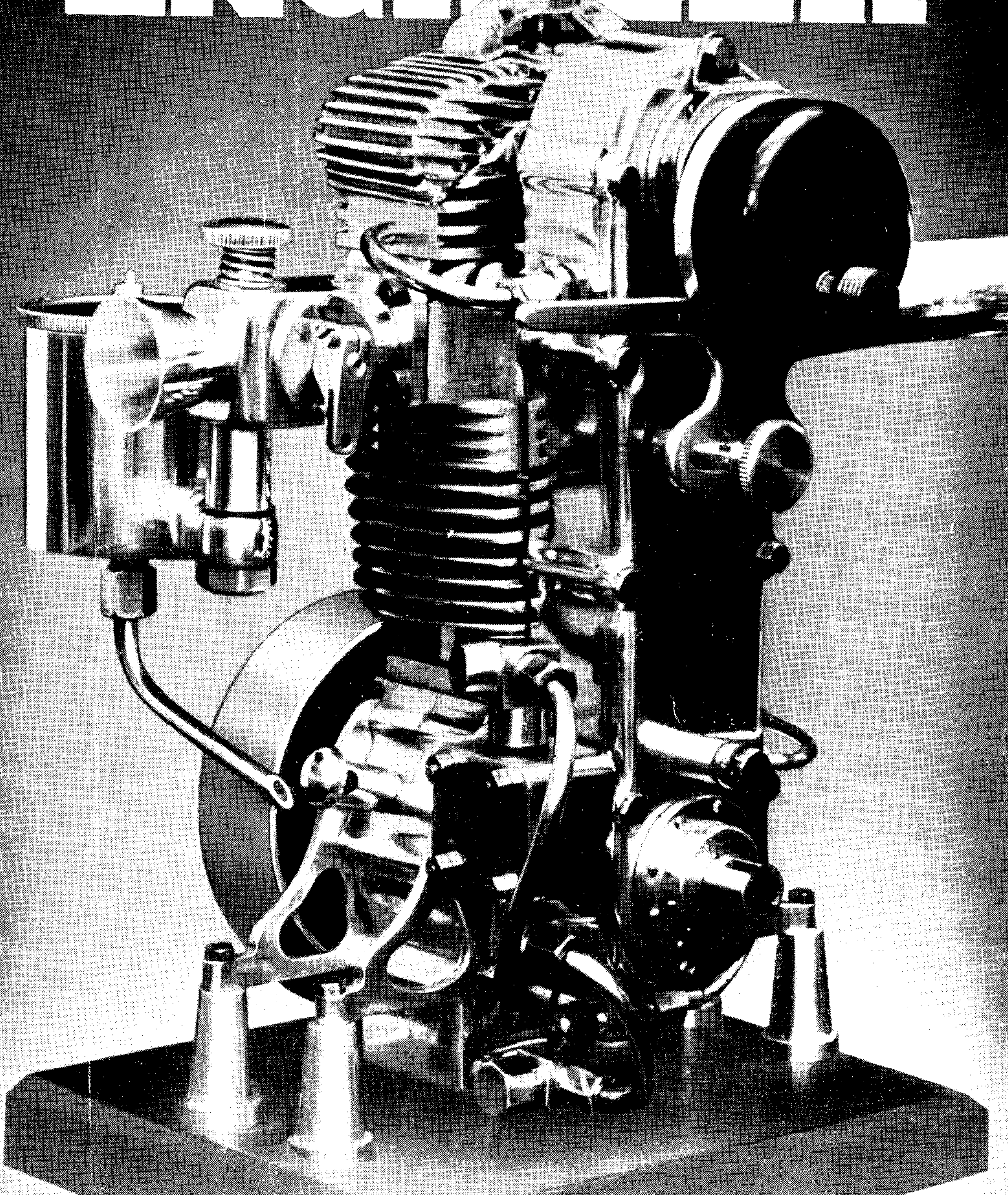
THE MODEL ENGINEER



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The MODEL ENGINEER

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

18TH NOVEMBER 1948 VOL. 99 NO. 2478

SMOKE RINGS

Our Cover Picture

● THIS 30-C.C. petrol engine, constructed by Mr. S. V. Woodford, of Lymington, represents an excellent example of advanced design combined with excellent workmanship and finish. The engine is the overhead-camshaft type, having a totally-enclosed chain drive, and the inclined valves are operated by rockers, also totally enclosed, but readily accessible by detachable finned plates held down by a straddle clamp. An enclosed contact-breaker is fitted to the outer extremity of the camshaft, and forced lubrication is supplied by a worm-gear-driven oil pump. The carburettor is equipped with float feed, a barrel throttle and adjustable needle jet.

This engine was awarded a bronze medal at the 1948 MODEL ENGINEER Exhibition.—E.T.W.

Rugby Locomotive Testing Station

● I WAS privileged to be present at the official opening of the new Locomotive Testing Station at Rugby, on October 19th. It was a very impressive experience, and, during the proceedings, I found myself thinking some thoughts which I believe many readers will share with me. The first thought that occurred to nearly everybody present was one of regret that the late Sir Nigel Gresley himself should not have lived to see the consummation of a scheme for which he had laboured, at first alone, for so many years. However, it was appropriate that the Eastern Region A 4-class locomotive, *Sir Nigel Gresley*, should have been chosen as the first locomotive to demonstrate to our party the working of the apparatus.

Other thoughts which crossed my mind were concerned with many things. I felt that the whol plant must surely be the best of its kind in the world; nothing has been overlooked, and the equipment is capable of making and recording permanently every sort of observation that can be made on a steam locomotive. This clearly suggests that, in the technical world, the days of the steam locomotive are not yet numbered; the ingenuity and financial outlay involved in providing such perfect facilities for the scientific study of locomotive performance would never have been expended upon an expiring contrivance. I feel much good will come of it.—J.N.M.

Bridgwater Calling

● WE HAVE been asked by Mr. R. C. Manning, of 47, Taunton Road, Bridgwater, Somerset, to publish an appeal to readers living in the district to get into touch with him with a view to forming a model engineering society. Mr. Manning has been a model engineer for over fourteen years, and he feels that the formation of a society in the Bridgwater district would be the means of bringing pleasure and assistance to the many lone hands in the neighbourhood.
—P.D.

The Late Mr. J. Willis

● IT WAS with great regret that I received the news that my old friend, Mr. James Willis, of the Dublin Society of Model and Experimental Engineers, had passed away on October 14th. Mr. Willis was one of the most active members of the Dublin Society and was a most prolific and versatile worker, though his main interest was in model power boats. Mr. E. A. Tramp informs me that for very many years, Mr. Willis and himself kept the model power boat interest in the Dublin Society alive, and several years ago Mr. Willis won the Scallan Gold Medal for the first member in the society to exceed 20 m.p.h. with a metre speedboat, this success being repeated several times with a flash-steam boat which was described some years ago in THE MODEL ENGINEER. Other awards won by Mr. Willis in the Dublin Society include the Deighton Cup and the Warren Trophy, and he also won a bronze medal in the 1947 " M.E." Exhibition for a set of dies for casting the " Atom V " engine crankcase. I was very much impressed with the excellent work he turned out with very modest equipment, and no less by his genial and warm-hearted personality. I was the guest of Mr. Willis on the occasion of my visit to Dublin in 1946, and have very happy memories of the hospitality extended by both Mr. and Mrs. Willis during my stay. The Dublin Society of Model and Experimental Engineers will undoubtedly feel the loss of such a prominent member very keenly, but he has left a legacy of splendid service to the society and a fine example to those who follow in his footsteps.—E.T.W.

The late Mr. J. Willis

The Staines Society's Exhibition

● RECENTLY, WITH the support of the Aldeburgh, Hayes, Cranley and Vickers-Armstrong societies, the Staines Society of Model Engineers held their third annual one-day exhibition. Added interest was provided by a display of amateur photography arranged by the Staines Photographic Society, an idea well worth the consideration of other clubs when staging local exhibitions.

A number of " O " gauge locomotives, showing the advance in locomotive building and design, dating from Locomotion No. 1 of the Stockton & Darlington Railway, was shown by Mr. Hasling, and a model of an old pumping engine fitted with a Scotch crank, being run by compressed air, was another exhibit which created a great deal of interest. The addiction of the British public for watching men at work was catered for by a model engineer's workshop where the lathe and other tools were to be seen operating throughout the day. The Society's multi-gauge, portable track was erected in the gardens for the ever-popular live steam passenger hauling. However, misfortune in the shape of a defective water pump overtook this undertaking, but Mr. Pledger of the Vickers Society came quickly to the rescue with his 1 h.p. petrol-driven shunting engine.

Medals were awarded for the entries in the Competition Section selected by the judges as the best in their classes. The " Len Wilson " Memorial Cup, presented to the society by his father, was won by Mr. Quinsee for his " Hielan' Lassie " chassis.

By the close of the exhibition at 9 p.m., 1,300 people had passed through the doors.—P.D.

New Zealand Speed Record Broken

● FROM THE June issue of *The New Zealand Railway Observer*, I learn that the railway speed record for the Dominion has been broken with an attained and sustained speed of 66½ m.p.h. The previous official authenticated speed record was 64.4 m.p.h., recorded behind Baldwin 2-6-2 No. 10, in 1892, hauling a load of not more than 25 tons.

The new record is of a very different calibre, in that the engine was a 32-year-old " Ab " class 4-6-2, with 4-ft. 6-in. coupled wheels and hauling a load of 385 tons ; if the tender be included, the engine was hauling more than 7½ times her own weight. Her cylinders are 17 in. by 26 in., working pressure 180 lb. per sq. in., and her adhesion weight 32.8 tons.

The record speed, which was timed by Mr. T. A. Gavin, Editor of the *N.Z.R.O.*, was attained during a remarkable start-to-stop sprint from Orari to Temuka, a distance of seven-and-a-half miles over a falling grade averaging 1-in-200. The total time for the run was 9 min. 21 sec. ; but in four miles from the start, the speed had risen to well above 60 m.p.h., after which came two miles at 66½ m.p.h. each.

In view of all the circumstances, not forgetting that the gauge is only 3 ft. 6 in., the performance was certainly a most meritorious one which speaks well for the design of the engine. To reach 66 m.p.h. with 4 ft. 6 in. driving wheels demands a good front-end layout, while the narrow-gauge track must be perfect, in view of the size of the rolling-stock.—J.N.M.

The Greywood Miniature Railway

by J. N. Maskelyne, A.I.Loco.E.

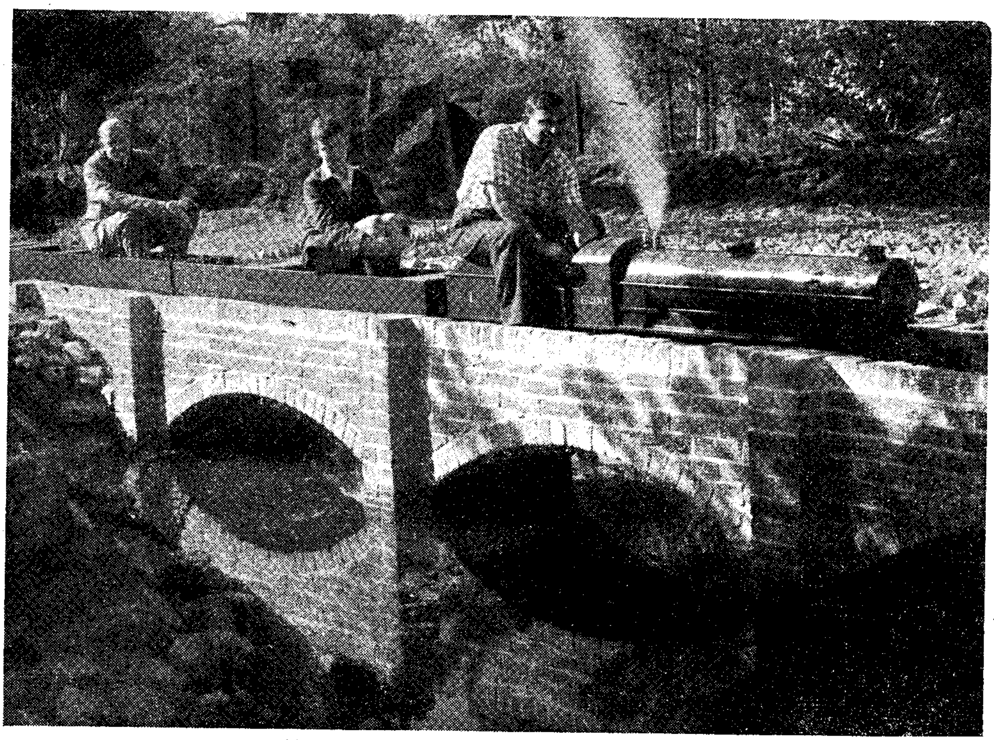
(Photographs by A. G. Edwards)

ONE brilliant Saturday in June last—there *was* one !—I spent a most enjoyable time as the guest of Mr. J. O. C. Samuel at his home near Weybridge. In the extensive and beautiful garden, there is the Greywood Miniature Railway, a 7¼-in. gauge line which is some 400 yards in extent and shaped rather like the letter " q." There are some unusual features on this railway, which I will endeavour to describe in the following notes, aided by the accompanying photographs.

