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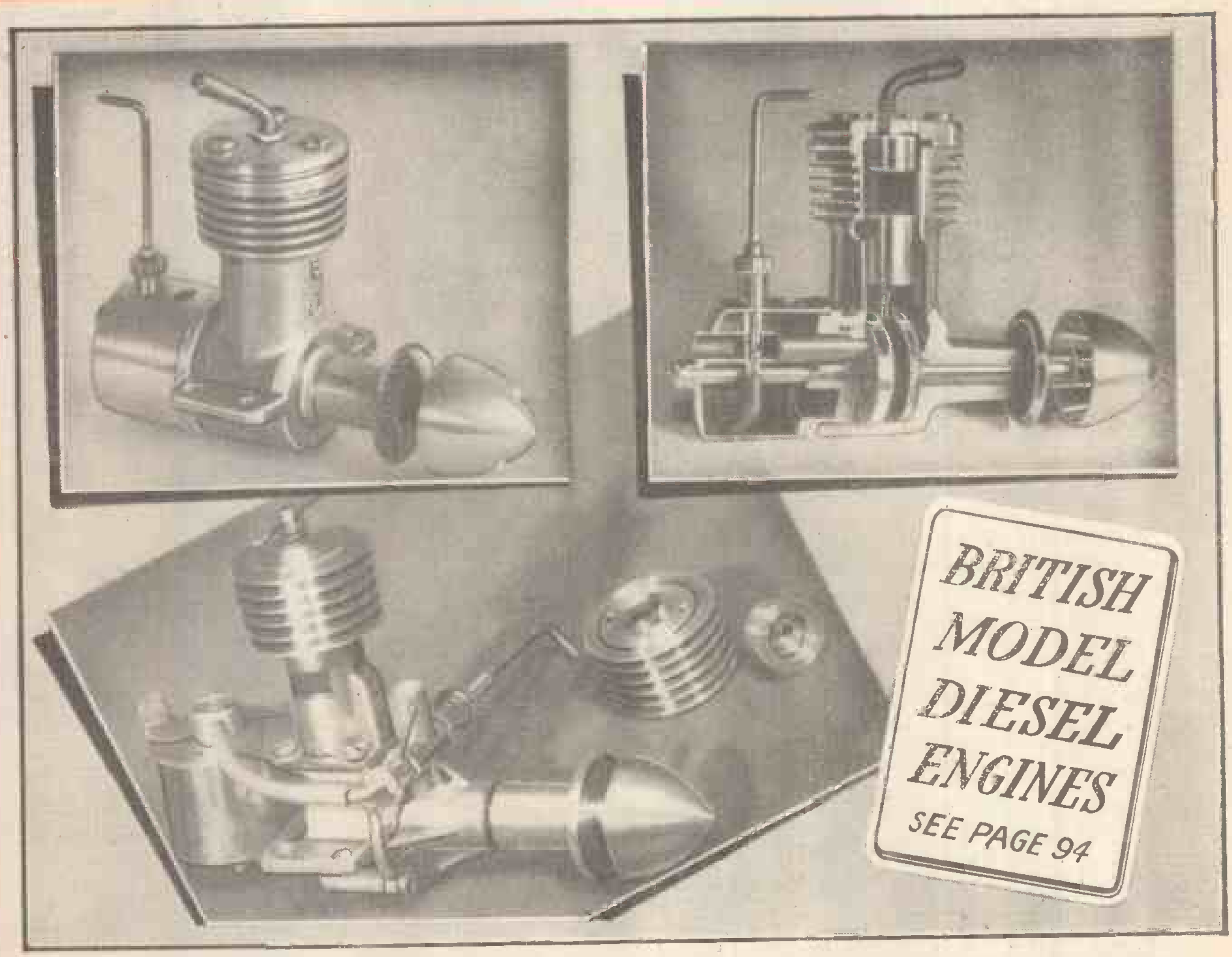
PRACTICAL MECHANICS

