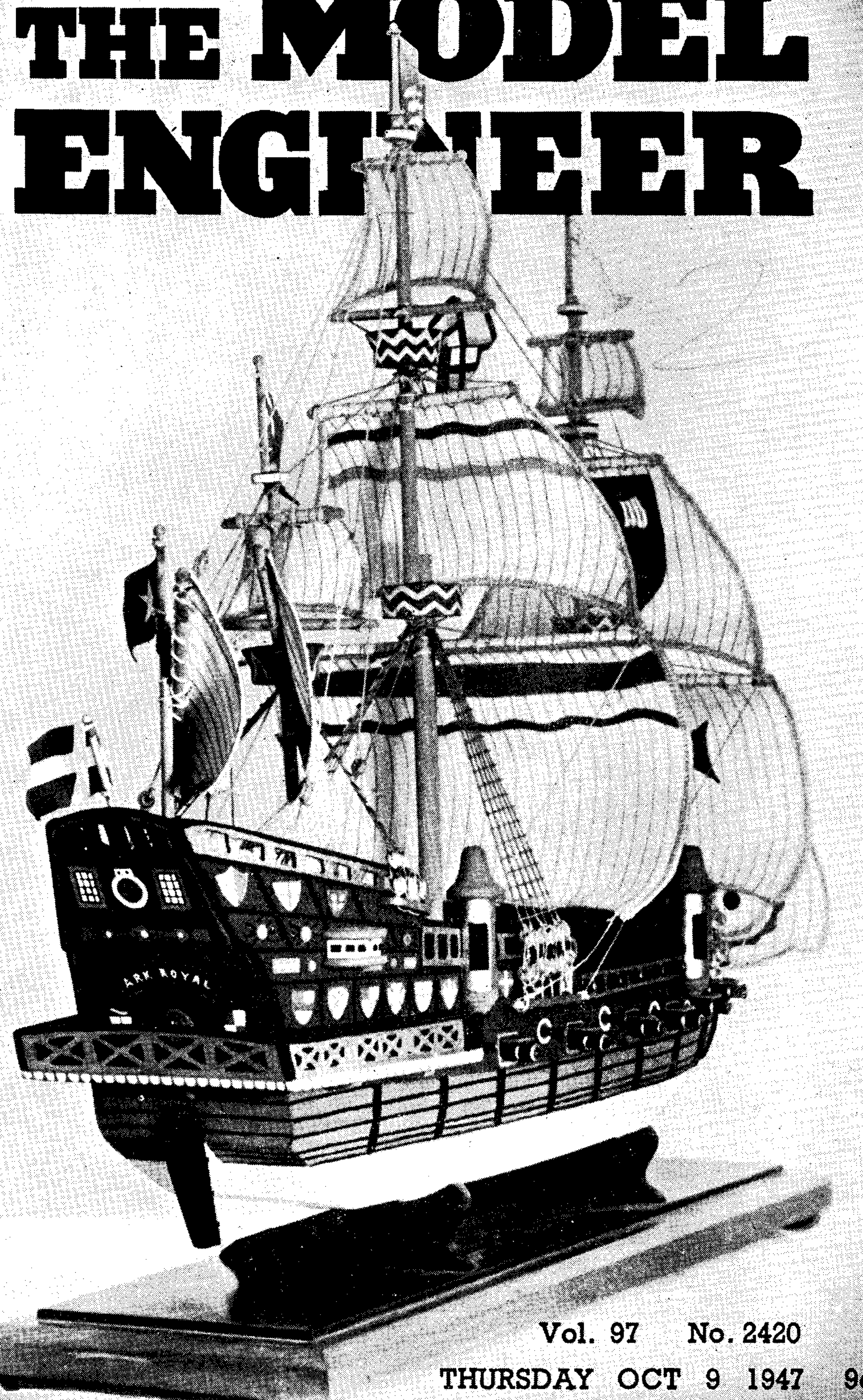
THE MODEL ENGINEER



Vol. 97 No. 2420

THURSDAY OCT 9 1947 9d.

The MODEL ENGINEER

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

9TH OCTOBER 1947 VOL. 97. NO. 2420

Smoke Rings	387
A Model Cargo-passenger Liner "Penang"	389
I.C. Engines at the Exhibition ..	392
Ship Models at "The Show" ..	396
For the Bookshelf	399
Proposed Design for a Small Gas Turbine	400
The "Bulle" Type Electric Clock ..	403
The Heat Pump	406
"Hielan' Lassie"—Accessories ..	407
A Simple Buffing Spindle	410
Editor's Correspondence	411
Club Announcements	413

SMOKE RINGS

Our Cover Picture

● THE ILLUSTRATION this week represents a departure from our usual policy of encouraging accuracy in modelling. In connection with ship modelling we invariably stress the importance of careful research before commencing work on the actual model. In the case of a galleon, especially when the model represents a vessel of 1600 or earlier, little or no research work is possible. All that one can do is to study maps and seals of the period and contemporary oil paintings such as may be found in the National Maritime Museum or at Hampton Court. The ships in these are mostly very disproportionate and they invariably over-emphasise the pictorial and decorative aspect. But for the person who is looking for an ornament or decoration to brighten up a room and to introduce a breath of the outside world, a model galleon offers great possibilities. Such a model is the subject of our illustration. The critic could pick out numerous errors and faults but as a decoration it is bright and cheerful and pleasing to the eye. Further, there is no doubt but that it gave many hours of interesting occupation to its builder. Most probably he will be led to take a greater interest in ship models, and as his powers of observation develop and his knowledge of ships extends, he will produce better models and may one day reach the prize-winning class in some future MODEL ENGINEER Exhibition. Herein lies the value of the various designs and kits which one sees offered on all hands. They arouse the interest and help the would-be model-maker over the initial difficulties. Even the kits themselves are graded, and, as the modeller progresses from the simpler to the more complex, he receives a course of education and training which, if followed out, will enable him ultimately to build the perfect model. The model shown on the cover was built by Mr. W. George of Bedford and exhibited at the recent "M.E." Exhibition. The photograph was taken by Mr. M. B. Craine.

Model-Maker Wanted

● STILL FURTHER to improve the contents of THE MODEL ENGINEER we have decided to re-establish THE MODEL ENGINEER Experimental Workshop which was discontinued during the war. We propose using this workshop for experimental work and the production of prototypes to the designs developed by our technical editors so that step-by-step descriptions of the building of these models based on actual workshop experience can be published in THE MODEL ENGINEER. Much of this work our editors have been obliged to carry out in their own home workshops, but of late, the call upon their time has become so urgent that it is now necessary to take steps to relieve them of most of the actual machining and other operations involved. For this reason we are seeking to engage the services of a young man who has a natural aptitude for model-making, preferably with a bias in the direction of machining and metal work generally. The applicant selected for the post would work under the personal supervision of Mr. E. T. Westbury and it would be an excellent opportunity for a young man, wishing to extend his knowledge of design and miniature engineering, to achieve his objective. To comply with the requirements of the Ministry of Labour, only applicants who have not yet reached the age of 18, or those still on demobilisation leave from the forces, can be considered for this vacancy. Applications giving the information necessary should be addressed to The Production Manager at the offices of THE MODEL ENGINEER, 23, Great Queen Street, London, W.C.2.

A Working Model Gas Turbine

● WE PRESENT this week a design for a working model of a small gas turbine from an Australian reader. A successful gas turbine has been the subject of much speculation and experiment among engineers for some years past, but certain practical difficulties have obstructed progress, among them being the need of a metal to withstand the abnormally high temperatures involved. Our contributor does not claim to have achieved final success, but he has given much intelligent thought to the problem and we think that many of our readers will be interested in his design. There is a fascinating field here for the model engineer who is attracted by experimental work, and we hope that our contributor will be able to go a stage further and try out his design with an actual model. Constructive criticism of his design will be welcome, as well as any news of experiments carried out by other readers in the same field. This is a real opportunity for model engineers to contribute to engineering progress.

Railwaymen's Models at Swindon

● THERE ARE a number of models of various kinds made by railwaymen at the G.W.R. Arts and Crafts Exhibition, at Swindon, now being held until October 11th. Entries have come from all parts of the G.W.R. system. A section of the show is devoted to working models, and I hear that one model-maker who has a special display on exhibition is organising model-making classes for the children of railwaymen at Pontypool Road. Over 250 entries have been received for the painting and sketching classes, which, with the model-making classes, are always very popular.

Electronically Controlled Model Railway

● A VERY attractive exhibit which demonstrates one of the many applications of a well-known electronic principle is on show by the Mullard Wireless Service Company Ltd., at the Radio Exhibition at Olympia. It consists of a complex model railway layout with entirely automatic control by means of photo-electric cells. Three model trains run on a Gauge "OO" track laid out with sidings, signals, level crossings and swing bridges and cover an area of some 20 ft. by 7 ft. The trains are started by a switch, but thereafter they operate entirely automatically—accelerating, slowing, stopping for signals, starting again. They run into sidings, uncouple and re-marshal in proper sequence—in short, they perform all the functions of a full-sized railway. It is interesting, for instance, to see the trains, each of which bears a distinctive colour, mixed by hand into a jumble of trucks of all colours and then watch them sort themselves out without any manual interference whatever. Two of the trains are coloured, while the third is black. Control is exercised by photo-electric cells (some of which are colour-sensitive) placed at strategic points about the system. The "safety" devices—i.e. the signals, level crossing gates, etc., are all operated by relays under the control of photo-cells actuated by the interruption of a beam of light impinging upon them. The shunting and sorting mechanism, however, depends for its operation on the reflection of coloured light from the trucks, and in this case the light source is on the same side of the track as the cell. As the train passes the control point, light is reflected from the trucks on to the cells. These accept the light-rays to which they are sensitive, and if they are of the colour to which they respond, the switching sequence which follows determines the course of the train. This model demonstrates in a practical manner the immense possibilities of electronic control devices in industry and the public services.

Our Invalid Visitors

● WHEN REFERRING to the visit to our exhibition of a party of disabled ex-service men I stated that they came from Roehampton. I now learn that this was not correct, as the party really came from the "special unit" of the Ministry of Pensions Hospital at Stoke Mandeville, Aylesbury, where they are having a basic workshop training in the odd hours between hospital treatments. My informant makes a special appeal to model engineers to seek out any similar disabled men in their district and, where possible, encourage them in model making. The interest it awakes, and especially the social contacts it gives them is, he says, so necessary to check depression in their shattered lives.

Mr. Fred Westmoreland

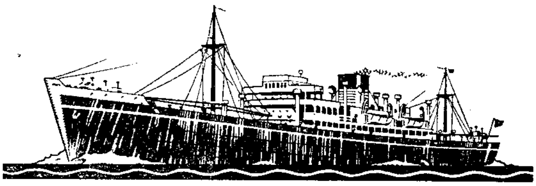
● AN ENQUIRY reached me at the Exhibition for the present address of Mr. Fred Westmoreland, son of the late Fred Westmoreland of Pendleton, whose speed-boats and other fine models are well known to model engineers of twenty years ago. Contact is desired by Mr. J. Andrews, 4, Chaworth Road, West Bridgford, Nottingham.

A Cheap Lathe

● IN THE "ingenious utility" competition at the Exhibition there was a very presentable lathe made from "bits and pieces." It bore a large card marked 5s. to indicate the cost of the materials from which it had been built. A visitor studied the lathe and the card for some little time and then said, "That seems very cheap, I'll buy it!"

Percival Marshall

* # The 36 in. model cargo-passenger liner "PENANG"



by L. W. Sharpe

HATCHES are a prominent feature of every cargo and passenger vessel, and although it is hardly possible to show every detail in a small scale, a passable representation can be made if the leading features are known, so I will endeavour to make this clear and leave it to individual builders to improvise as fancy or materials dictate. The sizes of all five hatches were given in the general arrangement, and construction can be carried out in several ways. Some may prefer solid wood with a lip to represent a dummy cover, others will cut them hollow and fit a separate cover, while artists in sheet metal might use this material for the coamings (or sides) and finish the cover in wood. I suggest the latter is as good a combination as any, because a hatch cover is generally in the form of planks laid lengthways, and wood lends itself very well for the indication of planking, unless one prefers to take the simpler course and paint the hatches grey to represent a tarpaulin.

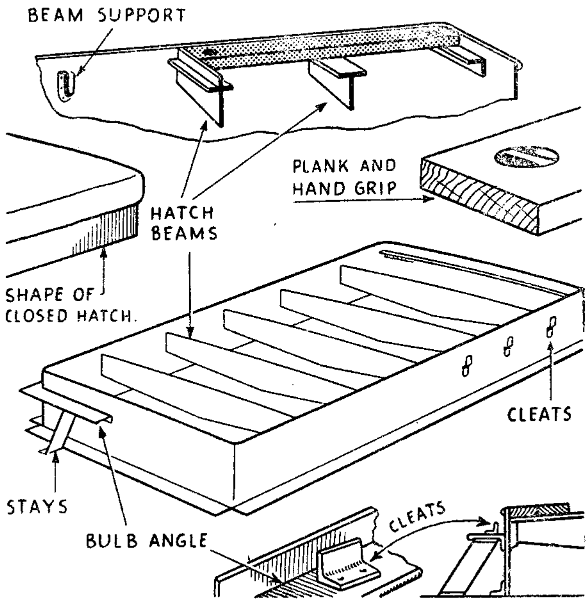


Fig. 29. A few hatch details

Now for a few details. Hatches on a weather deck are usually about three-quarters of the height of the bulwarks or rails, but $\frac{5}{16}$ in. is none too much to play with if any fittings are required, so no great harm to proportion will be done if the full rail height of $\frac{3}{8}$ in. is used. The real thing is riveted to the deck by angle bars, but a fillet of solder will make a good model job, afterwards cutting away the unwanted portion of the beams. Some hatch coamings have a line of cleats to carry the long battens and wedges; larger hatches have a 9-in. bulb-angle on sides and ends on which the cleats are mounted, supported every 10 ft. by stays to the deck. (See Fig. 29.) Inside the hatch are transverse beams deeper in the centre than at the ends. The top illustration shows that every alternate hatch beam has a raised centre plate so that all planks fit snugly over three beams, with only sufficient end play for easy handling. One plank is shown in position, and the black beam sections are merely drawn to show the principle, and not the generally accepted method of building them, which is much more complicated. The planks are fitted with a hand hole at each end, and some vessels carry planks with either a steel band or closed in end to save damage, which could be indicated on a model by one inscribed line between the hand hole and the end. The beams rest in sockets something like that shown on the left, and are lifted out under power.

If steam plant is fitted in the vessel, Nos. 1 and 2 hatches could, as mentioned before, be left uncovered for air supply to the burners, and the remainder painted grey to represent tarpaulins in position. If this is done, it should be noted that when the latter are stretched down over the sides and ends, the edge is turned back on itself so that increased thickness allows for tight wedging, and a fairly generous bulge all round is the result, as indicated in the left-hand sketch. If one wishes to be ultra-modern, it would not be a difficult matter to suggest the new all-steel hatch cover by painting the top grey with a black dividing line, and fitting dummy wire or strip runners at the sides, for this type is made in two longitudinal halves, which slide to one side on rollers, as shown in a separate sketch. (Fig. 30.) This would probably mean re-arrang-

*Continued from page 359, "M.E.," September 25, 1947.

ing the winches, but the position of these is not important so long as one remembers that the winch man's back is generally towards the derrick heel.