The track, at present, is mostly of steel angle spiked down to timber sleepers and battens embedded in gravel ballast. One part of the straight limb, however, has an experimental length, about 12 yards long, on which the rails are of the light alloy true-section, flat-bottom type introduced last year by Fenlow Products Ltd., of Weybridge.

I was especially interested in this particular length of track, because the idea of such very light material being able to withstand the usage to which it is subjected, on a miniature railway carrying an intensive traffic of live passengers, takes some believing. I examined it carefully, but could not detect any signs of wear, distortion or other troubles to which miniature tracks are liable. I understand that these rails have been so successful that, in due time, Mr. Samuel will re-lay all the rest of his track with them.

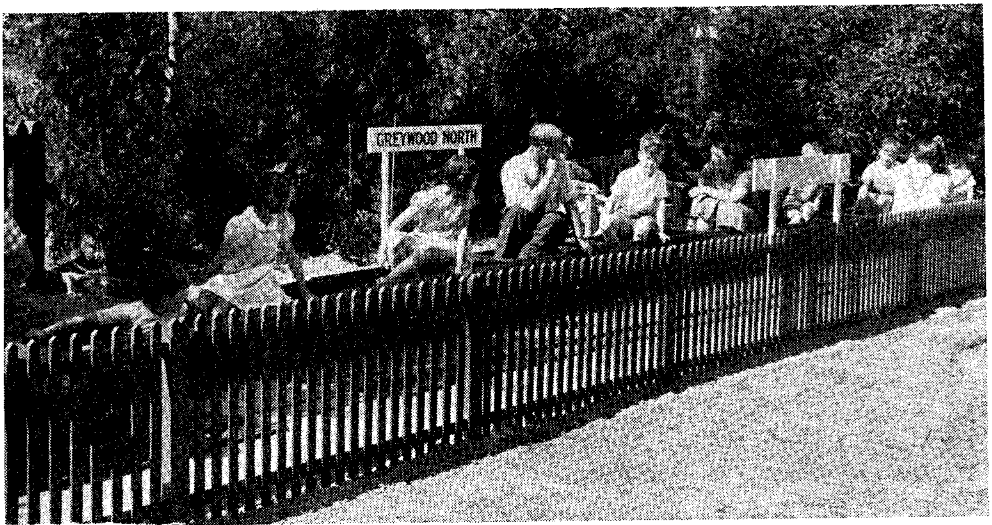
The railway is single-track throughout except at the terminus, which is the only station, at present, and is provided with a turntable and a run-round road. The trains start from here, make a complete circuit of the line and return to the terminus. After each run, the engine is detached from the train, goes on to the turntable, is turned, then runs round the train and is coupled up to the other end, ready for the next trip.



Train crossing the brick bridge over the lake

About 150 yards from the terminus, we come to a single turnout over which the trains can make either a right-hand or left-hand run round the 160-ft. diameter circle, according to the setting of the points. An all-electric signal-box is situated close to these points and controls them as well as the signals on the line. Complete interlocking is not installed, but there is enough to ensure that the points and the signals cannot conflict.

The signal-box is a brick-and-wood structure,

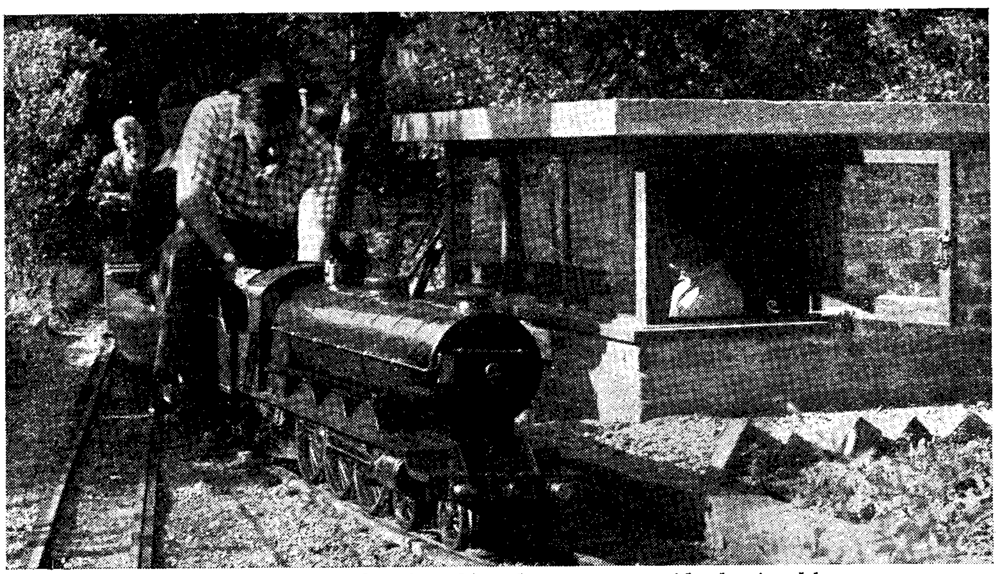


Waiting for the "Right-away" from the terminus

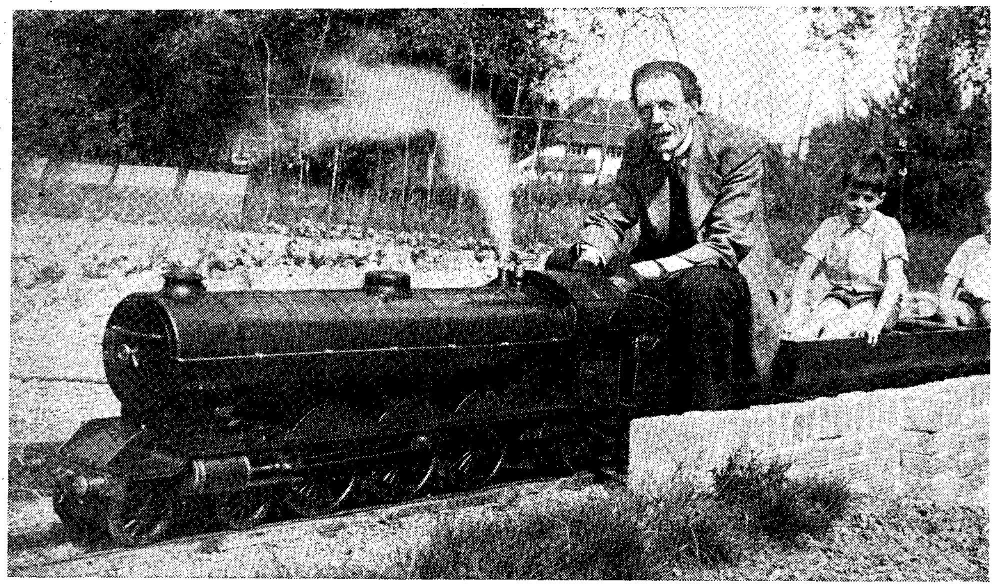
the floor of which is sunk well below the level of the ground so as to enable the signalman to stand normally and comfortably when on duty. The locking-frame consists of a large panel on which are mounted a number of single-throw switches, each numbered and equipped with red and green tell-tale lights which repeat the aspects of the signals, an extra safeguard which is particularly useful when there is more than one train in use.

The signals are of the lower-quadrant semaphore type, the balance-weights of which are attached to the moving cores of electrically-operated solenoids. The closing of the appropriate switch in the signal-box energises the solenoid which moves the arm to the off-position and holds it there ; opening the switch de-energises the solenoid, and the arm returns by gravity to the on-position.

Another major feature of the railway is a handsome red-brick bridge, some 10 yards long, crossing a large ornamental pool in which gorgeous water-lilies grow. And I must not forget to mention the tunnel, which is about 20 ft. long, and passes through a high, grassy, bush-covered bank not far from the terminus.



The 4-6-2 locomotive and train taking the turnout outside the signal-box

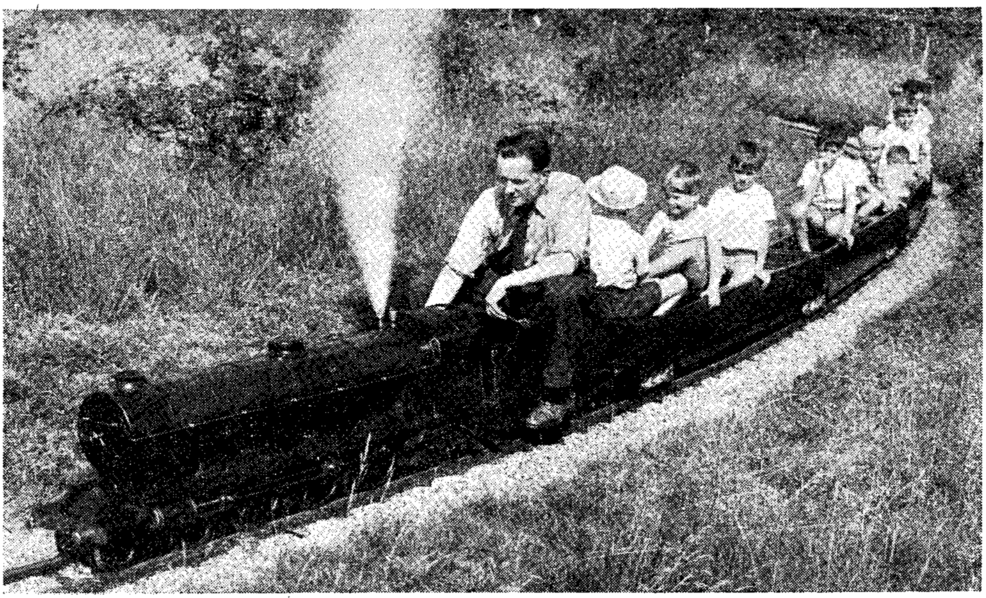


J.N.M. at the throttle

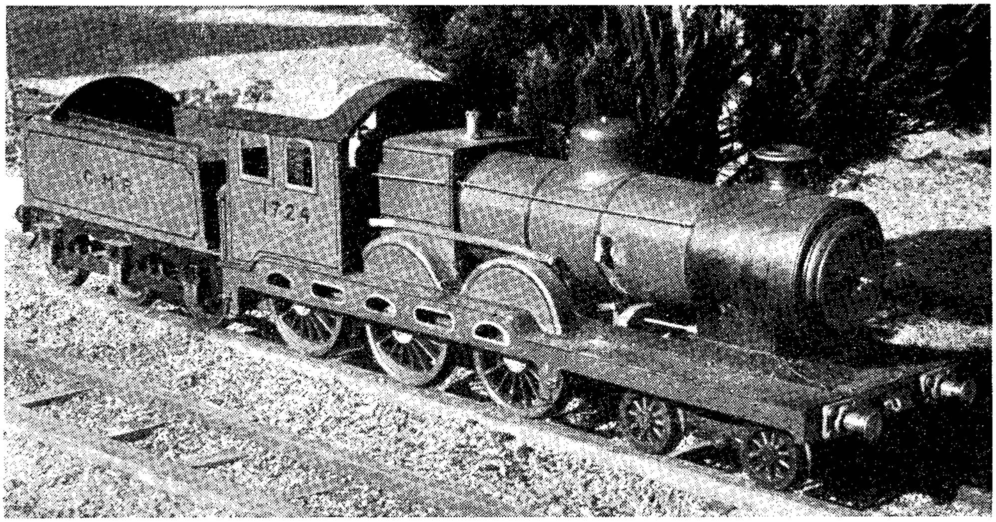
The locomotive stock consists of three engines, the largest and most important of which is a handsome 4-6-2 engine, very obviously designed as a half-size copy of the original Ravenglass and Eskdale Railway Pacifics. She is good to drive, and gave me no trouble whatever; but who built her, and where she ran before she came into the service of the Greywood Miniature Railway, I was unable to ascertain. She is equipped with superheater, snifting-valve, two injectors and all the usual fittings. She has Stephenson link-motion, and runs well when notched up almost to mid-gear.

The second engine, which I have not yet seen in steam, is a curious little 4-6-0 of quite amusing appearance. She seems to be a sort of caricature of the L.N.E.R. "B-12" class; but I am assured that she runs and steams very well.