9D

EDITOR: F. J. CAMM

DECEMBER 1949



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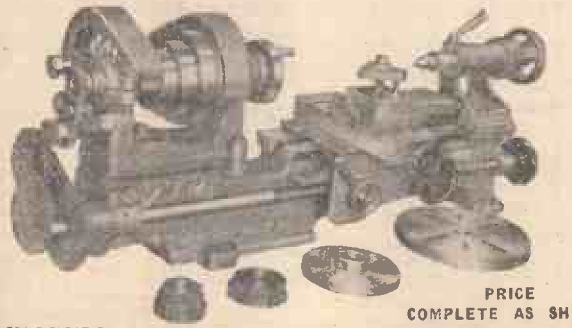

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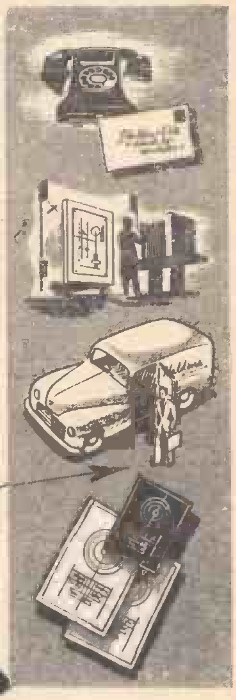

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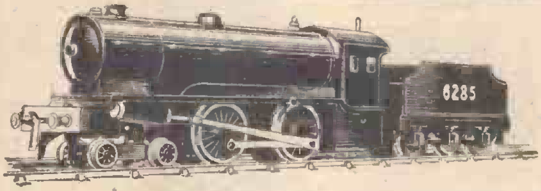

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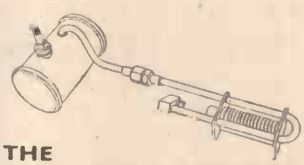

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PRACTICAL MECHANICS

EDITOR F. J. CAMM

DECEMBER 1949
VOL. XVII. No. 194

Owing to the paper shortage "The Cyclist," "Practical Motorist," and "Home Movies" are temporarily incorporated.

FAIR COMMENT

By THE EDITOR

TELEVISION PROGRESS

THE great advance in television technique revealed at the last radio show, coupled with the announcement that the Sutton Coldfield Station is to open on December 17th, have aroused the interest of the public residing in what may be called the service areas. This at present is presumed to be an area of 25 miles radius from the transmitting station, although good reception has been reported from localities over 100 miles away. Indeed, reception has been reported in South Africa, but this may be regarded as freakish and exceptional.

With the Alexandra Palace serving what may be regarded as the Metropolitan Area and the Sutton Coldfield station serving the Midlands, the viewing public has been considerably enlarged, and with this has come a great demand, not only for commercial television receivers, but also for instructions for the construction of a television receiver. I have received many hundreds of these during the past three months, and at our stand at Radiolympia I dealt with many hundreds of queries on the subject. The increasing interest in this latest scientific conjuring trick is evinced by the increased demand for our *Television and Short-wave Manual*.

Our companion journal, *Practical Wireless*, has already commenced the publication of a short series of articles describing the construction of a television receiver specially designed in the PRACTICAL MECHANICS and *Practical Wireless* laboratories and upon which I have been concentrating for more than a year. It is an 18-valve receiver, of the T.R.F. type, single sideband, and with permanent magnet focusing. Readers who wish to make their own television receiver may care to follow that series of articles. In due course I shall describe the construction of a television receiver in this journal, and the design for it is already completed. One of the difficulties at the moment is that component supply is short.

The B.B.C. is tied to the present system of transmission for a number of years, but whether the large tube, or the direct vision tube as it is more correctly termed, will remain as the ultimate, cannot be forecast. Already it has been successfully demonstrated that a projection system using a small cathode ray tube no larger than an ordinary valve, and an optical system for projection, yields results which are equal to those of the direct vision tube. Such systems were demonstrated at Radiolympia. A disadvantage with this latter system is that whereas with the direct vision tube the extra high tension is of the order 7,000-10,000 volts, with the projection system this jumps to 25,000 volts.

It must not be overlooked that the construction of a television receiver at home cannot be undertaken by the very unskilled, as can an ordinary broadcast receiver, nor can it be guaranteed, when the construction is complete, that you will switch on and receive pictures. A great deal of adjustment, trimming and lining up, calling for expensive apparatus, is necessary. I have taken care in the design which we describe in *Practical Wireless* and in the P.M. design to reduce this adjustment to a minimum, and I have made a point of insisting that manufacturers supply components to very close limits in relation to the specification given to them.

