet. Roundabouts, swings and organs are, themselves, nothing but huge toys, and there is no prototype which lends itself so readily to model production. The mechanical difficulties are often enormous, but one can always count on the finished model looking right. The imposing fairground organ by B. Willeter (Brighton) bears this out admirably. It is excellent, with its carvings, figures, bright colours and unrestrained flamboyance. Here is the modeller's opportunity. Gold paint—that arch enemy—may be freely used with every confidence. All this, and music, too ! What more could any modeller ask ?

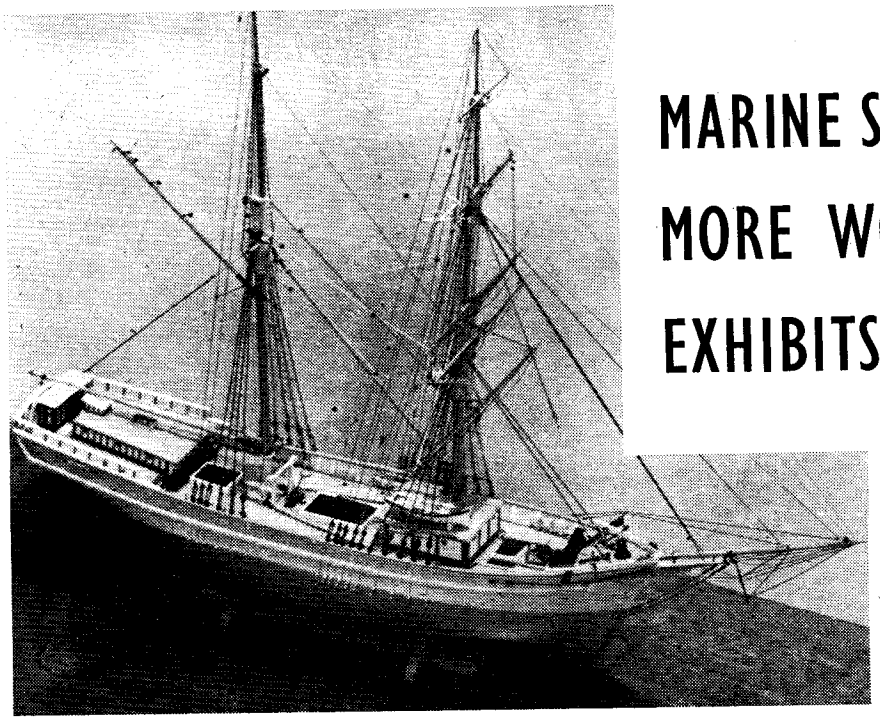
FOR YOUR BOOKSHELF

The Birth of the Steamboat *by H. Philip Spratt (Charles Griffin and Co. Ltd), price* 28*s.*

APART from any other merits, this book deserves special distinction for the considerable amount of research work which has been devoted to compiling an historical review, in chronological order, of all the ideas, experiments, and efforts which have contributed to the development of steam navigation. It extends back to periods much earlier than that of the first practical steam engines, and includes the names of many pioneers.

Mechanical propulsion of ships by paddles driven by human or animal power, was tried long before the Christian era, and many ancient manuscripts contain reports of such ships, in some cases with illustrations. Among the first to make practical proposals for using steam to drive ships either by mechanical or other means, were the Marquis of Worcester and the French savant Papin, towards the end of the 17th century.

They were followed by a number of theorists and experimenters who attained only limited success during the next century.—E.T.W.



MARINE SECTION HAS MORE WORKING EXHIBITS THIS YEAR

By
EDWARD BOWNESS

Model of brigantine LEON *in* $\frac{1}{8}$ *in. scale by J. A. Pomeroy, of Gerrards Cross*

THE most striking feature of the ship entries in the Marine Section was the increased number of working exhibits, especially in the sailing classes. There were twice as many models in the classes for working yachts and sailing ships as last year—16 compared with eight—and one, the brig *Espiegle*, by M. Garnett (Bristol), was of sufficiently high standard to gain the Championship Cup.

Entries in the Miniature Class were down and, although many were of high quality, none, in the opinion of the judges, merited the Championship Cup for Miniatures.

There is no suggestion that interest in ship modelling is diminishing, or that standards are falling off, but the one or two outstanding models which usually appear were absent. Standards this year showed that more research work is being done, better plans are available, and there is very little "scale scattiness," to use Jason's well-known term. The ship modeller seems to be looking on the ship he is modelling as something which has to be lived in and operated by human beings.

It was thought that the extra months between this Exhibition and the previous one might have produced more entries but probably most competitors were pleased to be able to postpone the completion of their models until the autumn and early winter rather than spend summer days in the workshop.

In the class for non-working steam and motor ships, there was a small entry. Strictly, some of these models should have been included in the miniatures, especially the frigate *Hedingham Castle* by G. Beck and the *Swift* by C. I. Rooke (Orpington). The frigate was shown in a sea which was too turbulent to be realistic. In a really rough sea the crests of the waves are further apart and the individual waves bigger. The ship herself was nicely detailed and the painting showed effectively the effect of rough seas and hard work.

A beautiful ship

In his model of the passenger cargo ship *St Essylt*, A. J. Gilbert (Orpington) just missed the beautiful lines of the stem and bows. The rail line toward the stemhead drooped toward the sheer line below it instead of continuing parallel with it. *St Essylt* is one of the most beautiful of all our merchant ships and it is important to pay close attention to these finer points. But the model well deserved the VHC awarded it.

The only medal winner in this class was the rather impressive model of the cruiser *Sheffield* by D. W. Gale (Lincoln) which won a bronze medal. The model was made to a drawing by Norman A. Ough and is an example of the wonderful way in which these drawings have stimulated interest in modelling naval types. They were first reproduced in *Ships and Ship Models*, in June 1954. Mr Gale's model is nicely proportioned and the decks are full of interesting detail. The paint has tended to thicken up the finer details, but with just a little more attention to points such as these, the builder might well win higher awards.

One of the juniors showed an interesting waterline model. This was the model of a Thames and Medway pilot vessel entered in the Schools Competition by a schoolboy, J. K. Troupe. A visitor to the Exhibition who was chief engineer of this vessel for many years, told me it was a faithful replica of his old ship, and he was quite thrilled to have seen it. There was another very nice model by a junior, that of the coasting steamer *Hardale* by D. I. Rowland

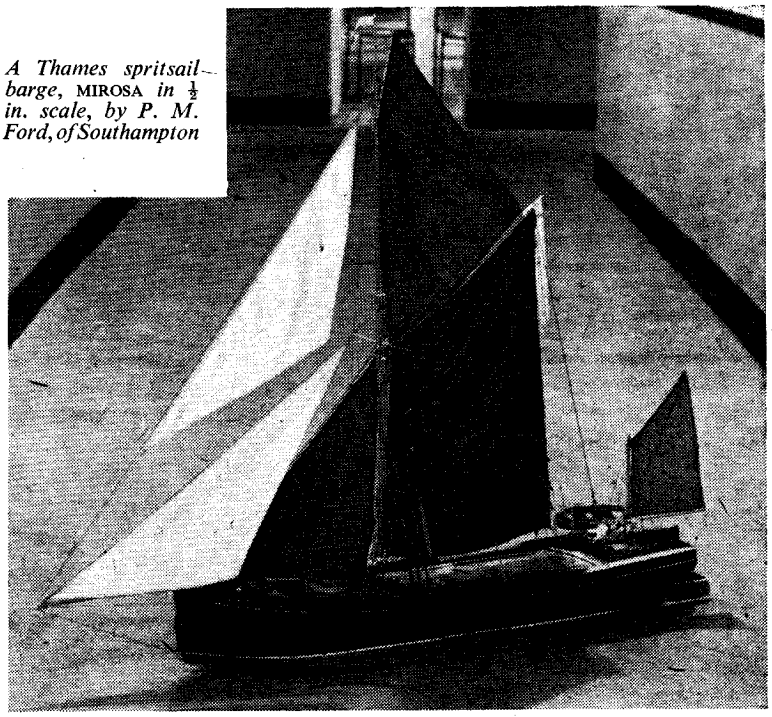
(Farnham). As this exhibit is powered by steam it is being dealt with in the article dealing with power-driven ships.

In the Marine Section, there was the precedent of a working model ship winning the Championship Cup. The judges decided that whatever this model may lack in exhibition finish was more than made up for in the fact that it was built to sail and that actually it sails perfectly.

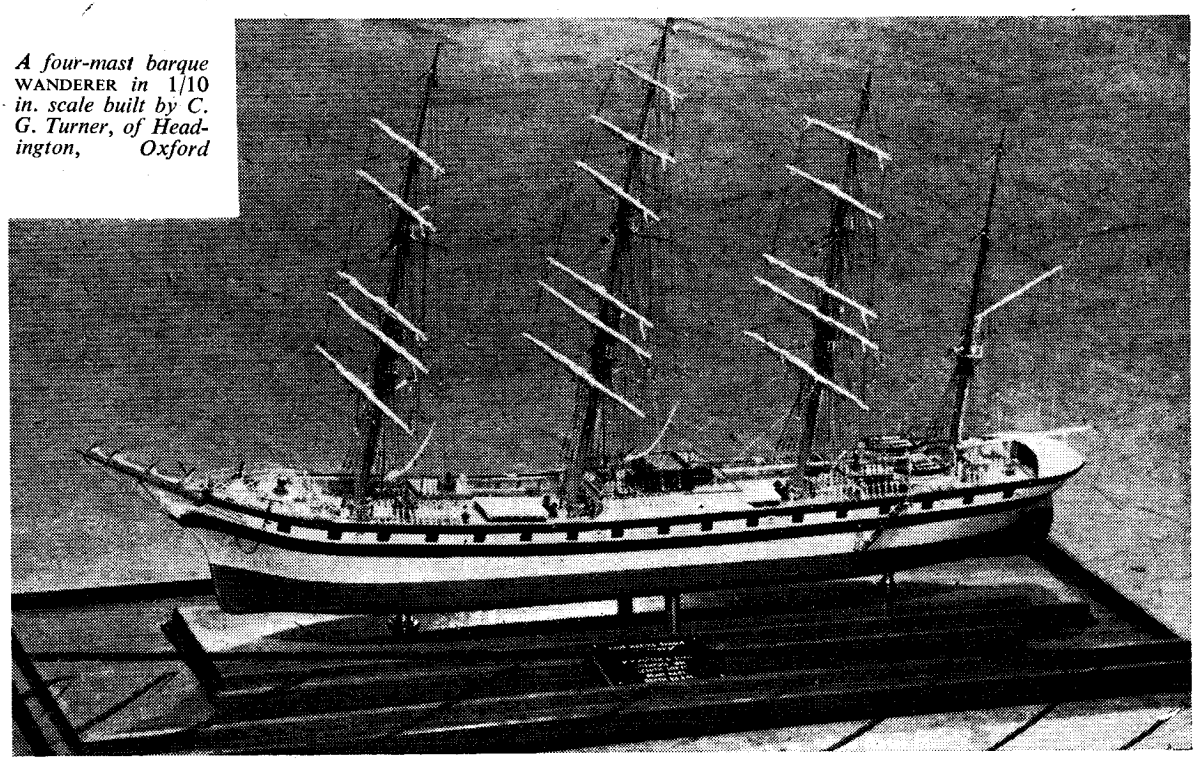
In the class for Non-Working Sailing Ships, there were three silver medal winners, but no cup-winner. The most outstanding model was that of the famous four-mast barque *Wanderer* by C. G. Turner (Headington). The Poet Laureate, John Masefield, who once served in this ship, took a great interest in the building of the model, for which he provided the deck and sail plans. The builder spent two years in research and a further seven years in construction.

Minor faults

The scale is 1/10 in. : 1 ft giving a hull length of just over 30 in. The builder has incorporated a large amount of detail considering the comparatively small scale. Unfortunately there were several defects which prevented its winning the cup. The sails were far from being perfect, and the model would probably have been better without them. The clews of the square sails seem to have had the yardarm. This portion is merely a piece added to represent the portion the natural corner of the sail and showing when the sails are clewed to should not be over-emphasised. (The



A Thames spritsail-barge, MIROSA *in* ½ *in. scale, by P. M. Ford, of Southampton*



A four-mast barque WANDERER *in* 1/10 *in. scale built by C. G. Turner, of Headington, Oxford*

same fault was seen in Mr D. D. Bilimoria's *Cutty Sark*. It is an error I cannot remember having seen before.)

The staysails should be hanked to the stays and the tack should not extend below the attachment of the stay to the mast. The spanker looks as though it were rolled up and not brailed in as it should have been. The figurehead blends in with the curve of the stem very beautifully, the rigging is neat and reasonably correct, and the boats are good. Altogether there is much to commend in this model. It is a great pity it just missed winning the cup.

A model with charm

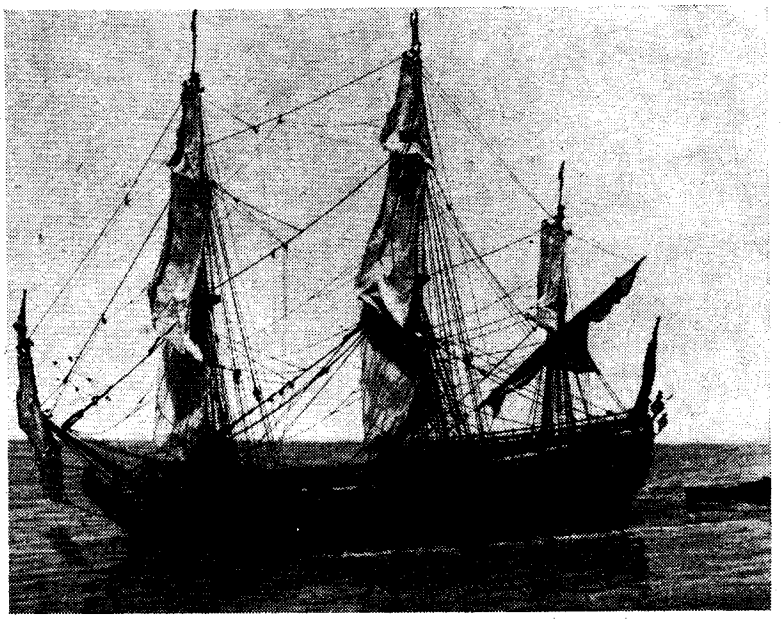
Another fine effort in this class is that of the brigantine *Leon* by J. A. Pomeroy (Gerrards Cross). This is a planked model made to Harold Underhill's drawings. It is to $\frac{1}{8}$ in. scale giving a hull about 15 in. long. The finish in both hull and rigging is exquisite and the spars have that slender, tapered appearance that adds so much charm to a model. I noticed that the boltheads in the cleats securing the chainplates seem to be too prominent. I would hate to bring a rowing boat alongside, especially as they are just on the waterline!

Another point to be noted is that the vertical rows of pins or trenails securing the planks to the frames are spaced nearly $1\frac{1}{2}$ in. apart. This suggests a spacing for the frames of 10 to 12 ft which is, of course, far too wide. I consider that intermediate rows of pins should have been introduced, even though they were dummies. In Underhill's book the frames are spaced about 2 ft 6 in. apart.

Other medal awards

The third silver medal was awarded to J. W. B. Soddy (Luton) for a beautiful model of a Portuguese ship, late 15th century, built to $\frac{1}{8}$ in. scale. The hardwoods and other materials used in this model are carefully selected, and with the clean workmanship and fine finish this is a model anyone would be proud to possess. Both hull and rigging are accurately modelled.

Bronze medals were awarded in this class to D. D. Bilimoria (Bombay) for his 1/5 in. scale model of *Cutty Sark* and to T. W. Dickey (Newtonabbey) for his model of a Foo Chow trading junk to $\frac{1}{4}$ in. scale. This was a colourful model but almost too neat and tidy for a Chinese junk. This model was also awarded the Maze Cup for Oriental craft. Mr Bilimoria's model suffered from having been based on information prepared before the ship was restored, and also because he was unable to see the ship since her restoration.



Waterline model of the frigate HMS JAMES-GALLEY, circa 1676, *built to a scale of 32 ft : 1 in. by D. McNarry, of Barton-on-Sea, to be seen in loan section*

The entries in the class for working yachts and sailing ships reflect the greatly increased interest in sailing models of square-rigged and other ships since the Thames Society's rallies were introduced. Many of this year's entries have taken part in the rallies, and the spritsail barges are of a class which was created specially for them.

The Championship Cup winner, the brig *Espiegle*, is to Underhill's drawings. It represents a naval brig of 1845 and is fully detailed and beautifully built. The standing rigging is true to type and the running gear follows it as closely as possible although modifications have been made for quick adjustment when sailing. The bowsies might have been made to look more like blocks, but the builder was thinking more of sailing than of winning Exhibition awards.