The third engine is a 1½-in. scale G.N.R. Stirling 8-ft. single engine, which, although it



Rounding the south curve

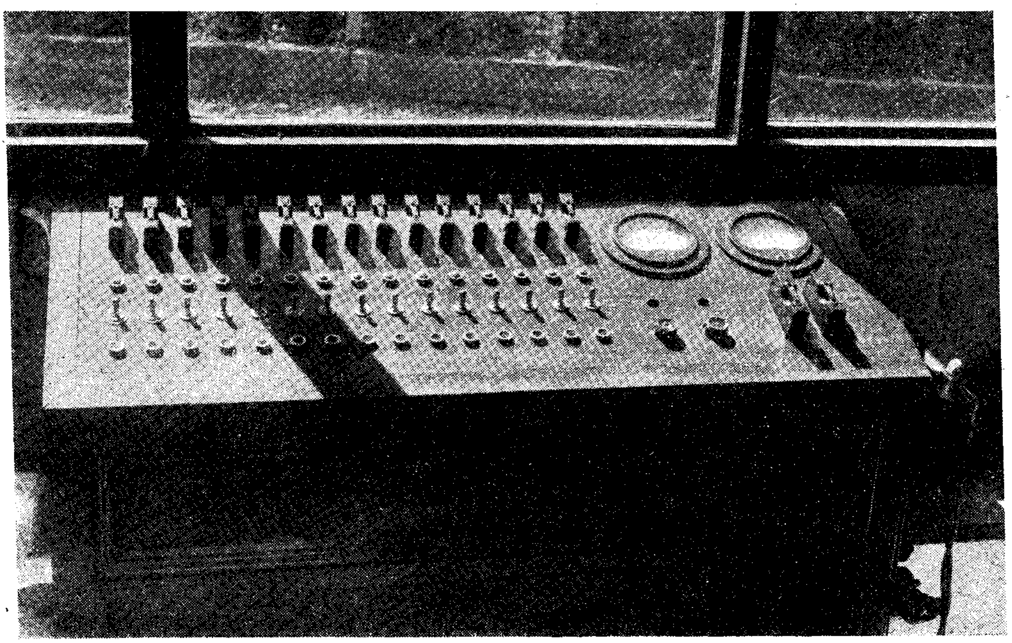


A 7¼-in. gauge 4-6-0 locomotive, very much " after " the Class B12, L.N.E.R.

works well, is not often used, chiefly because she is very tricky to drive and is hardly man enough to deal with the loads usually hauled.

The present train is normally a four-car one made up of two articulated two-car units. These are solidly-built of wood and were constructed in the Greywood workshop. An interesting feature is that the bogie-frames and wheels are duralumin castings and are equipped with ball-bearings. To some extent, these cars are experimental, to ascertain how dural frames and wheels stand up to such use. They run very well and, at the moment, appear to be successful.

Such is the Greywood Railway. Does it spoil the garden? The photographs should supply the straight answer to that question.



Electrical locking-frame in the signal-box

A Quick-change Gearbox

by E. Stephens

THIS gearbox was built to the design of an American engineer, Mr. Robert C. Stevens, of Los Angeles. The original design was for the American " Craftsman " lathe, but it can be adapted to suit other types. It provides for 56 changes of gear, 42 of which are the usual screwcutting pitches ranging from 8 to 112 threads. The other 14 are ultra slow feeds, starting from 0.0029 in.

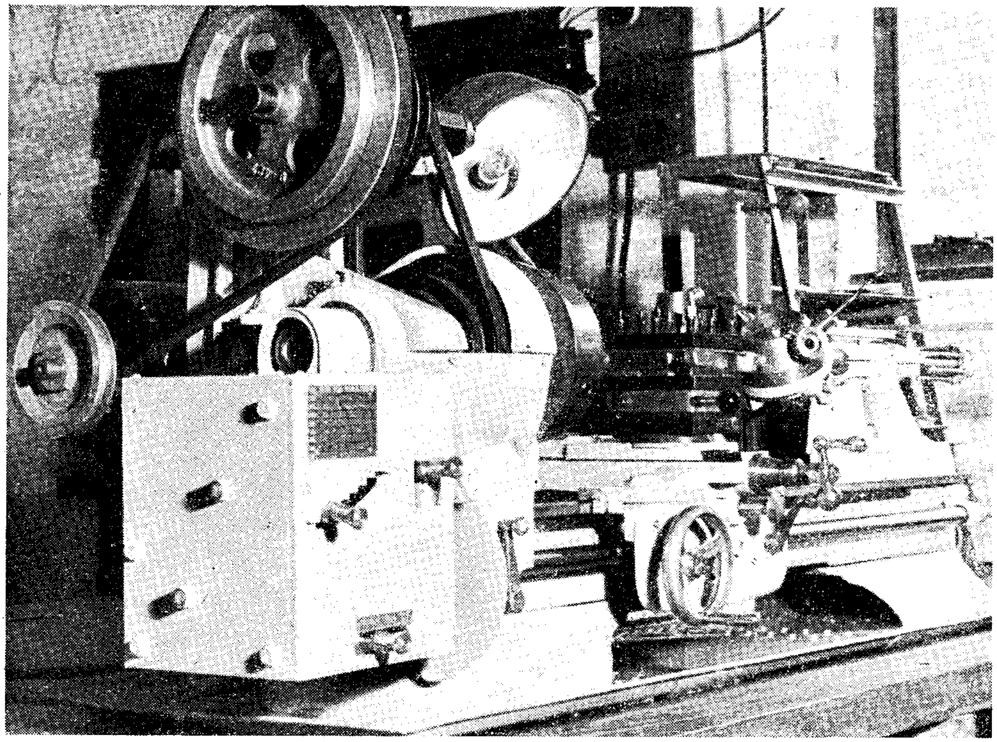
The gear positioning is carried out by the three levers at the front of the box. The lever at the top left is the main gear selector, that on the right engages with the double gear under the lathe mandrel. This lever also has a neutral position, disconnecting the gearbox from the mandrel.

Most of the construction is in ¼-in. sheet dural with stiffeners of ⅝ in. diameter mild-steel bolted between the box sides. One of these stiffeners can be clearly seen in the back view. The gears used, with the exception of four specials, are the original lathe change-wheels plus a few " Atlas " spares. The four specials were cut for me by Messrs. Bond's Ltd.

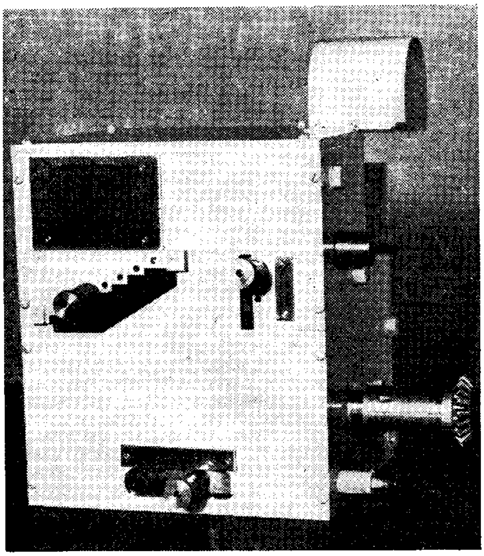
The bevel gear seen projecting from the box in the front view is the left-hand bevel gear out of the " Atlas " reverse gear-case and provides the connection between gearbox and leadscrew.

The only alteration necessary to the lathe was the drilling of two holes in the inner change-gear guard. This was retained in order to have something to which the gearbox could be bolted, and the fixing screws can be seen in the front view. The double gear that engages with the mandrel was taken off its shaft and remounted directly below the mandrel, a new shaft being fitted to the spider to take it. This, by the way, is now the only function of the spider. Two more screws hold the box at the back and the whole assembly is very rigid.

The plates showing the various gear changes are engraved in polished aluminium and are the work of Messrs. Gilkes & Son, the engravers, of Reading.



The 5-in. " Atlas " lathe with the gearbox fitted in position

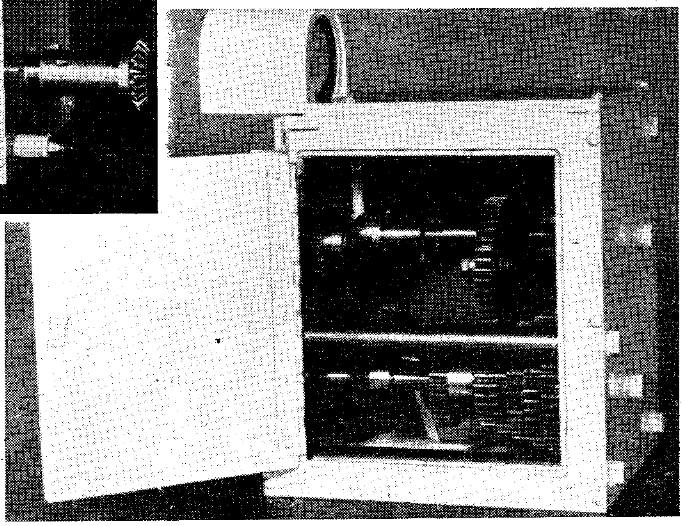


The machine tools used in the construction were the lathe, drilling machine and a small hand shaper. The keyway-cutting was done on the lathe using a milling attachment. All the work was straightforward and no involved machining operations were necessary.

The box can be assembled or taken off the lathe in about 10 minutes. It runs very freely and makes little noise. Adequate provision is made for lubrication, although I regret not having fitted oil-cups to the main bearings during construction.

The photographs were taken by Mr. McCormack, of Garston.

Above—Front of box, showing bevel-gear connection to reverse-case



Right—View of gearbox from the rear

The Southern Federation of Model Engineers

ON a recent Sunday, 230 members of the Southern Federation were entertained to a tour of Eastleigh Locomotive Works by permission of the Southern Region, British Railways. Conducted by ten guides provided by the Eastleigh Society, the party spent a wonderful afternoon touring the various shops in this vast factory, and saw much to interest them. The foundry, iron and brass, pattern shop, coppersmiths, boiler, wheel, machine, brass, erecting, stripping, and finishing shops were all visited in turn. It is hard to pick out any particular branch for special mention, the interest was so varied, but all were anxious to view at close-quarters the now famous " Merchant Navy " and " West Country " Class Pacifics. They were indeed lucky in this respect as there were several under periodical repair and also new ones being built. One chassis completely wheeled, was fitted with inspection lights, and here one " queued up " for knowledge. Young and old, male and female, took the opportunity of examining at close-quarters, the valve-gear, firebox and cab of this monster and came away more than ever impressed by the responsibility of the man who will drive her, and the magnificent workmanship of the men who build her. Not a few bore marks of their enthusiasm and " waste " was in good demand.

Mr. R. Lewis, Secretary of the Eastleigh Society and in charge of the guides, welcomed the Federation and their friends on behalf of British Railways, and invited interested model engineers to visit the workshop of the Eastleigh Society, open for inspection. Mr. Pemble, of Andover, in replying to the speaker, thanked both him and his colleagues for the splendid way in which they had steered such a large party through the programme so well, and he assured Mr. Lewis that everyone had spent a real happy time. He also thanked the Secretaries of Portsmouth, Fareham, Bognor, Isle of Wight, Southampton, Bournemouth, Salisbury, Newbury, and Basingstoke, whose collaboration had contributed much to the success of the day's enjoyment, as did also the caterers who had provided a grand tea.

The Eastleigh workshop was then invaded in no uncertain manner, and it was only with difficulty that the various secretaries could get their parties complete for home.

A Long Job Finished at Last!

by "L.B.S.C."

ONCE again it is "Doris's" turn to "carry on with the show," and once again I have not been able to finish the drawing in time for this week's notes; it is the boiler this time. *Anno Domini* is becoming a bit of a drawback, but it is one of those things that cannot be dodged. All I can do, is to keep going to the best of my ability, and crave the indulgence of the good folk who follow these notes, for any shortcomings. However, there are plenty of other things to write about, and this week I should like to draw your attention to the successful completion of a job that has taken a long time to carry out; but as I mentioned in connection with the "Maid" and the "Minx's" boiler staying, everything comes to an end at last. It is just 31 years since Mr. S. Symons, of Mold, in North Wales, started building his 7¼-in. gauge 4-4-0 "Charlotte Francis." It is entirely his own design, and follows the outline of no particular railway; he said that he just wanted an engine that would do the required job, and be easy and comfortable to drive. Naturally, there are some points about her that wouldn't please our old friend Inspector Meticulous, such as the cab sitting on top of the splashers, the smokebox hinges on the left-hand side of the door, instead of the right (O.K. for a "cackhanded" fireman!) and the small driving wheels; but as the first-mentioned details don't detract from the engine's ability to pull and go, and the latter rather helps the pulling effort, really there isn't anything to start fretting about. She has a couple of nobby little lamps over the front buffer-beam, anyway!

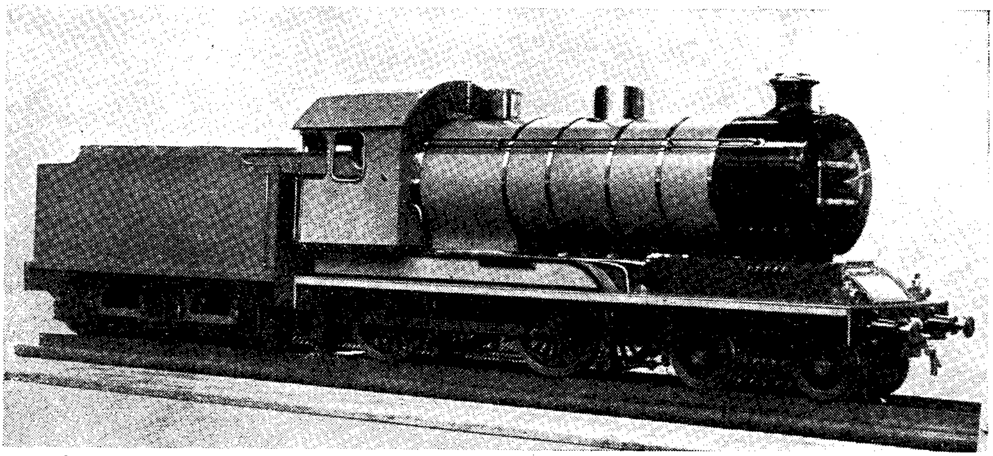


Photo by] [*W. Cull*

Started 1917, *finished* 1948—*a lesson in patience*!