At present television receivers are dear; indeed, they cannot be made very much cheaper than the commercial article. The great advantage is that, having built the receiver, you are better acquainted with its principles and thus better able to correct errors and to service it. As the television areas increase so will prices go down. Manufacturers cannot at present lay down production lines on a scale suitable for a nation-wide demand. The latter is comparatively small when compared with the sales of broadcast receivers. There can be no doubt, however, that television is here to stay, and that within 25 years the present system of broadcasting will be as dead as the silent film.

The Editor and Staff Extend Seasonal Greetings To All Readers

LIGHTER BICYCLES

AT the recent Cycle Show it was noticeable that all of the large manufacturers have now entered the light-weight market. Elsewhere in this issue the outstanding exhibits are dealt with, but the accent on almost every stand was lightness. Hitherto light-weight bicycles have been pioneered by a small number of comparatively small firms catering chiefly for the club man. But small firms are not able to embark upon experimental work with new metals and methods to the same extent as large firms. In fact, few of the small firms have an experimental department at all. It would seem, therefore, that the large firms will be able to turn out light-weight bicycles more cheaply than the former.

Full advantage is being taken of the new alloys and synthetic materials to reduce the weight of the present-day touring bicycle, which weighs between 30 and 40lb. A bicycle weighing only 16lb. was exhibited by one firm, but at the Paris Cycle Show, which clashed with our own Cycle Show, there was exhibited a track bicycle with a steel frame which weighed only 6½lb. Weight had been reduced, of course, everywhere, and instead of the normal 32 spokes in the front wheel there were 16, and only 20 in the rear, against 40. A track machine is not suitable for utility purposes. It is stripped of all accessories, such as saddle bags, bell, brakes, etc., but even so, to have got the weight down to so low a figure, indicates what can be done. As a contributor points out, however, lightness is chiefly an advantage when starting and stopping the bicycle. It has much less momentum when in motion, and thus would require a greater effort to maintain a given speed than a heavy one.

"PRACTICAL ENGINEERING" DATA SHEETS

READERS who missed earlier notices are reminded that each week eight valuable engineering data sheets are included in *Practical Engineering*, our companion journal, which is published at 4d. every Friday. There will be at least 160 of these sheets, and an index will be included. A special binder may be obtained at the reduced price of 2s., and readers who wish to collect the sheets from No. 1 may obtain back issues, specially reserved for the purpose. The series commenced in *Practical Engineering* dated September 30th.

LATHE COMPETITION

A FURTHER design for a home-made lathe, submitted in connection with our lathe design competition, appears elsewhere in this issue. Next month we shall announce details of a further interesting competition which will appeal to our ingenious readers.

F. J. C.

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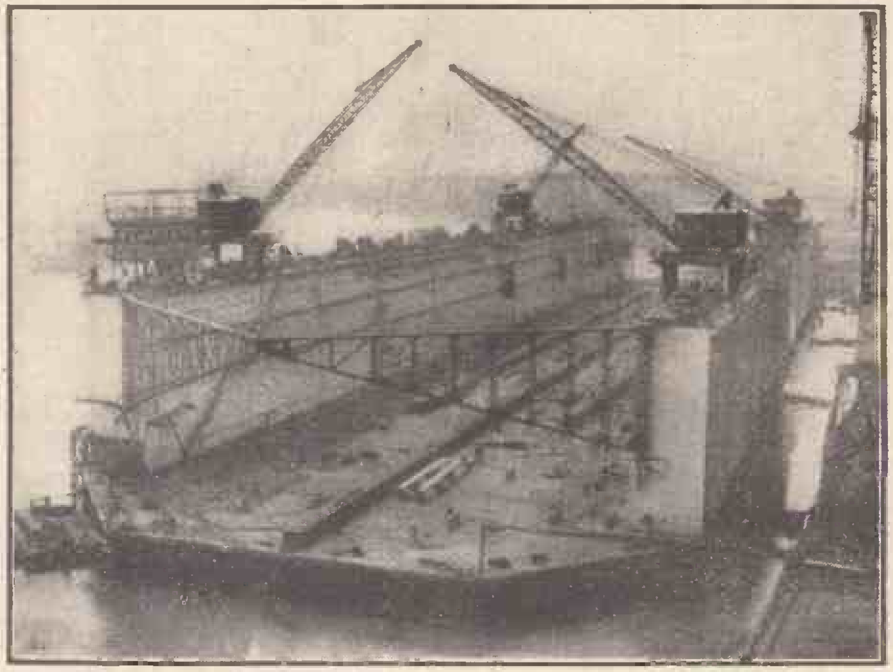
The Mechanics of Floating Docks