Running Rigging

Rigging is another little matter which needs properly understanding if one is to get somewhere near the real thing, and on a model just as at sea, can be classified as running rigging for cargo working, and standing rigging for the masts. There are three different methods of elevating the derricks to the required height for cargo working, which are illustrated by diagram (Fig. 31), so that builders can once again suit their fancy—or match their skill—regarding a choice, barring the third method which calls for the inclusion of a chain, and a much smaller one than that used for the anchor cable, which, as will be told later, can now be bought out.

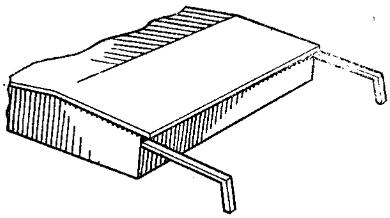


Fig. 30. All-steel hatch cover

Derrick Gear

The first method is called the *topping lift tackle*, which makes use of a double sheave block at the crosstrees and a single sheave block at the derrick head, giving a power gain of 3 to 1 The wire starts at a becket (or small extension) attached to the derrick head block, and is rove through one sheave of the crosstrees block, down through the derrick head sheave, back through the second sheave of the crosstrees block, down to a lead block shackled to the deck, and thence to a convenient cleat probably mounted on the mast table. In the case of extra heavy lifts, blocks with 3, 4 or 6 sheaves are used in conjunction with specially heavy derricks called "Jumbos," usually clamped in a vertical position to the foremast. The second rig, known as the *span and tackle*, consists of one wire shackled direct to the derrick head and running through a single sheave crosstrees block to terminate at the upper block of a pair forming a topping lift purchase. These may be either 2-fold or 3-fold blocks (the number indicates the sheaves in each block) according to the estimated safe working load. The lower block is shackled to the deck, a cleat being used as before to hold the wire.

The final rig is the *span and chain preventer*, which also starts as one wire shackled to the derrick head and running through the crosstrees block as before. In this case it is attached to a union plate or "monkey's face" (strange how many of these customers get aboard a merchantman), which is simply a triangular plate with three holes, allowing both a chain preventer and a wire pennant to be attached to the topping lift. It will be gathered that this is really a stronger type of span, substituting a chain for the blocks and tackle. The wire pennant is used for lifting or lowering the derrick to the required position when the chain is shackled to a deck lug to take the strain, and the wire slacked off. Incidentally, the chain preventer is never used with a topping lift tackle.

The actual lifting of cargo is performed by wires known as cargo runners, secured to the winch drums, thence through the cargo blocks at heel and head of the derricks, and ending at a swivelling cargo hook. Very often a steel hoop is fitted half-way up the boom to hold the slack of a runner, but I fancy that *Penang's* $\frac{1}{8}$-in. diameter booms will be a trifle small for this luxury.

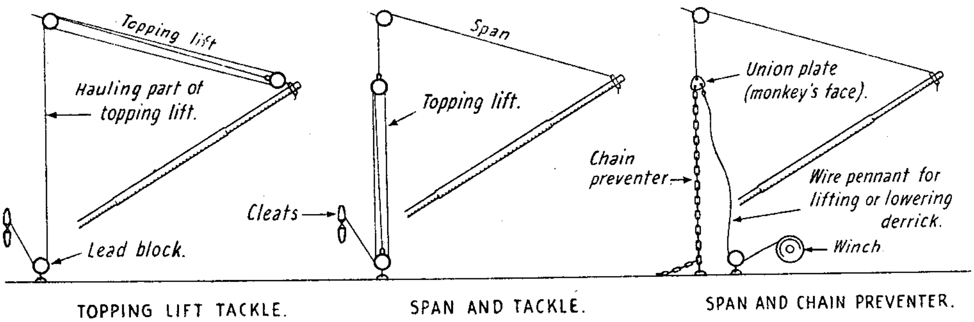


Fig. 31. The three methods of mounting derrick tackle

Standing Rigging

Standing rigging consists of two, very often three, shrouds port and starboard running from the bulwark top or deck to the shroud bolts in the crosstrees, and a backstay on each side of each mast, in addition to the forestay and foretop stay. If three shrouds are fitted, the centre one runs athwartship in line with the mast, the others are at equal distances from it, while backstays are a little aft of the after shroud. (See Fig. 32.) Ratlines are not seen on steamers and motor-ships, except on some of the purely passenger liners. The backstays are attached at their upper ends by shackles to a mast ring or collar (called a spider) fitted with lugs, some little distance below the truck or cap at the mast top, while the lower ends of shrouds, backstays, fore and foretop stays are all shackled to bottle screws, very similar to those seen on telegraph poles, except that the marine variety have a barrel centre with a tommy hole for tightening purposes.

These bottle screws are shackled to lugs, either in the deck or on the bulwark top; either is accepted practice, so here the model builder can choose the position best suited to his deck removing arrangements. The shrouds and backstays are generally either eye-spliced, or doubled

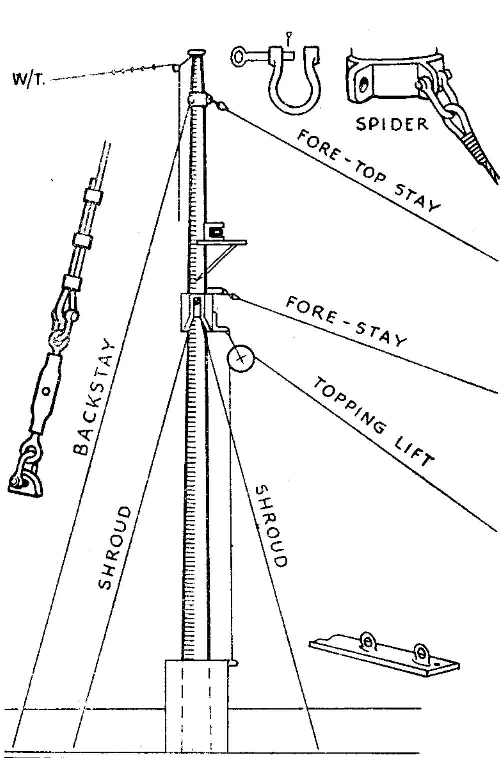


Fig. 32. *Standing rigging and attachments*

back on themselves and secured by three bulldog grips, the latter, by the way, at least in a smart ship, are painted white. I do not suggest that making bottle screws to this scale is a job for any but the stoutest heart; information is given for those who like to know the "whys and wherefores." Very likely most builders would compromise with a plate fitted with rings as shown in the inset. For those who really like piling on the agony, bottle screws abound on a sizable vessel, including the funnel and samson post stays, and even the triatic stay.

Dummy masthead lights add a touch of the real thing to a model, and *Penang's* are made of tiny pieces of brass filed to the shape illustrated in Fig. 33, with a perspex or bead inset to represent the glass, the lamp standing on a platform filed to fit the circular mast and pinned to it as shown. The foremast light is lower (15 ft. is the regulation difference) than that on the mainmast. The red and green navigation lights on the bridge wings are also constructed according to regulations regarding the arc of visibility, which runs from two points abaft the beam and must not allow a light to be seen from dead ahead. A picture tells the story, so a sketch (Fig. 34) will explain the leading features, and once again builders can carry out their own ideas as to how far into detail they go.

In the illustration, the bridge wing is built

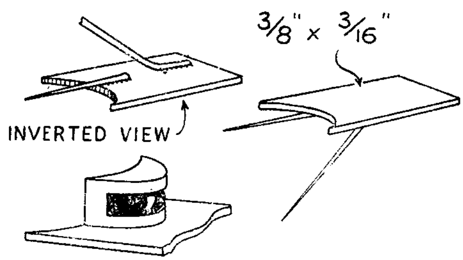


Fig. 33. *Masthead light and platform*

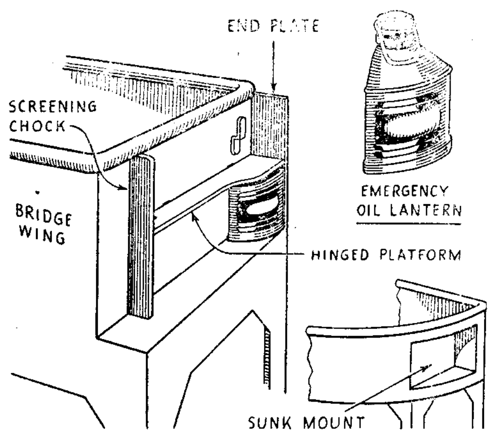


Fig. 34. *Port and starboard bridge lights*

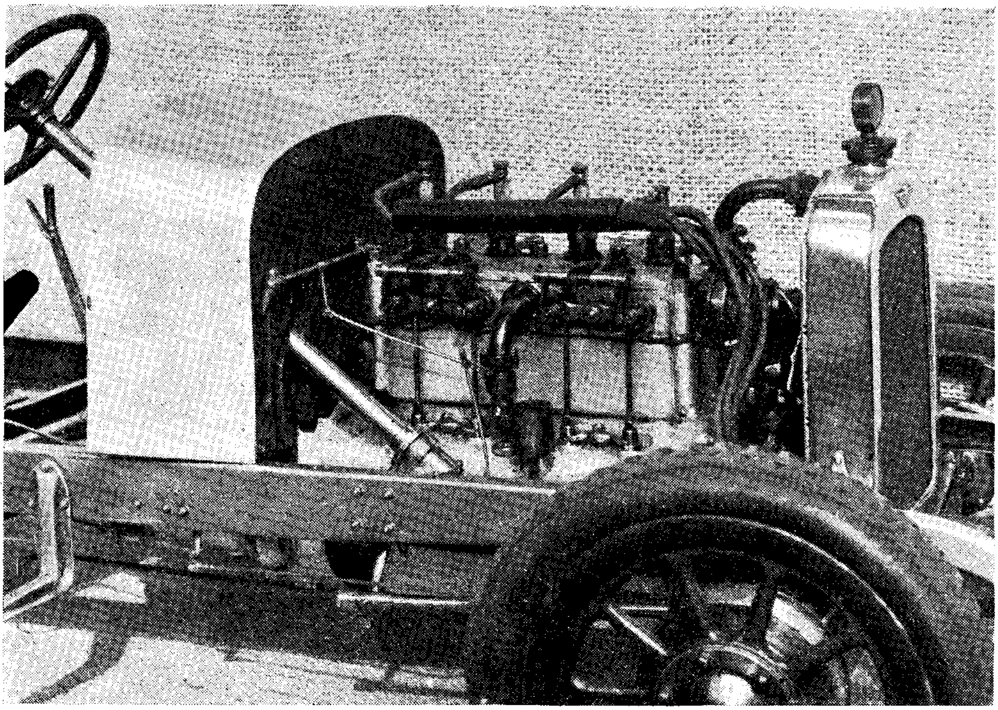
short so as to form a ledge, but many vessels sidelights rest on a projecting base of wood or steel. At the rear is a vertical end plate, with the electric lantern fitting into the corner thus formed. A platform above the lantern hinges up to allow for removal and above this is a bracket for an emergency oil lantern. At the forward end of the platform (actually 36 in. from the lamp centre-line) is a screening chock about 5 in. wide, which, as its name implies, screens the lamp from shining ahead. I ought to mention that the oil lantern is not usually in evidence, being stowed away in the lamp room. At the foot of the illustration is a third means of mounting sidelights, often seen on modern vessels with well-rounded bridge fronts, which might be termed a sunk mount, but to carry this out in light gauge sheet metal would necessitate building up the inside of the wing.

(*Continued on page* 395)

*I.C. ENGINES AT THE EXHIBITION

by Edgar T. Westbury

IN the trade section, nearly all the ready-made I.C. engines shown were of the compression-ignition type, and as most readers are familiar with these engines, or at least with their outward appearance, it has not been considered necessary to illustrate any particular examples of them. Among the makes of engines displayed, the most prominent were the Mills 1.3-c.c., the E.D. 2-c.c., Eta 4.5-c.c. and the Owat 5-c.c. engines.



A close-up of the engine fitted to the model Austin car, by Mr. G. C. S. Seymour, described in the issue of September 18th

Petrol engines were well in the minority, but were featured by a number of trade exhibitors, and accessories for these engines, such as sparking plugs, coils and batteries were also available.

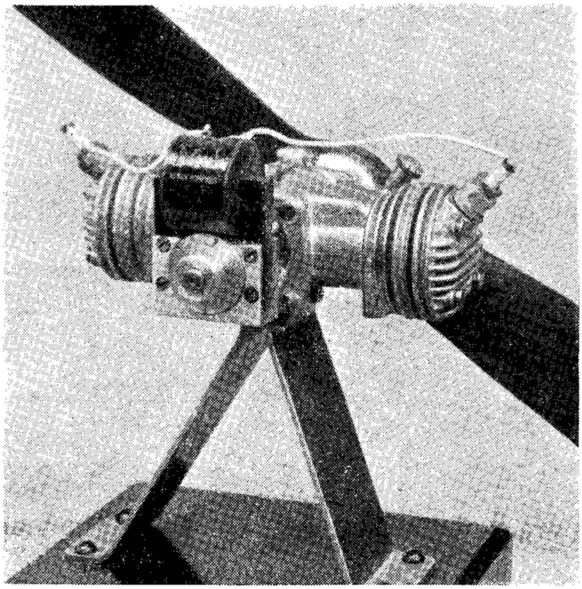
There was a somewhat depressing lack of supplies for the actual construction of engines—that is, castings and other raw or unfinished materials—such as were formerly among the most interesting features of the trade stands. It may be mentioned that this applies not only to I.C. engines, but also to steam engines, other than locomotives, and other items of constructional interest. There may, possibly, be several reasons for this, such as the absence from the Exhibition of many well-known specialists in castings and parts—probably due, in turn, to the difficulties in the supply of these commodities—and also to the scarcity of lathes to enable the intending constructor to get to work on the machining of castings.

Whatever may be the cause, however, there is without doubt a tendency for users of engines to rely more and more upon the ready-made product, which thus becomes an object of utility rather than of real model engineering interest. It is understandable, and indeed logical, that the constructor of a model such as a model car, boat or aeroplane, who lacks facilities for the construction of an engine, to turn to the commercially-made engine as a means of fulfilling its ultimate purpose ; but if this policy is adopted simply as the line of least resistance, it is bound, eventually, to cheapen the value of model en-

*Continued from page 314, "M.E.," September 18, 1947.

gineering as an outlet for craftsmanship and inventive talent.

I trust that these words will not be interpreted as a campaign against the manufacturer of these small engines ; nothing is further from my intentions, but I would point out that the legitimate function of the commercial engine is to supplement rather than to supplant the amateur-built engine. The prosperity of the manufacturer is ultimately dependent upon the maintenance of interest in the actual construction of models, as will be confirmed by any traders of long experience in model engineering supplies. I predict that if interest in the construction of engines should die out, the ready-made product, however ingenious or well-made, must eventually degenerate to the level of a mere plaything, and cease to interest the real craftsman.