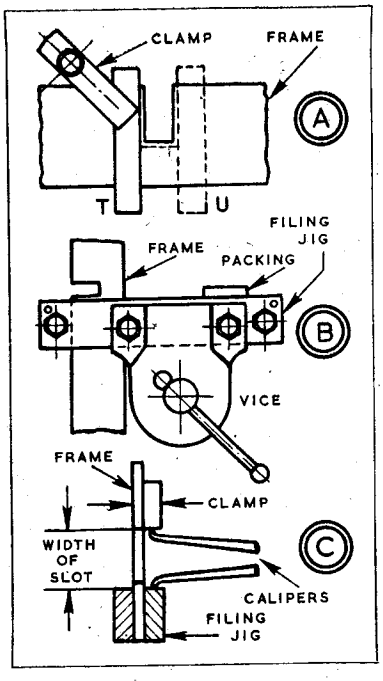
The lugger *Ebenezer* by M. T. Davey (Hove) is of the same high standard as *Espiegle* and sails equally well. The scale is $\frac{1}{2}$ in. : 1 ft and the fishing gear is included. In addition to a bronze medal it was also awarded the Vaughan Evans Trophy. The A-class racing yacht by J. E. Storey (London E5), which also won a bronze medal, is a superb piece of work, the planking being especially well done. The model of *Thermopylae*, 1/7 in. scale, by G. Hill (Reading) won its spurs at the Thames Rally. It looks a picture on the water and sails quite fast, but the rigging is rather sketchy and the yard fittings crude: otherwise it would have won a higher award than VHC.

In the Miniature Class three models won silver medals, but none of them quite merited the Championship Cup. These were the model of s.s. *Deutschland*, scale 100 ft: 1 in., by J. Bowen (London E12), the motor fishing vessel *Replenish* by Capt A. Thomson (Edinburgh) and a set of five boats for HMS *Victory* to $\frac{1}{4}$ in. scale by G. H. Draper (Ilford). Capt Thomson made his model, which is to $\frac{1}{8}$ in. scale, mostly at sea, although he must surely have been in port when he painted the name on his lifebelts! The model was flown from Singapore.

Four models won bronze medals. These were a tug towing an oil drilling barge, by C. C. Beasley (London N1), HMS *Warspite* by C. Seston (London W7), *Cutty Sark* by D. Hunnisett (Aylesbury). All were built to a scale of 50 ft : 1 in. The remaining bronze medallist was a launch for HMS *Royal George*, *circa* 1787, to $\frac{1}{4}$ in. scale, by A. S. Randall (London SE20).

From Glasgow came G. M. Smith's model of *Norman Court* to a scale of 33 ft : 1 in. This has a planked hull with good lines. There is still some slack rigging, although there is considerable improvement on the same builder's *Loch Etive* in the previous Exhibition. ▣

ACCURACY in HAND FILING



By GEOMETER

In most occupations depending on co-ordination of hand and eye, considerable practice is necessary to achieve proficiency—which means being able to work speedily and with certainty as to results. It is so in free-hand filing, and particularly when it is essential to adhere to dimensions and alignment.

Starting with a piece of metal such as plate or flat bar stock, the filing of an edge reasonably straight, flat and square with other surfaces, is an achievement in itself. When, however, a dimension is applied at which the edge must finish, the work becomes much more demanding in skill and time; for not only must the edge be geometrically accurate, it must be at the specified dimension. So whatever the skill in free-hand filing, time is required for checking and correcting to be sure that no part of the surface is filed beyond the given position.

Using a jig

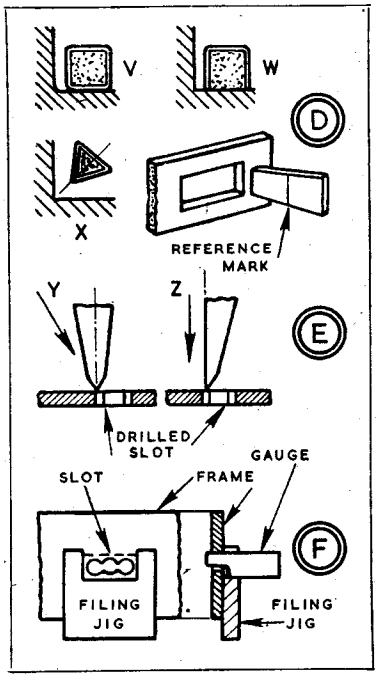
Accuracy in a case like this and in many others, is best achieved not by free-hand filing to the finish, but by using a guide or jig after the work has been roughed out. The guide or jig is clamped to the work with its surface at the given dimension—then the upstanding edge of the work is carefully filed down to this surface. Hardening is not necessary if a guide or jig is used carefully, once or a few times, especially if it is substantially thicker than the material being filed. For contact of the file with the surface and light marks on it indicate that filing must stop.

Using a guide, squareness is easily obtained at the ends of plate material—as on locomotive frames, or the bedplate of a model engine. The usual way is to mark the ends using square and scriber, saw off the surplus and finish by filing to the scribed line, checking with the square.

If a guide is clamped on for finishing, it can be set to dimension, checked true with the square, and the surplus filed down to its surface at the first attempt. On a part whose opposite end must be finished parallel with the first, and to a close overall dimension, a second guide can be clamped and its position checked with calipers before the first is removed.

The principle is applicable to open-sided slots, like those in small locomotive frames. A guide *T*, as at *A*, is clamped and squared to the roughly cut slot, then frame and guide gripped in the vice for filing. Before the guide is removed, another U can be clamped in position, using a simple gauge (flat or round stock) between them to give the dimension.

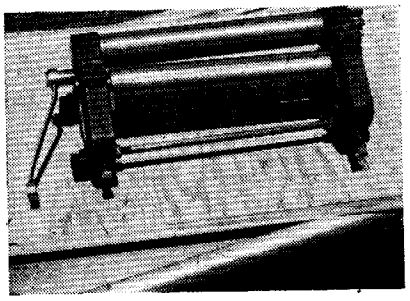
A filing jig, as at *B*, sometimes allows greater freedom for mounting in a vice. Two pieces of flat bar are drilled and dowelled with their edges flush, and the frame is set in at the required position, packing of the same thickness balancing the grip in the vice. Resetting the frame for filing the other side of the slot can be done as at *C*. A piece of material is clamped flush to the finished edge, then calipers can be used to the filing jig to give the width of the slot.



To avoid altering the edge of a slot while another at right angles is filed, the safe edge of the file should be worked to the one not to be touched. When a square file is used it means one edge must be ground smooth to a safe edge, and it has the incidental advantage of providing a much sharper corner at edges. As at *D*, the normal square file *V* has radii at the corners, and grinding a side smooth *W* eliminates radii at two corners. On the other hand, a three-cornered file *X* can be used to clear corners.

For gauging the width of a slot as a second edge is filed, a taper gauge is helpful; it can be either the full final width of the slot, or provided with a reference mark indicating depth of entry.

Enclosed slots which are roughed out by chain drilling are best trimmed at the edges with a straight-sided chisel, as at *E*. In very small slots, this helps in starting files. The chamfered edges of the ordinary chisel cause it to slide at an angle *Y*, but the straight-sided type can be driven straight down *Z*. Accurate filing can be done with a jig as at *F*; and for locating the second edge, a width gauge stepped at the end can be entered to set the jig. ▣



These bending rolls are easy to make

By R. V. Hutchinson

YEARS ago I had a strong desire for a small set of bending rolls capable of rolling up cylinders and cones of sheet metal up to $\frac{1}{16}$ in. thick. Toward the project I had one oil pump impeller gear, upon which the proportions of the machine hinged.

It had seven teeth, 6 d.p., 26 ft pressure angle, $1\frac{1}{2}$ in. outside dia., 1.167 in. pitch dia., 0.4905 in. bore and $1\frac{1}{8}$ in. face. The arcuate thickness of the teeth was 0.2543 in. It was parted off to make two gears each $\frac{1}{2}$ in. wide.

Being involute gears they ran well on non-standard centres. A graphical approach, not repeated here, indicated their tooth action was discontinuous when the centres were spread from 1.167 in. to 1.220 in., and the backlash taken up completely when closed-in about 0.015 in.

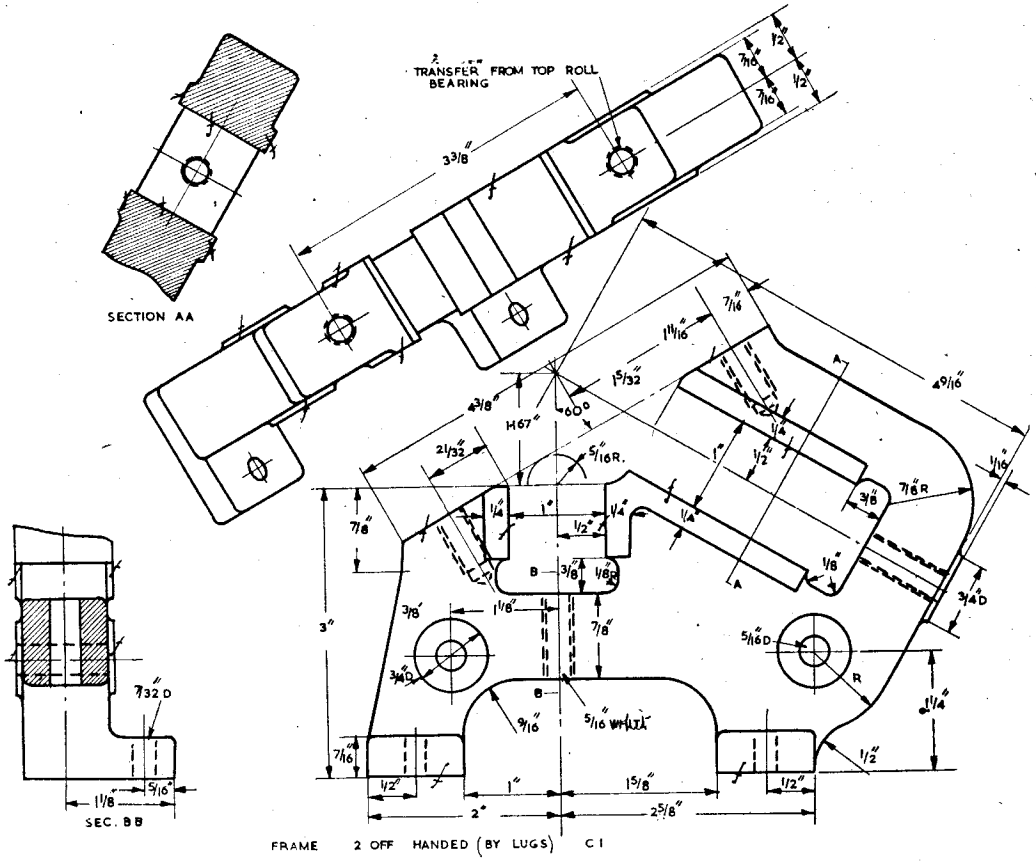
The usable change in cutters approximates 1.220 in. — 1.167 in. + 0.015 in. = 0.068 in., which exceeds the thickness of plate expected to be rolled, so from this viewpoint the gears were usable. Backlash at 1.154 in. centres was about 0.0023 in., so the size of the pinching rolls was set at 1.154 in.

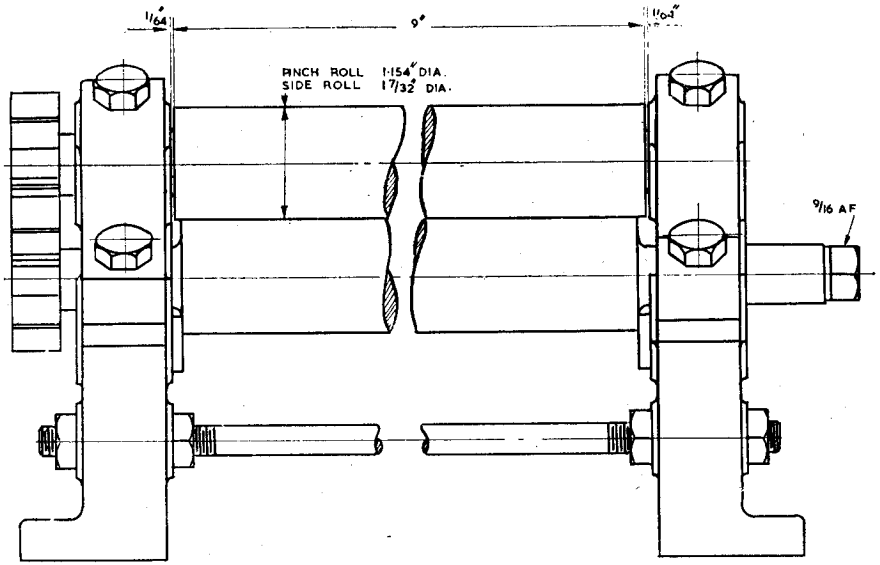
To accomplish bending, the sheet is pinched between the top and bottom rolls which, when rotated, force it up against the side roll, the position of which governs the curvature produced. If cones are desired, the side roll is tilted in respect to the others, if cylinders are required it is set parallel to them.

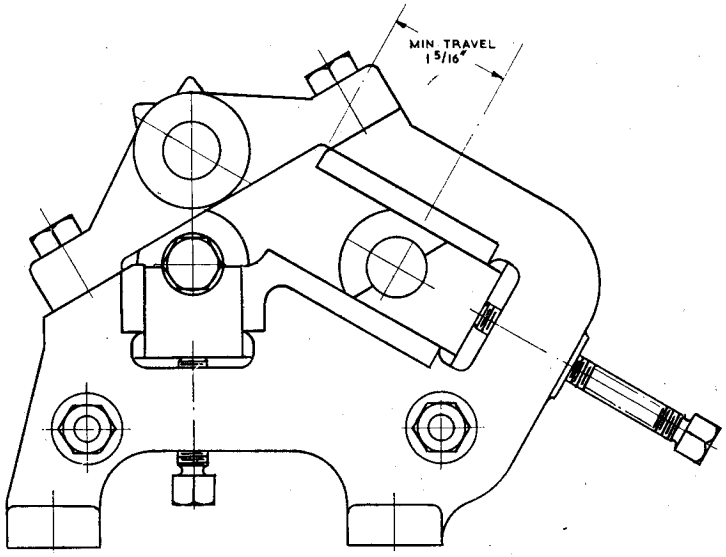
The top and bottom rolls move together under the joint influence of friction at the sheet surfaces and the meshing of the gears. When, in accommodating "over thick" material, the roll centres are spread beyond the value for continuous tooth action, the gears "bump"—an unpleasant but not necessarily disastrous circumstance.

The detail sketches are fairly self-explanatory.

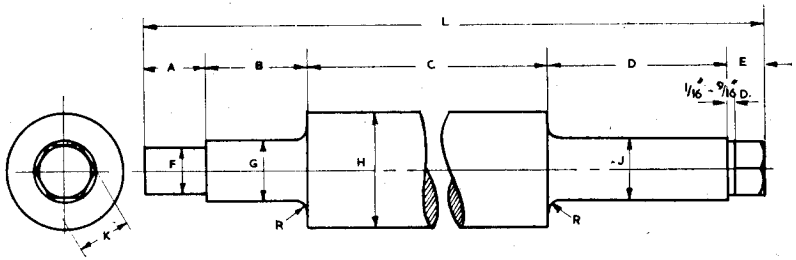
The frames were made of soft cast iron. The pattern had $\frac{1}{8}$ in. per foot (1/96) shrinkage and neither draft nor finish on surfaces marked "f." It came from the sand quite cleanly after rapping. The foot lugs were duplicated on each side of the pattern, instead of being made as loose-pieces,



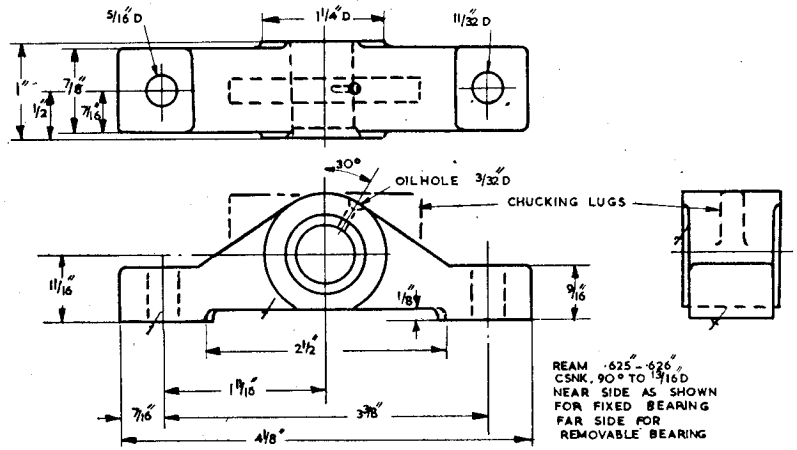




ARRANGEMENT OF SLIP ROLLS FOR 1/16" SOFT STOCK



ROLLS 1 OFF EACH TOOL STEEL



SPREADER BOLT 2 OFF BMS

TOP ROLL BEARINGS 1 OFF EACH HANDED CI

and the unwanted ones removed from the castings.

Frames were finished as follows. After sawing off the extra lugs, the finish strips and spreader-bolt bosses opposite those remaining were brought into a single plane by filing and checking on a bench plate. The jaw slots were filed to fit the pieces of 1 in. square cold drawn steel later used for roll bearing boxes, and the two spreader-bolt holes laid out and drilled in one frame only.

They were then keyed together by the same blocks in the slots, clamped and the two $\frac{1}{16}$ in. holes transferred and drilled through the second frame, and both tightly bolted together with body-fitting bolts. After this, the jaws were drawfiled, one pair at a time, removing and replacing the key blocks as necessary. It is important to have the vertical surfaces at the *front* of the bottom-roll jaw in one plane, and similarly, the lower surfaces of the inclined jaws—hence the drawfiling. The inclined top faces and the bottom of the feet were also filed flat and matched. Because of absence of both draft and finish allowance, this was not very much work.