As the general construction of the engine follows the usual practice, there is no need to describe her in full detail. The cylinders are of cast-iron, 2 in. bore and 3 in. stroke, with ordinary flat slide-valves actuated by Joy valve-gear. The coupled wheels are 8½ in. diameter, and as this would equal 5 ft. 8 in. in full size, which would be just right for a four-coupled mixed traffic engine at the time the job was started, I reckon myself they are quite in order; plenty big enough for a full-sized edition on the old Cambrian Railway, anyway. The boiler is a pretty hefty job; Mr. Symons doesn't say what diameter it is, but one can get an idea by comparing it with the wheels. The barrel contains twenty-five ¾-in. tubes, and a five-element superheater. The fittings include a variable blast nozzle, with a four-jet blower fitting attached. There is a steam manifold in the cab, supplying steam to the various backhead fittings, all made to "L.B.S.C." specifications, but enlarged to suit the size of the boiler. Two injectors were made and fitted, as described in these notes, and work perfectly, although the steam-pipes are 22 in. long, and the overflow pipes 9½ in. long; the engine has no pumps, and none are required. The boiler is lagged with spun glass silk, covered by the usual metal cleading, with polished bands; the dome-cover and safety-valve casing are also finished bright. The size of the engine allows the tube-type whistle to be mounted on top of the boiler in the correct position; it resembles a Caledonian hooter.

The bogie is independently sprung, having two springs to each axlebox, also side-control springs, lubrication being attended to by what enginemen call "trimmings," that is, wick feeds. The tender axleboxes are fitted with self-aligning ball-bearings, and has the usual working hand-brake. The total length of the engine and tender is 8 ft.

I don't know whether she will still be there by the time these notes appear in print; but at time of writing, the engine is on view at the Williamson Art Gallery and Museum at Birkenhead, as Mr. George Stratton, A.L.A., who is the Librarian and Curator, invited Mr. Symons to put her on show for a while. However, she is far from being a "museum piece," and it won't be long before she is in active service; Mr. Symons is busy getting his line laid down, and says he has cleared seven trees off the right-of-way already! Congratulations to him on the completion of a real patience-testing job, the longest that has come under my notice; though the engine was built at Mold, she certainly is far from being "moldy." Mr. W. Cull also deserves a word of commendation for his excellent photograph.

Steel Boilers

From time to time I receive letters from beginners asking if steel can be used for small boilers instead of copper, and two such enquiries have come to hand in the past few days. I don't recommend steel for boilers below 7¼-in. gauge as a general rule, because of the tendency of this metal to rust and pit, if the steel is used in its natural state and untreated. I have seen water come out of a steel boiler, quite thick and red with rust; and I once dissected a small steel boiler that had started leaking. The plates, originally ⅛ in. thick, were badly corroded on the inside, and "blisters" had formed all over the interior. Under some of the larger ones, the metal was down to paper thickness. A steel boiler can be used, and will not appreciably deteriorate, if it is galvanised inside and out after being welded or riveted and stayed, and the bushes or thickening plates for the fittings put in. Any firm who makes galvanised water-tanks and the like, would undertake to do the galvanising.

The only way to preserve a steel boiler which has not been treated or proofed, is to keep the interior quite dry when the engine is not in steam; and the best way of doing this, is to fit a big blow-off valve. When finishing a run, shut down with about 30 lb. of steam in the boiler; throw out what is left of the fire, and then open the blow-down valve wide, and blow every drop of water out. The remaining heat in the plates will completely dry the interior of the boiler by the time they have cooled off, and this will be a good insurance against rust, as a dry plate is resistant to rust, whereas a damp or wet one encourages it. Followers of these notes who have outdoor workshops which are not impervious to damp, won't need reminding of that fact. I am never troubled with rust in my own workshop, as it contains our heating boiler and is, therefore, always dry. Our cousins over the big pond, who go in for welded steel boilers, invariably blow them down after a run, and dry them out as above, which is why they don't agree with me that copper boilers are preferable to steel. All my own boilers are copper.

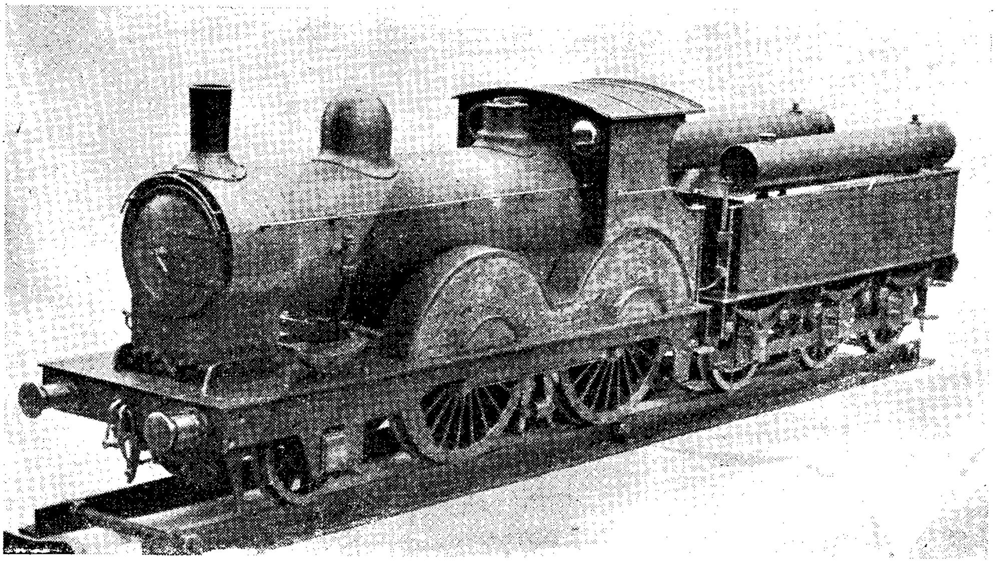
A Flashback to 1874

On the afternoon of Saturday, October 2nd, your humble servant made a happy return to bygone days for an hour or so, because on that day, roughly a year and eight months "behind schedule" (*Anno Domini* again!) my little Brighton single-wheeler made her first run. It was just like one of the British Railways locomotive exchange runs, as I have not yet made the tender, and had to use the black tender belonging to "Jeanie Deans," which looked rather out of place behind a yellow engine. Moreover, "Jeanie" has no pump, only an injector, consequently there is no pump feed-bag nor a by-pass pipe on her tender, so a little jerrywangling was called for. The union for the emergency hand-pump connection on "Grosvenor" lined up all right with the corresponding pipe on "Jeanie's" tender, and I rigged up an improvised feed-bag to connect the injector water-valve on same, with the feed-pipe of "Grosvenor's" crosshead pump. Then I lit the fire, and in less than four minutes, the little spring-balance safety-valves were blowing off merrily and very realistically. I let the engine run slowly for one lap without any load, then took my seat on the flat car, and gave her steam. The little reincarnation moved off without a slip, and rapidly accelerated, so back came the lever next to middle, and the engine settled down to a steady "eighty-odd." Although her firebox door was open, she still blew off, so I put the pump on to check her, using the by-pass valve as a pet-cock, and regulating the water by means of the injector water-valve; rather an unsatisfactory way of doing it, but I had no alternative with the improvised connections. Also, when the water came through and shot out of the end of the by-pass pipe for a few strokes of the pump, it went all over the right-hand rail head, which wasn't exactly favourable to one solitary pair of driving wheels.

"Grosvenor" didn't mind a bit, and just slid over the rails almost as quietly as "Jeanie," but the beats could be distinguished very faintly. In next notch to middle, they were slightly uneven, due to the expansion of the valve spindles under heat. I have had this before; when the ports are only just cracking, and the valves are cutting off at 20 per cent. of the stroke or less, it doesn't need much variation of port opening to throw the engine slightly off beat, and I make the necessary adjustment whilst the engine is hot. She needed some coal at the end of a mile, and a little more after another mile, which would be equivalent to firing big sister about at Redhill, and again at Balcombe. I let her carry on until she had made the equivalent of a non-stop run from London Bridge to Brighton, and then shut down, with just a few live cinders on the firebars, 30 lb. of steam on the gauge, and the water up to the top nut.

Everything worked fine, the only adjustment needed being to the valve-spindles as previously mentioned; and this did not make any appreciable difference to the steady running of the engine. The crosshead pump is well master of the boiler, though the ram is only ⅛ in. diameter ("scale" 2 in.). The only time the firehole door was shut, was for a minute or so after putting fresh coal on the fire. The mechanical lubricator, which only has a 3/32-in. ram, and feeds direct into the steamchest, kept a trace of oil around the chimney top, but no drops were thrown out.

Followers of these notes may recollect that originally I intended to build a D-class tank, and had made some of the components. Then one night I had a very vivid and realistic dream, in which the immortal Billy himself came to my workshop, saw the parts on which I was working, and told me that the next lot would have had many improvements. He explained exactly what these would be, and added some interesting suggestions about improvements to the tender

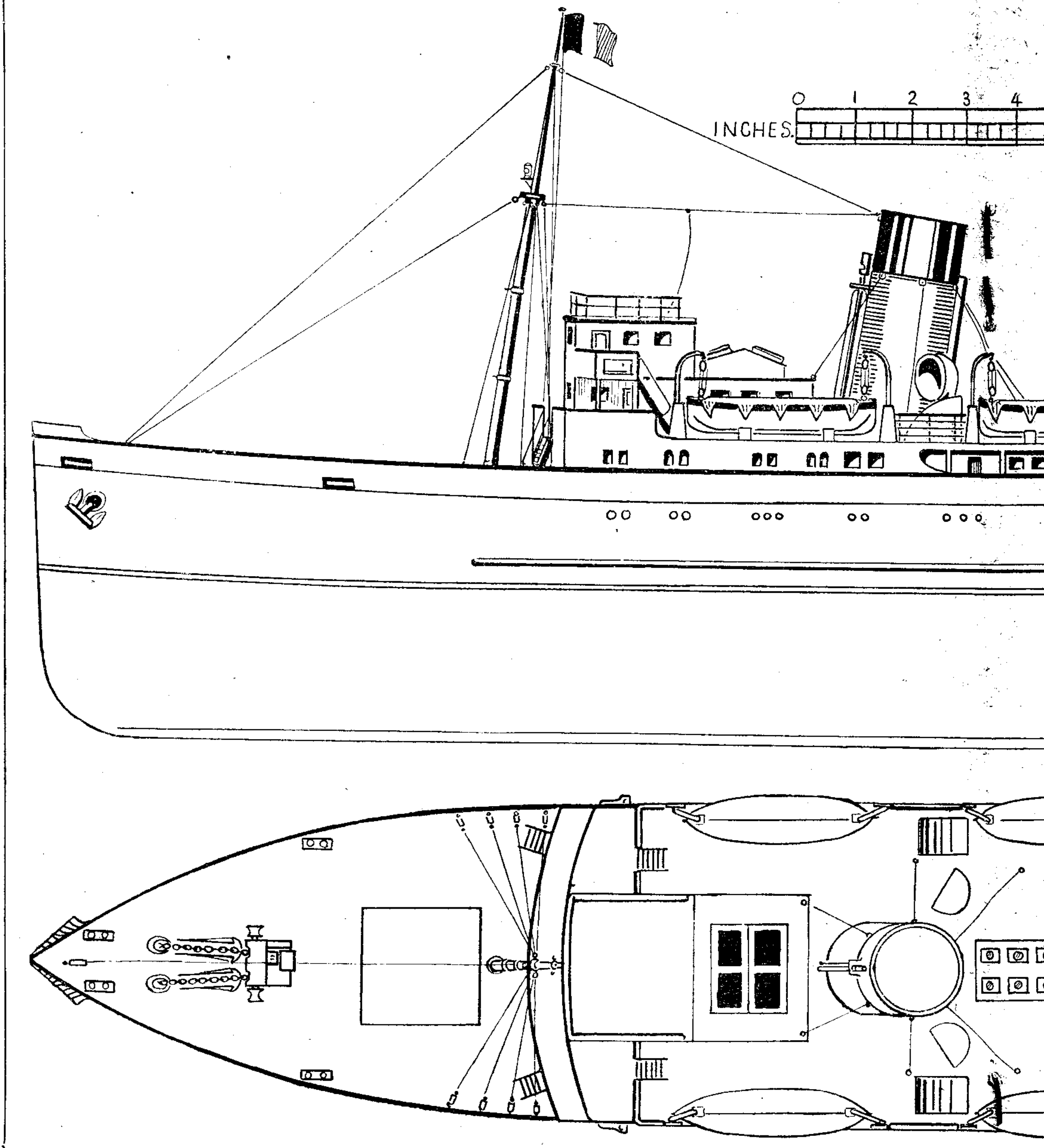


A bit of the old Great Eastern, built by Mr. C. H. Cokayne

engines also. The dream was so vivid, and so realistic, that I not only recollected all that the great engineer told me, but made notes of it next morning for future reference. I decided not to carry on with the tank engine, but to build a $3\frac{1}{2}$-in. gauge reincarnation of old "Grosvenor," Billy's first single-wheeler, and in it to incorporate the improvements that he had told me in the dream. This I have done, so that in effect, the locomotive is a posthumous Stroudley design.