The " Craftsman Twin " 10-c.c. horizontally-opposed two-stroke engine

For this reason I strongly urge that in the competitive exploitation of models, distinction between those powered with commercially-made and amateur-made engines should be observed, so that the inexperienced and ill-equipped amateur constructor is not deterred by having to compete against engines which are produced by experienced makers, aided by modern facilities. I am aware that this raises a topic for controversy, and I have already encountered some opposition to it in preliminary discussion, but I honestly believe that it would be to the ultimate advantage, not only of the amateur, but also the professional engine producer. If this policy is adopted the designers on both sides will be kept on their tiptoes in the development of the most efficient features of design ; and methods of construction, materials and so on, will be improved in relation to available equipment and facilities in either case. There is not merely one goal, but several, to aim at, and there are also many angles of approach —in short, there is an infinite and ever-widening variety of interest, which will ensure that in neither case will the exponents of the engines regard them simply and solely as a means to an end.

Castings and Parts

At least two new firms have entered the arena in supplies for engine constructors, with designs which are at least interesting, though modesty forbids me to make a catalogue of their virtues. The first firm, Messrs. T. Garner & Son Ltd., Barnsley, are not new to the Exhibition, or to readers of THE MODEL ENGINEER, but this is the first time they have dealt in castings and supplies for model I.C. engine construction. As pointed out in a previous issue of THE MODEL ENGINEER, they are marketing castings and parts for the " Ensign " 10-c.c. engine, as fully described in *Model Car News*, and with the thoroughness characteristic to the firm, have broken away from many of the old traditions of the model supply trade by introducing die castings in place of the usual sand castings for an engine of this type. Many of the visitors to the Exhibition expressed an admiration for the accuracy and high finish of these castings, which not only simplify setting - up and machining, but also result in a very clean and workmanlike job when completed. The finished engine was also on view, in working order, but it was not possible to provide facilities for demonstrating it in action.

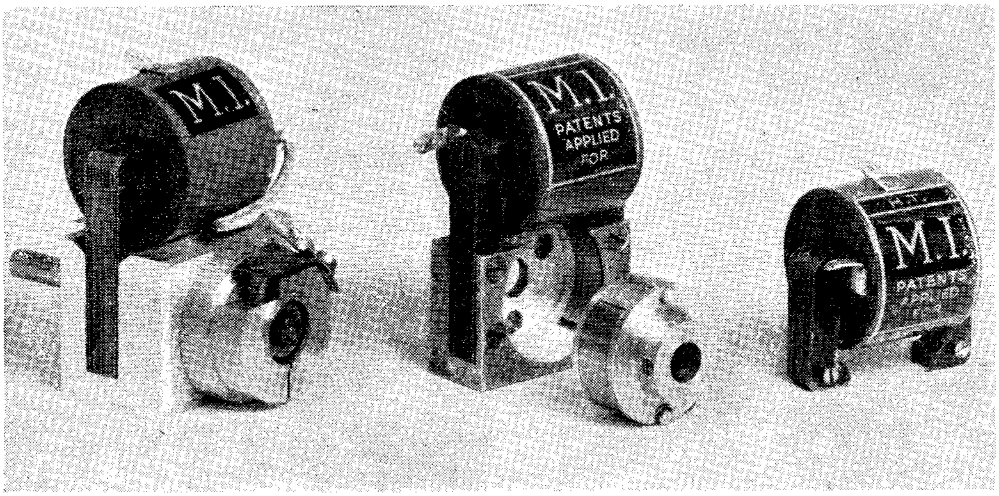
The second firm, Craftsmanship Models Ltd., Ipswich, has only recently become known to model engineers. Their speciality is stated to be " unusual types of models," and this was borne out by the specimens displayed on their stand, including those with which we are at present directly concerned. Prominent among these were the castings for the construction of the " Seal " 15-c.c. 4-cylinder engine, as described recently in THE MODEL ENGINEER. These castings are not made from the original patterns of the engine, but having carefully examined a set of them, I am able to assure readers that they fulfil the requirements of the specification in every detail, and are of excellent general quality, well above the average for small sand castings.

Many of the visitors who inspected these castings, while most enthusiastic about the design, expressed their lack of confidence in their own ability to construct such an ambitious type of engine. Readers who have followed the detailed description of the construction, will, however, realise that all the operations are quite straightforward and by no means more difficult or complicated than those in many other types of models. Arrangements are in hand by Craftsmanship Models Ltd., to assist constructors by carrying out some of the more difficult machining operations, and also to supply some parts such as the crankshaft, camshaft and cylinder liners, in a finished or semi-finished state.

showed that efficient sparking was obtained over the full speed range, also over a wide range of timing control. The M.I. low-consumption lightweight coils were also demonstrated.

Engines Used on the Circular Track

I have been asked to give some further information on the engines which are used in the



Examples of the complete M.I. miniature magneto, both self-contained and " unit " types, also the M.I. Super Lightweight ignition coil

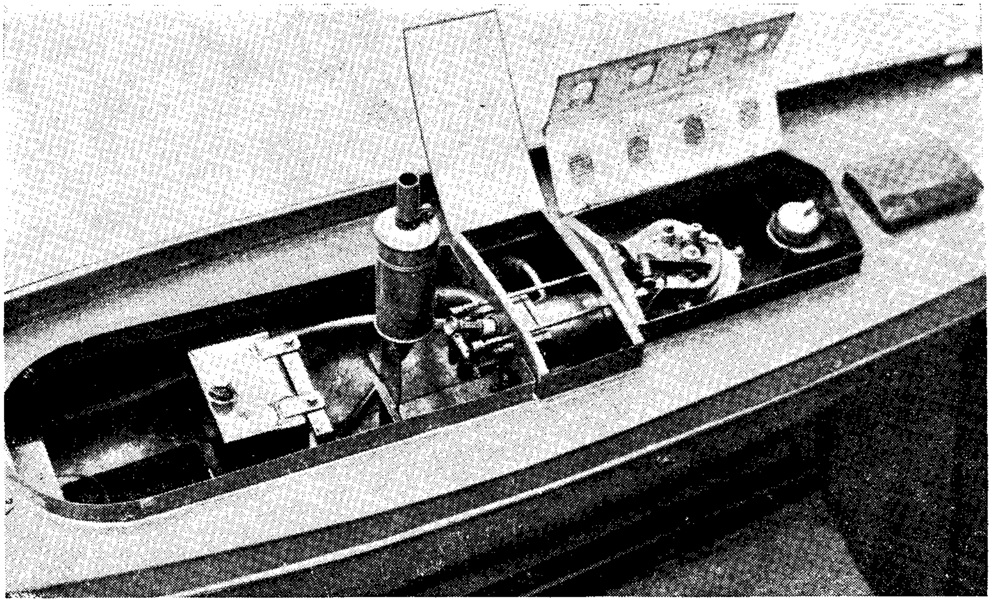
An entirely new engine featured by this firm was the " Craftsman Twin " 10-c.c. engine, which is still in course of development, but its success is already beyond doubt. This engine, as may be seen from the photograph, is a horizontally-opposed twin having cranks at 180 degrees, so that the two cylinders fire simultaneously, and the common crankcase serves for the pre-compression of the charge. Engines of this type have been extensively and very successfully used for such purposes as outboard motors, but this is the first time that a design for a small engine having these features has been available to amateur constructors.

The engine is equipped with a rotary admission valve, and ignition is by a magneto of the M.I. type, specially adapted to fire two normal plugs simultaneously, though coil ignition may be used if preferred, using either a special dual-spark coil or two balanced coils of the normal type, operated in either case by a single contact-breaker.

At this stand were also exhibited several examples of the M.I. miniature magneto, including complete self-contained magnetos, and component units for building in as integral parts of engines. These magnetos, which have already been described in THE MODEL ENGINEER, enable a thoroughly efficient ignition system to be applied to the smallest engines, at a total weight of not more than 3½ oz., and are capable of supplying the ignition requirements of racing engines at the highest speeds yet attained. A magneto of this type was demonstrated, running at variable speed from an electric motor, and aircraft, cars and boats demonstrated running on the circular track, for the benefit of readers who seek guidance on the type of engine appropriate to duties in the various classes of models.

As already stated, all the aircraft, so far as can be ascertained, had commercially-made engines installed, the capacity ranging from 1.3 to 2.5 c.c. The cars demonstrated by the trade had 2.5-c.c. and 5-c.c. compression-ignition engines, and petrol engines up to 6 c.c., but the cars exhibited by the Pioneer Model Racing Car Club all had petrol engines of a minimum capacity of 5 c.c., and a maximum of 10 c.c. The majority of these, particularly in the 5-c.c. class, were of amateur construction, including three, or possibly four, of the " Kestrel " type, and two of a later design, not yet described, having a shorter stroke and generally more compact design than the " Kestrel." The 10-c.c. cars included a modified American O.K. Super-60, and one or more engines made from Hallam castings.

In the model power boats, all the I.C. engines, with the exception of two or three small compression-ignition engines, were fairly large petrol engines, amateur-built, and mostly several years old in design. Both Mr. Vanner's petrol-driven boats, *Leda III* and *Ida*, had water-cooled four-stroke engines of about 30-c.c., arranged with the crankshaft vertical, and bevel-geared to the propeller shaft. All the other boats had direct drive to the propeller, and honours were about equally divided between air and water-cooling, or between two-stroke and four-stroke. Examples of the 30-c.c. " Grayson "



The engine-room of Mr. Vanner's tug "Ida," showing the water-cooled petrol engine disposed horizontally, and the exhaust silencer normally enclosed in funnel casing

and 15-c.c. "Grayspec" engines, well known to readers before the war, were represented; the only really modern note was struck by Mr. L. Purple's 15-c.c. two-stroke, which is designed on the lines of M. Suzor's open-port flat-top 10-c.c. engine, and produces similar music. As yet, no manufacturer has attempted to produce an engine large enough to suit the average model power boat, though events in this direction are foreshadowed and something interesting may be available before the opening of the next MODEL ENGINEER Exhibition.

A Correction

I regret that an error occurred in the caption of the photograph published in the previous instalment of this article, referring to the two small compression-ignition engines, which were described as the work of Messrs. C. K. Grover and G. A. Watts (page 313, top right, September 18th issue). Both engines were, in fact, made by Mr. C. K. Grover, to whom my apologies are due.

"PENANG"

(*Continued from page* 391)

Open Rails

I stated in the first article that open rails for this model are only used on the fo'c'sle deck, short spaces on the boat deck and the poop deckhouse. Those who prefer to dodge such a job, and it is never an easy one, could fit metal or wood bulwarks throughout without incurring any risk of derision, for I have noted instances, even round a small poop deckhouse, where such were fitted, particularly on Danish and Swedish vessels, and bulwarks right round a fo'c'sle deck are not uncommon on British ships, save across the break of the fo'c'sle. I note that three-ball stanchions, $\frac{7}{16}$ in. in height, are again on the market, and although these are $\frac{1}{16}$ in. in excess of the height decided on for bulwarks and rails, would be well worth buying out, for this is undoubtedly a country where the manufactured article is sometimes superior to the best of home-made efforts. To compensate for that unwanted $\frac{1}{16}$ in. it might be possible to sink the deck stringer plate that amount below the sheer strake, for on a big sister an angle-bar always connects these two, which is the reason why, on many excellent models, stanchions rising out of a flat deck side not only tend somehow to look insecure and rather bare, but are definitely incorrect.

If it is decided to fit plated bulwarks round the weather deck, the openings for the three-roller fairleads right aft, will take the mooring and towing wires, but if open rails are used, Panama leads must be fitted, port and starboard, a little inboard of the fairleads.

(*To be continued*)

Ship Models at "The Show"

Paint and Finish, and the Silver Medal Winners

by "Jason"

"FINISH" starts at the beginning in all good ship modelling work. Your choice of materials, for example; if you can choose the correctly and naturally coloured materials at the beginning it comes near to perfection. Your wood should be "free from knots, shakes, and splits." Painting should be on a good surface with the best paints. You'll get a really fine finish on your hull with twenty coats of paint—*if you rub down each coat.* Things which can be "stuck on" should *not* be stuck on. They should be pinned and/or screwed on. Screwing or bolting is the best. In this way each part may be properly painted beforehand and attached afterwards. Yes, it's quite correct! I did say "bolted." Miniature workers like Draper bolt parts of their models; funnels, for example. Well, Mr. Miller, as I remarked, had not done these things. Consequently his model suffered in appearance, in finish and in proportions. Now these three items are devastating. Moreover, they are the faults of many newcomers to modelling, and maybe some of the more experienced modellers are also liable to slip occasionally. Sorry, there is not enough room to develop "Finish and Painting" now. That must remain for a special article.