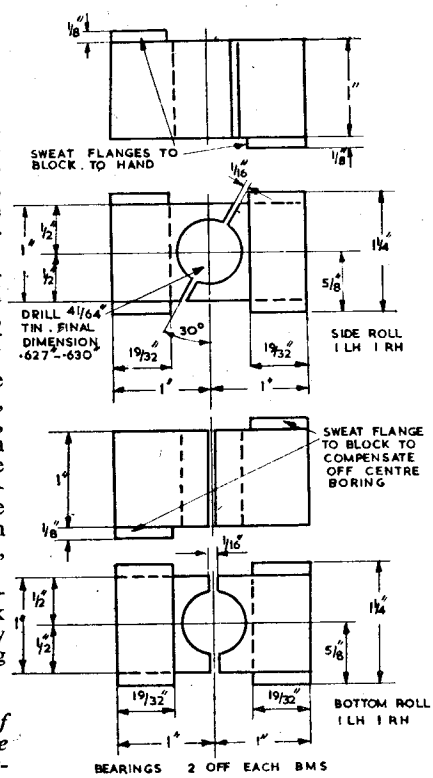
the lower attaching hole is drilled $\frac{5}{16}$ in. for locating, the upper one 11/32 in. for clearance by and for $\frac{5}{16}$ in. 18 capscrews.

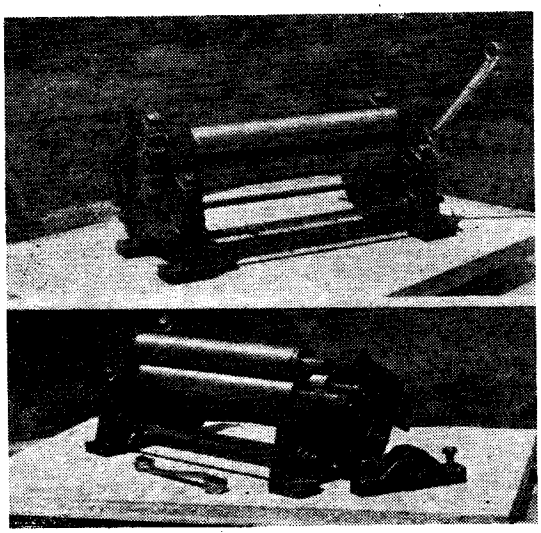
As described, the top and bottom rolls will work in parallel rather than in skew contact under the forces acting on them while rolling. So long as the lower roll-bearing blocks are symmetrically bored, this will be true, independent of clearance between bearing blocks and jaws.

The rolls are of SAE 1045 hot-rolled steel. While the top and bottom rolls are specified 1.154 in. dia., the side roll may be any diameter between 1 7/32 in. and 1 5/32 in.

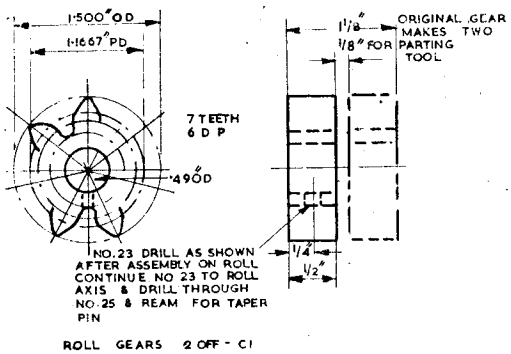
The roll-bearing blocks were made from 1 in. square cold-drawn steel, with separate flanges. After splitting, the half holes were hot-tinned with 60 lead/40 tin solder, as were the sides of the blocks receiving the pre-tinned retaining flanges. These flanges were sweated in place with 3/32 in. of the cylindrical bearing, thus providing fillet clearance.

Nowadays when using "anti-scuffing" greases, tinning the roll neck bearings is no longer needed—they may be reamed nominal size and running clearance provided at the roll necks.





Left: (top) Set of slip rolls from the front. Below: A diagonal view with top roll bearing removed



The lower blind tapped holes in the inclined faces were located alike from the front vertical faces just mentioned. The finished top-roll bearings were aligned by a piece of $\frac{5}{8}$ in. round, bolted to the frames by their $\frac{5}{16}$ in. holes, and their upper holes transferred and drilled and tapped in the frames. After drilling the foot-lug holes the frames were separated, and the adjusting screw-holes drilled and tapped after separation.

The top-roll bearings are handed because of bearing-fillet clearance—

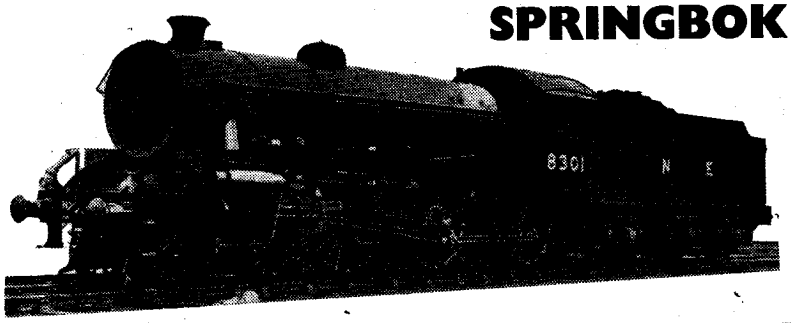
A sub-assembly was made of the fixed top-roll bearing, the top roll and one of the gears, which had been pre-drilled radially for taper-pin reaming. The No 23 drill went to the centre of the shaft, continued through the opposite tooth with No 25 drill, emerging at the tooth-tip. The hole was reamed with a No 1 taper pin reamer deep enough to receive a No 1 × $\frac{3}{8}$ in. pin, sunk just below the root of the tooth. The bottom roll and its gear are similarly assembled.

Quick removal of the loose top-roll bearing, an essential in commercial slip rolls, was not arranged.

The setscrews for bottom roll adjustment have cup or flat points, while the longer screws for side-roll adjustment have rounded points to suit the tilt of the bearings when rolling cones.

Slip rolls were chosen over pyramid rolls in this instance because, at the time, I had good foundry service and a suitable gear.

Pyramid rolls also do a perfectly good job of bending both straight and taper work. They can be readily arranged to be built up. ▣



SPRINGBOK

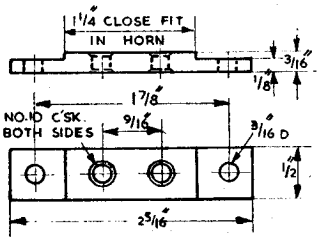
AN LNER BI 4-6-0 LOCOMOTIVE IN 5 in. GAUGE, BUILT AND DESCRIBED BY MARTIN EVANS

Fitting horns and weighshaft bearings, machining axleboxes and making the bogie pin stretcher

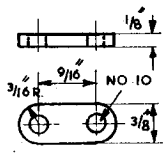
BEFORE the mainframes can be assembled, the horns and weighshaft bearings should be fitted. The drawing of the main horns appeared in the issue for January 7. The casting is supplied with a central rib, through which a $\frac{1}{16}$ in. dia. hole may be drilled for the oil pipe to the axlebox. If this rib is absent, it would be better to put the oil hole to one side of the axlebox and drill the top flange of the horn accordingly. This alternative position is shown in the drawing of the axlebox.

Although the cast horns could be fitted to the frames without machining the bolting face, I do not recommend it. Only a few of us (not including myself !) are clever enough with a file to get the bolting face really true. However, it is easy enough to endmill them if an endmill about $\frac{1}{2}$ in. dia. is available. Before setting the horns up, get rid of the sand and scale on all surfaces which are to be machined, then file the outside faces to bring the overall thickness of the casting to $\frac{5}{8}$ in. To do this, take the minimum off the outside (which lies next to the back of the wheel), clean this up by rubbing on a sheet of emerycloth laid on something flat, then work from this face, checking with the micrometer.

Set up the vertical slide facing the lathe headstock, make certain that it is square by traversing the cross-slide across a centre in the mandrel, and bolt each horn in turn direct to the vertical slide by means of a piece of 1 in. × $\frac{1}{4}$ in. steel just long enough to span the gap. One $\frac{1}{4}$ in. dia. Allen screw into the usual T-nut will do the trick. The endmill is held in a collet or in the three-jaw and the depth of cut is arranged such that the flanges which go through the openings in the mainframes are left exactly $\frac{1}{8}$ in. deep. The saddle can then be locked and the cross-slide and vertical slide traversed all around, against the rotation of the endmill.



HORNSTAY 6 OFF BMS



SPRING PLATE 6 OFF BMS

Two of the main horns, those for the driving axleboxes, need a slice cut off their top rear edges as shown in the drawing, to give more clearance for the firebox. Do not forget that these two horns will be left and right-handed; easily overlooked !

The other four horns have eighteen $\frac{1}{8}$ in. dia. holes drilled in them for attachment to the mainframes. If there is no room for two each side at the bottom of the castings, one a side will be plenty strong enough. I usually mark out and drill the horns before fitting to the frames, and to get a good fit, the openings in the frames are individually filed until the horns can be pushed in tightly. The $\frac{1}{8}$ in. holes are then continued through the frames, and countersunk on the outside. Iron snaphead rivets are used, hammered into the countersinks and filed flush.

The main axleboxes can be tackled next. I am showing two types, a solid pattern and one with a separate keep. The former is quite satisfactory, though the separate keep is more in accordance with full-size practice, allows the axleboxes to be removed from the axles without removing the wheels, and allows for a lubrication pad under the journal.

Machining methods

Castings will be available for these, and to start off with, the four-jaw chuck can be used to machine all the faces a shade oversize, although if a horizontal milling machine is available, this would make short work of the axleboxes, including the slots for the horns. If the lathe has to be used for the slotting, there are several ways of going about it. One of my favourite ones is to use a machine vice bolted to the vertical slide and arranged facing the lathe mandrel. The lead-screw should be engaged and great care should be taken to ensure that the working surfaces of the vertical slide and machine vice are quite square—an accurate way is to use a dial test indicator fixed to the bed, the cross-slide being traversed across it. Note that the slot is offset, so that the outer flange is 3/32 in thick only.

The partly finished axlebox is then placed in the machine vice hard

against the base of same (or with a piece of true "packing" as required) and an endmill put in a collet or in the three-jaw. The whole axlebox is then traversed across the endmill to true it up, the saddle advanced exactly $\frac{1}{8}$ in. and locked, and the slot cut. By taking the readings of the vertical slide handwheel (allowing for the backlash) the exact width of slot can be cut.

The axlebox can now be reversed, and by tapping it against the base of the machine vice (or the packing strip) we can be sure that the other side will be true and parallel to the first. Anyone with a 1-2 in. micrometer will be in clover here as the exact width ($1\frac{1}{2}$ in.) can be gauged, while a careful reading of the leadscrew handwheel will ensure that the depth of the slot is again exactly $\frac{1}{8}$ in. If no micrometer is available, the first axlebox should be machined to as near to $1\frac{1}{2}$ in. wide as possible, and the reading of the leadscrew handwheel taken. If the latter is not disengaged while all six of the axleboxes are being dealt with, and the backlash carefully allowed for, the same reading on the handwheel will give axleboxes exactly the same width.

All axleboxes should now be set round the other way, checked for truth, and the tops and bottoms skimmed with the endmill to dead length using the same methods.

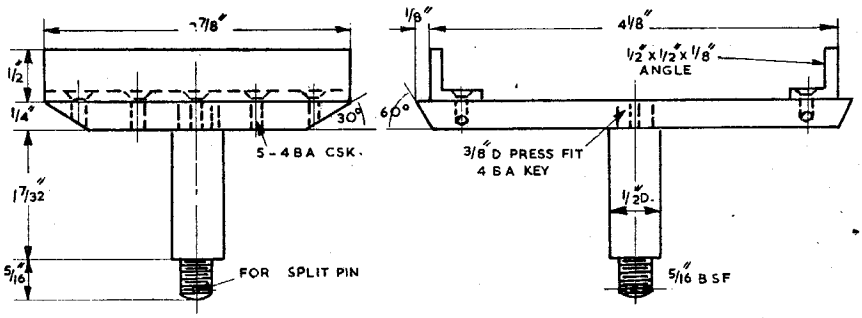
Before boring the axleboxes, pair them off and mark a number on the inside of each. There are several ways of boring them, but I think the use of a V-angleplate is probably the most accurate. The first box is clamped in the V and the whole angleplate shifted around on the lathe faceplate until the required axle centre is running true. The thicker flange of the axleboxes should be placed in the bottom of the V due to the clearance provided at this point.

When the first axlebox has been set, the hole may be started with a centre-drill, and then drilled out to $\frac{1}{2}$ in. or so. A boring tool can then be used to bring the diameter to about 0.010 in. under the $\frac{3}{4}$ in. The second of the first pair of axleboxes should be set up in the V-angleplate, but arranged the other way round. In this way, it is possible to ensure that the axles will be exactly square in the frames after assembly, even if the locating of the axle centre in the first axlebox was a shade out.

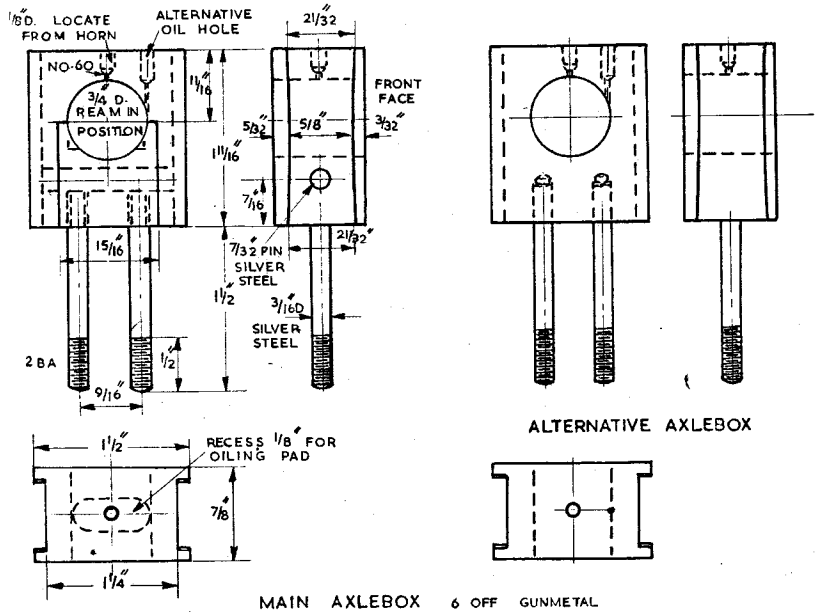
Before drilling axleboxes with separate keeps, they should be slotted out to a width and depth of $\frac{15}{16}$ in. and 1 in. respectively. This should be done by milling or planing, or even by filing. One milling method is to drill a row of small holes across the top and run in a thin (say, $\frac{1}{16}$ in.) slotting cutter at each side, the piece being then broken out and the top filed flat. This method requires much less power than using one big side and face cutter.

The keeps themselves may be castings or they could be cut from 1 in. × $\frac{7}{8}$ in. gunmetal bar. The best way is to make them a fairly tight fit to start with, then fit the pin, of 7/32 in. silver steel. It should have its ends slightly rounded for safety's sake, and be a nice hand push fit in the box. The boxes can then be drilled and bored as described for the solid pattern axleboxes. Knock out the pin and the keep, and ease the keep so that it, too, is a nice push fit. Reassemble and we are then ready for the horns again.

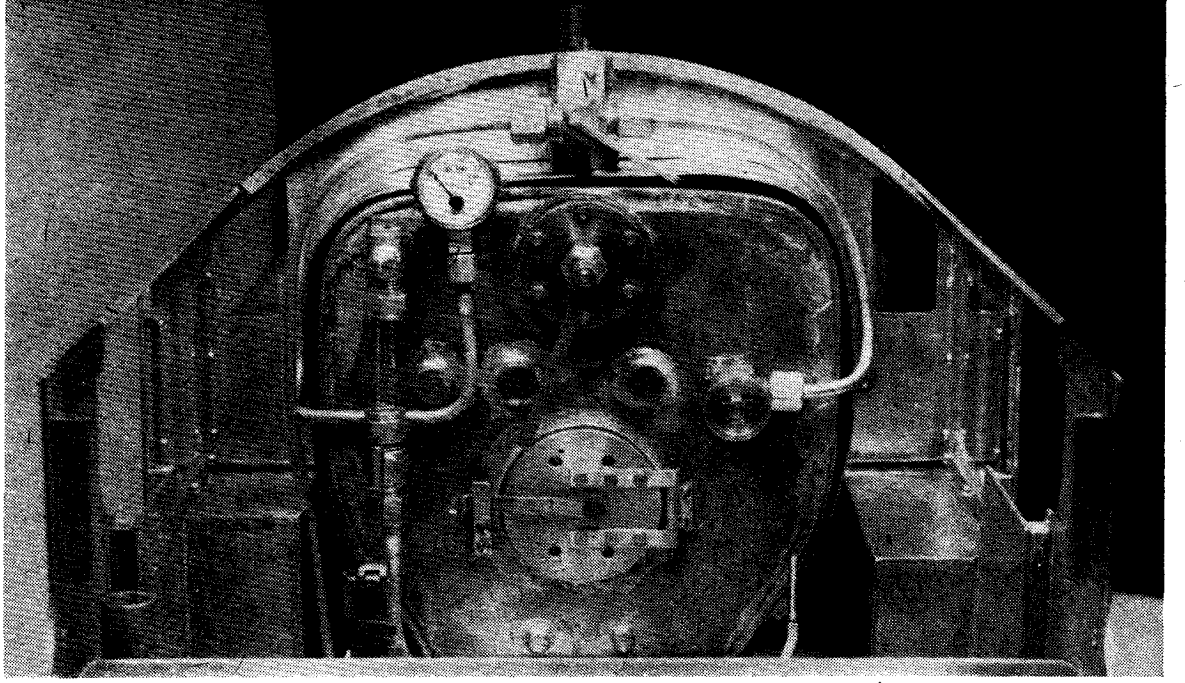
The mainframes are bolted back-to-back and the horns machined on the inside until the axleboxes are a nice sliding fit but without shake. The axleboxes should once again be fitted in pairs, individually. This machining operation is an awkward one on the lathe, but if a good strong machine vice and vertical slide are available, it is possible to do the whole of the machining including the bottoms of the horns (to which are



BOGIE PIN STRETCHER 1 OFF BMS



MAIN AXLEBOX 6 OFF GUNMETAL

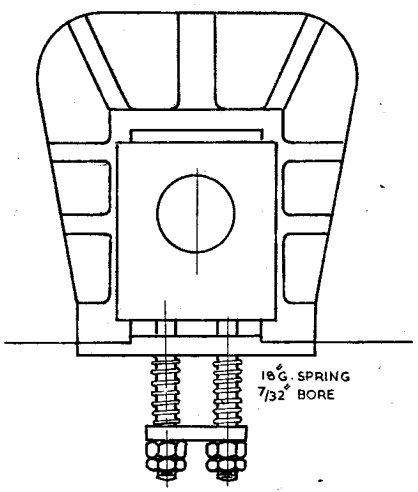


Constructors who are busy with JUBILEE, *the 3½ in. gauge model of an LMS 2-6-4 tank which Martin Evans has recently built and described, can see from this illustration the generous width of the cab. With the roof removed stoking and control are particularly easy, a point which Mr Evans bore in mind during the designing stage*

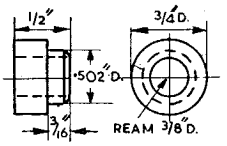
bolted the hornstays) by using a large endmill. The endmill must be long enough to overhang the chuck jaws by about 2⅛ in.