To digress for a minute, the dream was simply explained. That evening I had been talking with an old L.B.S.C.R. friend about Stroudley days, and his engines, and showed him a large photo-reproduction of the old boy, also his personal signature on some shed memos. From early childhood, "last impressions" have frequently continued as realistic dreams—not the fantastic kind, such as when you see a pink elephant with green stripes and a tail made of feathers, trying to climb a ladder bunker first—so it was only natural that I dreamed that night about old Billy. But I've been a bit more puzzled about two incidents, viz., in the dream Billy picked up my valve-gear parts and held them close to his eyes; and he said that in addition to the pumps, I should fit an "inspirator" to feed the boiler when standing, but it should work with hot water. When making my notes the next morning, I frankly confess that I suddenly became scared, and a cold shiver went down my spinal column as I realised that in his lifetime, Billy was short-sighted, and he called an injector an "inspirator." A fearful shock in my young days taught me a lesson I'll never forget. One night at the loco sheds in the supper interval, a tube-boy and two cleaners had been playing "banker" with a miniature pack of cards, and when your humble servant appeared, the tube-boy asked me to tell his fortune. I shuffled the cards, and the boy cut them and turned up the cuts on the seat box; when I read the combination and said "Why, you've only got a fortnight to live," we all laughed and thought no more about it. Ten days after, at one o'clock in the morning, the tube-boy was crossing the coal-road to boil a can of water for his tea in the firebox of the coal crane, when he was caught between two engines and crushed to death. Coincidence, maybe; but that kind of coincidence is unpleasant, to say the least of it. 'Nuff sed!

At the time of writing, I have not a photograph of baby "Grosvenor" in her present state, but hope to offer one soon, with a brief description of her construction and dimensions, as several followers of these notes have requested details with a view to building a similar engine for themselves. Same thing happened with "Jeanie Deans"; there are quite a few under construction at the present time. Suffice it to say that the engine has "scale size" cylinders, but the valves are on top, and bigger in proportion to size than those of big sister, with approximately twice the valve-travel. The link-motion is as in full size, but with eccentrics of greater throw, the die-blocks being attached to the lower ends of two rocking levers pivoted to the motion plate; the upper ends operate the valve spindles. On the full-sized job, the lagging under the boiler barrel was recessed to clear the lifting-arms and lifting-links in back gear. As my boiler is "all boiler," the barrel not being lagged, I could not make the same sharp little recess, so I have followed

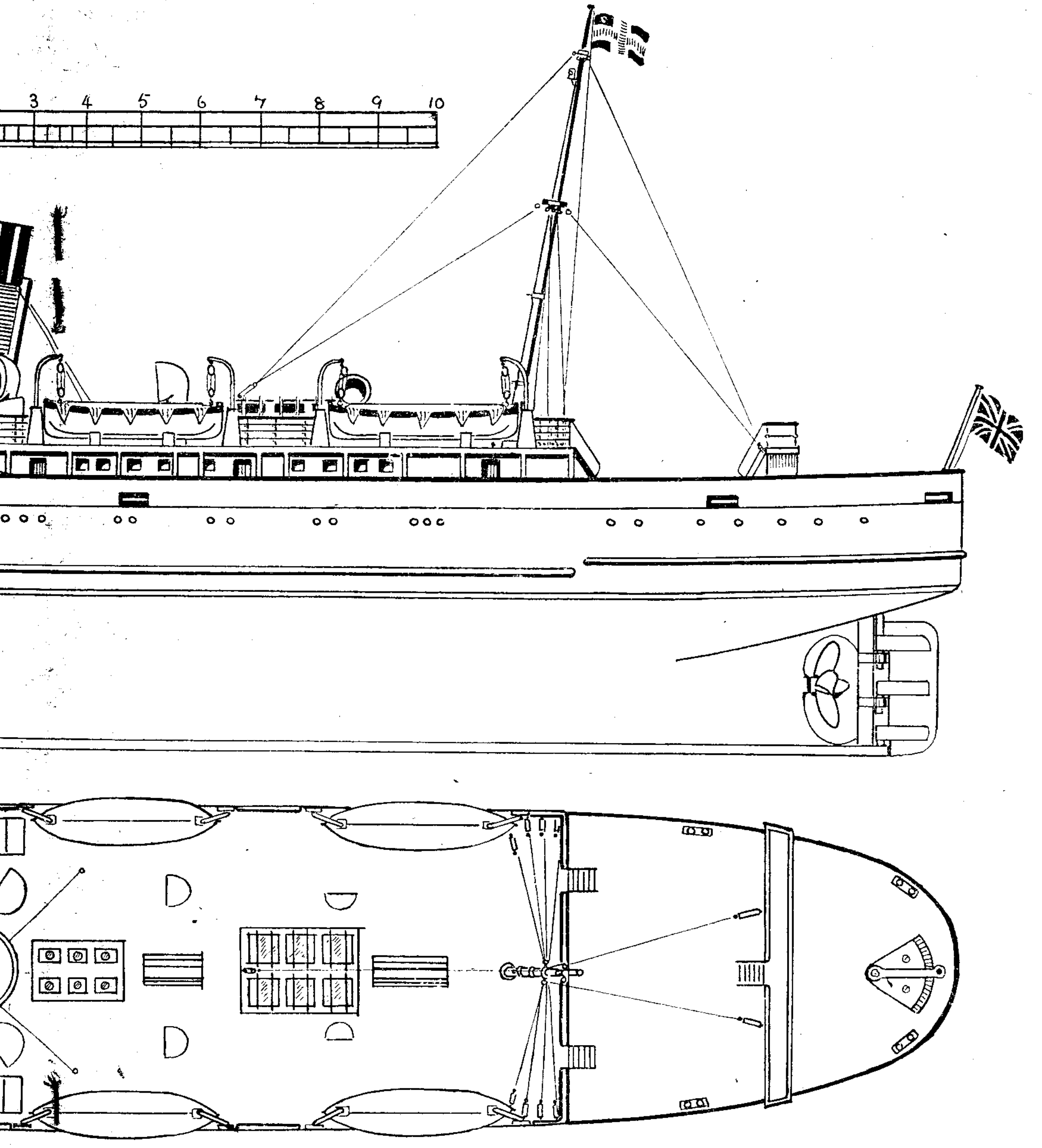


Elevation and deck plan for a scale m

The scale of the model then occupied my attention, bearing in mind the scrap materials at hand, and the limited means at my disposal.

Finally I worked out a scale of $\frac{1}{8}$ in. to 1 ft., giving me a length for the proposed model of about 32 in.

Next, I set about drawing up some plans based on my calculated figures. These plans were of an extremely simple nature, being only sufficient to enable me to get some idea of each item during the course of the building. I then set about adding (1) the approximate measurements of the beam and displacement. (2) What the front of the bridge housing would look like. (3) What a



r a scale model cross-channel steamer

" bird's-eye " view of the main and boat decks might show in the way of fittings. Before I go on to describe the building, I had better make a few remarks on the matter of " fittings." Take for example, the boat davits. I could see them on the photograph, but to determine the type was almost impossible. I could see that there were ventilators of sorts, but here again, the type was questionable. Therefore I decided to construct these items to what I would call a general type.

Now for building, and here I might add, that the whole model, including the steam power unit, was improvised completely from scrap, and I think the whole layout did not cost me more than

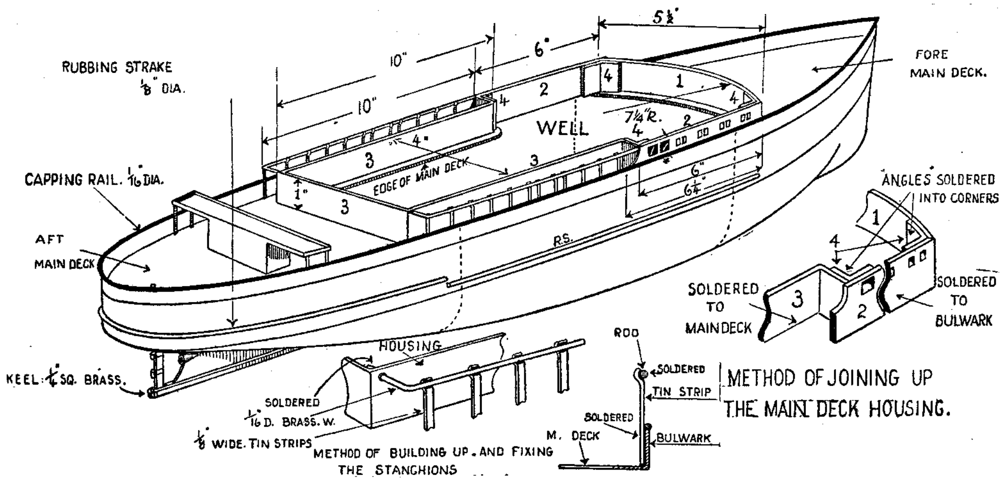


Fig. 1. Sketch of the hull and maindeck housing. The complete boat deck fits over the "well"

four shillings or so, which was used chiefly to purchase some paint and a couple of small brushes.

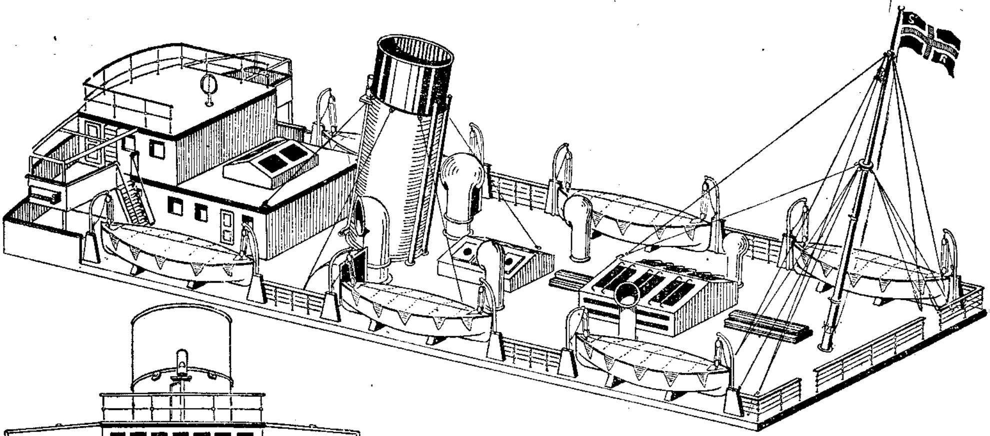
I commenced the actual building at the beginning of 1947, and had not got very far when the "Icelandic" spot of weather started, rendering the workshop almost unusable. To get hold of a pair of shears was like catching hold of the north pole itself! I therefore collected a handful of tools, and a box of scrap, and descended, in a shivering state, upon the kitchen table (much to the "better half's" discomfiture). The result was better than I expected. The whole of the hull was shaped up and soldered, and the decks put into position, before I was able to use the workshop again.

Hull (Fig. 1)

This was formed up in three sections; bow, amidships, and stern. Referring to the drawing, templates of brown paper were cut to the measurements of each section, pasted on to some tin sheet, which was then cut out. Each section was bent up to its required shape, and then butt-soldered together. Strips of tin were cut, well tinned, and sweated over the joints on the inside. The drawing will show where the joints were located.

The Keel

This is a length of 1/4-in. sq. brass rod, and was next fitted. The centre line of the hull, was well tinned over, as was the rod. Then spotting it into



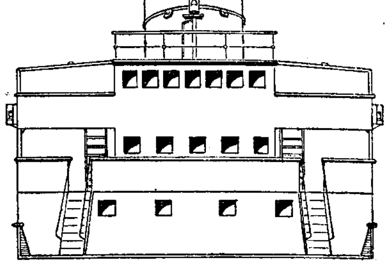


Fig. 2. Sketch showing the layout of the boat deck, and left, for'ard view of bridge housing

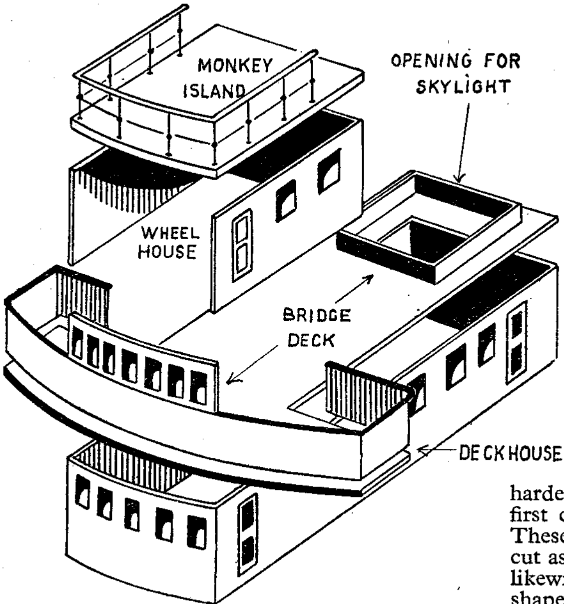


Fig. 3. An exploded view of the bridge housing

position I began the sweating operation with the aid of a big soldering iron. Normally, I would have carried this out with the blow-lamp, but that was hardly an item which could be used in the kitchen.