The older ship modellers will recollect how I used to crusade against the use of white cotton thread as standing and running gear in sailing ships of all periods. No sooner does a six-year war come along than they are at it again. Nearly half the models were guilty of this offence. In passing, I glanced at the names and they were new to me. It does not matter even if your white thread is on scale or even below it, the model still looks top-heavy. The white hits the eye. It attracts unnecessary attention. It destroys the "balance" of the model. This year's champion sailing ship, for example, is a fine example of perfect choice of colour in cordage. Consequently one sees the ship as a whole, not as a blur of white over a hull. There are four colours only in ship cordage, and of these white is scarcely used, being found only in certain American ships and a few first-class yachts. Such cordage is white because it is made of cotton. From this is will be seen that modellers could forget white ropes. The other three are: (1) dark brown, representing hemp rope which has been treated with Stockholm tar (not coal tar); (2) biscuit colour, a sort of yellowy brown representing Manilla rope, which, in its new state, is straw yellow; and (3) black, which

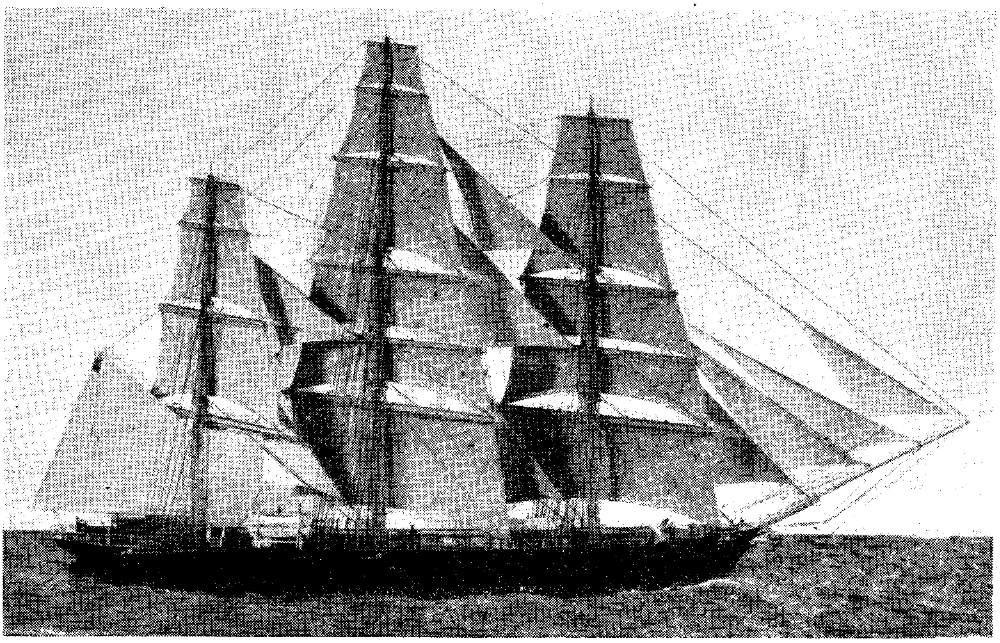


Photo by] [*M. B. Craine*

Silver Medallist and runner-up for the Championship Sailing Ship Cup, "Sir Lancelot," scale $\frac{1}{8}$ in. to 1 ft. Model by I. Marsh of Barry Dock, South Wales represents the tarred rigging and any gear that has been wormed, parcelled, and served. Now don't let these sailormen's technical terms puzzle you. I want to emphasise. *Don't use white* unless you know definitely that it is required, say, for certain stays or backstays which had been painted white. There were a few of the card then include it on your model. Personally, I feel that this method can only be a very rough guide at the best. My advice to beginners is to examine each detail separately. Ask yourself the following questions :

What are the overall dimensions ? How does its colour fit in with the general picture of the

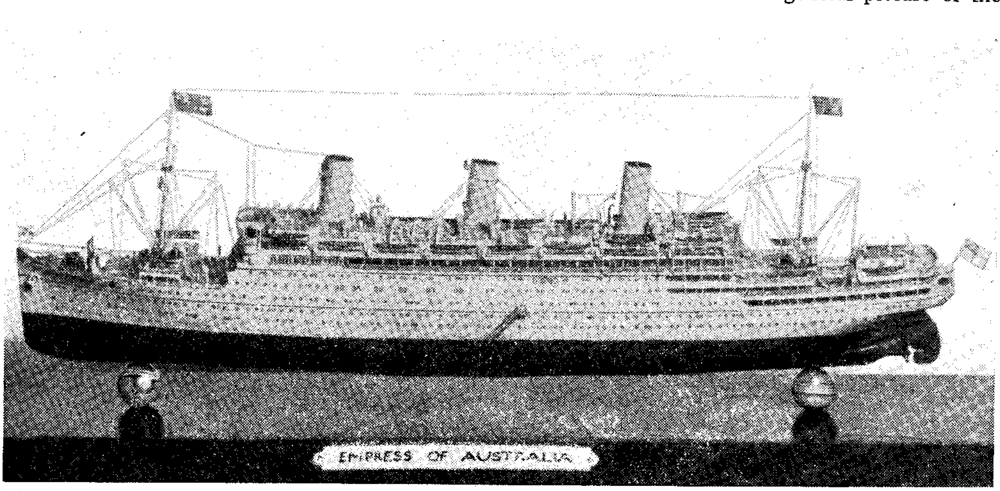


Photo by] [*M. B. Craine*

"*Empress of Australia*" (*C.P.R. liner*), *scale 75 ft. to 1 in., by K. P. Lewis of Birkenhead, who already has a score of models to the same scale. This model can be seen for the next few months at the Imperial War Museum, London*

Western Ocean Packets, the Clippers, and even some of the windjammer companies which "whitened" certain of their standing rigging. Hemp (dark brown) is seldom used in modern windjammers, say, 1880 onwards.

Scale consciousness is an expression I like well. It means quite simply that a modeller is very careful with his scaling of *all* items and details on his model and not only the main dimensions of the hull and spars. I have already referred to a foremast signal yard which was *four feet thick*. You can be quite certain that the modeller concerned will get a shock when he finds out ; and he will, if he reads on, for it is my experience that many modellers commit such errors quite unknowingly.

The purpose of these notes is to prevent such errors creeping in a second time. Moreover, the various ship model societies take it up with newcomers, that results in the very excellent standard which has been achieved this year in miniature and one-foot scenics.

Do you struggle to include $\frac{3}{4}$-in. handrails on your boat deck and at the same time leave off the 12 in. patent davits ? Are you one of those people who must have a $\frac{1}{2}$-in. wireless aerial which is really a scale size of 6 in. or 8 in. diameter ? Do you omit a 15-ton windlass from the wide open spaces of the fo'c'sle head ? Well, we'll make modellers of you yet !

The amount of detail is a matter of choice so here's a paragraph on that aspect.

Experienced modellers use a postcard picture as a guide. If you can make it out on the post- ship ? Can I make it to scale ? Am I fitting some other detail which is smaller ? Suppose you decide upon fitting a deckhouse. Then what and how will the deckhouse be fitted ? Consider doors, portholes, galley sky-lights, a coil of rope. Now don't make hard work of this. It is a matter for reflection in an armchair with your pipe. It is also a matter of inclination. After all, never, never forget that this is a hobby, "Jason" or no "Jason." I hope I've dealt with Mr. Miller's faults to your entire satisfaction. Now I must glance at my notes to find out some more faults quite personal to him. His boats were really—tut-tut. They had no sheer. They should have sheer, i.e., a nice curve downwards from each end towards the middle. We've had dozens of pictures of ship's lifeboats during the war. (Are you keeping a cuttings book by the way, of pictures and photographs of your particular interest in ships ?) His boats were the same height as the house on which they rested, say 9 ft. high. His paint had been applied so thickly in places that it had actually "run." His wheel had eight spokes only. His copper sheathing was too heavy, the pins too big, and the copper bottom was so "rough" that it would have cost six knots in speed. Dead-eye lanyards were too long. Well, Mr. Miller, I now feel better. So do you, I hope.

The Silver Medallists

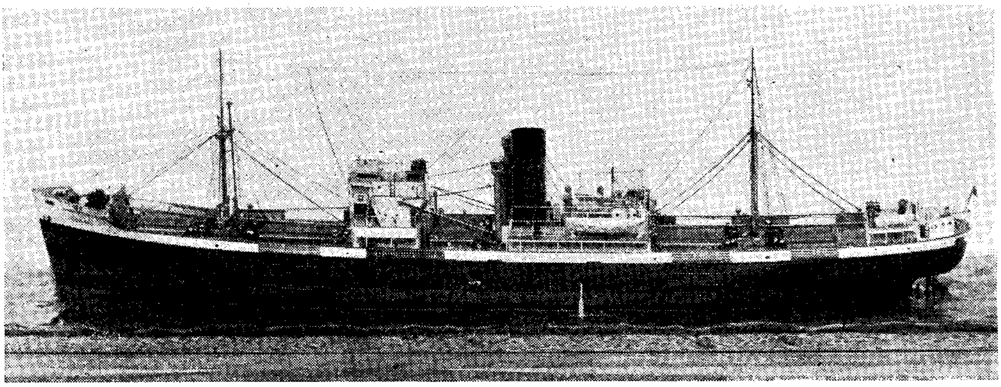
Bearing in mind my remarks on Mr. Miller's model about general criticisms applicable to many of the entries, I would now like to describe the Silver Medal winners' entries. *Sir Lancelot*, a sailing ship model to a scale of $\frac{1}{8}$ in. to 1 ft. (waterline in a sea setting), is a fine piece of work by I. W. Marsh, of Barry Dock, Glamorgan, South Wales. Mr. Marsh, in more than a quarter of a century of trying for a Championship Cup, has achieved a high standard of craftsmanship. His metalwork may be described as exquisite. He can, for example, make a davit head of five working parts all within the compass of $\frac{1}{8}$ in. His model was fitted with wooden sails with the right amount, but not too much, of flowing curves. His mainsail, for example, was 1/32 in. thick, carved out of a piece of yellow pine $1\frac{1}{4}$ in. thick. All his standing and running gear was properly scaled and in natural colours. Rails were excellent. He had even such refinements as reef-tackles. His reef points were natural. There were some minor points of criticism. His sea setting was devoid of any white for wake or bow wave, yet in every way he indicated a speed of at least 5 or 6 knots. His davits were inclined inboard, 15 degrees or thereabouts, thus making it impossible to swing his boats clear of the rail. The champion widened the gap between himself and Mr. Marsh by a full hull which was timbered and planked. Mr. Marsh's *Sir Lancelot* was, nevertheless, well worth a silver medal. He also earned a special merit prize of £2.

Miniatures

There were two miniature steamships, or rather a miniature and a one-foot scenic, which caught the eye of many visitors. Each won a silver medal. I'll deal with the *Empress of Australia* first. A full hull model which floats at correct displacement depth and to a scale of 75 ft. to one inch, contained an amazing amount of detail, yet so truly scaled that nothing was obtrusive. Her maker, Mr. K. P. Lewis, of Birkenhead, Cheshire, depicted her as she appeared for the Royal trip to Canada, in 1939. Every porthole was a piece of wire. All details were hand made. His flags were excellent, the Royal Standard being meritorious. Most people had to use a glass to see the bridle of the accommodation ladder. Ventilators were gems, (she was formerly the *Tirpitz*, *ex*-German liner) of German style. Boats were fitted with thwarts. His rails were some of the best I've seen in miniature work. The mast-head lights were lamps and lenses with the screen below. He used an original mounting for his pedestals, of two glass marbles, $\frac{5}{8}$ in. diameter. I regard this model as one of the finest pieces of craftsmanship in the Exhibition, yet it was but little longer than a lead pencil. It will be on view in the Imperial War Museum (near Southwark Cathedral) for a few months, so see it if you can.

A Wilson Liner

The other steamer was the Wilson liner *Livorno*, a cargo steamer to a scale of 25 ft. to 1 in. The model was by E. N. Taylor, of Gosport, Hants. The outstanding point about Mr. Taylor's *Livorno* was its popularity with visitors. This was due to that very indefinable something which requires several sentences to describe. The *Stirling Castle* had it to a lesser degree. A sailorman came up to the *Livorno*. He said: "Ah! that's just right!" He added, "She looks alive." She had that "rightness." There are not many modellers who can capture it. Most of the Hampshire models have it. Draper's *Mauretania* (even though it was a "still life") has it. That irrepressible Sheffielder, Money, had it in plenty in his pre-war *Coalhulk* (1938). The *Livorno* was a good example of a one-foot-scenic. Green-painted, she showed the natural cargo steamer's plating along the sides. In the wake of the hatches she had the wedge fillers along the edges of the plates to prevent slings of cargo being tipped up. Like the *Empress of Australia* and the *Stirling Castle* Mr. Taylor had a wealth of detail which was quite unobtrusive, so perfectly scaled it was. Here's an example of Mr. Taylor's painstaking efforts at realism, but realism to scale. The rails in the main deck bulwarks are movable. They are held in place by strut-supporting staunchions. He had them. Truly, this is a minor point. They could scarcely be distinguished. Still,



Silver Medallist Wilson cargo liner "Livorno," an outstanding model by E. N. Taylor (Gosport). Scale 25 ft. to 1 in. Remarkable for its faithful detail they were there. We all have to admit in considering detail that Mr. Taylor had an easier scale than the champion—25 ft. instead of 50 ft. to the inch—whereas Mr. Lewis achieved his at 75 ft. to the inch. One thing I found very disturbing on the *Livorno*. There was, perhaps, too much gloss, too much of a shiny surface, and reflected lights destroyed his very fine winch and windlass work. It was not fully seen owing to the light-stabs. Fine for diamonds, but not for deck details. Messrs. Lewis and Taylor presented models of outstanding merit and both thoroughly well deserved silver medals.

Now for Mr. Shipsides' model of the opium smuggler, *Nymph*. This was a fine little model up to silver medal standard, to a scale of $\frac{1}{16}$ in., in a good sea setting. He mounted sails. Everything was well scaled, which fact helped him secure the silver medal. His boat, on deck, was well made and equipped. Year after year, I keep reminding modellers who include reef-points to show these reef points "in action" responding to the wind force. I'm afraid that Mr. Shipsides forgot this admonition on the three lower sails *but suddenly remembered my warning in time for his topsails*. Nevertheless, good work Mr. Shipsides.

The smallest model in the show caught the judges' eyes for a silver medal. Mr. W. H. Honey (Tulse Hill), did this with his *Lalla Rookh*, a famous clipper in a sea setting. His rigging was of very, very fine copper wire. His sail work was undoubtedly exquisite, especially at the scale of 100 ft., yet I feel that Mr. Honey was fortunate in his award. This model puzzled me for a while. There was something wrong. It was neither "still life" nor "action." It seemed lifeless. All that was required was a few splashes of white, a little wake, a bone in her teeth, a smoothed green circle or two. So little, yet so much!

Atomic II was a displacement power boat. A free-lance job by Mr. L. V. See, of Portsmouth. His power layout was well above average and accessibility was good. Both these items are extremely important in power boats. As the whole was designed by the maker, his silver medal was well deserved. To cap that, the boat's performance is meritorious. The model does 18 knots (actual), which is not bad for a displacement hull. His finish was excellent; above that which is required for the hurly-burly of the "pond" and the "water." I'll deal with the Bombay Cup winner and the bronze medallists later.

For the Bookshelf

British Sports Cars, by Gregor Grant. (London: Messrs. Foulis & Co. Ltd. 8s. 6d.)

This is the first book to describe in detail the histories and mechanical specifications of British sports cars which have graced our roads and intrigued motoring enthusiasts since the earliest days of the movement.

The author has ambitiously covered 96 different makes of British cars which appeared in sports or sporting guise since the year 1900. When it is mentioned that, in addition, he includes chapters on monocars, "specials," three-wheelers and accessories, as well as a list of present-day manufacturers and an index of personalities, and remembering the existing paper shortage, it is hardly surprising if some of his descriptions are too brief or could with advantage be more clearly written. One feels that if some of the obscure makes, many of which never reached the production stage, had been omitted, more useful information could have been included about those great sports cars such as the Bentley, Sunbeam, Vauxhall, Aston-Martin and others.

This observation apart, the book does contain an astonishing amount of information. Mistakes have crept in, which is unfortunate in a reference work of this kind, more especially as it will be largely in the hands of those new to the game, who will take everything it tells them as gospel. As one instance, a photograph of a certain Frazer-Nash states that it has an Anzani engine, whereas the text goes to considerable pains to say that this particular car had a D.F.P. engine of different design. And not all the errors are as obvious as this one.

However, as a superficial introduction to a very large number of diverse British sports cars, this book is a welcome addition to the existing semi-technical works on motoring, and it is further enhanced by some good photographs, mostly of fairly modern cars.

Those who motored in the early twenties will find their memories pleasantly jogged by the many examples of old light cars and cyclecars which are dealt with by the author, some of which he illustrates by means of thumb-nail sketches.

In general, this is a worthwhile book for those who seek to gain an introduction to ancient and modern sports cars. Gregor Grant's greatest failing is that he has attempted too much and, in consequence, seems to have compiled his data hurriedly, without careful checking of certain essential facts. He even commits the rather serious breach of journalistic etiquette of crediting to one writer a statement made by someone else.