If jacks are used on each side, the set-up shown on page 592, ME, 8 May 1958 could be used, though the small machine vice seen would not really be quite satisfactory for the job. The hornstays are cut from ½ in. × 3/16 in. bright mild steel, and recessed at each end so as to butt inside the axlebox slot—this makes a much stronger job than a plain strip.

Use the springpin holes in the hornstays as a jig for drilling



ASSEMBLY OF MAINHORNS AND AXLEBOXES



BUSH FOR WEIGHSHAFT
2 OFF GUNMETAL

the axleboxes, the axleboxes being jammed against the stays for this purpose. The axleboxes can be tapped 2 BA for the springpins, and in the case of the axleboxes with separate keeps, the springpins can be screwed up tight against the keep pin. The spring plates need no description, while the springs themselves are wound up from 18 s.w.g. spring wire. Two 2 BA nuts should be used for safety, under the spring plates.

Before reaming the axleboxes, which should be done in position in the frames, the flanges of the axleboxes should be rounded slightly on the insides. This can easily be done with a file and makes the locomotive much smoother over a rough road.

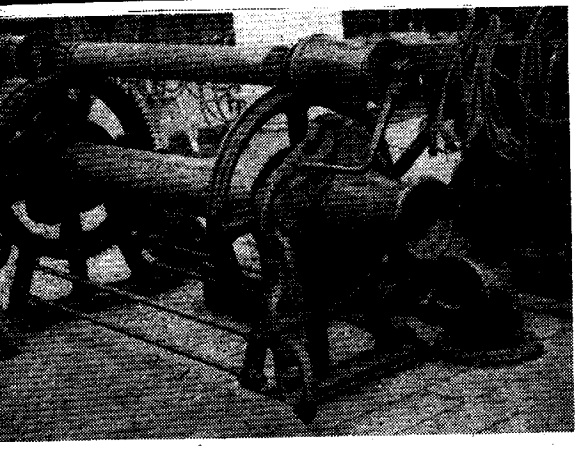
The weighshaft bearings are simple bushes turned from gunmetal or phos-bronze. They should be made a tight press fit in the mainframes as they will never have to come out again. They will last the lifetime of the locomotive. The ⅜ in. dia. hole will probably have to be reamed in the lathe, unless a long machine type ⅜ in. reamer is available. If there is any stiffness after assembly, a length of silver steel with a flat filed at one end at about 10 deg. and hardened can be put through. This will soon correct matters.

There is no need to go to the expense of a casting for the bogie pin stretcher, in fact a fabricated construction is better in many ways, owing to the method of fitting it to the mainframes. The basis of the stretcher is a piece of ¼ in.-thick mild steel, to which are attached ½ in. × ½ in. × ⅛ in. steel angles. The pin itself is turned from ½ in. dia. silver steel, being made a press fit into the plate. A 4 BA screw is put through, half in the plate and half in the pin, for safety's sake. The bottom end of the pin can be drilled for a split pin, though personally I prefer a vibration-proof nut; it's much quicker! The whole stretcher is secured to the mainframes by four 4 BA countersunk steel screws each side, and do not forget to run the ¼ in. drill through the fixing angle to take the rod for operating the cylinder drain cocks.

SPRINGBOK IN 4¾ in. GAUGE

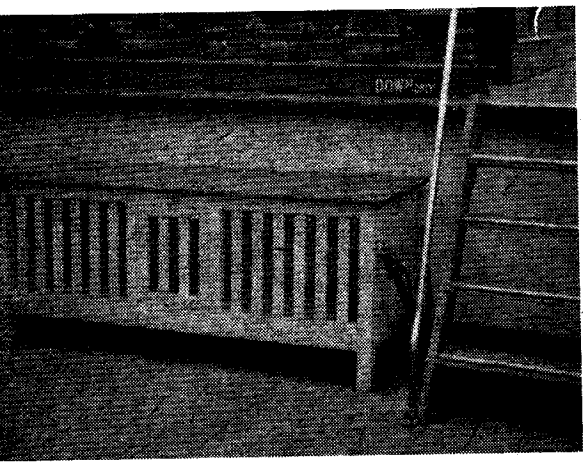
If anyone is thinking of building *Springbok* to the American 4¾ in. gauge, there should be no difficulty. The distance between frames should be reduced to 3⅞ in. and there is enough metal in the various stretcher castings to allow for this. No trouble should be experienced at the buffer or drag beams. The drawbar angles for the drag beams will have to be shortened by ⅛ in. on either side. Any other alterations necessary I will mention as we come to them.

★ *To be continued on February 4*



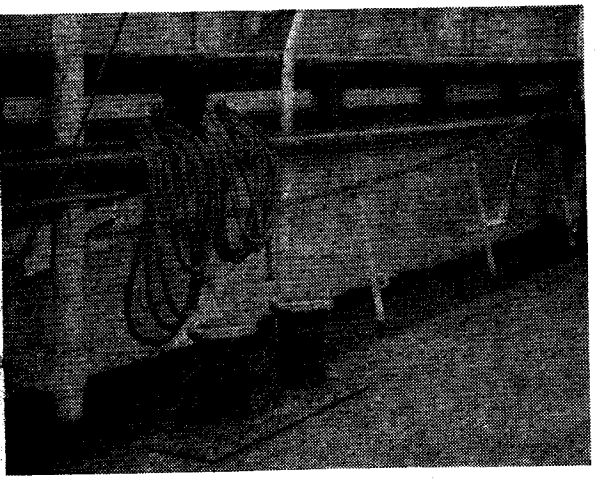
Left: Anchor winch of the CUTTY SARK

Right: Wheel

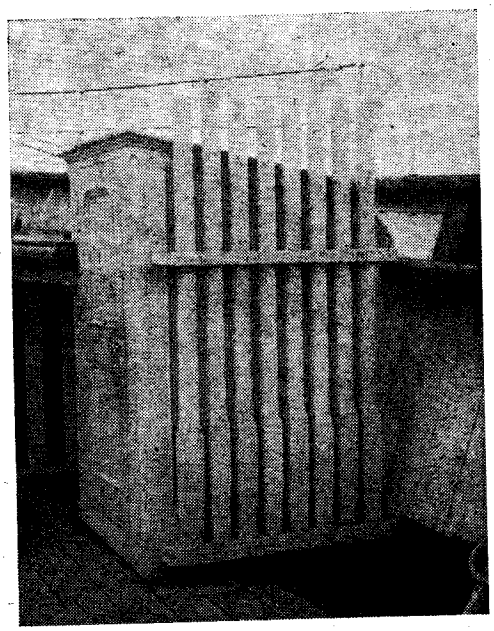


Left: Hen coop

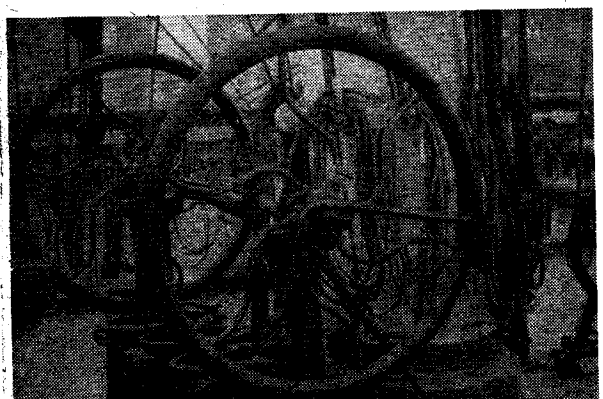
This pictorial record of the* CUTTY SARK *was made by V. H. ISAACS, who is now making a model of the famous vessel



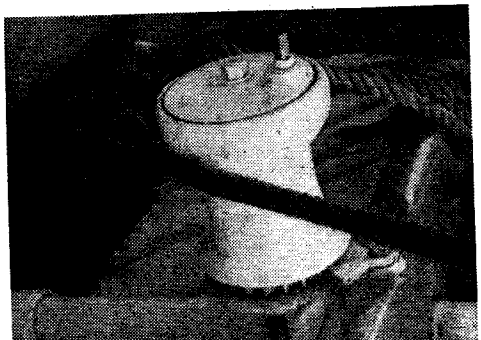
Right: The starboard lavatory with capstan bars racked alongside the vessel



Left: The starboard fore bollards with pin details above

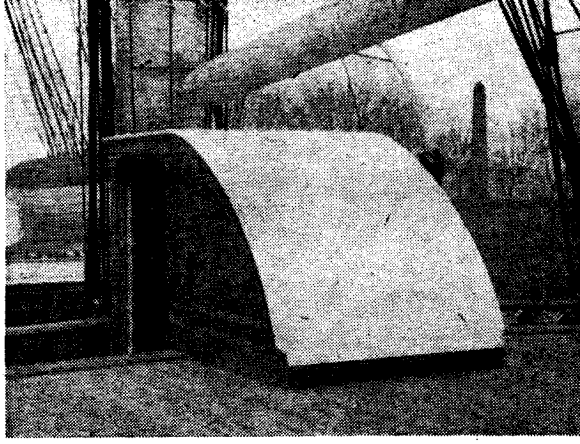


Left: Pumps

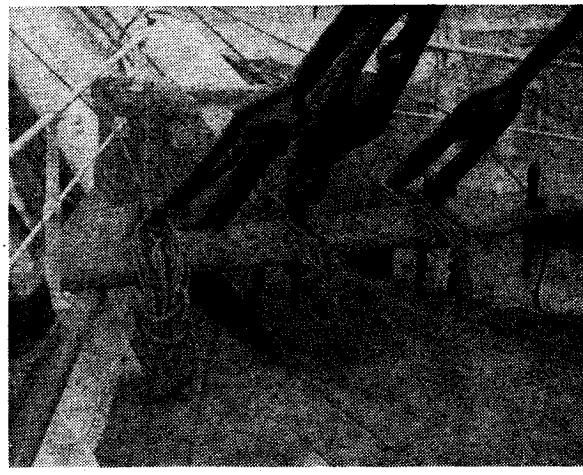


Right: Rail winch

Most famous sailing clipper in the world

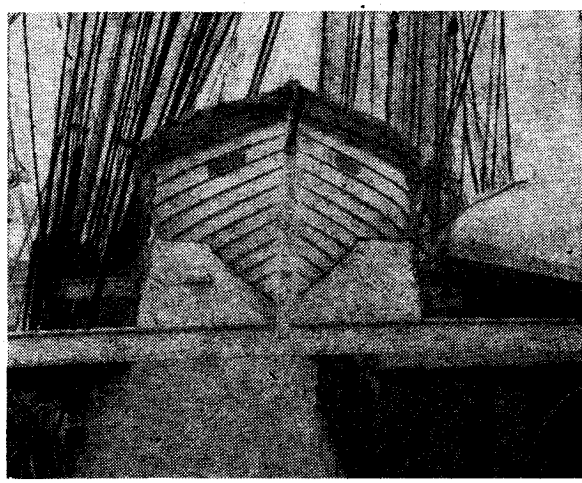


Right: View of the coach-house companion of the vessel

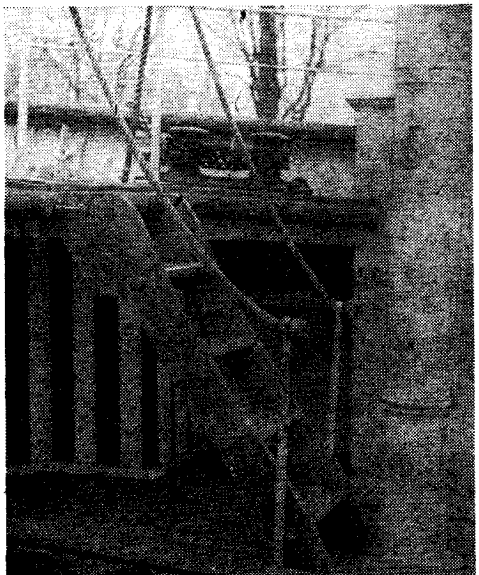


Right: Bowsprit pin-rail and stays detail of CUTTY SARK

Left: Detail of the ship's anchor winch



Right: Boat skids



Right: Stern bollards at starboard

Left: The starboard fo'c'sle companion

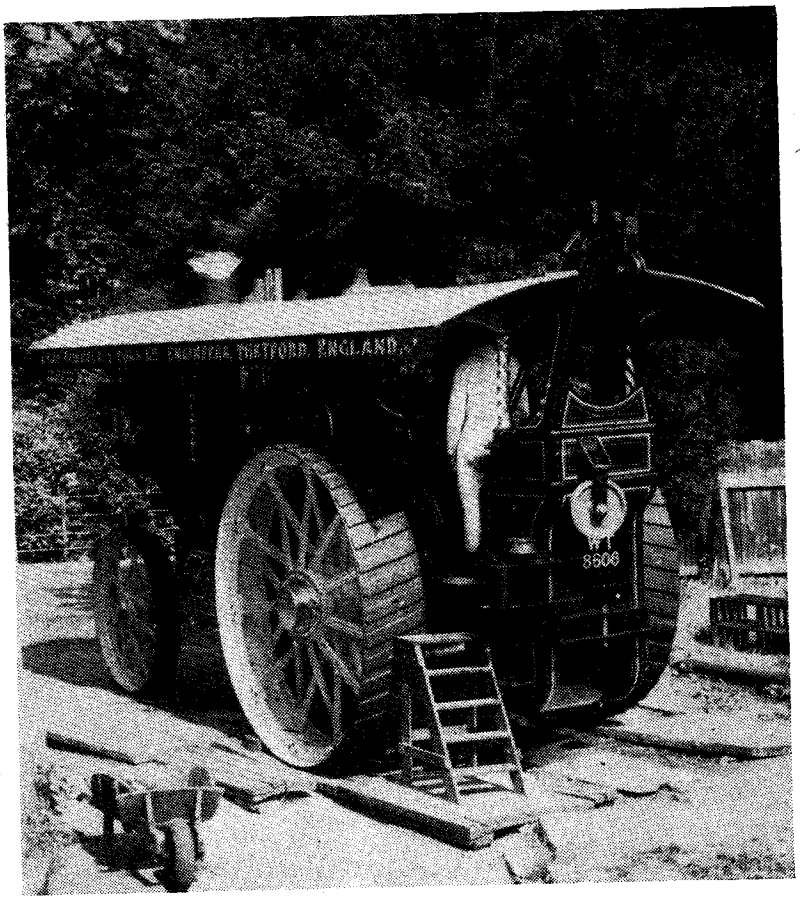
Rebuilding the BURRELL SHOWMAN'S ENGINE *EX-MAYOR*

This account by W. J. HUGHES tells how a road locomotive enthusiast tackled the three-year task of making No 4000 an engine of superlative splendour

THE last of the Burrells, No 4094 *King George V*, has been in the possession of one family all its life. The same could not be said of Burrell No 4000 *Ex-Mayor*, which left Thetford at the end of February, 1925.

This engine went to Tuby's, the Doncaster showmen, who looked after her well enough. Then she fell on evil days of neglect. Eventually she came into possession of Eptons, of Bolingbroke, who put her in running order again, and thence to her present owner, Mr J. Salem, who lives in Cheshire in a delightful house situated in a pleasant park. The latter, incidentally, contains magnificent 3½ in. and 7¼ in. tracks, with a wonderful stable of locomotives.

When Mr Salem became owner of *Ex-Mayor*, he had already had the experience of rebuilding two engines. The first of these was the Fowler showman's engine No 14862 *Excelsior*, which was subsequently purchased by W. D. Miller, of Brighouse. I gave a full description of this engine, with photographs, in the issues of MODEL ENGINEER for 29 July and 21 October 1954.