Next came the fitting of the rubbing strakes, three in number, one port, one starboard, and one around the stern. These were made up from $\frac{1}{8}$ in. diameter wire, and were soldered on in their respective positions.

Fitting of the Maindeck

Here again, the drawing will show its character. Briefly, two portions were cut to templates, bow and stern. These were soldered into position $\frac{1}{2}$ in. below the line of the hull, to allow for bulwarks. Next, the promenade housing "walls," which were fashioned from strips of tin, were soldered on. The upright supporting stanchions were cut from $\frac{1}{8}$ in. width tin strips, each one being separately soldered to the inside of the bulwarks. A capping rail of $\frac{1}{16}$-in. wire was soldered edge on to the bulwarks. This consisted of one continuous piece, which was bent to the shape of the "bulwark" line, the joining up taking place at the bow. Apart from the docking bridge, which was attended to later, the last two items were the hawse pipes, and the under-water stern fittings. In the former case, holes were drilled, and fitted with $\frac{3}{16}$-in. diameter copper tubing. In the latter case the stern tube was a piece of $\frac{1}{4}$-in. diameter brass, which was "bushed" at both ends, and drilled to take a shaft of $\frac{1}{8}$-in. diameter silver steel. The stern post was fashioned from a piece of tin, in accordance with the template. The holes for the rudder tube were drilled, and fitted with a length of $\frac{1}{8}$-in. diameter brass tube.

Boat Deck and Bridge Housing (Fig. 2 and 3)

The drawing will give a fair indication of the construction and layout. One or two points will need explaining as follows: First, with the exception of the deck cabin, boiler room, and engine room skylights, which have open ports to provide ventilation, all the doors and windows were painted on. Secondly, the complete assembly is so constructed as to fit over the open well in the hull, and is held in position with four clips. The necessary stays, which extend from this deck to their respective positions on the masts, are held in position with small hooks which are easily detachable, when it is necessary to lift off the deck. The two main ventilators, actually serve their purpose, but the others are dummies. The soldering of the bridge housing, provided me, I think, with one of the hardest job of the lot. The "deck" portion was first cut out, then the charthouse with its roof. These were first soldered up. Then the bulwark, cut as shown, was bent around to the shape and likewise soldered. The deckhouse was then shaped up and soldered to the deck. But joining the upper house to the lower was the ticklish item. After manipulating a couple of small soldering irons until they looked like twisted candlesticks, I was able to wangle my way into the odd corners.

General Fittings

Taking first the handrails (Fig. 4), I made up a special jig for this job, to take one long section of "rail," which was afterwards sheared off in lengths to suit their respective positions. The

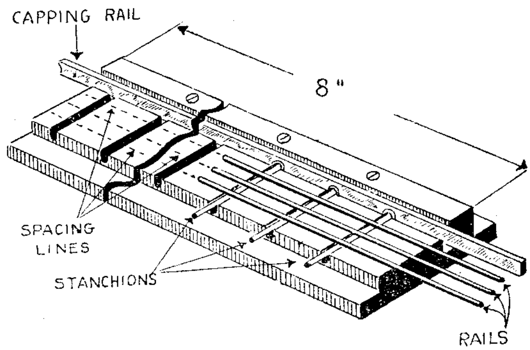


Fig. 4. Hardwood jig for setting-up handrails

capping rail had to be flat, but having nothing ready made to suit the purpose, I had to beat out some $\frac{1}{16}$-in. diameter copper wire, afterwards filing off smooth. The stanchions were fashioned from $\frac{3}{4}$-in. thin panel pins, and the railings, from thin copper wire of about 32 gauge. Holes were drilled into the deck to correspond with the stanchions, which were set in accordingly and soldered.

(To be continued)

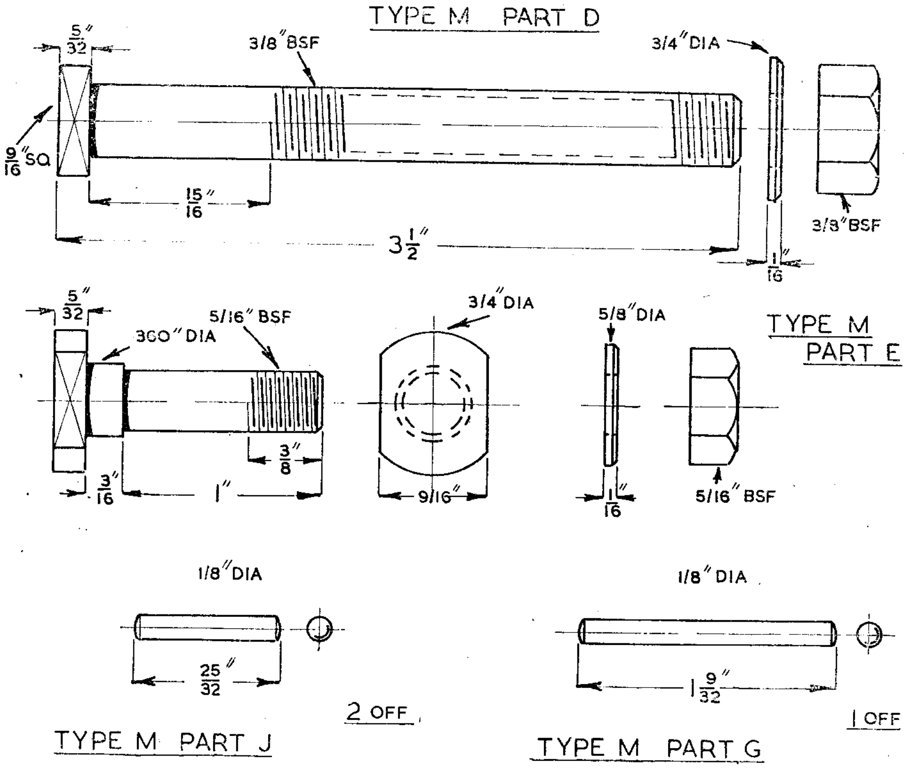
IN THE WORKSHOP

by "Duplex"

*24—A Two-tool Back Tool-post

CONTINUING with the sequence of operations.

(11) Stand the casting on the surface-plate and adjust it on a packing-piece with the aid of a square so that the underside of the base stands upright. Set the scriber of the surface-gauge to the centre marked on the upper surface of the pillar and scribe a line across the under surface of the base.



To mark-out the centre-line of the short fixing-bolts, reset the scriber to the distance above the previous centre-line as shown in the working drawings of either the M or D pattern base. Mark-out the centre-line of the base register-pins in the same way.

(12) Turn the casting on its side and, as before, adjust the base to stand at right-angles to the surface-plate. Set the scriber point to the centre mark on the upper surface of the pillar and scribe the horizontal centre-line along the base.

Lightly punch-mark the intersections of the vertical and horizontal centre-lines, and from these points mark-out the centres of the fixing-bolts and register-pins with the dividers, in accordance with the dimensions given in the drawings for either the M or D type base.

(13) Grip the casting in the machine-vice, base uppermost, and drill the register-pin holes with a No. 31 drill for a depth of $\frac{1}{2}$ in. in the D type and right through the base in the M type.

Note. In the case of the D type base the dimension given on the drawing for the centres of the fixing bolt holes, as measured from the column centre-line, is incorrect. This dimension should read $1\frac{3}{16}$ in. and *not* $1\frac{1}{16}$ in. as shown.

Drill the fixing-bolt hole or holes with a $\frac{3}{16}$-in. diameter drill.

With a $\frac{5}{8}$-in. diameter pin drill, having a $\frac{3}{16}$-in. diameter guide peg, spot-face the upper surface of the base to form seatings for the washers of the fixing-bolts. If a pin drill is not available, the casting can be clamped to the lathe faceplate and the seatings faced with a boring tool, or, as an alternative method, the whole bolting surface can be faced flat when the casting is mounted in

*Continued from page 485, "M.E.," November 4, 1948

the chuck for operation (10). The bolt holes are then drilled out to 11/32 in., and any burrs formed are removed from the under surface of the base with a scraper.

Lastly, centre-drill the centre mark on the upper surface of the pillar.

(14) To mark-out the overall height on the base casting, the scriber of the surface gauge is set to the height shown in the drawing ; that is to say, when the upper edge of the tool slot lies, as it should, ¼ in. above the lathe centre height, the scriber is set equal to the lathe centre height, X, measured from the surface of the cross-slide, less the distance Y.

The distance X was found to be $2\frac{1}{16}$ in. in the M.L.7 lathe and $2\frac{3}{16}$ in. in the Drummond-type Myford lathe.

A line is then scribed at this height on all four sides of the base pillar to act as the machining dimension line.

(15) For the next operation the casting is mounted in the four-jaw chuck as in (10), and the centre-drill mark is centred as illustrated in (4). In the M type a central hole 25/64 in. in diameter is drilled right through the casting for the passage of the long fixing bolt, but should there be any difficulty in drilling this hole straight, it should be bored to the finished diameter as illustrated in (6). In the D-type base the tapping size hole to receive the central stud is drilled with a 21/64-in. diameter drill to a depth of ¾ in. beyond the height dimension line scribed on the pillar. The upper end of the pillar is next faced down to the scribed height dimension line.

The drill hole is then bored out to form an accurate fit for the register spigot of the turret

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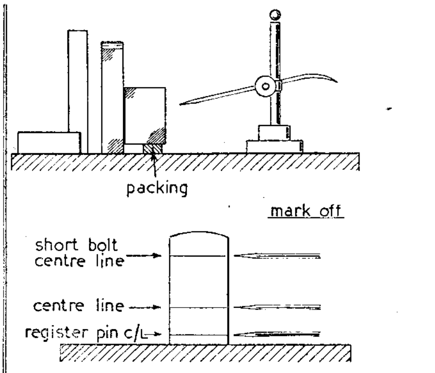

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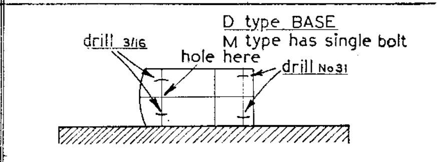

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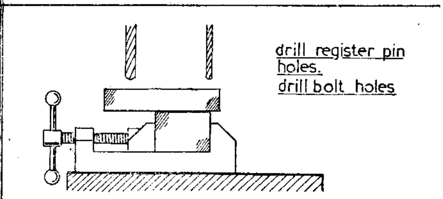

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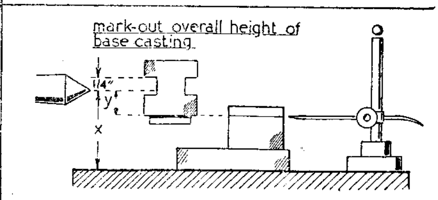

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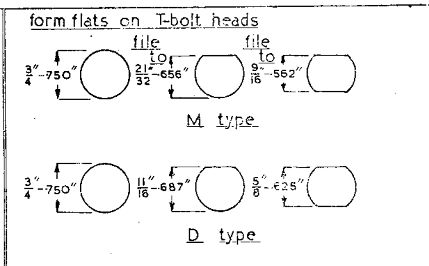
mount casting in four jaw chuck. see 10
centre casting. see 4.
drill central hole. see 6.
open out hole to form turret register spigot seating.