But it is better to have some sort of reference work on this intriguing subject than none at all, and we can well believe that, already, "British Sports Cars" is in considerable demand.—W.B.

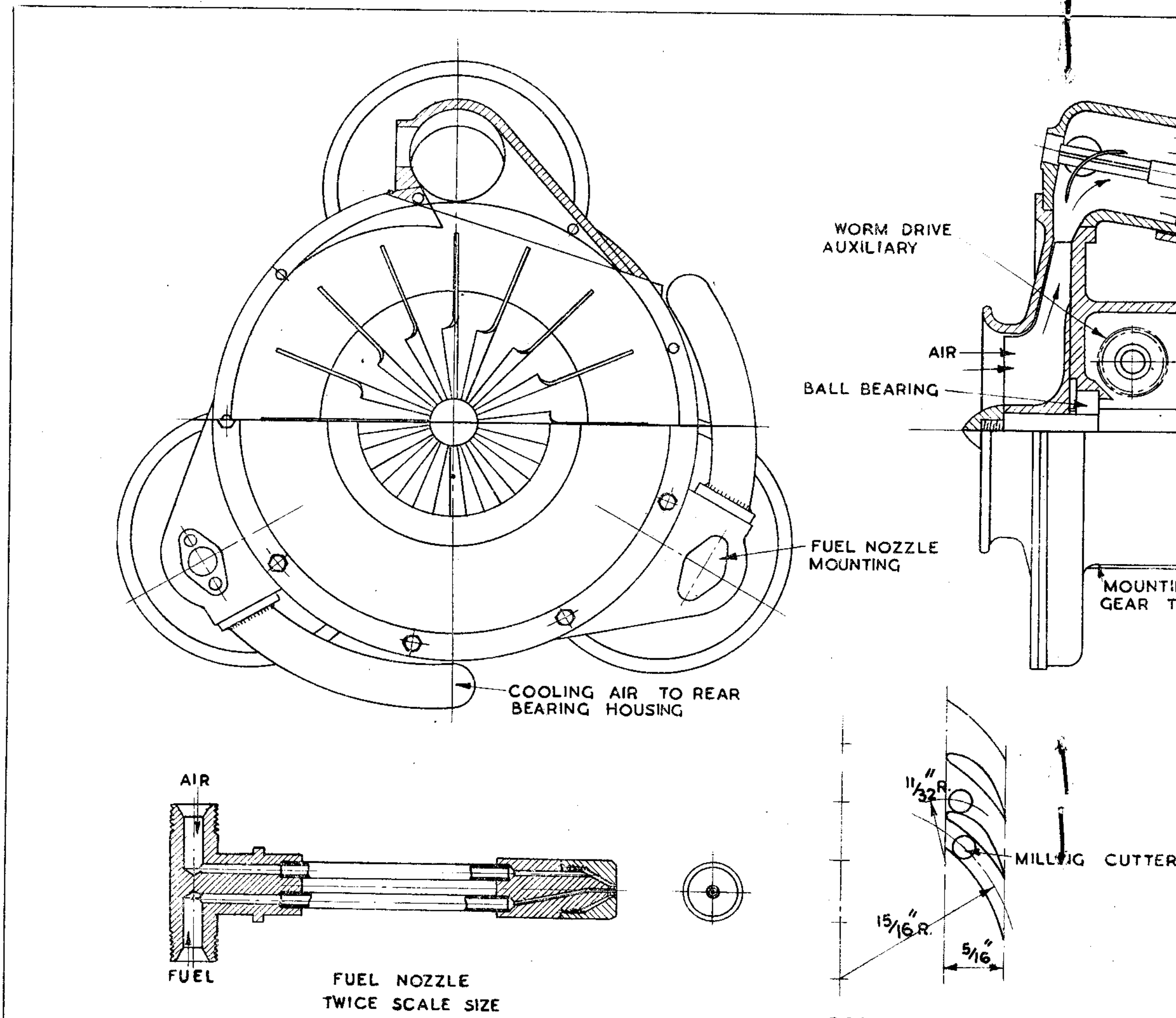
PROPOSED DESIGN FOR A

by L. K. B. (Aus

A PARAGRAPH in "Smoke Rings" of THE MODEL ENGINEER, May 22nd, on the subject of gas turbines and jet engines, inviting views on the subject, has prompted me to put forward some ideas which I have arrived at after a considerable amount of thought. I would like to say that these ideas are as yet theoretical, but have arrived at a stage where I feel that a start on construction can be made, and this I intend to do.

Before describing the proposed design, it would be as well to go briefly into reasons for the adoption of this particular design. Throughout, simplicity has been one of the main points to be considered wherever possible. It follows, in the main, the type which has been most successful in full-size practice. The centrifugal compressor has been adopted for its simplicity, and ease of construction. This type also allows of the use of individual combustion cans employing a central fuel nozzle. While having certain disadvantages, this type appeared

in t
adv
cha
ing
size
and
mig
bus
cha
size
wou



FUEL NOZZLE TWICE SCALE SIZE

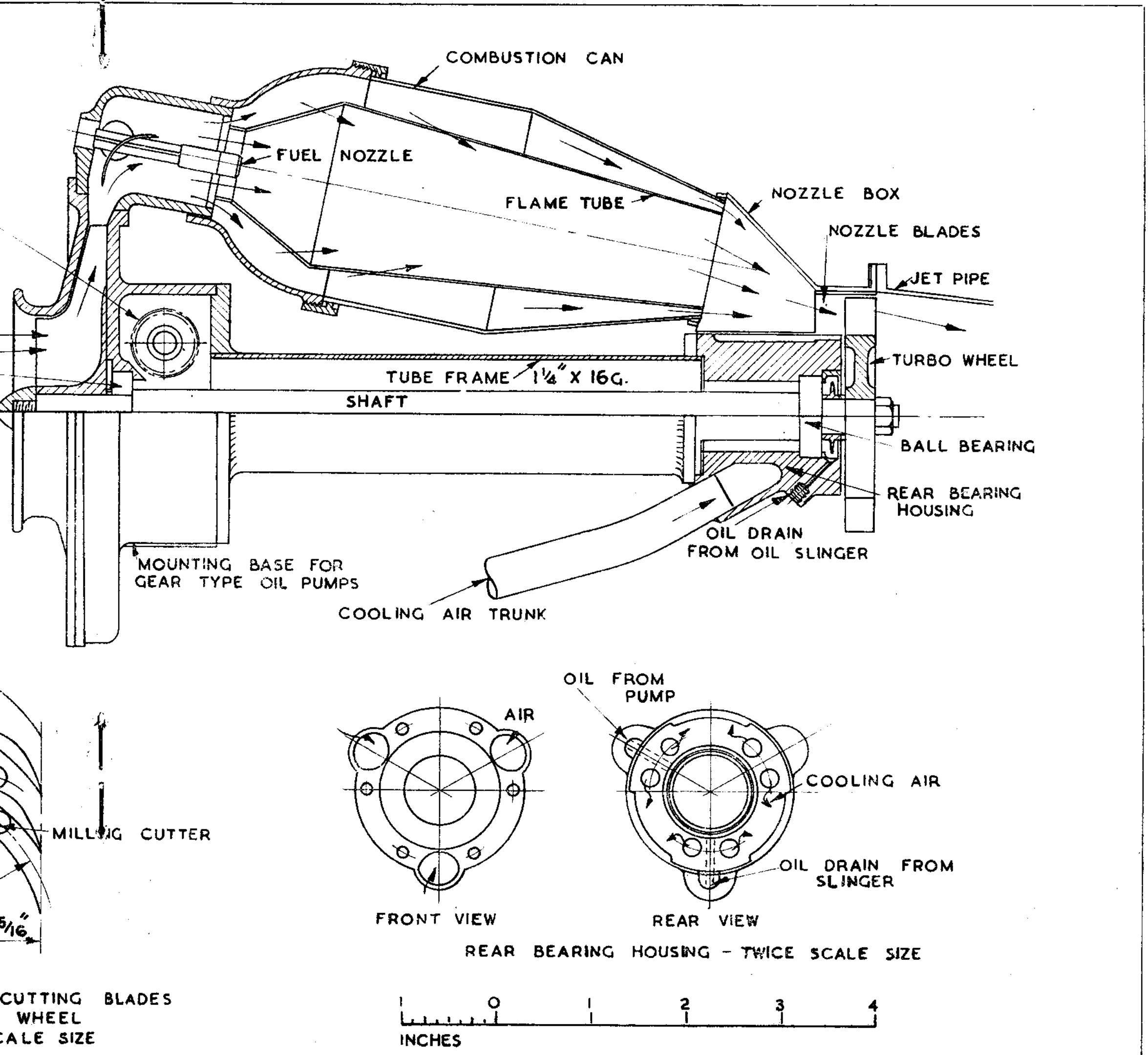
METHOD OF CUTTING BLADES ON TURBINE WHEEL TWICE SCALE SIZE

OR A SMALL GAS TURBINE

. K. B. (Australia)

for gh- ints ows, nost ugal city, also tion hile ared

in the size under consideration, to have certain advantages over the single annular combustion chambers used on some full-size engines employing axial flow compressors. This type in this size would require more numerous fuel nozzles and it was feared that localised excessive heating might take place. The three individual combustion cans are of a size which should give more chances of success, as a fuel nozzle of workable size may be used. One of the chief problems would appear to be the adequate cooling of the turbine wheel, nozzle box and rear bearing, and considerable attention has been paid to this feature, both air and oil spray cooling systems being provided for. No details of the drillings in the flame tubes has been shown, as it is expected a number of different arrangements will have to be tried. In this connection it will be noted that both the combustion cans and the flame tubes have been kept as simple as possible and are easily removable. Injection of solid fuel alone in small quantities offered difficulties, and it



was felt that at least in the early stages injection with and by air would be more satisfactory, offering more efficient atomisation and mixing of the fuel and air. The type of nozzle adopted is similar to one described in THE MODEL ENGINEER some time ago, in the construction of a paint spray gun, although, of course, a good deal smaller.

Full Size Practice

The general construction of the engine will be seen to follow full size practice to some degree. The compressor has a single entry impeller which has sixteen blades. These are formed of sheet brass, which are sweated into radial slots milled in the hub which is turned from brass bar, and secured to the front end of the shaft. Both the impeller and turbine wheels are "overhung." The impeller is 4 in. in diameter, the blades $\frac{3}{16}$ in. in width at the tip, $\frac{3}{8}$ in. at the entry and extended forward and given a twist in the "eye" of the compressor intake. The compressor casing consists of a front circular cover spigoted to the rear half and delivery elbows. The rear half may be described as the main casting, as it carries the three delivery elbows bolted on to flat seatings at 120 degrees, also the gear case is incorporated on its rear face to furnish drives for auxiliary services. The front main bearing is also situated in it immediately behind the impeller. Spigoted to the rear of this gear case is the front flange of the main "frame" of the engine, which consists of a $1\frac{1}{4}$ in. diameter $\times$ 16 g. steel tube, to which the front and rear flanges are brazed or welded. To the rear end of this is attached the rear bearing housing, which is drilled to convey cooling air from the cooling trunks to the rear face of the turbine wheel. This air then passes outwards and backwards past the inner surface of the nozzle box and to the atmosphere. Its exit to the atmosphere is restricted somewhat in order to ensure that a slight pressure is built up, so forming a pressure seal on the rear bearing to prevent the escape of oil. The rear bearing housing is also drilled to provide a flow of oil from the oil pump over the rear face of the rear bearing. Drainage passages are also drilled to take excess oil away from the oil slinger channel back of the rear bearing and the rear housing.

The centre-lines of the combustion cans are at 11 degrees to the axis, and it will be seen that the discharge elbows on the compressor convey the air directly into these allowing them to be of symmetrical and simple construction. The fuel nozzles are introduced through the front of the discharge elbows and these elbows are cast with a long spigot which can eventually be cut off to provide a seating for the nozzle bases, they can be chucked by these while the rear portion is machined. The flat base by which these are attached to the main casting can then be machined at 11 degrees to the centre-line of these elbows. The elbows are then bolted to the rear casting, this assembly being then set up for machining the front face to which the front cover is spigoted and bolted. All castings so far mentioned are of light alloy.

The front portion of the combustion cans are of mild-steel. It is hoped that it will be possible to machine these from reducing pipe couplings. The rear portion of the combustion cans is of heat resisting sheet, cut out and welded up, the rear end being afterwards skimmed up in the lathe for a sliding fit in the nozzle box openings. The flame tubes are also welded up from heat resisting steel sheet. At the entry end of the latter the fuel nozzle is situated and held central by a radial guide vane which gives the air a swirl as it enters. The discharge ends of the flame tubes are squashed somewhat to a square form so that they are supported in the inside of the combustion cans. Holes will be drilled in the flame tubes to allow primary air to enter as combustion proceeds.

The nozzle box offered some problems, but, finally, with a "mock up" of the discharge end of the combustion can and nozzle blade outer shroud, and numerous trials with pieces of sheet iron, a shape was evolved which should meet the case. Broadly described, it resembles three fishtails such as are used on motor car exhausts with their discharge bent into a third of a circle. The whole assembly consists of a cylindrical winch wall with three scallops cut out to clear the cooling air trunks and oil pipes, a short tube to receive each combustion can and a short tube of a diameter to go over the nozzle blade shroud ring. These are all connected by a curious shaped piece of sheet which was evolved as above. The whole is of heat resisting steel sheet welded together. The nozzle blade assembly consists of an inner and outer ring having holes to receive the ends of the blades which are of sheet and placed at an angle of 45 degrees to the axis; tabs on each end of these pass through the holes and are turned over. There are sixteen blades.

The turbine wheel is $2\frac{1}{2}$ in. diameter, has 18 blades $\frac{3}{8}$ in. long cut from the solid by a similar manner to one described in "Model Steam Turbines," but modified to suit the different shape required and the chord line which requires to be at an angle of 45 degrees to the axis. The wheel is cut from a disc of heat resisting steel $\frac{5}{16}$ in. thick, and is secured to the rear end of the main shaft.

The jet pipe is tapered from where it joins the nozzle box rear face by a flange to a diameter of 2 in. at its orifice. A "bullet" cone may be fitted to protect the rear face of the turbine wheel from the hot gases.

Experimental Work

The auxiliary drives referred to earlier will not at first be used until some experimental work on the bare engine has shown what is required. The supply of air for fuel atomisation, fuel and lubricating and cooling oil will be from an external source. However, provision has been made for driving a transverse horizontal shaft by worm and worm wheel to carry fuel and air pumps and a tachometer drive. Driven by bevel gear from this shaft is a vertical shaft, the lower end of which drives the gear type oil pressure and scavenge pumps.

Cooling air is taken from the compressor

(*Continued on page* 405)

*The "Bulle" Type Electric Clock

by R. N. Gibbs

THE spindles are all 0.093 in. silver-steel and the count-wheel spindle was cut off to correct length and tapered to fit count-wheel boss, which had been reamed from the underside. The count-wheel must be a tight fit and must run dead true ; the other end of spindle should be rounded and polished for its footstep bearing. The worm should be parallel-reamed a tight push fit to spindle and worm pushed on midway between top and bottom leaves of bracket. Then the little piece of clock-spring steel, with its 9-B.A. screw put in place, and the whole assembly should run free enough to blow round.