The engine has a crane turret and pulleys to allow use of winding rope

Scenic showman's engine

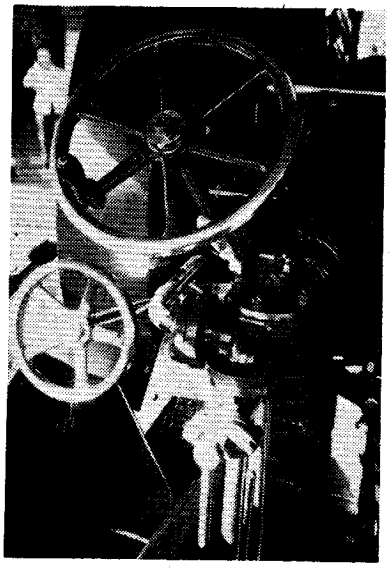
Mr Salem's second rebuild was the Burrell two-speed five-ton tractor No 3846, new in 1920. She is now in perfect condition.

Burrell No 4000 is a scenic showman's engine, with a platform behind the chimney for a separate exciter for the dynamo, and also with a turret mounted on the tender for a 30 cwt crane. These scenic engines were developed especially for the switchback railway type of ride. This required a large jolt of electricity when starting, and a crane capable of lifting the heavy cars from track to truck and vice versa, when tearing down or building up the ride. Unfortunately the original dynamo and exciter are missing, and Mr Salem has only managed to secure a dynamo for the front platform.

Transmission systems

She is a single-drive engine, which means that the final drive is by gearing on the nearside, with a live axle transmitting the motion to the offside hind wheel. Burrells also used extensively their twin-drive system, where the compensating gear or differential is on the countershaft, with a pinion at either end of the latter driving a spur-wheel attached to each hind wheel separately, the hind axle being "dead" in this design. Apart from the different gearing arrangement, the single-drive scenic engine has a larger tender than the twin-drive, and the hornplates are not cut away at the top front edges.

The engine's name derives from the fact that Mr Tuby became successively alderman and then mayor of his native town, and his earlier Burrells received those titles respectively. When a third Burrell was acquired, what



Beneath the steering column is the wheel for the flywheel brake, and also the pump. The bypass cock is the fitting which is nearest the camera

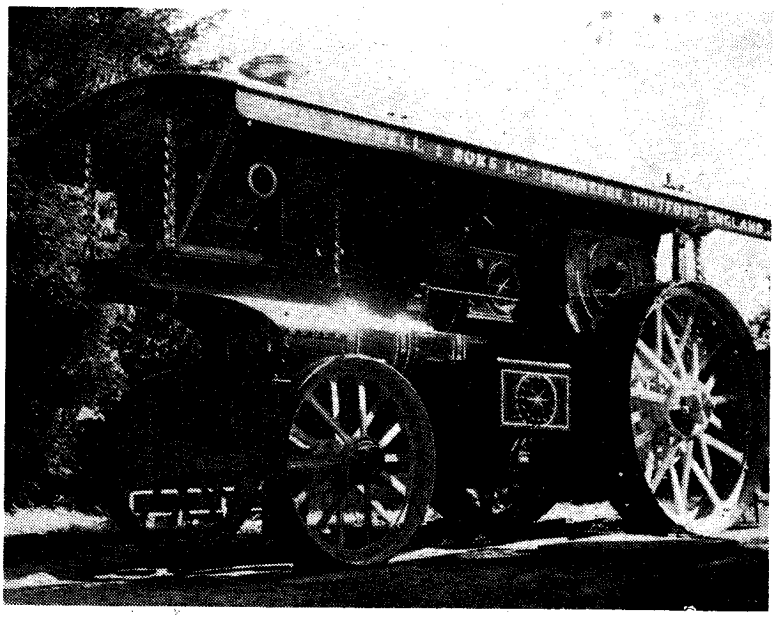
was more natural than to name her *Ex-Mayor*, to join her stable-companions ?

The rebuild of No 4000 began about three years ago when she was sent to a commercial firm in Crewe for the fitting of a new smokebox. On return, she was entirely stripped down. All parts of the motion were cleaned and polished to remove bruises, scratches, and other blemishes in the metal surfaces.

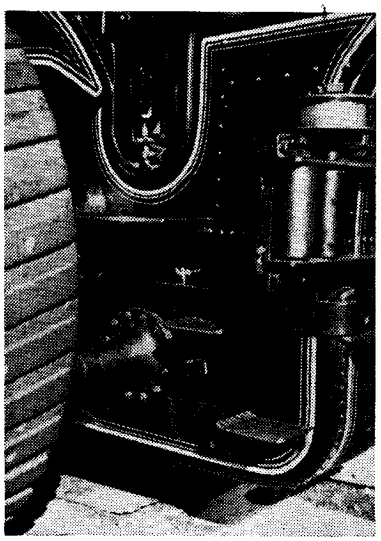
Replacements were made, including a new chimney and fine copper cap, bearings were relined or rebushed, parts were remachined and refitted, and the result is a motion which runs as smooth as silk.

The old blue livery had been stripped off and rubbed down, and *Ex-Mayor* now stands resplendent in the more conventional showman's colours of deep crimson with primrose wheels, all beautifully lined out. In most respects No 4000 is at least equal to new, and in some features better.

In all the work involved, the chief conspirator has been Louis Raper, whose name is well known in the scale model locomotive field—remember his Championship Cup winner, the Lancs and Yorks *Aspinall* 0-6-0 ? Without doubt, as Mr Salem says, Louis is one of the finest builders of locomotives in the country, and he has carried this perfection to the rebuilt Burrell. It is as a result of their co-operation that this superlative road locomotive now stands as a tribute to the name of Burrell. ▣



EX-MAYOR *gleaming with paint and polish*



Arrangement of brake shaft bracket, footsteps, fairlead, and drawstrap to drawbar to relieve strain of haulage

TELLING THE TIME

Watch and Clock Encyclopedia *by Donald de Carle, F.B.H.I. (London: N.A.G. Press, Ltd.)* 50*s*.

In common with all other trades, horologists have their own particular " jargon," and many of the terms they use are not readily understood, even by persons having good technical knowledge in other spheres. Clearly, there is a need for at least a comprehensive glossary of horological terms, but this book goes much further in providing a great deal of technical information on the subject, together with excellent illustrations.

There are obvious difficulties in covering a technical subject in alphabetical progression, and some encyclopedias have tended to become an irritating mass of cross-references. The author of this work, who is well known as a writer and expert on horology, has largely avoided this pitfall and produced a book which apart from its informative value, is easy to read.

All types of clocks and watches both ancient and modern are dealt with, together with details of component parts, tools and appliances, and historical development. Statistical information in tabular form such as clock and watch trains, pendulum lengths, motionwork, etc., is included and there is a section on workshop hints and helps. Altogether a most useful book for the practical watch or clock enthusiast, whether amateur or professional.—E.T.W.

Locomotive depot of the Southern Pacific and Western Railroad at Luddenham, west of Sydney

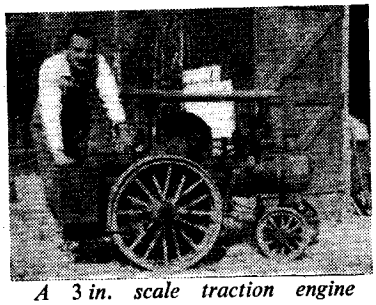
LIVE STEAM GOES BUSH!

This description of a 5 in. track set in pleasant farm surroundings comes from E. C. DEARMAN, of Hazelbrook, N.S.W.

IN this hectic age of earning a living, how we long for the big open spaces, and to get away from crowded city life! Mr Ted Herbert, a machine tool manufacturer, of Sydney has solved the problem and at the same time given pleasure to his fellow live steamers by building ¾ mile of 5 in. track on his 30 acre farm property at Luddenham, 40 miles west of Sydney.

Arriving at the property you are impressed with the peace of the countryside, gum trees, native birds, occasional rabbits and hares, and cattle grazing contentedly on lush pastures. A simply furnished cottage with all-electric conveniences is the "social centre," and nearby is a dam, for the marine enthusiast, and fully equipped workshop, including motorised 5 in. centre screwcutting lathe (built by Mr Herbert), motorised ½ in. drill, double-ended grinder, and other equipment.

About 100 yards away is the engine shed with vertical boiler for steam raising, fresh water tanks, coal crusher, and barbecue. A run of 100 yards takes you to "Snake Gulley" terminal, and the main line of ¾ mile, set out in a rough oval, runs through bushland and skirts open fields. The maximum grade is 1 in 40.

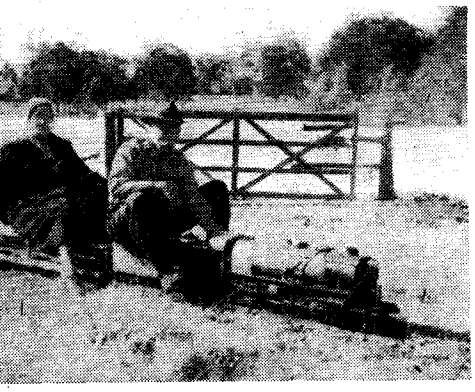


A 3 in. scale traction engine

The locomotives comprise Mr A. E. Herbert's Mikado 2-8-2 with two-cylinders of 1¾ in. bore × 2½ in. stroke, slide valves, drivers 4⅜ in. dia., working pressure 100 p.s.i. She is fitted with duplex feed pump and injector. Coal fired, she is a Denvers Rio Grande type engine, 14 years old; Mr Herbert's Mountain American type 4-8-2, built 1956-57; Mr F. C. Smith's Prairie type 2-6-2, with two cylinders of 1¾ in. bore × 2 in. stroke, piston valves. Her working pressure is 80 p.s.i.—and she is fitted with steam feed pump, and a shuttle valve built to his own design. She is wood-fired; Mr Neil Campbell's Pacific with Southern valve gear, cylinders of 1 11/16 in. × 2 in. stroke, slide valves, working pressure of 125 p.s.i. Driving wheels of 7⅜ in. dia., boiler of ¼ in. steel plate. She has an injector water feed and is coal-fired; Mr Charlie Mead's *Maid of Kent* (LBSC design) fitted with turbo-generator as described in ME [11 and 18 November 1954].

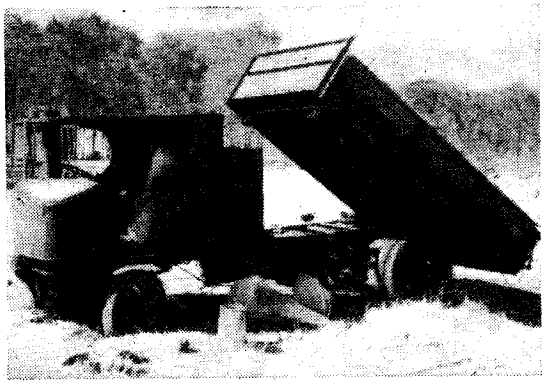
These locomotives work hard, and loads of up to one ton are hauled by double heading engines. A Sentinel tipping steam wagon and 3 in. scale traction engine complete the live steam stock. Other 5 in. gauge locomotives are being built and will be run on this interesting track, which was built only after several methods of construction had been tried.

It was finally decided to use 1 in. × ½ in. section rails with spacer bolts made from 7/16 in. steel, shouldered to 5/16 in. The track is laid on wide sleepers and attached with hook bolts from spacer bolts. Sleepers are laid on the ground, and ballasted with clay. It was soon found a good idea, as the track could move across the sleepers, to provide for the expansion of rails on curves (up to 2 in. in hot weather). Experience has shown that rail section of under 1 in. × ½ in. is inadequate for 5 in. gauge. Nineteen 11/32 in. holes were drilled in each length of steel. On curves the spacing of the holes was increased or decreased according to the radius. The inside rail was shortened by up to 1 in. Big radii were set out. Over £600 worth of steel was used in building the track. ▣

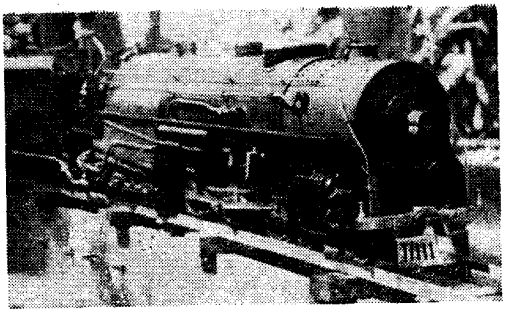


Left: Mr F. C. Smith's Prairie type 2-6-2 locomotive in steam on the track

Right: Maintenance team working on the Sentinel steam wagon



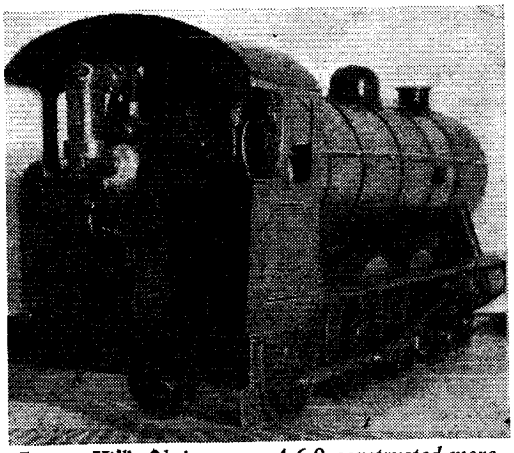
TRACK MEET IN SOUTHERN ONTARIO



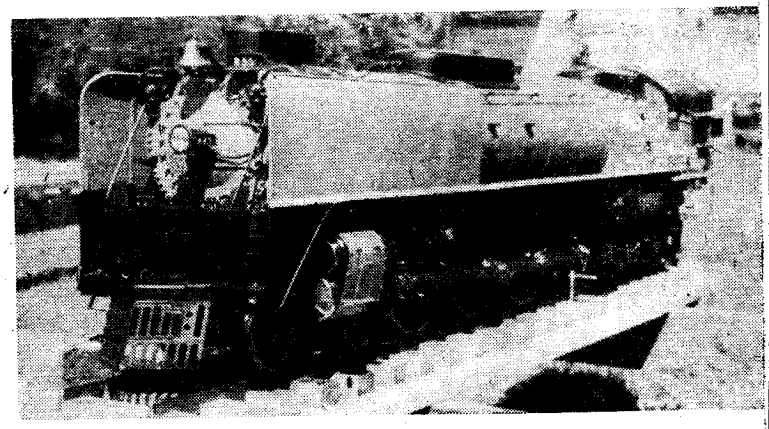
Rex Smith's $3\frac{1}{2}$ in. gauge CPR 4-4-4 JUBILEE locomotive. She has $1\frac{1}{4}$ in. × $1\frac{3}{4}$ in. stroke cylinders and 100 p.s.i. working pressure. The originals were speedy and handsome machines, and so is this $3\frac{1}{2}$ in. gauge engine

A New York Central Hudson in $2\frac{1}{2}$ in. gauge built by Jack Hart, of Windsor, Ontario. She has $\frac{7}{8}$ in. × $1\frac{1}{4}$ in. cylinders with flat valves. An axle-driven pump and injector are used to feed the boiler

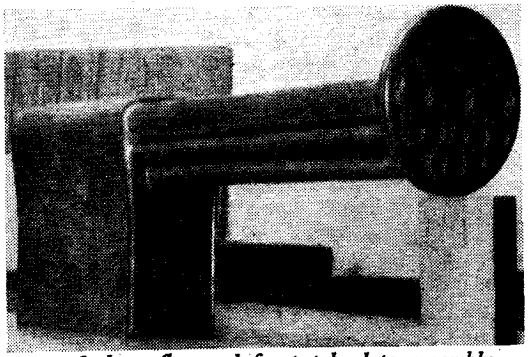
"Just a bunch of friendly smoke sniffers" is how GEORGE HILL describes the enthusiasts who drive these locomotives at Port Rowan



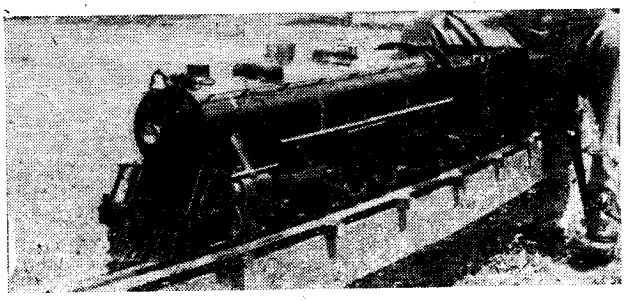
George Hill's $2\frac{1}{2}$ in. gauge 4-6-0 constructed more than 30 years ago. She has $\frac{5}{8}$ in. × $1\frac{1}{8}$ in. cylinders brazed up from chunks of mild steel, flat valves and slip reverse. A steam pump to LBSC's design and an injector constructed by Mr Hill, feed the boiler



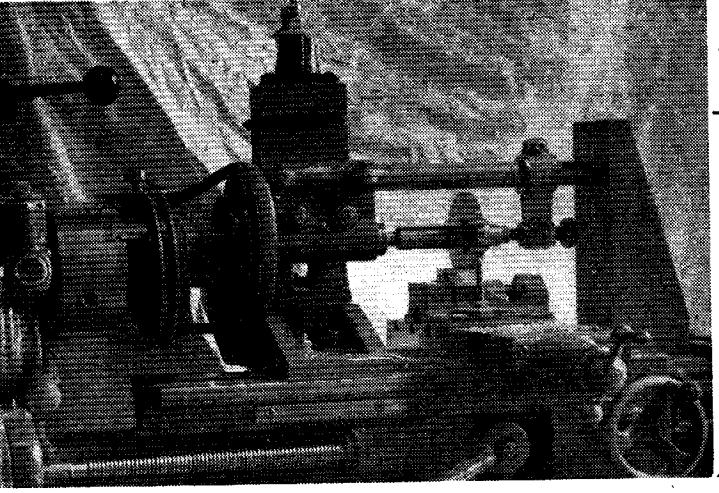
A $3\frac{1}{2}$ in. gauge United Pacific 4-8-4 constructed by Al Roedding, of Weston, Ontario. A magnificent miniature locomotive, she is a mass of fascinating gadgets, all of which work. They include air brakes, air-operated reverse, and a turbo lighting set designed by Otha Hege. She has a double chimney and multi-nozzle exhaust as in full scale. Cylinders are $1\frac{1}{4}$ in. × 2 in. with piston valves



Inner firebox, flue and front tubeplate assembly for George Hill's $4\frac{3}{4}$ in. gauge old-time Midland express locomotive. The unit was furnace brazed



A $3\frac{1}{2}$ in. gauge 4-8-2 CPR constructed by Harry Garry, of Winnipeg. It is now owned by Jack Lilbourne, of Brantford, Ontario. She has $1\frac{1}{2}$ in. × 2 in. cylinders, with piston valves. The boiler, which is soft soldered and also riveted, is fed by an axle pump and what appears to look like a Bassett-Lowke injector



This simple unit, designed by S. OWEN, enables milling operations to be carried out with much more efficiency

The device set up for horizontal milling, using a standard vertical slide

An inexpensive new lathe milling attachment

THIS appliance, now the subject of a provisional patent, provides an inexpensive attachment for a small lathe which will enable both horizontal and vertical milling operations to be carried out simply and efficiently.