16



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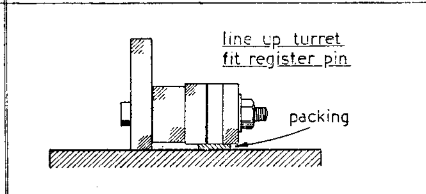

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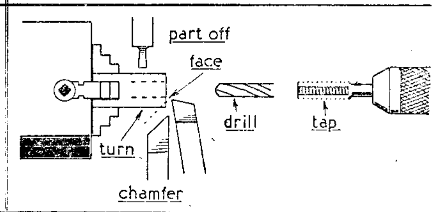

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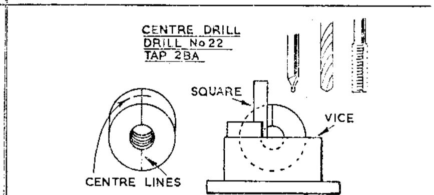

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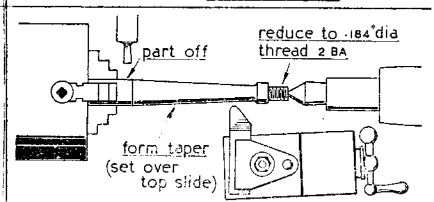
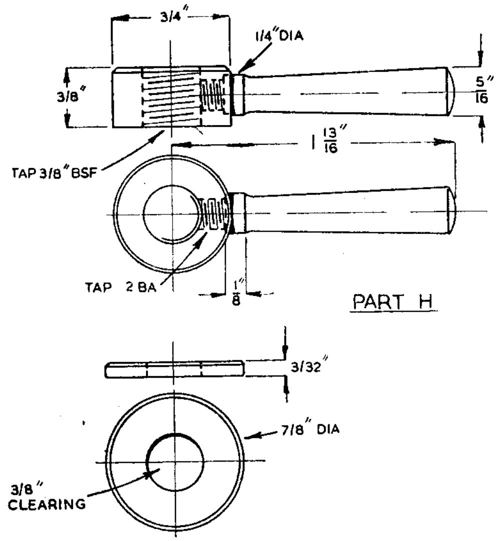




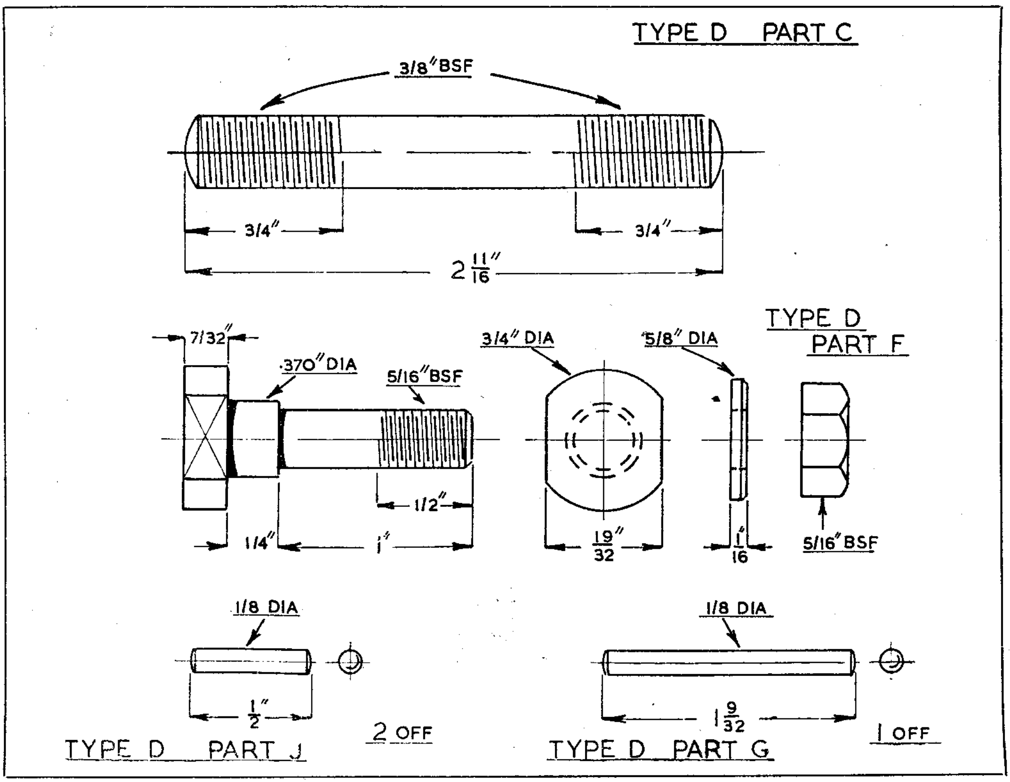
and to the depth shown in the drawings of the two types of base. The drill hole in the D-type base is threaded $\frac{3}{8}$ in. × 20 t.p.i., and to ensure that the tap enters squarely it may be started in the hole while supported in the tailstock drill chuck.

The central stud (C) is made in accordance with the drawing and is then firmly screwed in place.

For the M-type base the long central bolt (D) is turned in the lathe from a length of $\frac{3}{4}$-in. diameter round mild-steel, and its shank is threaded $\frac{3}{8}$ in. × 20 t.p.i. to receive the lower securing and upper clamping nuts. At the same time, the single fixing bolt (E) for the M-type base can be machined, or in the case of the D-type base two bolts (F) will be required.

(16) As will be seen these T-bolts have flats formed on their heads to engage the T-slots in the cross-slide. It is important for accurate fitting that these flats should be equidistant from the shank of the bolt; this is best ensured by working to micrometer measurements, as illustrated in the drawing, when filing the heads to shape.

(17) To fit the register-pins used to locate the turret at its two stations, the turret is clamped in place on the pillar with a $\frac{3}{8}$-in. B.S.F. nut and then adjusted to lie evenly on a packing-strip while resting on the surface-plate. After the nut has been securely tightened, the assembly is transferred to the drilling machine where a No. 31 drill, entered in the hole previously drilled in the turret, is fed into the pillar to a depth of $\frac{1}{2}$ in. The turret is then turned through an angle of 180 deg. and reset on the surface-plate to bring the second tool slot into position for drilling its register hole in the pillar.



In the same way, a third hole is drilled in the pillar at right-angles to these two holes so that the turret can, if required, be clamped with its tools turned to the side in order to afford greater working space.

The register pin (G), made from a length of silver-steel, is fitted to the turret after the hole to receive it has been opened out from below with an $\frac{1}{8}$-in. reamer to afford a light press fit.

The three holes in the pillar are then carefully enlarged with the reamer until the pin fixed in the turret enters freely but without shake. The two register pins (J) are fitted in the base in the same way with the aid of the reamer.

(18) The clamping nut (H) is faced, turned and chamfered ; it is then drilled 21/64 in. and also tapped from the tailstock with the tap supported in the drill chuck.

After it has been parted off, the nut can be faced on its underside by mounting it on a stub of screwed rod held in the chuck.

At this operation the tool is fed across the work to scribe a light centre-line on its face, and this line is then continued along the edge of the nut in a similar manner.

(19) A centre-punch mark is made at the centre of the line scribed on the edge of the nut. The nut is then clamped in the machine vice with the cross-centre line set vertically with the aid of a square. After the punch mark has been enlarged with a centre drill, a No. 22 drill is fed in to meet the bore, and the drill hole is opened out at its mouth to $\frac{1}{4}$ in. diameter to accommodate the shoulder turned on the handle. Finally, the hole is tapped 2-B.A.

(20) The handle is formed from a length of $\frac{5}{16}$-in. diameter steel rod. After the end of the rod has been reduced in diameter to 0.184 in. and threaded 2-B.A. with the aid of the tailstock die-holder, the tapered portion is turned with the top slide set over for about 1 deg. When the handle has been parted off to length, it should be lightly gripped by the threaded portion in the chuck of the drilling machine and then finished with a fine file and emery-cloth.

To afford a rigid fixing, the handle is screwed firmly in place with the shouldered portion engaging the recess formed in the nut.

Finishing

The turret can be left in its machined state, or, if preferred, its exposed surfaces can be finished by filing with a fine file to remove the tool marks.

An easier method of producing a pleasing finish is to ply the scraper with diagonally crossing cuts until a uniform frosted appearance is obtained.

Surplus metal where the base overhangs the cross-slide can be removed with the hacksaw. The edges of the base should be given a good finish by draw-filing with a fine file and then smoothing the surfaces with a strip of oiled emery-cloth backed by a file.

To give a good appearance, the unmachined surfaces should be painted, preferably with a cellulose paint, as this does not stain with oil.

Note : The drawing of Part A on page 482 shows a No. 31 hole to be drilled " on assembly." This hole should, of course, be drilled in Operation 2, as described in the text.

Also, in the drawing of Operation 2 on page 483, the position of the tool clamp screws is shown incorrectly. The $\frac{1}{8}$ in. and $\frac{3}{16}$ in. dimensions should be transposed so as to agree with the drawing of Part A.

For the Bookshelf

Small A.C. Transformers, by A. H. Avery. (London : Percival Marshall & Co. Ltd.) Price 3s. od. net.

This is a revised edition of a popular handbook originally published in 1932, and it deals in a comprehensive manner with the design and construction of small transformers of a type and size useful to the amateur experimenter. Consideration of the technical theory of transformer design is omitted, since it is beyond the scope of a practical handbook such as this one ; but every stage in the construction and assembly of the components of a small transformer is lucidly described and illustrated, and cnly the purely essential mathematical calculations are included. It is a thoroughly worthy little book.

The Beginner's Guide to the Lathe, by the late Percival Marshall. (London : Percival Marshall & Co. Ltd.) Revised edition. Price 3s. 6d. net.

One of the most useful and popular of the " Model Engineer " handbooks, this new edition has come at a time when, more than ever before, instruction in the elements of using a lathe is much in demand. The contents have been revised and brought up to date by Mr. Edgar T. Westbury who has done his work well. The modifications in no way affect the general style of the original book, but consist chiefly of new illustrations and some amplification of the text to bring it into line with modern developments in the simpler types of lathes. The book remains, essentially and literally, a " Beginner's Guide."

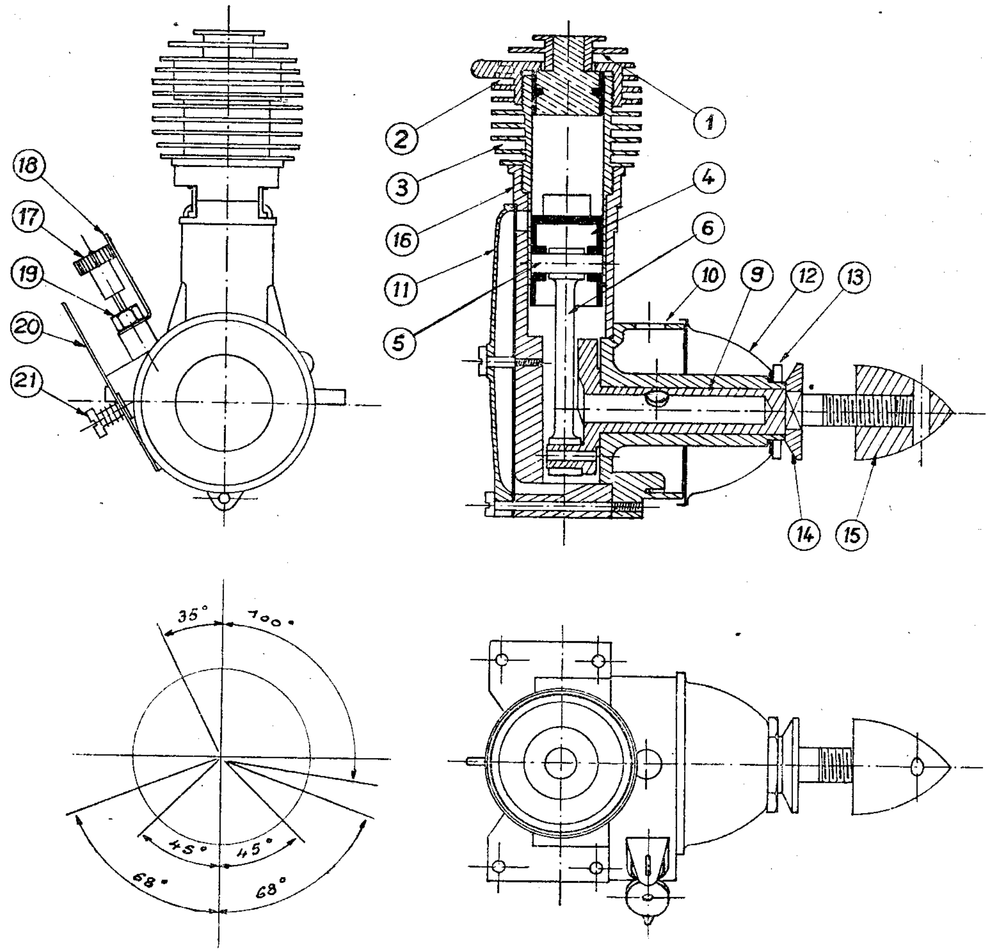
Trigonometry Made Plain, by G. P. Rawlings, O.B.E., M.A. (Oxon.). (London : Percival Marshall & Co. Ltd.) Revised and enlarged. Price 7s. 6d. net.

To students, as well as to many professional engineers and craftsmen, this book is invaluable. The author's style of writing, so supremely different from what is commonly associated with text-books, ensures that the reader is kept thoroughly entertained and amused while being instructed ; at the same time, real knowledge of an essentially technical subject is most successfully passed on. Tables of logarithms, antilogarithms, sines, cosines and tangents, as well as the answers to all exercises set in the text, are included.

A Racing Compression-Ignition Engine

by G. M. Suzor

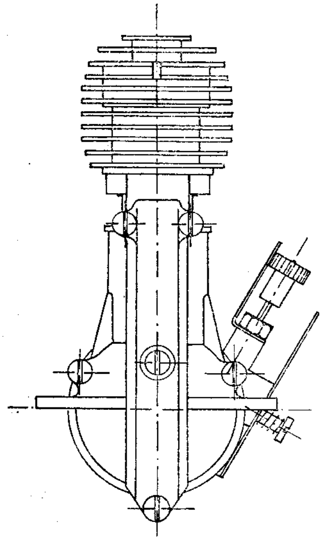
THE coming of the Swiss "Dyno" engine, which was the first model compression-ignition engine on the European market, naturally attracted me towards this new principle of functioning, the apparent advantages of which could not pass unnoticed by anyone. These advantages are principally the ability to work without any special firing device, so that such engines are, on this account, lighter than their normal firing opponents, especially in the small cylinder capacities. A few enthusiasts have been positive that these c.i. engines start more easily than the other engines, but this is not correct. However, these engines seem to be unable to reach a high r.p.m., and this defect grows as the cylinder capacity is increased. It is thus that a normal 5-c.c. c.i. engine is no more powerful than a 5-c.c. normal ignition engine, and that higher than 5-c.c., the c.i. are definitely weaker; for instance, a normal 10-c.c. can reach 20,000 r.p.m. and even more, whereas in actual fact, a 10-c.c. c.i. engine is quite incapable of doing this. Therefore, it is wise to consider this type of engine only in a lower cylinder capacity than 5-c.c., and make the best of it.