I have not made a drawing of the bosses for centre wheel and the friction drive for the minute hand, nor the 12-to-1 reduction - gear for the hour hand, as these will be governed by whatever can be found in the scrap-box. Mine were taken from the remains of a BEE clock and came in very nicely, as I was able to ream the small pinion that fits the centre-shaft to suit 0.093-in. silver-steel. The wheels from a small drum clock would be about proportionate.

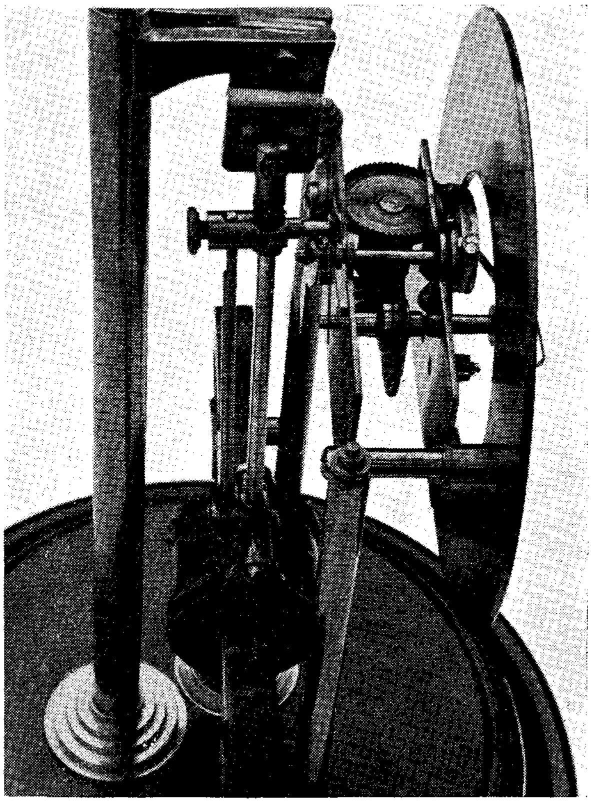


Photo by] [*C. Newton*

A view of the works behind the dial

When all the wheel-work is assembled, well wash with petrol, give a touch of clock oil to all bearings and it should be possible for wheels to spin round on giving the count-wheel a flip.

The escapement calls for considerable patience. I think the drawings will make it quite clear. Two small pieces of clock-spring will be required, 0.100 in. wide and about 0.015 in. thick. I softened a strip and, after fitting the two links and getting the escapement to work, I hardened the tips and smoothed off the gathering edges with a carburundum slip. The barrel for the gathering pallets is better a tight fit on the spindle ; the trigger switch is taper-reamed to fit a taper on spindle, as I found it took a lot of movement back and forth to get correct position of trigger in relation to escapement. I used darning-needles for the pins of the links, grinding a flat on another similar darning-needle to use as taper reamer. After making sure that the holes in the links were an easy fit, I tapped the needles home and broke off the surplus neatly on the grindstone, to avoid softening the needle.

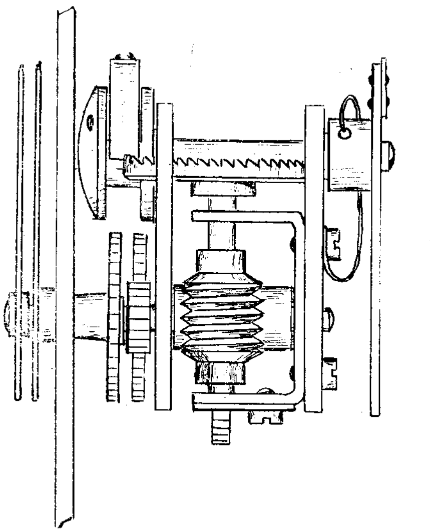
The links are riveted to the clock-spring pallets before fitting the pins, and everything must be absolutely free, but not sloppy. When the works are finished and the two stands finished for the clockwork, it will be possible to get the works running in conjunction with the pendulum, as you will have transferred the trigger switch from its temporary bracket to its proper place on the clockwork and it will be possible to get all adjustments made as regards sweetness of running and timekeeping. Fit a couple of temporary hands.

Figs. 6 and 7 describe wheels and clock parts and Figs 8 and 9 parts for the pillars. The twin flanges at the top of the pendulum pillar were silver-soldered to pillar with a distance-piece between of the same thickness as the pendulum cheeks, with the silk in between. Drill and tap 5-B.A. at a suitable height the rear of the two clock pillars, and fit a short 5-B.A. stud for the magnet clips. The dial was a nice straightforward job. A piece of brass sheet was marked out with a pencil and filed up fairly true, and the two bosses

*Continued from page 370, "M.E.," October 2, 1947.

were soldered in position. A piece of wood had two recesses bored to clear the bosses, and the dial was fastened down and mounted on faceplate of lathe. After skimming up true, the grooves for the minute spaces and inner groove were turned up, using a small parting-off tool.

Now, as I am not much good at engraving, I adopted a "safety first" policy by drilling a $\frac{3}{16}$-in. hole in the centre of the wood backing-plate and using one of several pieces of tin notched exactly where a radial line of a numeral



Right-hand view of works, omitting frame distance-piece and dial boss

would be required. When it came to the V and X's, I filed the notch to the required angle and clamped down and scraped out numeral, with a thick or thin scraper. The sketch will, perhaps, make this clearer. The dial and bosses are shown on the next page. Two 5-B.A. screws were required, approximately 0.937 in. long, to go

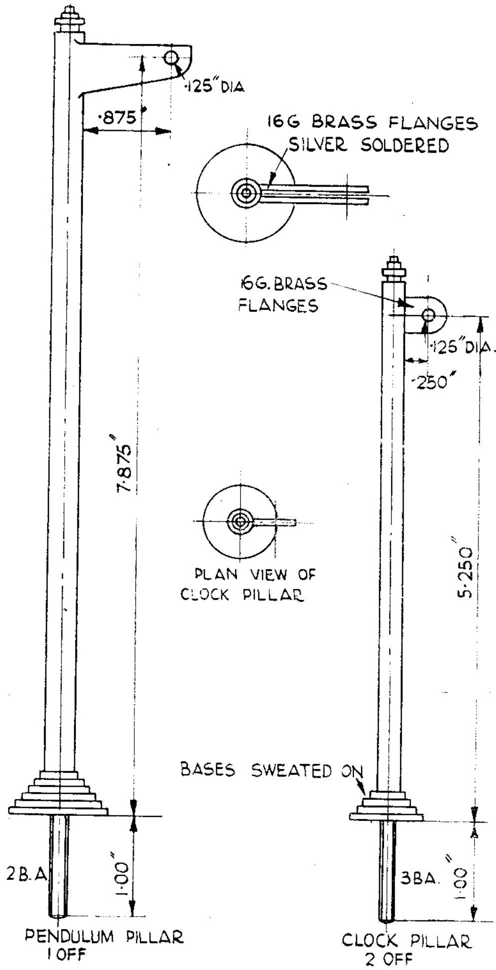
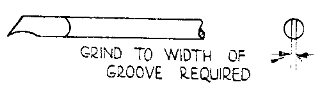
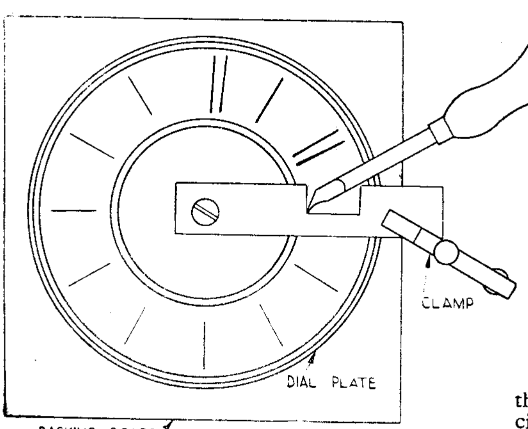


Fig. 9

through flange on pillar, clock frame and distance-piece, and screwed into dial boss. The dial, after engraving is finished, should be mounted on lathe faceplate and, after filling the engraving with a black cellulose paint, and



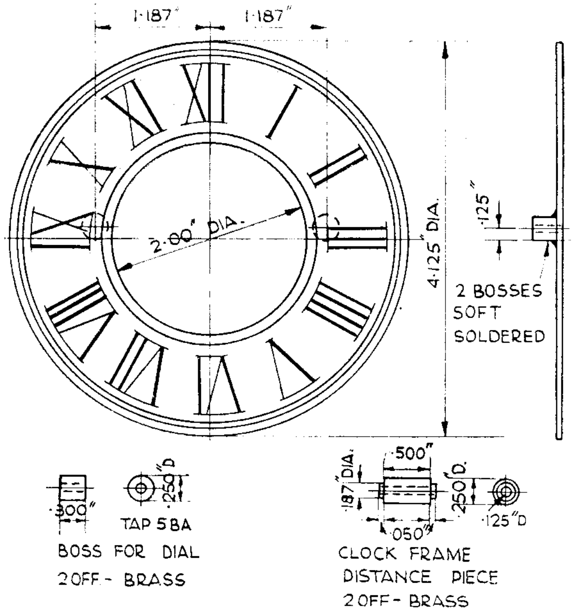
Engraving tool 0.250 *in. dia. silver-steel, hardened and tempered light straw at cutting-edge*



Method of engraving dial

thoroughly drying, should be given a fine circular grain. I used fine glass-paper and, when satisfied with the finish, lacquering with a gold, or a cellulose, lacquer.

I have not given any drawing of the hands, as they can be cut out of thin sheet steel to suit your own tastes. A couple of bosses will have to be turned up to suit the minute spindle and the hour wheel. The glass dome is a stock article. I checked one up on a friend's clock, one of those with a revolving balance - weight, and found it was $5\frac{3}{8}$ - in. internal diameter by $10\frac{1}{2}$ in. high. A friend helped me out with mine after we had nearly walked our shoes away looking in second-hand shops. The base will have to be turned up to suit whatever dome is obtained, and a deep recess turned out of the underside to accommodate a $1\frac{1}{2}$-volt dry cell, one pole of which is connected to the pendulum pillar and the other pole to the two clock pillars. I think I have made everything reasonably clear, but I will be pleased to answer any queries through the Editor.



Proposed Design for a Small Gas Turbine

(*Continued from page* 402)

discharge elbows by $\frac{3}{8}$ in. diameter pipe or cooling air trunk to the rear bearing housing.

No provision is shown for ignition, but this will take the form of a spark plug in each combustion can operated by a trembler coil for starting. No combustion can interconnectors are shown as used in full size practice, but in the interests of simplicity, it is hoped in the size of engine under consideration they will not be found necessary.

No details are shown of the method of fixing the impeller and turbine wheel to the shaft, but a taper form of mounting will probably be adopted.

The following table sets out the proposed dimensions of the main features of design which I may add are not "scientifically" designed in that no design formulae for either compressor or turbine was available covering the size under consideration. However, as much data as possible was obtained of full size engines and areas and sizes of parts have been kept to the ratios it appeared had been used in these.

Compressor	
Impeller diameter	4 in.
Intake "eye" diameter	2 in.
Blade tip	$\frac{3}{16}$ in.
Blade root (at 1 in. rad.)	$\frac{3}{8}$ in.
Cooling air trunks	3 in. × $\frac{3}{8}$ dia.
Combustion Cans (3)	
Entry diameter	1 in.
Maximum diameter	$2\frac{3}{8}$ in.
Discharge diameter	$1\frac{1}{4}$ in.
Length (total)	$5\frac{1}{2}$ in.
,, (to joint)	$1\frac{9}{16}$ in.
Flame Tubes (3)	
Maximum diameter	$1\frac{3}{4}$ in.
Discharge diameter	$1\frac{3}{16}$ in.
Entry diameter	$\frac{7}{8}$ in.
Turbo	
Diameter	$2\frac{1}{2}$ in.
Thickness	$\frac{5}{16}$ in.
Blades (18)	$\frac{3}{8}$ in. long
Nozzle Box	
Three branches.	

I trust the foregoing may be of interest and also the drawings, which are to scale; time does not permit me to do a complete set, however, they should serve to illustrate the description.

THE HEAT PUMP

by D. A. WRANGHAM (Principal, Sunderland Technical College)

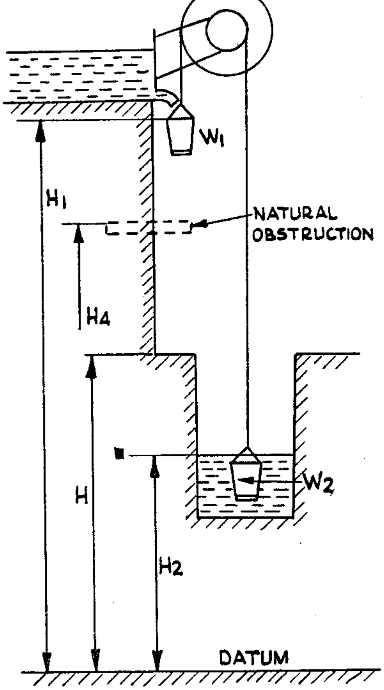
I AM not at all surprised at your correspondent having difficulty in appreciating the action of a heat pump, for, on the face or it, one would think that this appliance was producing something for nothing.

Moderate quantities of energy are available from the combustion of fuels, and enormous quantities from the splitting of the atom. This concentration is produced by nature, so why should army engineers trouble about up-grading? To do this would be as ridiculous as to pump water up to a reservoir in order to run a water turbine.

The action of the heat pump is probably best appreciated by considering a hydraulic analogy, as first suggested by Professor Ewing.

Consider a supply of water at the top of a mine shaft H_1 feet above some datum, whilst the water at the bottom of the shaft is H_2 ft. above the same datum.

Replace the cages by buckets, the pulleys by a Chinese windlass and imagine friction absent and the ropes and buckets weightless.



Let the bottom bucket be submerged and run water into the top bucket. When a certain weight W_1 lb. is run in, the top bucket will start to descend and lift W_2 lb. in the bottom bucket, movement will continue until the work done by the top bucket descending a distance $H_1 - H$ is equal to that done by the bottom bucket ascending a height $H - H_2$.

This equality is expressed by
$W_1 (H_1 - H) = W_2 (H - H_2)$.

At this common height which (in the case of the heat pump is determined by the temperature of the natural sink to which heat is rejected) both buckets may be emptied to discharge $W_1 + W_2$ lb. of water through a height $H - H_2$. This head is far more convenient for use than the head H_1, as, for example, the head in water service pipes compared with the head in the float tank. From the energy equation, the smaller this difference of elevation the greater the value of W_2.

In the case of a heat pump, W lb. of water may be replaced by W units of caloric or heat, and the heights H by absolute temperature T.

W_1 units of caloric, when allowed to do useful work in falling through a temperature range $T_1 - T$, can raise W_2 units of low grade heat from temperature T_2 to T. Thus, the effective heating value of W_1 becomes $W_1 + W_2$.