A Brief Description of the Various Types in Use

By H. E. HUTTER, A.M.I.Mech.E.

THE floating dock provides complete facilities for lifting and repairing vessels up to the largest sizes.

The earliest known form of dock consisted of an old ship's hull with the stern cut off and deck and beams removed. The vessel to be docked was warped inside the hull, the stern gap closed and the hull pumped out. One of the earliest docks appears to have been put in service at Deptford in 1774 and remained in commission until 1816. What may be termed the prototype of the modern dock appears to have been first built by Swan, Hunter and Wigham Richardson in 1859. Since that time there have been many developments in general design and types.



The Singapore dock, which was built for the British Admiralty, has a lifting capacity of 55,000 tons.

Graving Docks

The alternative to the floating dock is the graving dock, in which the water is pumped out after the vessel has been brought in, the gates closed and the vessel shored up. Both types of dock have special features and can be compared on a comparative basis.

The construction time of a large graving dock is a matter of years, due to the preliminary work required and the vast amount of excavation needed. This must be compared with the floating dock in which site dredging will be carried out whilst the dock is being built, the actual construction being very straightforward and frequently completed in a very short time. Swan, Hunter prepared the drawings of an 11,000-ton dock in eight days, and seven-and-a-half months later it was in position in Germany. An exceptional instance was a 7,500-ton dock which was built and towed 5,000 miles to its site in four months.

The graving dock cannot be extended to meet future demands, whereas the floating dock can be designed for lengthening, and will be kept in commission until the new section arrives on site.

A considerable depth of water is usually required for a floating dock, but this seldom calls for extensive dredging, and little trouble appears to occur from silting up. High tides which interfere with the operation of a graving dock give no trouble.

A floating dock has been known to lift a vessel more than 214ft. longer than the dock, the total weight naturally being within the stated lifting capacity; but on the other hand a 4,500-ton vessel had the after-end lifted by a 3,000-ton dock sufficient to fit a new propeller. Heavy parts such as these can be brought alongside by barge, and readily transferred to the pontoon.

The most usual material for dock construction is steel, though during the last war a considerable number were made of concrete, due to the facilities for manufacture. A rather unusual dock of 3,000 tons capacity was constructed in the U.S.A. from timber, but, unfortunately, during towing across the Atlantic it completely disintegrated in a storm.

The control of a floating dock during docking operations is a skilled matter, bearing in mind that the dock is, in fact, a very large flat-bottomed pontoon, and any unequal weight distribution will cause a whole dock to cant; this can take place very quickly, and calls for much experience to avoid serious trouble. It is not unusual for a three-million-pound ship to be lifted in a one-million-pound dock.

A number of different types of steel docks are used, some of which have what is termed self-docking features; that is, a part of the actual pontoon can be lifted out of the water for inspection and repair, using the remainder of the dock for lifting purposes. In the Admiralty the practice is never to self dock. A dock can also be careened to examine the lower walls, but this does not expose the bottom. This does not appear to be a serious matter, as the accepted life for a steel dock is of the order of fifty years.

Floating docks will be divided into two classes according to whether they are self-

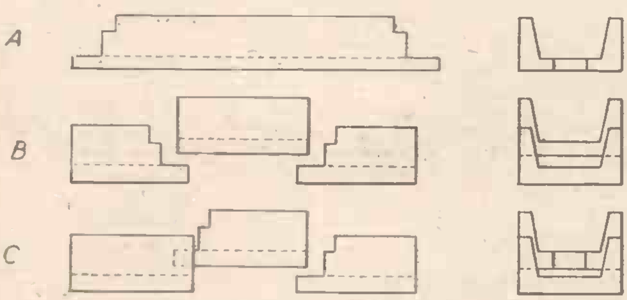


Fig. 1.—Bolted sectional dock.