Elevation, plan and sectional elevation of a $\frac{9}{16}$ in. bore by $\frac{3}{4}$ in. stroke C.I. engine

Most of the constructors have been hypnotised by mysterious and complicated fuel mixtures and have thought that in this way they would improve their speed possibilities. Unfortunately, they are running in a close circle, because if there are "hot" fuels such as ether and "cold" fuels such as alcohol, they both need different compression ratio to ignite. It follows that the more one dispenses with hot fuel, the more it becomes necessary to give a higher compression ratio to start. If one admits that it is already difficult enough to get the necessary precision workmanship to obtain the 14-1 compression ratio needed with ether fuel, one will easily notice the great difficulty to reach 20 or 25-1 with less hot fuels.

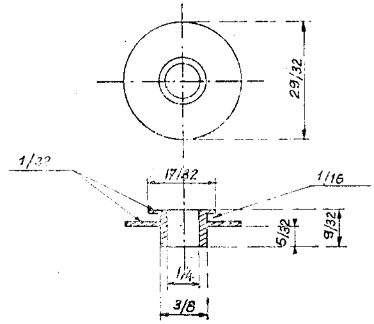
On this subject, my point of view about the "reason why" is as follows: When one starts a c.i. engine, it is cold, and therefore needs a higher compression ratio than theoretically necessary, as the cylinder walls are cold and



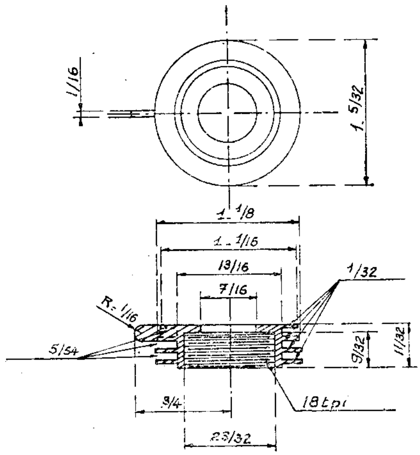
absorb a part of the heat produced by that compression. Supposing that one started at 18-1 instead of 14-1 (which is insufficient), the engine would start and become rapidly hotter. From that moment, it will usually be noticed that if the compression ratio is diminished to, say, 14-1 the engine will go on running satisfactorily. If, on the contrary, the compression is augmented, one will find the r.p.m. increasing, and it will rapidly reach a maximum impossible to exceed. This maximum will usually coincide with a peculiar noise—the engine undergoes an excessive ignition advance, which is then not only provoked by the compression ratio, but also by the heat of the cylinder walls and head. If one operates on the compression device, it is much more difficult to change the cylinder temperature.

The conclusion of all this is that one loses the ignition control, and to maintain it as far as possible, it would be necessary to keep the cylinder walls and the head as cold as possible (colder than for a normal ignition engine). Funnily enough, the cylinder heads of all c.i. engines fitted with variable compression devices, are represented by a true counter-piston, which is entirely enclosed, has no contact whatever with the exterior and cannot be cooled, with the result that this counter-piston presents an unfavourable "hot spot."

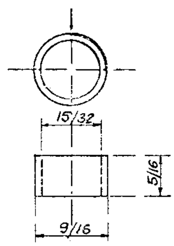
In view of this condition, I have designed a small engine which is absolutely different from the others. Its aspect is compact to the extent that: The fuel tank is part of the crankcase, the needle valve is very handy and is far enough from the propeller so as not to injure the fingers, and it carries an "anti-flooding" device constituted by the transfer passage down to the bottom of the crankcase. This device is very efficient



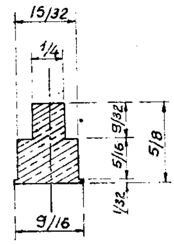
Part 1. *Light alloy (casting)*



Part 2. *Light alloy (casting)*

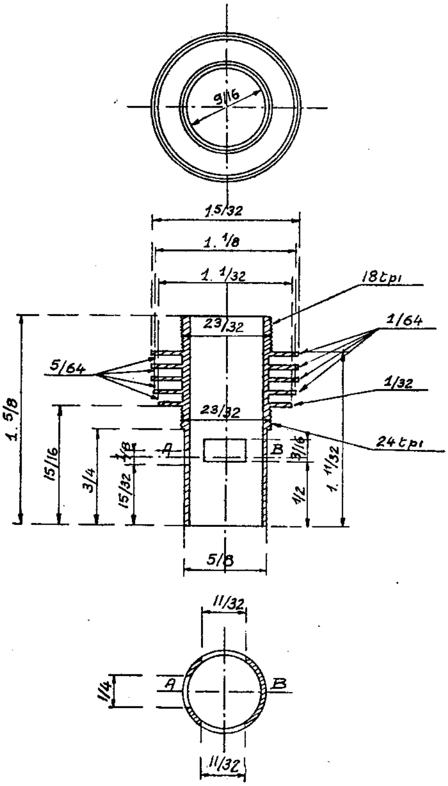


Part 2. *Casting.*

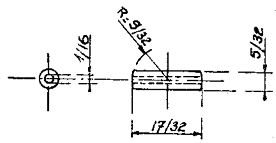


Part 2. *Light alloy*

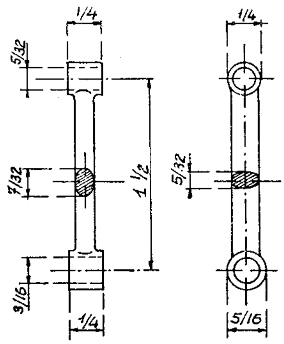
and empties the crankcase instantaneously. This contributes largely to its easy starting ability, but I did not hesitate to stop the engine by means of a shutter (20), which stops the engine by flooding it. On account of this particular device, the engine can work properly only in a vertical position. I might add that, having inverted an



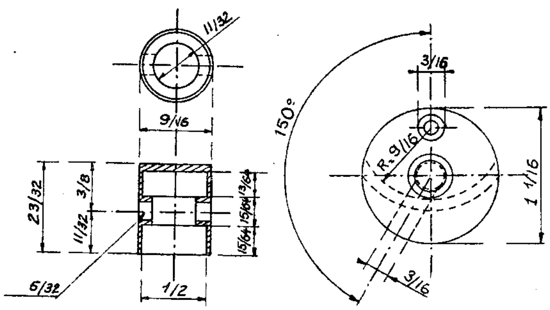
Part 3. Steel



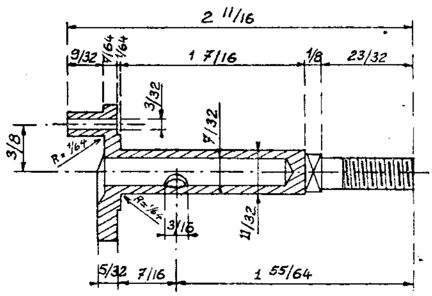
Part 5. Bronze



Part 6. Special light alloy



Part 4. Cast-iron



Part 9. Steel

engine, one encounters such starting troubles that I was always against this method of procedure. Finally, the cylinder-head (2) carries a plain counter-piston extended to the exterior, to achieve better cooling.

To build this engine easily, it is evident that the best solution is to cast all the parts of the crankcase, but if one has not this opportunity, it is, of course, always possible, though more difficult, to machine these parts from the solid. In this case, the best metals are : duralumin or aluminium alloys of the "Y" or "RR" type. The crankcase is made from five pieces, namely, the transfer-passage (11), the main body (16), the crankcase cover and carburettor (10), the tank shell (12), and the fixing nut (13). The piece (11) is easy to make ; it need only be perfectly surfaced. Piece (16) is a little more difficult, principally on the threaded part which will receive the screwed cylinder. Precision is needed in the making of the transfer port, so that it will coincide exactly with that of the cylinder itself. Most difficulty is experienced with piece (10) as it carries the carburettor body and acts as a bearing for the crankshaft ; this carburettor is, in fact, plunged into the fuel tank and works mainly with a submerged jet. This principle avoids the necessity for a fuel pipe, with its attendant troubles.

(To be continued)

Editor's Correspondence

Floating Cutters

DEAR SIR,—With reference to Mr. R. T. A. Brown's remarks in the September 23rd issue, on the "Floating Cutter," which I described some time previously, may I say that I fully endorse his views, and the only apology I have to offer in neglecting to warn the worker against using the cutter in a sand-holed or ported cylinder, was that I was taking it for granted he would have the sense not to use it thus. Without offering any contradiction to Mr. Brown's advice regarding rake on the top of tool, may I say that I have done countless numbers of bores using the cutters with no rake, the top being perfectly flat. To those interested, may I say that if I want a specially good job I use two cutters, with not more than three "thous." between them, the second and larger one going through dead slow, with a preliminary smear of oil on the bore.

The method I use of sizing the cutter is to hold the axis of the cutter truly in line with the micrometer.

Yours faithfully,
Glasgow. R. JOHNSTON.

Machine Tool Tests

DEAR SIR,—The article by "Duplex" in THE MODEL ENGINEER for September 30th, is of considerable interest to one who is both a model engineer and a supplier of small machinery for a number of different trades, and in all fairness to the manufacturers who are endeavouring to cater for the amateur, I would like to make a few observations.

When manufacturing machinery for commercial purposes, price is usually the last consideration, the sole criterion being the ability of the machine to perform its desired functions over a period of time without undue maintenance. The model engineer is, however, nearly always limited in the price he can pay, and this limit is reflected in the accuracy and finish of any production offered only to him. In support of this contention, I would remind readers that many of the pre-war suppliers of machinery for the amateur, such as Messrs. Drummond Bros., Henry Milnes, Tom Senior, Exe Engineering Co., who all enjoyed a well-deserved reputation for high-class work, have found it expedient to drop this type of manufacture as soon as other conditions permitted.

Further, the excellent methods advocated by "Duplex" for the construction of the "M.E." drilling machine (which I agree could hardly be improved upon) would, if adopted by a manufacturer, result in the machine being retailed at somewhere between £12 and £15. Would any model engineer pay this price for a ¼-in. capacity lever-feed drill?

Regarding accuracy in a drilling-machine, I would assert that the squareness of the machine spindle to the table to within an error of 0.001 in. in 1 in. is as close as the user requires, since I have not yet found the twist-drill which will penetrate as truly as this, and for more accurate results, I prefer a boring operation in the lathe.

Aluminium alloys for such components as machine tables and other parts where rigidity and hardness are required are, of course, useless, and no reputable maker would countenance their use. They are not to be despised, however, for lightly loaded parts such as jockey-pulleys. After all, our i.c. engine friends use this type of material with success for pistons, which take a bearing on the cylinder wall and provide another for the gudgeon-pin. Is "Duplex" confusing this material with die-castings in zinc-base alloy? Components of this nature should not find a place in any but the cheapest machines, since the material has nothing to recommend it except ease of production.

Finally, I would summarise by remarking that the manufacturer who wishes to supply the model engineer must strike a mean between price and quality. This must not be taken as an excuse for marketing rubbish, but the fact remains that no market exists amongst the amateurs for plant of the quality of that shown at the recent Machine Tool Exhibition. In addition, no comparison can be drawn between the products of a manufacturer who is bound by a price limit, and that of a skilled model engineer to whom time occupied in construction is of no importance.

Yours faithfully,
"SIMPLEX."

S.M.M.L.A. Locomotive Competition

DEAR SIR,—It is good to see from "Smoke Rings" that attempts are being made to tackle the question of locomotive efficiency on a scientific basis. I do feel, however, that the suggested formula, like that used by the South London Society, has serious faults.

The best way to illustrate the weakness is to consider two locomotives, A and B, which are similar in design, size, boiler pressure, workmanship, etc., but differing in the diameter of their driving wheels. Let us assume that locomotive A has driving wheels twice the diameter of locomotive B. Now if each puts up an equal performance, locomotive A will cover twice the distance but haul half the load of locomotive B, a statement with which few would disagree. But if we apply the suggested formula, locomotive B will receive only half the points which its rival would get, due to the fact that its theoretical tractive effort would be twice as great.

The Eccles and District Model Engineering Society has, in efficiency tests held at its continuous track, used the formula :—

$$\frac{L \times D}{C} + \frac{L \times D}{W}$$

where L = load in pounds.
D = distance covered in feet.
C = coal used in oz.
W = water used in oz.

For haulage tests, the figure obtained from multiplying the load by the distance should be divided by $d^2 \times s \times p$. Where d = diameter of cylinder, s = stroke of piston, and p = boiler pressure.

Yours faithfully,
Eccles W. J. THOMPSON.