Contrast this with direct heating where the thermal head $T_1 - T$ is thrown away, and only W_1 units of heat are available.

Now let us consider the correspondent's suggestion for electric heating. W_1 units of caloric are released at temperature T_1 in the cylinder of an I.C. engine, or in the firebox of a steam engine.

To protect the plant against the effect of high temperature about one-third of this heat must be thrown away.

Next, the expansion of the working fluid, which conveys the heat through the organs of the engine, is definitely limited; so we must throw another third away in the exhaust, thereby leaving but one-third as mechanical energy. Of this, further losses are incurred on the electrical side.

To express this in the terms of the hydraulic analogy, W_1 units of heat are run into a bucket which is so leaky that one-third is lost before the bucket hits a natural obstruction (the temperature T_4 at the end of expansion). This obstruction discharges the remaining energy on to the scrap heap of the universe.

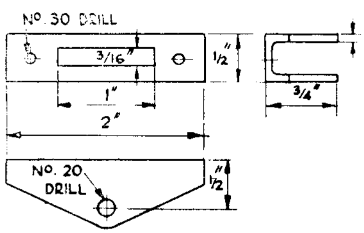
The diminishing quantity W_1 of caloric in its descent to H_4 raises W_2 units of electrical energy (which almost equals $\frac{W_1}{4}$) to a height of practically H_1. Except for grilling, this caloric is at far too high a temperature, and its tempering involves the same losses as occur with direct heating from fuel. It is, therefore, a most serious waste to extract high grade electrical energy from fuels merely to reconvert it to heat.

As long ago as 1851, Lord Kelvin appreciated the way in which we were dissipating our natural assets by direct or indirect heating, and he suggested a heat pump. Like other eminent men of vision, he was ignored, and the development of the heat pump was left to foreigners who are now reaping the honour and the glory, as well as the material benefits.

"L.B.S.C."

"HIELAN' LASSIE" — ACCESSORIES

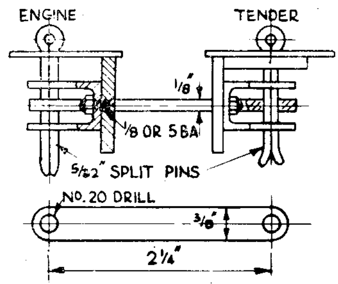
VERY little remains to complete the engine. In the issue in which appeared the section of the tender, some detail drawings were included, showing the drawbar, screw-coupling, buffers, and brake-pipe; and readers who can make anything by looking at a drawing, and not needing explanatory notes, have doubtless made these blobs and gadgets ere this. For beginners, and those who have not yet made them, the following notes may be helpful. The buffer sockets may be turned either from castings, which our advertisers can supply, or from $\frac{5}{8}$-in. round rod; brass or steel will do equally well. The shanks are



Drawbar bracket

screwed $\frac{3}{8}$ in. by 32. On the engine, they can be put through clearing holes in the beam, and have nuts to secure them; but on the tender, there isn't any room for nuts, and that is why I specified tapped holes in the buffer-beam. As the frames of the tender slightly overlap the holes for the buffer shanks, and we can't shift the buffers because it would upset the proper spacing, run a D-bit or a pin-drill into the holes in the buffer-beam, and enter it to a depth a little more than the length of the buffer shank. Run the tap in, to full depth of D-bitting; this will cut a thread on the recessed part, and allow the buffer-shank to enter full depth, as shown in the sketch mentioned.

The buffer-heads can either be turned from $\frac{7}{8}$-in. round mild-steel held in the three-jaw, or built-up by brazing bits of $\frac{5}{16}$-in. round mild-steel rod to discs or washers $\frac{7}{8}$-in. in diameter. On one occasion, I found that I had only a short piece of bar, not long enough for four buffer-heads, but wished to finish the buffers right off at the time, for some reason long forgotten. I chucked the piece of $\frac{7}{8}$-in. rod in the three-jaw, faced it, centred it and drilled a $\frac{1}{8}$-in. hole clean through, and parted it into four discs $\frac{1}{8}$ in. thick; there was just enough, and parting-off No. 3 with only enough left in the chuck for No. 4, was a tricky job, as you might guess! A piece of $\frac{5}{16}$-in. round mild-steel rod was then chucked, and a $\frac{1}{8}$-in. pip turned on the end, to fit tightly in the hole in the disc; this was parted-off at $\frac{1}{2}$ in. from the end, and "ditto repeatoed" three times. Each shank was then re-chucked, parted end outwards, centred, drilled and tapped for the spindle; the pip was then driven into the hole in a disc, and a judicious application of my blowpipe, plus a touch of white Sifbronze, rendered head and shank inseparable for evermore. The shanks were then chucked in the three-jaw, and each head turned nicely to shape, as shown in the section of the "Lassie's" buffers. The resulting heads were as neat as if turned from the solid, and the job took about the same length of time. The spindles for the "Lassie's" buffers are made from $1\frac{1}{2}$-in. lengths of $\frac{1}{8}$-in. round rod, either mild or silver-steel being suitable; they are screwed either $\frac{1}{8}$-in. or 5-B.A., and furnished with ordinary commercial nuts. The springs are wound up from 18- or 20-gauge steel wire; they need to be fairly stiff on a heavy and powerful locomotive.



Engine-and-tender coupling

Drawbar and Screw-coupling

The drawbar hooks are filed up from $\frac{1}{8}$-in. by $\frac{1}{2}$-in. flat steel, to the shape and dimensions given, a simple matter needing no detailing, except to remind beginners that the surplus metal above and below the shank, can be sawn away, leaving a minimum of elbow exercise with the file. But do, please, round off that part of the hook over which the coupling-link of the flat car will go! I have seen, even on exhibition jobs, and high-priced specially made commercial and professional engines, hooks left with sharp edges that would cut the coupling-link in two, if a careless driver opened the regulator all-of-a-sudden-Peggy. The hole is drilled $\frac{1}{8}$ in. and countersunk each side. When erecting, put a stiff spring on the squared shank, between the beam and the securing nut and washer.

The shackles of the screw-couplings are made from 3/32-in. steel rod or wire, the ends being filed half away and then bent into eyes with a pair of round-nose pliers. Braze or silver-solder them; if the eye should get blocked solid, put a

No. 40 drill through. Don't forget to put one shackle through the hole in the drawbar hook before bending the eyes, for you won't be able to get it through afterwards!

The swivels are turned from $\frac{3}{16}$-in. steel rod, the pips on each end being an easy fit in the shackle eyes. One swivel is drilled 3/32 in., and the other drilled No. 48 and tapped either 3/32 in. or 7-B.A. The shackles are sprung over the pips on the swivels. The screw is turned from a bit of $\frac{1}{8}$-in. or 5/32-in. round rod, the plain end being an easy fit in the plain hole in the swivel which is attached to the drawbar hook; push it through, and rivet over just sufficiently to prevent it coming out, but not enough to prevent it turning easily. The handle is a bit of 16-gauge spoke-wire screwed in, and the ball is turned from $\frac{3}{16}$-in. rod, and screwed on.

Brake-pipes

The brake-pipe is a bit of $\frac{1}{8}$-in. copper pipe—or copper wire would do equally well, as the pipes are only ornaments—bent to shape as shown in the drawing mentioned above, which also gives dimensions. The hose is a piece of $\frac{1}{8}$-in. rubber tube; solder a little bit of wire into the bent-over end of the pipe, and slip the tube over it, putting a wire clip on, to simulate the full-sized brake hose clip. The dolly ("baby's dummy") can be turned from a bit of $\frac{1}{4}$-in. round brass rod, the part with the eye being filed flat each side. Bend a bit of thin sheet brass or copper about $\frac{1}{8}$ in. wide, around the pipe, put the tongue of the dolly between the projecting ends, and rivet it with the head end of a domestic pin. Slip the end of the rubber hose over the "teat," and put another wire clip on, for the sake of appearance. The complete gadget is attached to the buffer beam, to the left of the drawbar, by a clip, half-round with a lug each side, like a plumber's pipe-clip. Solder the clip to the pipe, and drill a No. 51 hole through each lug, using $\frac{1}{16}$-in. or 10-B.A. hexagon-head or round-head screws to attach it to the buffer-beam.

Working vacuum brakes could, of course, be fitted, and I would gladly give instructions if they should be needed; but I don't advise them on any engine intended for hard work on either home or club tracks. They cannot be used for service stops, for reasons I have already explained when dealing with the tender brake; and it is hardly worth while going to a lot of trouble for something that cannot be used. If appearance is desired, simply fit hangers and brake blocks to the coupled wheels of the engine, similar to those described for the tender, but of course larger, and tighten the hanger bolts so that the blocks keep clear of the wheels. The bottom ends of the hangers should be connected across the engine by tie-rods made from $\frac{1}{8}$-in. round rod shouldered down at each end.

I originally intended to fit working Westinghouse brakes to my "Tugboat Annie" (I wouldn't have the vacuum-operated article as a free gift—an old engineman's prejudice!) but have never been able to squeeze in time to make the weeny donkey-pump, triple valves and accessories, and I'm afraid poor "Annie" will never get her automatic brakes now! She was at work the other evening, going as merrily as ever—though I have had to sharpen up the blast a little, to burn anthracite pea coal—and I'll bet the old signal thought to itself, "Well, now, that's a better-looking Southern engine than the big 'W.C.'s' and 'Q.I.'s' which I used to see at Coulsdon!" Incidentally, anthracite peas suit wide fireboxes, same as anthracite cobbles suited the American "Wootten" fireboxes; a shallow fire with a fairly good blast, makes bags of steam and lasts such a jolly long time that you forget when you put the last bit on!

Engine-and-Tender Coupling

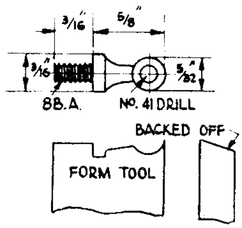
Bend up a couple of bits of 16-gauge sheet steel, to form a kind of channel, as shown in the accompanying sketch; cut a slot in each, corresponding to the slots in the drag-beam, and fit them over the slots, to the inside of the beams, by a $\frac{1}{8}$-in. or 5-B.A. countersunk screw and nut at each end. The holes for the pins which hold the coupling-link in place, are drilled No. 20. Use 5/32-in. ordinary commercial split-pins; then, if you drop one in the grass when coupling or uncoupling engine and tender, and can't find it, there's no need to waste your breath on reciting a verse in railroad Esperanto—just get another pin! The link is a bit of $\frac{1}{8}$-in. by $\frac{3}{8}$-in. flat steel, cut and drilled as shown.

Final Remarks

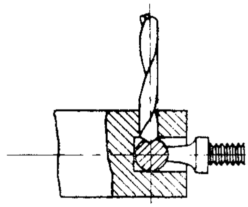
The notes on finishing off "Juliet" may be applied equally to the "Lassie." If anybody wants to make his own handrail knobs, they can be turned with a form-tool in the slide-rest, the tool being made from a flat file which is worn-out and useless for its original purpose. Young Curly was very great on making tools from bits of worn and broken files; one reason he always liked to light the kitchen fire himself, as mother never bothered to rake over the residue left from the previous day's fire, and any bits of steel that Curly left overnight in the fire to soften, usually had to be reclaimed from the domestic ash-can! The sketch shows the profile; the knobs can be drilled in a simple jig, which is easier—and quicker!—than setting up each one separately on an angle-plate. I use rustless steel wire for the handrails, as a friend who, alas! is now on the other side of the Great Divide, gave me a big bundle of drawn rustless steel in all sizes from $\frac{1}{16}$-in. to $\frac{3}{16}$-in.; but nickel-bronze wire, or even ordinary tinned iron wire, will keep bright without cleaning.

Steps can be bent up from 16-gauge sheet-steel, and riveted or screwed to both engine and tender frames. Guard-irons can be cut from 13-gauge steel, and also attached by riveting or screwing. As to the amount of detail put into the externals of the locomotive, that depends entirely on the whims and fancies of the builder. Our worthy friend, F. C. Hambleton—may his pencil point ever remain sharp!—likes to see plenty of detail, especially lamps, destination boards and what-have-you. Personally, I prefer to dispense with everything that isn't conspicuous by its absence, in a manner of speaking, on an engine intended for serious work, as all superfluous knobs and excrescences usually either get knocked off themselves, or knock bits off the operator's personal anatomy. I've had some, with other people's engines ; experience teaches —and is sometimes painful !

The notes on painting and operating "Juliet," may be taken as a guide for the "Lassie"; but recollect that here you have a very powerful and speedy locomotive which, if it were ever allowed to get out of hand, is capable of doing considerable damage. Therefore, don't "go mad" with it ; if you want to do a bit of "showing off"—perfectly understandable and quite justifiable, be it known —take it along to some continuous club track, where you can "let her out" without fear of disaster. This may seem superfluous to the uninitiated ; but one of my $2\frac{1}{2}$-in. gauge locomotives once ran away with its driver, smashed clean through a board fence, and injured the driver's head, arm and side, so that he had to have hospital treatment. Incidentally, all the damage the engine sustained, was a bent buffer-beam and a battered smokebox, so she came off best.



How to turn handrail knobs


How to drill handrail knobs

Just one more item. I have turned over all my original drawings of the "Lassie" (how much worry, time, and "brainstorming" were spent on getting them out, nobody could even guess) to the Southern Railway draughtsman, Mr. Roy Donaldson, of Ashford, and he is making proper tracings of them, from which blueprints will be made. Not being connected in any way with "the trade," and not wishing to "poach on other folks' preserves," in a manner of speaking, I don't sell blueprints, or anything else, for that matter ; so anybody who wants a set, should look out for announcements in the advertisement pages. Sets for "Juliet" are already available, and others are in course of preparation, which should satisfy many good folk who have written to me on this subject.

Correspondents of grandmothers' days never reckoned a letter was finished unless it had a P.S. tacked on to its tail ; so I'll be old-fashioned, too, and add one to this. Several correspondents say they have had some difficulty in getting $2\frac{7}{8}$-in. wheel castings for "Lassie's" tender, but plenty of $2\frac{3}{4}$-in. are available, and could they be used ? Certainly, by all means ! The difference isn't noticeable, especially as the wheels are almost hidden under the frame ; the only alteration you need make, is to drill the holes in the axleboxes $\frac{1}{16}$-in. nearer the bottom, to keep the same running position of the boxes in the horncheeks.