The set-up consists of a two-step V-rope pulley to be carried and driven by the lathe self-centring chuck; heavy baseplate bolted to the lathe bed and extending backwards; a small bracket bolted to the rear end of the baseplate and having small vertical position adjustment; a second bracket bolted to item No 3 with horizontal adjustments to and from the operator to cover different belts; a vertical spindle, secured in No 4 and carrying two jockey pulleys revolving in a horizontal plane and retained loosely in position with movable collars; a purchased vertical slide of any suitable design, bolted to baseplate No 2; a bearing head bolted to the front of the vertical slide and carrying a revolving spindle bored No 1 Morse taper, to carry the milling arbor or cutter bar spindle and having a two-step V-pulley at the driven end; a heavy steady bar carried by a 5 in.-long boss with clamping screws; an arm sliding on the steady bar and fitted with a hardened centre screw to provide tailstock support for the cutter bar or mandrel; and a cast iron bracket with a long vertical slot to support the outer end of the steady bar. This, of course, has to be unlocked when vertical adjustments are being made.

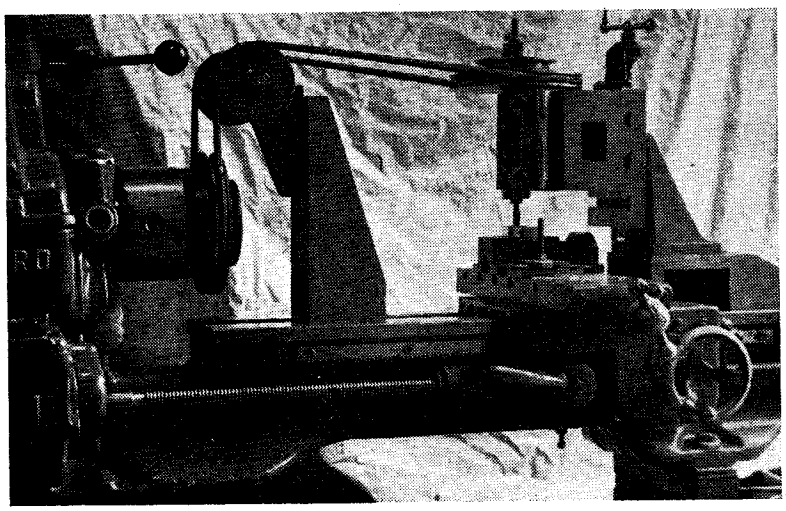
When fitting this bracket it is advisable not to drill the base-hole until final setting up, as the lathe centre (to which I had adhered in the vertical plane), is not necessarily the same as the centre of the space between the lathe ways.

When mounted as shown, in a good lathe, this provides ample movement for most model engineers' requirements in all three directions and micro-adjustments will be available if the adjusting handles are so marked.

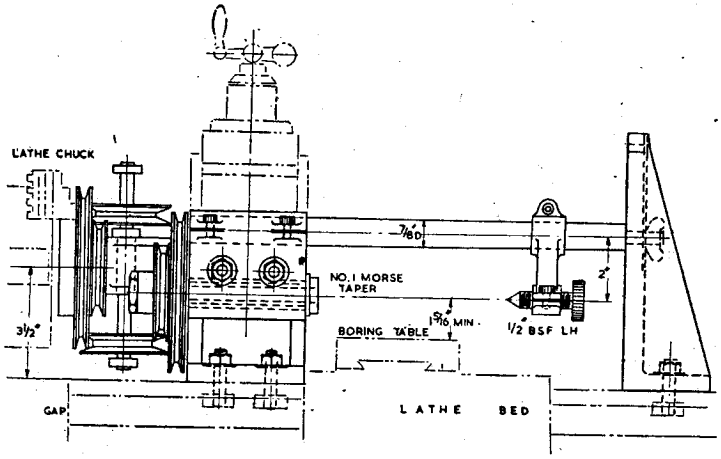
It has been found, in use, that the ⅜ in. V-belt gives no trouble whatever and plenty of vertical adjustment of the spindle is possible without altering the jockey-pulley positions. It is advisable to keep the vertical slide gib on the tightish side.

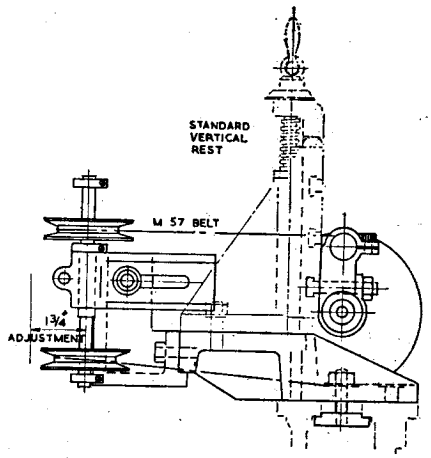
I made my own patterns and had the iron castings made at a local foundry. All machining was done on the lathe and a No 2 Champion drilling machine. The difficult parts to machine at home are the rather large rectangular faces on the baseplate and the outer steady support. I did these by mounting them on the boring table with the face to be machined facing the lathe faceplate.

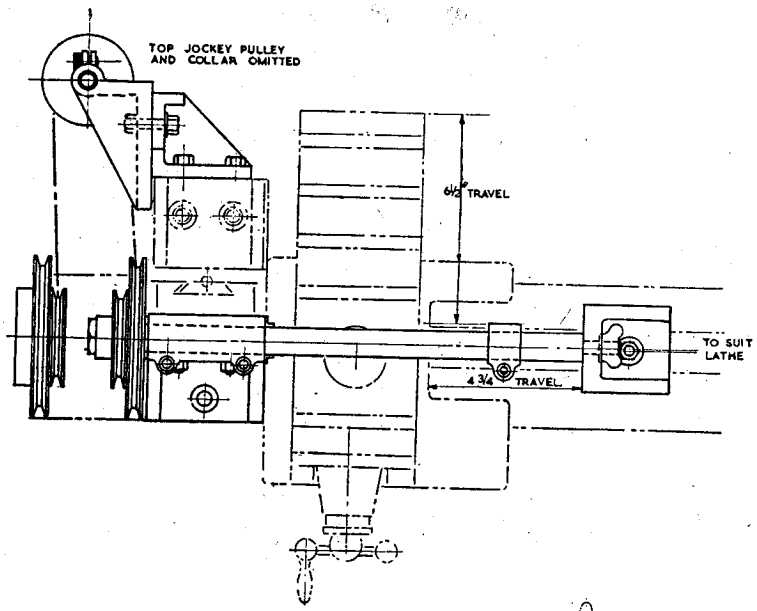
I mounted the tool on the faceplate in such a position that by cutting upwards in the rear and downwards at the front and using the full cross-slide travel, all the face was covered. A little filing was necessary where the cuts joined up.



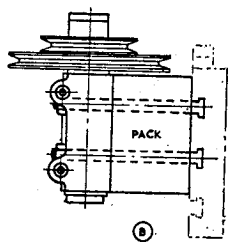
Set-up for vertical milling operations on work mounted on cross-slide

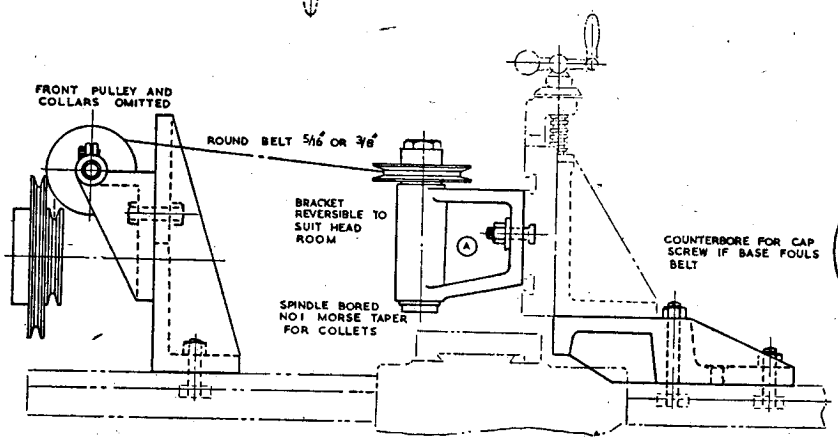


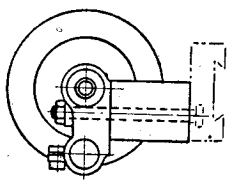


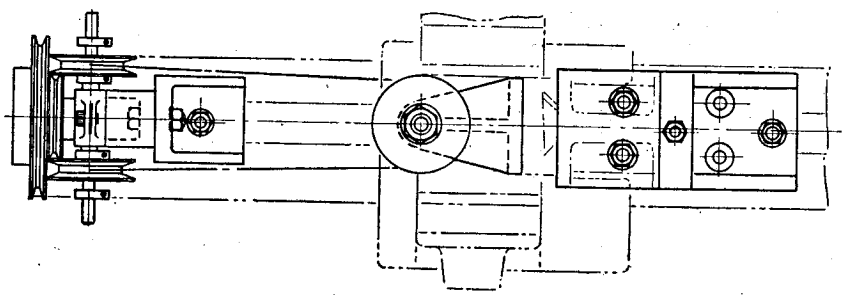


HORIZONTAL MILLING ATTACHMENT
APPLIED TO 3½" LATHE









SET UP FOR VERTICAL MILLING

A WITH ADDITIONAL HEAD

B WITH STANDARD HEAD AND PACK

This method entails plunging in to start the cut and I find it advisable to thoroughly grind off all the hard and dirty skin from these faces before starting. It is not possible on a small lathe to plunge in very deeply and if the tool is part of the time on the skin, it will soon want regrinding. This is the most boring and exasperating operation on the whole job, unless one is lucky enough to have a lathe with an automatic cross-feed.

Vertical milling

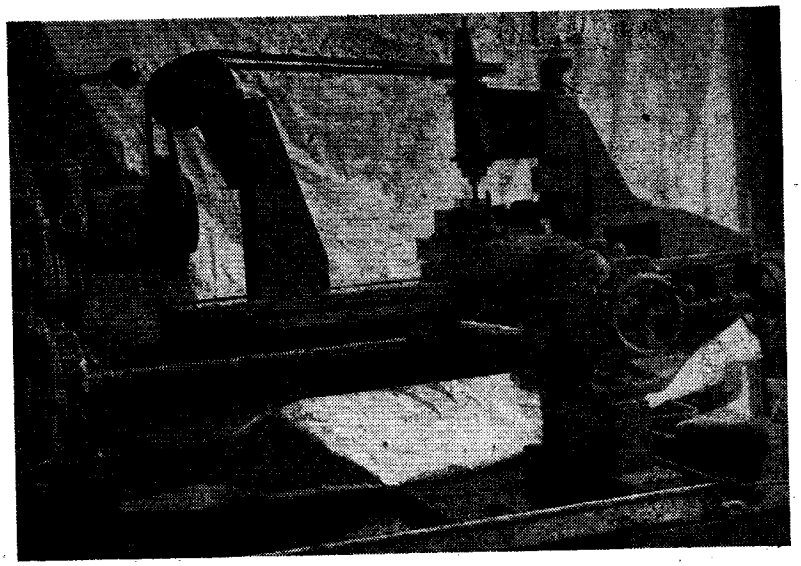
To set up as a vertical miller, all the components except the small bracket bolted to the baseplate are used in the positions shown. It was necessary to provide a pack between the vertical slide-face and the bearing head to clear the pulley. I had two cast, in case I wanted to pack the slide up higher at some time, for any of the set-ups. Incidentally, the baseplate was drilled and tapped to carry a Myford type vertical slide in both set-ups.

I found that, as I had expected, a V-belt did not have room to twist between the driving pulley and the jockeys and it was necessary to use a $\frac{5}{16}$ in. or $\frac{3}{8}$ in. round belt in the vertical set-up.

One snag with this set-up was the difficulty of seeing the tool when in use. This was due to the fact that the boss on the bearing head which normally carries the steady bar is in the front. To improve this, I made a smaller independent head for the vertical set-up. I bored the spindle for this to suit collets as being more suitable for small endmills and drills. A pack is, of course, not necessary with this head.

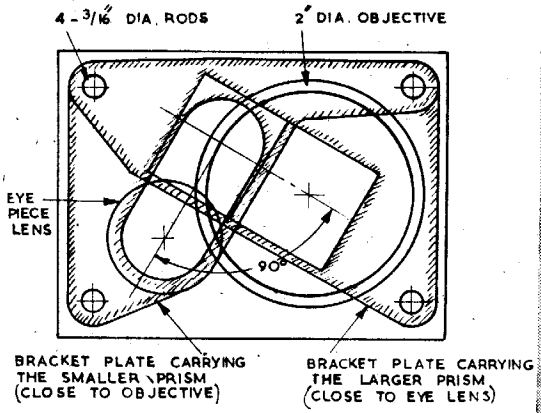
I find it takes very little time to align the set-up, but slots could be machined for tenons in the underfaces of the baseplate and steady support if desired.

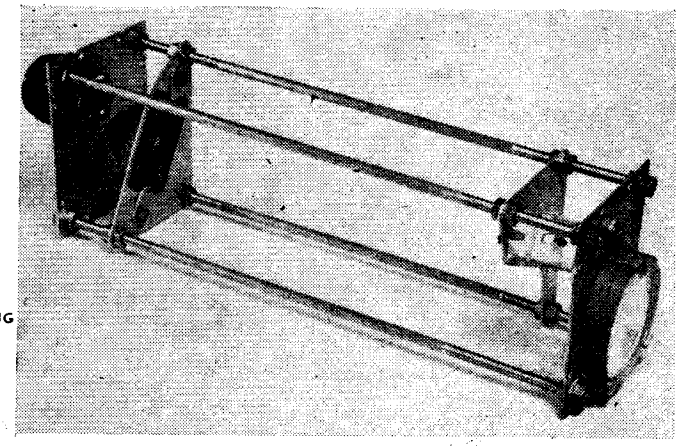
The bracket could stand a lot of weight reduction for a repeat order, in fact, weight could be reduced generally except in the baseplate where I think it is an advantage. The steady bar could be longer, but this will depend on requirements. ▣



Set-up for vertical milling, giving greater reach and improved rigidity

Full set of components for horizontal and vertical milling

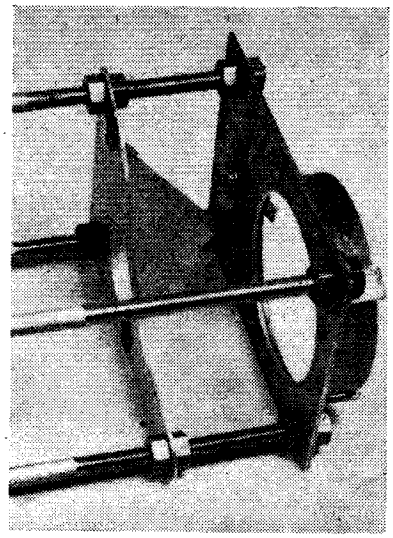




End elevation of the device showing disposition of the lenses and prisms and shapes of aluminium plate brackets. Right: The instrument with the outside casing removed

A FORESHORTENED TELESCOPE

Using two prisms to reduce its overall length W. T. BROWN produced this very compact instrument



Close-up of the foreshortened telescope showing the prism and adjustment at the instrument's object end

AMONG the miscellaneous stock of lenses I have accumulated were a 2 in. dia. object glass with a focal length of about 24 in. and a focusing eyepiece which at one time formed part of a pair of binoculars. I decided to use these two lenses as the basis of a telescope but to do this in a straight-through tube with the extra pair of lenses necessary to invert the image, would make its overall length about 32 in. This could be reduced, say, 6 in. if two right angle prisms were used in lieu of the two inverting lenses.