Expectations Fulfilled

Referring to "Juliet" above, one of these engines made a fine run on my own line last Thursday evening (time of writing). She was built from castings and materials supplied by Dick Simmonds, and was exhibited on his stand at the recent "show." The makers were Messrs. J. and C. Hughes, of West Byfleet, one of whom, I believe, is a signalman on the Southern Railway. Dick Simmonds telephoned to ask if I had seen a "Juliet" at work, and when I said "No" offered to bring her along for a run, an invitation promptly accepted. She did everything I claimed for the design, with a bit to spare. The engine, which bears the name of "Jabberwock," was finished off ahead of the instructions, so that some of the details are different from the "words and music," but the working parts are as specified, link-motion reversing-gear being fitted. Steam was raised in four minutes by aid of my electric blower. Dick Simmonds did the first lap, and warmed her up. I then added four shovels of coal to the fire, and proceeded to do two-thirds of a mile with only one stop. After the first lap, I had to open the firehole door, to prevent excessive blowing off. Being after dark, and a strange engine, I didn't notice that the water had gone up out of sight in the top nut of the gauge, until she started spitting water from the safety-valve, and a cloud of white steam from the chimney ; and although the by-pass valve was then fully opened, it was only after several laps, that the water came down to visible level in the glass. Meanwhile, the engine was travelling at a pretty good clip, with the lever in next notch to the middle, and only a crack of regulator opening. No more coal was added to the fire. To test the valve-setting, I stopped the engine, and let her restart notched up ; the beats were perfectly even, and she got away quite freely, without the least sign of "compression kick." Although short wheelbase 0-4-0 engines with big overhangs are usually tailwaggers, the "Jabberwock" never wagged hers at all, but ran perfectly steady the whole trip. So builders of "Juliet" will know what to expect from their own jobs !

Can You Beat This ?

A goodly number of engines of the "P.V. Baker" type have been built, or are now in hand, by followers of these notes ; and of those which have arrived at the running stage, there has been no complaint whatever, the usual tale being forthcoming that the engines are capable of doing more than I ever claimed for them. It is only an honest statement of fact, and no "blowing hot air," to say that no locomotive ever described in these notes, has been in any way whatever, unsuccessful ; usually the reverse, as stated above. In the case of the little 0-6-0, so named because the combination of piston-valves and "Baker" gear gave her the initials and name of one of my 1914-18 war munition girls (Patricia Violet Baker) a coincidence too good to be missed, I aimed at an easily-built and symmetrical locomotive of pleasing appearance, good efficiency, and simple to operate. One of them built by Mr. R. H. Procter, of Hildenborough, Kent, made a splendid show on my own road, hauling three passengers without the least effort, with the lever next to middle, maintaining full steam pressure, plenty of water, and doing best part of a mile on one firing.

You see a picture of her reproduced here, and she is a fine job, take it from Curly.

Well, the Trowbridge S.M.E. decided to build one as their club engine, and announced the fact. What was the amazement of the Secretary, to receive a letter, unsolicited, unwanted, and unwelcome, pointing out in derisive and sarcastic terms, that the design was all wrong, the engine could not possibly be a success, and so on and so forth! Anyway, the letter put the cat among the pigeons in no uncertain manner, the locomotive dept. of the club being "Live Steamers" to a man; and the chairman promptly addressed a personal letter to the said correspondent, telling him that, in spite of anything said against it, the engine will be built!

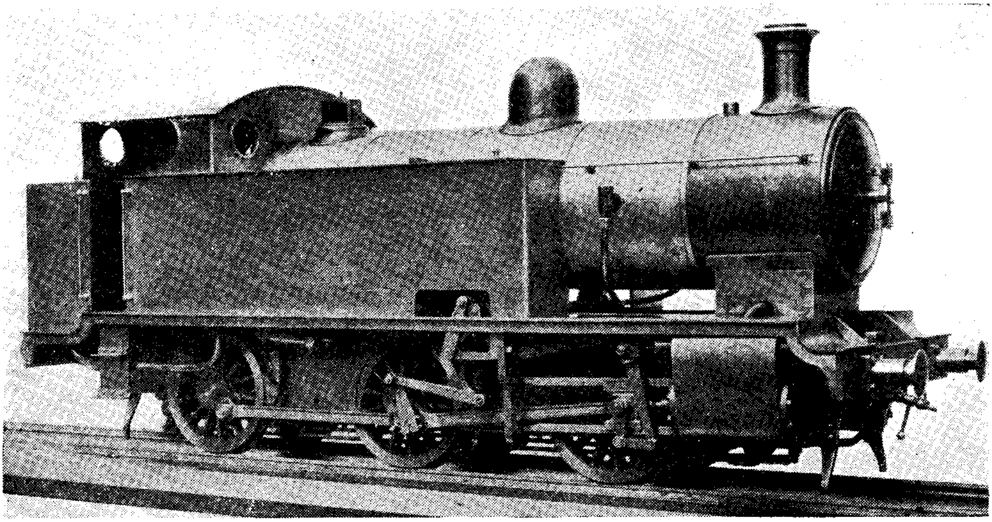
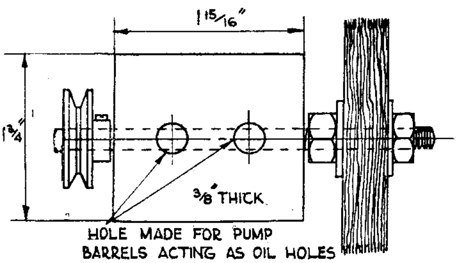


Photo by] [*R. C. Procter*

Mr. Procter's "P. V. Baker"

A Simple Buffing Spindle

REQUIRING to polish some silver-soldered boiler fittings, and knowing that I had a buffing wheel in a drawer in the workshop, a buffing spindle was made up in the following manner and from materials in hand.



The scrap-box revealed a piece of brass which had been intended for the valve-box for a locomotive force pump, but was discarded owing to a blow-hole in the casting.

The passage which had been drilled for the connection of the two pump barrels was drilled right through with a suitable drill and reamered to form a bearing for the $\frac{1}{4}$-in. silver-steel spindle. One end of this spindle was screwed 1 in. of $\frac{1}{4}$-in. 26 t.p.i. A nut was run on to this, then a washer and the mop gripped between another nut and washer.

A brass V-pulley was turned up and secured to the spindle with grub-screw through the collar of the pulley.

The brass bearing block was gripped in the lathe tool-holder with the mop to the right and the pulley opposite the self-centring chuck. A piece of strong leather boot-lace made a belt which ran round the chuck body and the pulley. The chuck being 5 in. in diameter, a good speed was obtained, and the belt was tightened by adjusting the top slide of the slide-rest.

Since then, a further spindle has been made to hold dental burrs and very small drills, and is run from the motor-driven overhead shafting.

It takes only a moment or two to rig the fitment up and, although made in a hurry, it works very well.—C. V. BAVIN.

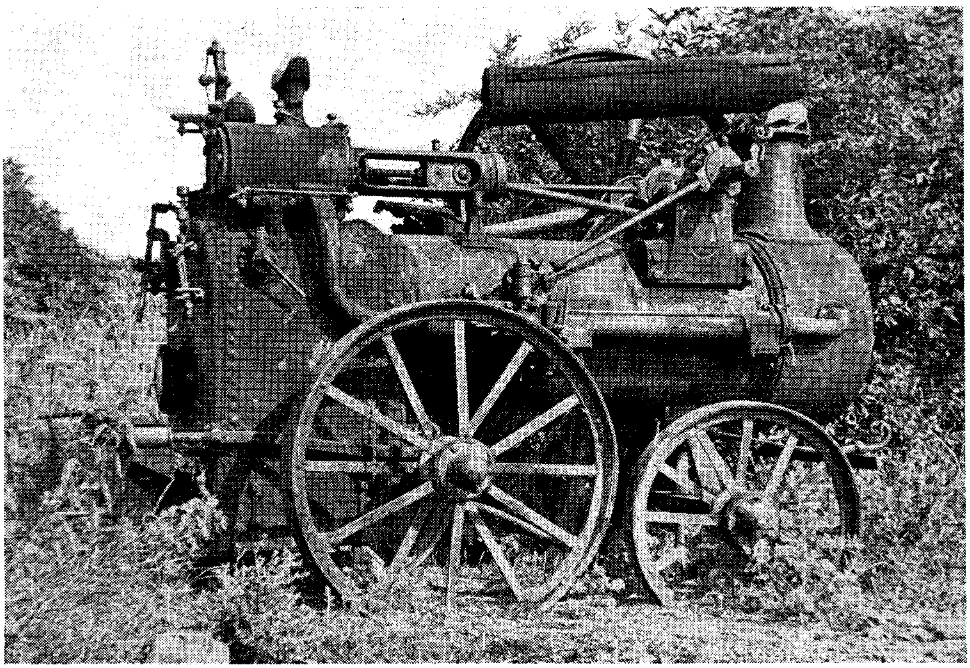
Editor's Correspondence

A Derelict Engine

DEAR SIR,—On one of my week-end visits to the Cotswolds recently, I came across an old engine near the village of Ilmington. In view of the notes and photographs you have published recently, the reproduced picture may be of interest to your readers.

It is a pity that this engine has been left derelict, but if anyone would like more details I can give them the exact location, on request, through the Editor. Yours faithfully,

Leamington Spa. N. E. RIDDIHOUGH.



I.C. Engines at the Exhibition

DEAR SIR,—I should be glad if you could correct a mis-statement which occurs in Mr. E. T. Westbury's article above-named.

Mr. Westbury says "Two of the model racing cars shown in the competition section have *commercially-made engines* (my italics) fitted, but the third, a model of the Mercedes-Benz . . . is equipped with an engine built by the constructor . . ."

May I say that the Sports Car Chassis, No. 194, exhibited by Mr. H. R. Hartley, is also fitted "with an engine built by the constructor"—a 5-c.c. "Falcon I" two-stroke built by Mr. Hartley himself from a set of commercial castings.

It is possible that Mr. Westbury's statement is a slip of the pen, but I am sure that, in fairness to a member of this society, you will not object to publishing this correction.

Yours faithfully,

W. J. HUGHES.

Public Relations Officer,
Sheffield and District S.M.E.E.

Tee Slots in Lathe Slides

DEAR SIR,—Referring to the article by Mr. McNeill in your issue of June 26th (just to hand), I have had a little experience of broken "T" slots and heartily support his plea for stronger lips to these slots.

Some years ago a friend of mine purchased a secondhand 3-in. lathe, the lips of the "T" slots of which were only $\frac{1}{8}$-in. deep. There came a day when a "dig in" occurred with the result that large pieces of the lips to one of the slots were broken out. I well remember how downcast my friend was. This looked like the end of his lathe operations, or perhaps an expensive bit of replacement. However, on measuring up the top slide, we found that it could just be fixed on the table of my No. 1 Adept hand shaper. (A very handy little machine this is, if used within its capacity.) Setting the lathe slide carefully, we were able to machine out a recess on each side of the broken slot, of dimensions to receive two pieces of mild steel 3/16-in. thick, and, from memory, about $\frac{3}{4}$-in. wide, and of a length equal to the width of the top slide. These were fastened in place by three countersunk screws in each, and after fastening, the inner edges of the inserts were machined to give the necessary width between lips. Of course the head of the "T" bolt had to be reduced a little, as the lip of the "T" slot was now 3/16 in. instead of $\frac{1}{8}$ in. This has not proved any disadvantage. Since then, the other two slots having given trouble, they were similarly treated, and have given good service over several years. Mr. McNeill's experience when bolting his vertical slide to the lathe carriage was unfortunate, but I feel that he is a gentleman of some experience and ability and will have overcome the broken "T" slot in his own way—it would be interesting to hear as to the method—or perhaps he may have purchased a new slide. I would however, like to draw the attention of newcomers to his suggested preventive, viz., to insert a "stout and truly parallel faced" plate between the slide and the carriage (emphasis on the "truly"), in any case where the attachment or work does not bear upon the upper surface of the lip. If the "T" bolt and nut impart a squeezing action to the lip of the slot rather than a direct upward pull, as is the case in the sketch on page 780 of THE MODEL ENGINEER of 26/6/47, there is far less likelihood of damage. Let us hope, however, that lathe manufacturers may be led to incorporate "T" slots with stronger lips.

In the matter of design, I am still hoping that some enterprising firm may adopt the idea of producing a lathe which can be purchased as a simple lathe, with all attachments, e.g. back gear, screwcutting gear, dividing head (simple) micrometer collars, screw cutting indicator, etc., etc., available to be added as the purchaser desires or as the state of his finances will permit.

Yours faithfully,

Cromwell, N.Z. T. M. ELLIS.

Corrected V. Uncorrected Valve-gears

DEAR SIR,—In his comments on valve-gears in your August 14th issue, "L.B.S.C." attributes to Charles Brown's gears the parentage of the Joy gear. This is not correct, as Charles Brown's gear dates from about 1878. Engleman's gear of 1859 is the true parent of all the successful gears taking their motion from the connecting-rod, and the one patented in that year was probably the earliest to give what may be regarded as a "correct" motion to the valve. Wolff, in his *Modern Locomotive Practice* calls attention to this very point.

Arguments against the shortcomings, largely imaginary, of straight slides, seem to overlook the fact that, in *any but mid-gear* (which is not a working position anyhow) a curved slide introduces errors which are not present with a straight slide, furthermore, such errors are not normally correctable, whilst those introduced by a straight slide are, by off-setting the top joint (in an outside admission valve-gear) of the vibrating limb, almost perfectly corrected.

Actually, Greenly gave, as long ago as 1907 (MODEL ENGINEER 23/5/07), a fully-detailed set of instructions for laying out accurately either a Heywood or his own reversed Heywood gear, whilst, in 12/6/24, he gave details of the ultimate correction for the very minor error introduced by the use of a straight slide.

A gear properly laid out on these principles, whether it be the original Heywood or Greenly's more compact version of it, will give a steam distribution at least as good as, and probably better than, that given by a correctly designed Joy gear.

The "corrected" gear was "so called" to distinguish it from the original simple "uncorrected" gear. It may be of interest to readers to learn that Doble used this "uncorrected" form of gear for his early steam car engines, without even dropping an arm from the connecting-rod to obtain an extra long vibrating limb as is done on, what has, with such subtle humour, been christened the "Gravedigger" gear. This gear, *in practice*, functioned perfectly satisfactorily.

Yours faithfully,

Wealdstone. K. N. HARRIS.

Electro-Mechanical Oscillograph

DEAR SIR,—With reference to the article "Watching the Wheels Go Round," in your issue, June 26th, No. 2405, page 777. Under paragraph headed, "Uses of Duddell Oscillograph," page 779, mention is made of these units being used in connection with sound-track rendering of cinematograph work.

Can you furnish me with details of this particular unit, as I am very interested, which must be capable of 100 per cent. response at frequencies 10,000—20,000 cycles. If unable to oblige with the above, perhaps you could give me the name of the manufacturers.

Yours faithfully,

Hanwell. ED. L. FOSTER.

DEAR SIR,—In reply to your correspondent, Mr. Foster, the unit used for sound track recording would be similar to the mirror galvo shown in the article which would be used to illuminate a transverse slit behind which the film would be drawn in such a way that only half the length of the slit would normally be illuminated.

When the galvo was being vibrated to the full, that is with maximum sound level, the light on the slit would vary between the whole length of the slit and none at all at the frequency of the sound being recorded.

I think it is extremely doubtful whether a flat response between 10 kc. and 20 kc. can be obtained by this method, and would myself have placed the upper limit as about 5 kc.

Further information could no doubt be obtained from the Cambridge Instrument Co., 13, Grosvenor Place, London, S.W.1, who manufacture oscillograph galvanometers.

Yours faithfully,

H.C.W.