It occurred to me that a more compact instrument could be made by using two prisms but placing them remote from one another, putting one prism close to the objective and the other near the eyepiece. This would, in effect, make the finished telescope about one-third of the length it would otherwise be.

The procedure seemed sound so I developed it further and finally arrived at the instrument as shown in the picture. The surrounding rectangular case has been removed in order to show detail more clearly. As will be seen, the prisms have been spread apart as far as possible and, as made, the rays of light from the objective traverses the length of the unit three times before reaching the eyepiece, thus reducing the overall length to about 9 in. to 10 in. Optically the light is turned through 180 deg. at each prism and with the prisms at right angles, a visual upright image is obtained.

Assuming a 24 in. focal length of object lens and a clear diameter of $1\frac{7}{8}$ in., it follows that the conical rays of light tapering to a point at its focal length has a diameter of $1\frac{1}{4}$ in. at the first prism and about $\frac{5}{8}$ in. dia. at the second. These diameters define the size of the prisms necessary to obtain the maximum visual efficiency.

The prisms available were of two sizes. The larger one—nearest the eyepiece—has an hypotenuse face $1\frac{3}{4}$ in. × 1 in. One half of this face receives the light from the object lens. Inside this prism the light is turned through 180 deg. and the emerging beam falls on one half of the second prism near the object lens. Again turning through 180 deg., the rays proceed to the eyepiece where they are finally viewed. This smaller prism has an hypotenuse face 1 × $\frac{3}{4}$ in.

The whole assembly is carried on four $\frac{3}{16}$ in. dia. brass rods screwed 2 BA for a longer length than is actually required to permit of the adjustment of the prism carriers on first assembly and to keep all four members of the unit parallel. The object lens is fitted external to the body to keep its length to the minimum possible. It should be emphasized that all optical faces should be parallel to one another.

A telescope of this power is not normally used for near observation and since the optical distance between the two main lenses is practically constant for viewing at any distance over about 100 ft, the focusing eyepiece needs but small adjustment to suit the eye of the observer.

Fully dimensioned views of the telescope would only be of assistance to an optical enthusiast if he had identical lenses and prisms to those detailed. ▣

This free advice service is open to all readers. Queries must be of a practical nature on subjects within the scope of this journal. 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, W.1.

READERS' QUERIES

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

Brighton Baltics

Can you please help me regarding the colouring of the Brighton Baltics after they became SR property? I am modelling No 333. Was her name still painted on the tank sides, or did she carry a nameplate? I presume the basic green and black was employed on the Brighton section, the same as it was on the Eastern.—R.F.S., Margate.

▲ *The Brighton Baltics were repainted in SR standard olive green in* 1923-24, *being lettered SOUTHERN in small letters on the side tanks with the number in large figures beneath it, also a small letter B between the two. This lettering was in yellow.*

The engine Remembrance N. 333, *however, retained the word Remembrance across the side tanks but without the full stop, the words SOUTHERN, B, and* 333 *being put on the bunker.*

Between 1928 *and* 1934 *the Baltics were repainted in malachite green, the two named engines* STEPHENSON *and* REMEMBRANCE *receiving cast brass straight nameplates on the side tanks, the lettering on the bunker being unaltered. The plaque was fitted under the word* REMEMBRANCE *in each case.*

Marine engine

I am building the triple expansion marine engine by O. B. Bolton from prints purchased from you, and would be pleased if you can give me some information.

First, what is the scale of the drawings? This is not shown, and I wish to make some modifications and additions, and keep to scale.

Secondly, I am thinking of adding a flywheel on the low pressure end of the crankshaft, with the addition, of course, of another bearing. What should the outside diameter and width be?

Thirdly, could you suggest a colour scheme for the engine?

Fourthly, could you advise me on a suitable boiler for the engine, and whether you sell plans for such a boiler?—J.A.O., St Helens.

▲ *The ME triple expansion marine engine is not an exact copy of a prototype and, therefore, the scale is not specified. From its general proportions, it would represent a relatively small engine and we would suggest that the equivalent scale would be roughly* 1 *in.* : 1 *ft.*

Your proposal to add a flywheel to the engine would be in order but, as marine engines are not normally fitted with flywheels, it would be rather difficult to give you exact particulars of the most suitable flywheel. We would, however, suggest that 4 *in. dia.* × 1 *in. width of face would be generally in proportion to the size of the engine, and satisfactory from a practical point of view.*

With reference to the boiler, we suggest that the Scotch-type marine boiler by W. Melville, described in ME dated 29 *May* 1958, *would be suitable. It would be advisable to increase the dimensions by about a quarter to give adequate steaming capacity.*

Brazing Maisie boiler

I am constructing a *Maisie* boiler to LBSC's data, now approaching the brazing stage. I have not had much experience of the older method of blowlamp and Boron spelter and do not have a brazing hearth or big capacity blowlamp. But I have access to an oxy-acetylene torch and have used Johnson Matthey No 2 Easy-flo silver brazing alloy (fusing temperature, I believe, is 630 deg. C) fairly extensively.

I would very much appreciate your advice as to whether the latter material would be suitable for *all* brazing on this boiler.

If Easy-flo is suitable, I suppose it would be necessary to "pickle?" —J.E., Osterley.

▲ *An oxy-acetylene torch is ideal for bronze-welding certain parts of your boiler, for instance the throatplate, backhead and foundation ring. Materials such as Brazotectic are used, with the appropriate flux.*

The tubes, however, should be silver soldered at both ends. For this an oxy-coal-gas torch will be required, plus a special non-return valve (for the town gas supply). Easy-flo No 1 *and flux is ideal here.*

Easy-flo should not be used with the oxy-acetylene outfit. In all cases a pickle-bath is required after each brazing or welding operation.

City of Truro

I am contemplating building a GWR *City of Truro* in 5 in. gauge. Can you supply drawings for this engine and are there any castings available?—E.V.H., West Kirby.

▲ *We have no drawings of the GWR City class in* 5 *in. gauge, nor are any castings available, although some of the stock castings supplied by A. J. Reeves and Kennion Bros may help you.*

*You may be able to obtain some drawings of these locomotives from the Publicity and Public Relations Officer, British Railways (Western Region) Paddington, W*2.

Traction engine

This is my first attempt at building the ME traction engine. I have completed the boiler, as far as the outer shell, but there is no firebox or backplate.

Would you tell me, please, do I have to fit the hornplates on next, before I proceed any further with the boiler? Also, would you let me know the price for complete blueprints for same?—G.P.N., Gravesend.

▲ *Drawings for the ME* 1 *in. scale traction engine are available from these offices, price* 17*s.*

We think you would be well advised to complete your boiler first. The horns could then be attached with a few gunmetal screws and then silver soldered with best grade silver solder. This is, of course, assuming that you are not using any soft solder in your boiler.

Three questions

Could you please explain the following: 1. What is a centre lathe, or rather why is it different from an ordinary lathe? 2. What does BGSC stand for? 3. From where or who can spring steel suitable for multi-leaved springs in ½ in. scale be bought? —J.A., Saffron Walden.

▲ *The term "centre lathe" is employed to define the normal type of general purpose lathe as used by engineers, but is applicable to any lathe in which work can be mounted between centres for turning, as distinct*

from lathes in which only work held in a chuck or on a faceplate can be dealt with.

The letters BGSC mean that the lathe is equipped with "back gearing," that is, reduction gearing to enable the lathe to be run at slower speeds than can be obtained direct from the main pulleys. SC means that the lathe is equipped with screwcutting gear.

Spring steel for making model vehicle springs in ½ in. scale can be obtained from several ME advertisers, including Bond's o' Euston Road, 357 Euston Road, NW1, Kennion Bros Ltd, 2a Railway Place, Hertford, and A. J. Reeves and Co., 416 Moseley Road, Birmingham 12, but if the particular size you require cannot be readily obtained, G. P. Wall, Magneto Steel and Wire Works, Attercliffe, Sheffield, Yorks, are actual manufacturers of spring steel and may be able to give you further assistance.

Locomotive pictures

Can you please tell me if it is possible to purchase photographs of foreign steam locomotives in England?

I have secured one or two from foreign agencies in London, but not quite what I want, neither do I like to worry them too much.—F.D., Nottingham.

▲ *A few photographs of foreign locomotives may be obtained from: The Locomotive Publishing Co. Ltd, Craven House, Hampton Court, Surrey.*

If they cannot supply you, you could try the Public Relations Officer of the railway concerned.

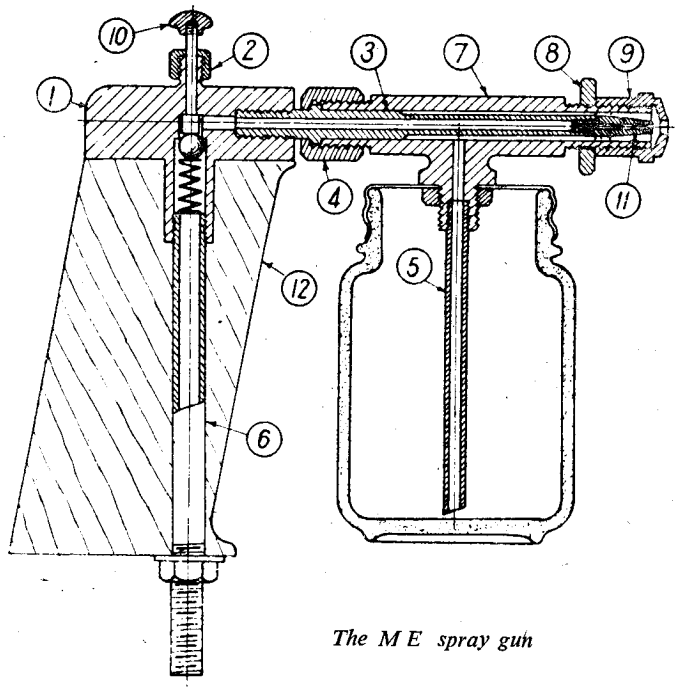
Paint spray

Can you advise me on how to make a paint spray? I am making my own but know very little about the nozzle parts. I intend to use a foot-pump for air compressor.—J.S., Manchester.

▲ *We would first of all point out that the amount of practical spraying which can be done with the aid of a foot-pump is limited by the volume and pressure obtainable, and for work on a practical scale, it is very desirable to use a power-driven compressor.*

The small paint sprays, which are recommended for use with a foot-pump, are of a type similar to a scent spray, having two small nozzles arranged approximately at right angles to each other. Air is blown through one nozzle, and the other, which is connected to a vertical pipe in the paint container, picks up the paint by suction and it is further atomised by the air blast.

For working at higher volume and pressure, an injector type of spray is necessary and devices of this nature have been described on several occasions in ME. *The best known is the* ME *spray gun.*



The M E spray gun

Steam generator

Was construction of the ME steam generator and Atmos vaporising burner ever described in ME? What would be the safe working pressure if built as specified? What fuel is this burner designed to use, alcohol or gasoline? Also, is the fuel to be supplied under pressure?

Where can I buy smokebox castings for the Trident Mark II boiler as described in the 13 May 1954 ME?

Also, can you give me the name and address of anyone who supplies castings for the ME triple expansion marine engine?—W.N.M., Indiana, U.S.

▲ *The ME steam generator and Atmos vaporising burner have not been described in detail in* MODEL ENGINEER.

The burner is intended to use petrol (gasoline) or a mixture of petrol and kerosene. The fuel is intended to be supplied under pressure in the same way as for a Primus stove or blow-torch. The air pressure applied to the tank may be up to 60 p.s.i.

We regret that we cannot advise you where to obtain smokebox casting for the Trident Mk II or castings for the ME triple expansion marine engine.

Turbo-generator

Could you supply details for turbo-generator suitable for *Virginia* headlight in 3½ in. gauge? I have several small permanent magnet motors but they do not give much light at 6-8,000 r.p.m. on 1.5 v. bulb. —J.S., Nottingham.

▲ *The construction of model turbo-generators has been covered in articles in* MODEL ENGINEER *in the issues for* 11 *and* 18 *November* 1954 *and* 10 *March* 1955.

However, of these issues only the last is available from our back numbers department, the other two being out of print. You can refer to the appropriate bound volumes of MODEL ENGINEER *in your local library, or may be able to obtain second-hand copies by advertising in our classified columns.*

Petrolea injector

Can you tell me if LBSC has described a locomotive named *Petrolea* as I would like the instructions for making the injector.—E.C., Leeds.

▲ *LBSC described how to make an injector which would be suitable for* PETROLEA *in* ME, 17 *January* 1957. *It is available from our back numbers department, price* 1*s.* 3*d. including post. Alternatively we can supply a scale drawing—No* 81, *sheet* 12, *price* 3*s.* 6*d.*

The locomotive PETROLEA *was described from* 7 *October* 1943 *to* 3 *January* 1946.

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

LOCO CALLED SHARK ?

SIR,—My photograph shows an old LSWR locomotive on an inn sign at an out of the way place called West Moors in Dorset, in front of the Railway Hotel.

The locomotive is by Beattie, after Adams had taken away the feed heater system and added a simple cab and a new chimney.

This interesting inn sign was seen by Mr H. H. Nicholls, of London

The building appears to date from about 1890, when this class still ran on branch lines, until superseded by the 0-4-2 type of Adams design.

By the way, the locomotive has the name *Shark* painted upon it; whether one of the engines actually bore this name I do not know, having only seen a picture of Beattie's *Atalanta* in its original condition.

London NW7. H. H. NICHOLLS.

REMEMBRANCE

SIR,—I feel honoured to find my name mentioned by no less a person than J.N.M. concerning the LBSCR locomotive *Remembrance* [ME, October 22].

The subject of whether a dedication ceremony took place or not, requires a definition of "ceremony." In this case it is obvious that if a religious dedication took place it would have to be done by several denominations, and the scores of people to whom I have put this question have given this as the reason why it was not done.

The present motive power superintendent at Brighton is an ex-LSWR man, but he assures me that no records exist of any ceremony. Apparently, all that happened was that the locomotive was shunted into the main line platform, and before a gathering of directors and officials, a short address was read in memory of the railway employees who fell in the 1914-18 war.

Several photographs exist similar to the one published, which were taken when the locomotive was leaving the paint shops. One of these includes the girl clerks from the wages office.

The *Brighton and Hove Herald*, whose files are available for research for nearly 160 years, always keep one page solely for church news, and any such ceremony would have been recorded, and photographed, if it had been a religious one. As a founder member of the Regency Society, I have checked the issues covering this period, and found nothing whatever.

Although I did not spend any length of time at Brighton Works, I know or knew many of the employees and staff, now mostly retired, or passed on. The general census of opinion regarding this particular locomotive is that it is far better forgotten. Apart from the troubles that are well known, there were others.

I remember machining castings that were intended to be fitted in the smokebox to prevent the fire from going out the spout when the regulator was opened. Another fault was the rolling; and the fore and aft bogies were altered several times.

The *Stephenson* did not appear to have these troubles so severely. Was it, I wonder, due to the different valve gear ?

Brighton. G. GOLDRING.

NOTCHING UP

SIR,—A correspondent asks how it is possible for a locomotive to run in mid-gear [Postbag, November 19].

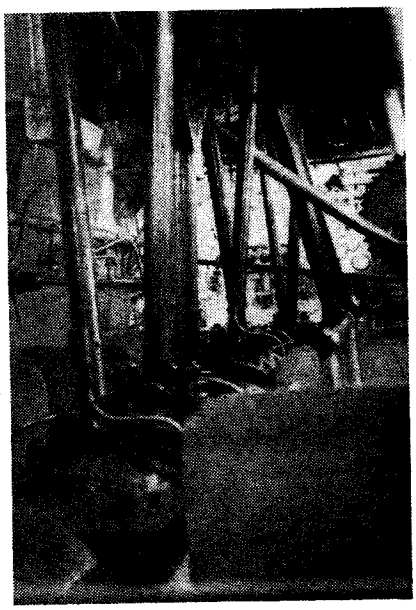
During the General Strike of 1926, I was a volunteer driver; one locomotive was an 0-6-0. Once it got going, it could be notched up to mid-gear, and it jogged along quite happily. The answer to the question in this case was slack in the valve gear motion. There was a good deal of slack elsewhere, but that is another story !

Ambleside. GRAHAM SATOW.

ENGINE ROOM

SIR,—I have pleasure in enclosing some photographs taken in the engine room of the s.s. *City of Lichfield* on which I recently served.

In the large photograph (looking forward through the motionwork) the Sampson rod from the reversing engine is visible (necessary because of the size and weight of the link motion). The cooling water pipes can also be seen on the back columns. These are for the engineer's nightmare—hot bearings, when, due to weather or other causes, it isn't possible to stop the engines for adjustment. Per-



Engine room of CITY OF LICHFIELD. *A picture from Mr D. Proudlock, of Wingate, who used to serve on the ship*

sonally, I discourage the use of these, except for a real emergency, as the salt forms in the bearing oilways, usually giving trouble until it can be cleaned out properly. In the case of a hot main, a good flush through with paraffin followed up by a liberal dose of engine oil usually works wonders.

This set of engines developed 2,500 i.h.p. at 66 r.p.m. giving 10½ knots, but they are, alas, no more. The new owners removed them and fitted twin, high speed, geared Murrlees diesels. These, it was claimed, would give two extra knots for only two-thirds the original oil consumption (26 tons per day at £10 per ton !).

I wonder if they will still do so after another 17 years ? Also if they will then be able to do a 15,000-mile round trip without piston or valve inspection and still give the same perfect set of "cards" at the end of the trip as at the start. Somehow I doubt it !

Wingate. D. PROUDLOCK.

PUSHING AND PULLING

SIR,—Vulcan inquires [ME, December 10] if a locomotive can pull more than it can push. There is, may I suggest, another aspect of the question which he does not mention.

It is common knowledge that when a vehicle stops on the brakes there is a transfer of weight forward so that the front dips down (quite phenomenally, indeed, with some modern forms of suspension). Conversely, when a vehicle starts there is a transfer of weight to the rear wheels.

When pushing, the pressure on the buffers would tend to hold the front of the locomotive down, thus promoting adhesion of the coupled wheels for starting. When pulling, the buffers would not be in contact and would have no influence one way or the other.

London W1. JOHN H. AHERN.

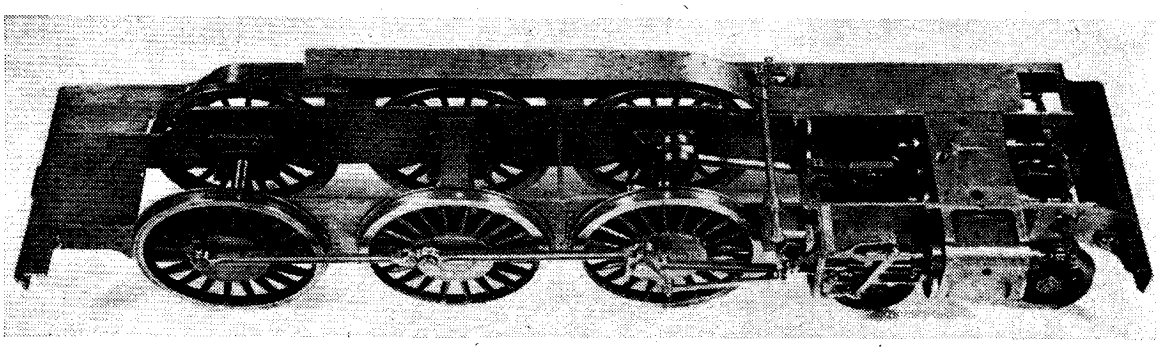
3½ in. GAUGE CLAUGHTON

SIR,—I thought that readers of MODEL ENGINEER might be interested to see the progress on my 3½ in. gauge LNWR Claughton, the drawings of which you published some time ago. The photograph by my friend Mr Arnold Eastham, shows the off-side of the engine with the footplating and splashers removed to allow the motionwork to be seen to advantage. The boiler is in hand, most of the cab is finished and the tender chassis is complete.

Spencer's cylinder drain cocks and combined relief valves are fitted to the cylinders. A large twin-feed lubricator has been constructed to fit under the inside cylinder valve rockers, and over the bogie. This will deliver oil to the main steam pipe to each pair of cylinders on the left-hand and right-hand. The cylinders are cut from solid lumps of gunmetal and have dural pistons, whilst the piston valves are stainless steel in hard-drawn bronze liners.

The valve gear follows the prototype pretty closely except that long lap valves are used and the full gear travel is a nominal ⅜ in. The link trunnion brackets are built up to represent the true LNWR design, as are the crossheads, motion brackets, etc.

Bramhall. W. TUCKER.



The 3½ in. gauge Claughton being built by Mr W. Tucker, of Bramhall, who gives details of its progress in his letter

COLOUR SCHEME

SIR,—A letter from Mr K. R. H. Rose [Postbag, August 27] asks for the colour scheme of locomotives of the Buenos Aires and Pacific Railway. Unfortunately, he requires authentic information capable of satisfying exhibition judges.

I am afraid it is next to impossible to obtain exact data, as the British-owned railways in this country were sold out to the government in 1948, and nearly all the British staff left within a relatively short time. Furthermore, his prototype dates back to about 1925, and old-timers have been pensioned. It is utterly useless to apply to the present staff.

However, I can assure Mr Rose, from memory, that somewhere between 1915 and 1920 the Pacific local service engines were painted a dull, dark green, known, I believe, as "Hooker's Green." Smokeboxes were blackleaded; buffer beams the usual red. Buffer stocks were probably black. Cowcatchers were coated with tar or creosote—at any rate they looked black; matt surface.

Lining is difficult to remember, but I think it was rather inconspicuous, maybe thin double lines of white and yellow. There was also some chocolate-brown somewhere, possibly the footplate valances. Large brass number plates, with polished figures, lettering, and edging—background colour depending on the home shed, many being about the colour of a privet leaf.

The 4-6-4s which came out some time later (Mr Rose's prototype) do not, however, call this colouring to mind particularly, though I never saw them at close quarters. Maybe they were all black except, of course, the buffer beams and number plates, as by that time the railways were beginning to "feel the pinch" and did not go in for expensive cleaning and upkeep as required by coloured locomotives.

It was rumoured that the engines were not particularly successful. The boilers were very high-pitched—or so they seemed—and it was said that the whole machine swayed alarmingly at speed. Perhaps they had other faults too; at any rate I have not seen one for years, though they may still be in existence, in some other part of the country. The local service is now handled by the old engines mentioned in the first part of this letter, supplemented by some new diesel locomotives.

There has been some correspondence in ME lately about the hard riding of electric stock in England. The same obtains here with the ex-Central and ex-Western electric trains. These suffer from a pronounced "hunting" motion, as of a two-cylinder locomotive going "all out." This is ascribed to there being several points of traction on the train, pushing and pulling simultaneously, and exaggerated by the low centre of gravity of the motor coaches. This motion is then transmitted to the trailer coaches by the tight couplings and buffers, and the whole train assumes a snake-like position on the track, each coach twisting from left to right alternately, especially at the "period" speeds. This is so noticeable that the railheads become very worn on alternate sides of the track.

Please note that the above remarks apply more especially when the track is not kept tight and in first-class condition. This cross-wise motion would not be produced in a train drawn by a locomotive, since all the coaches are then pulled out like a string, each restrained by the rolling resistance of the ones behind, except the last vehicle, which "whips" considerably, especially if of a short wheel-base.

San Martin, Argentina. C. H. ROBERTS.

NOTCHING UP

SIR,—In reply to Mr Vaughan's letter [Postbag, November 19] there is really no problem about a locomotive running in mid-gear and I cannot agree with your footnote.

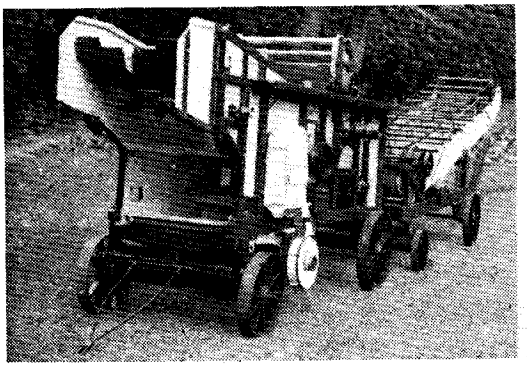
If the gear is correctly laid out and made, the valve will have a movement in mid-gear of 2 × (lap + lead). The steam ports will, therefore, open by the amount of the lead.

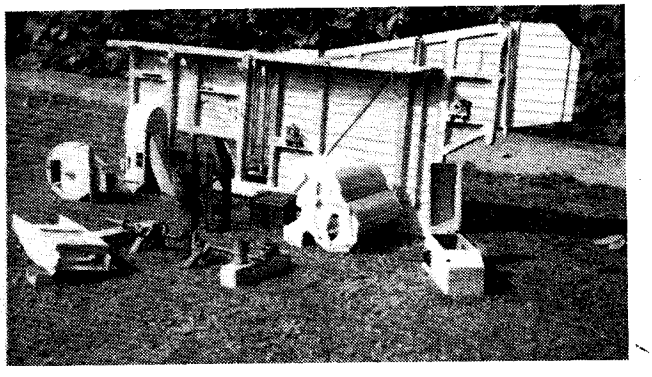
Exhaust lap is seldom used, the ports usually being "line and line" or with slight exhaust clearance. Therefore the exhaust will open by a minimum of steam lap + lead.

Under these conditions when the locomotive is running fairly fast the cylinders will receive enough steam to maintain motion unless the load is too heavy.

Obviously the engine could run in either direction in mid-gear, provided the valve events were correct, but when in motion the momentum of the train prevents any possibility of reversal taking place. No locomotive could, of course, be expected to start any appreciable load whilst in mid-gear.

Birmingham. J. H. BALLENY.





Mr R. Palmer, of Southampton, would like to know where he can get an enamelled plate to complete his model threshing machine

THRESHING SET

SIR,—I enclose photographs of my 2 in. scale thresher—part of a threshing set. I wonder if you could tell me of any firm which will make an enamelled plate similar to lapel badges? I need a small *printed* notice on steel to be used as a warning notice on the back of the machine. I can give the size and exact wording—if I can find the address of anyone supplying this sort of thing.

Southampton. R. PALMER.

PETROL GAS

SIR,—Re W. Foulkes' letter about petrol gas [Postbag, December 17], I remember seeing, when a boy, an advertisement in *The Ideal Home* for a petrol gas lighting plant. It was by Spencers, the British pioneers of petrol gas.

The illustration showed a crew-cut young lady pouring petrol out of a two-gallon can into a contraption which rather resembled a sausage machine. I vainly tried to persuade my mother to buy me one, but she was afraid I might do some damage with it.

Since the war I have seen in a government surplus store a petrol fired bunsen burner. This consisted of a tin can like a 1 qt oil can, with a tap at the bottom connected by 6 ft of flexible metal tube to a huge bunsen burner about ⅞ in. dia. The can was filled with cotton wool and had a small hole in the screw cap. As far as I could gather the cotton wool was soaked in petrol and the can suspended about 6 ft above the burner. The petrol vapour being heavier than air shou d then flow down to the burner.

Since the calorific value of petrol is approximately the same as that of butane, I would suggest that the proportions and jet sizes of Calor gas or Bottogas burners would be correct for petrol gas; also that the working pressure, 11 in. water gauge, would be the same. I hope the foregoing will be a useful clue.

Now perhaps someone can tell me about the "oil gas" which was formerly used for train lighting. I think gas oil was originally used for this purpose, but how was it gasified?

Essex. METHANIDES.

MAGNIFICATION

SIR,—With reference to the paragraph "Warrior Engine" [Readers' Queries, December 10], your correspondent might be suited by the Bishop Harmann binocular corneal loupe in the Allen and Hanbury catalogue (No 22212) worn like a pair of spectacles on the *end* of the nose. I use them myself and with reading glasses it gives me a near point of about 3 in. from the glasses and a far point of about 6 in. The magnification is not as high as a watchmaker's glass but is quite useful.

London W10. G. S. FERRABY.

CLUB NEWS

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

NEW TRACK AT OAKLAND ?

BILL BROWER and his track development crew have been hard at work considering improvements to the track of the Golden Gate Live Steamers. In his latest report he maintains that, without making any major alterations, the club could lay a ground level track of 7½ in. gauge with a minimum radius of 40 ft.

By moving the road slightly the radius could be eased to 50 ft. Then again, by crossing the creek at two points a gentler bend of 75 or 80 ft radius would result. This would entail setting the trestles on a curve and the highest would have an apex 20 ft above the ground.

The club, though, may decide, on grounds of economy, to adopt a second plan put forward by Bill—a double straight track with a turntable at each end. But if Bill has his way the Golden Gate will be treated to a scenic track crossing the creek on a curved line of trestles, for the construction of such a project has fired his imagination.

Publicity officer: Ralph McChesney, 7861A Redwood, Oakland, California.

BITS AND PIECES AT LEEDS

The prize for the best exhibit at the bits and pieces meeting held by Leeds SMEE was presented by the treasurer and was an Eclipse automatic centre punch. The cup in the picture was presented by one of the members as a second prize.

The judging was done by ballot, each member having one vote. After members had examined the exhibits, which were numbered, their votes were written on slips of paper and put in a box, the article recording the greatest number of votes being classed as the winner.

Mr F. S. Moore won the prize for his Stuart No 10 cylinder and motionwork, which for a first attempt at model making was very creditable and well deserved the prize. Mr Moore has been a member of the society for a little over a year, having just set up his workshop, and the Stuart No 10 was his first exercise in turning, prior to attempting a locomotive. Mr Moore is a compositor by trade and has had no previous experience of metalwork or lathework.

Mr D. Thompson won the cup with his two examples of woodturning.

Secretary: R. Jeffrey, 84 Burley Lodge Road, Leeds 6.

TIPS FROM NEW BRUNSWICK

Members of Atlantic Live Steamers have been making working leaf springs, and find that the beryllium bronze from discarded diesel horn diaphragms is just what the doctor ordered.

Fred Massey passes on that the stainless steel shells on his pistons (0.050 in. thick) working in bronze cylinders survived about 40 miles of running at our last meet, and this is now regarded as a proven method. The shells were turned from pipe couplings and put over the bronze piston with Easyflo. This method preserves proper expansion.

Secretary: Fred Massey, Rothesay, New Brunswick, Canada.

CLUB DIARY

January 21 Sutton MEC. Lecture by Mr A. Dunn on Workshop practice at the Club House, Chatham Close, Sutton at 8 p.m.

January 21 Hull SME. Jumble Sale at the Trades and Labour Club, Beverley Road, Hull at 7.45 p.m.

January 22 JIE. Paper by Dr. H. L. Haslegrave on developments in Engineering Education, Recently and to Come, at Pepys House, 14 Rochester Row, Westminster, SW1 at 7 p.m.

January 22 Dublin SMEE. Talk by Mr E. Meeham on his Lancashire and Yorkshire Railway Locomotive at 35 Westland Row, Dublin at 7.45 p.m.

January 23 Thames Group Marine Modelling Society. General meeting at the Reindeer Hotel, Greenwich at 7.30 p.m.

January 25 Clyde Shiplovers and Model Makers Society. Lecture by Mr J. D. Gillies on Radio Model Control, and a lecture by Mr A. M. A. Thomson on Today on the River, at the Highlanders' Institute, Elmbank Street. Members only.

January 26 Acton MES. Talk on model power boats, by Mr V. E. Smeed of the Model Maker at 29A Acacia Road, Acton, London W3 at 7.30 p.m.

January 28 Rugby SMEC. Film night at the Percival Guildhouse, at 7.30 p.m.

January 28 Sutton MEC. Practical demonstration on Photographing models by Mr Pugh at the Club House, Chatham Close, Sutton at 8 p.m.

January 28 Hitchin and District MEC. Discussion evening, members are asked to bring models along for discussion, at the Clubroom.

January 29 JIE. Paper on Ceramics at Pepys House, 14, Rochester Row, Westminster SW1, at 7 p.m.

January 30 Women's Engineering Society (London Branch). New Year luncheon at Hope House, 45 Great Peter Street, Westminster, London SW1, at 7 p.m.

January 30 SMEE. Annual meeting at the HQ, 28 Wanless Road, London SE24, at 2.30 p.m. This is also competition day

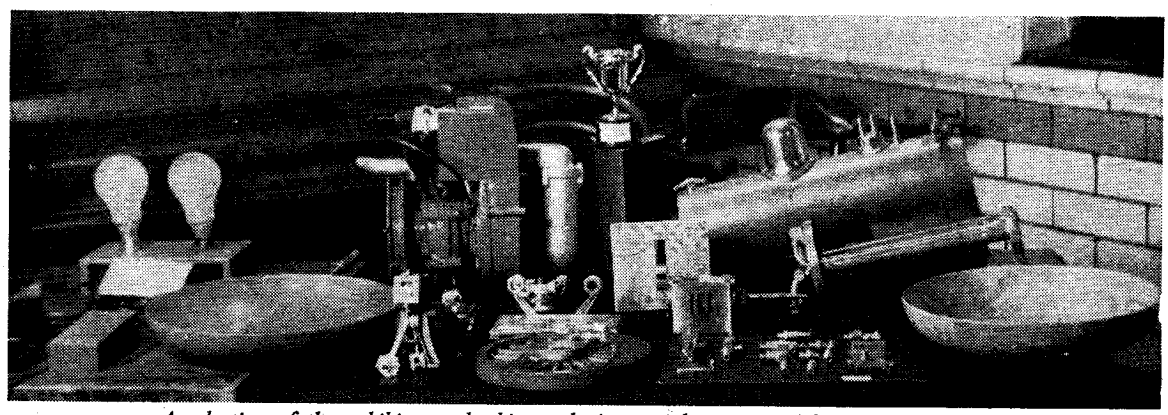
February 4 Sutton MEC. Demonstration by Mr W. Hayward on Bench Work at the Club House, Chatham Close, Surrey, at 8 p.m.

February 4 Hull SME. Lecture by Mr Proud at the Trades and Labour Club, Beverley Road, Hull at 7.45 p.m.

February 5 Warrington and District MES. Lecture by Mr J. Barraclough on Surface Finishes and Fits.

February 5 Dublin SMEE. Talk by Mr E. Tramp on Aluminium Casting at 35 Westland Row, Dublin at 7.45 p.m.

February 10 Women's Engineering Society (London Branch). Lecture by Professor Ball on the Uses of New Metals, at Hope House, 45 Great Peter Street, Westminster, London SW1.



A selection of the exhibits at the bits and pieces night organised by the Leeds SMEE