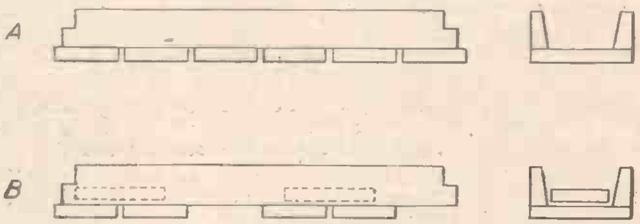


Fig. 2.—Sectional pontoon dock.

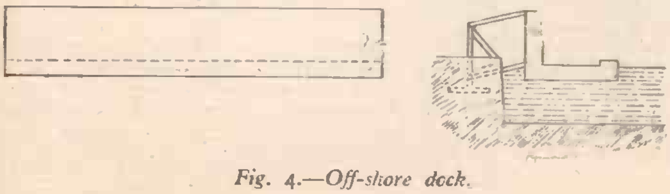


Fig. 4.—Off-shore dock.

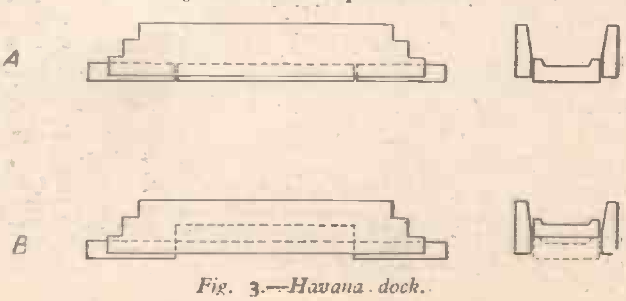


Fig. 3.—Havana dock.

docking or not self-docking. The box type of dock which consists of a square section U is made up with the two side walls and the bottom pontoon all connected as one permanent structure, and while this has been employed in the past, present practice for the largest size is a bolted sectional dock, as shown in Fig. 1. The usual form of construction is to build in three sections of more or less equal length, each one of which forms a complete box dock, and they can be attached together by bolts or rivets, and are only disconnected when self-docking is called for. In Figure 1 A the whole dock is shown assembled, B shows the centre section lifted by the two end sections, and C one of the end sections lifted by the middle portion and the other end section.

Sectional Pontoon Dock

The sectional pontoon dock is, from the self-docking point of view, one of the simplest, and it consists of a number of separate pontoons lying transversely to the length of the dock ; resting upon these pontoons and bolted to them are two continuous side walls. The length of each pontoon, that is, the length in way of the keel line, must be less than the clear width between the two fixed walls, and this allows any pontoon after attachment to be passed between the two walls and lifted similarly to a vessel. Figure 2 A shows the assembly of the whole dock, and B two of the pontoons lifted by the remainder of the dock.

This type of construction is of great assistance when the dock is constructed in a situation where the other types could not be completed. The relatively small pontoons can be built and launched and the walls afterwards built on them when afloat.

A special type of dock which is now rarely employed is shown in Fig. 3, and consists of two continuous sides similar to the previous mentioned types, but having the pontoons connected between instead of underneath the walls. Fig. 3 B shows how readily one of the pontoons can be lifted. The Admiralty have a dock of this type capable of lifting up to 17,000 tons.

Off-shore Dock

A simple type of construction and one of great value is the off-shore dock shown in Fig. 4. As can be seen from the illustration the pontoon and the side wall are connected together, and hinged girders are provided to connect the side wall to the shore so that the dock can be sunk or floated while remaining practically in the same position. After sinking, a vessel can be brought into the dock by either end or can be warped in sideways. The vessel is then shored up and the dock lifted. The usual practice is to divide the dock into two equal halves so that one half can be lifted upon the other.

Depositing Dock

Another interesting type of dock is the depositing dock, which is similar in section to the last-mentioned type, but, while the side wall is continuous, the pontoon is made up of a number of fingers with spaces between them. Stability to the dock is obtained by means of parallel beams hinged and connected to a flat outrigger. This type of dock is again constructed in two halves, the complete dock being shown in Fig. 5, which also shows half of it being lifted by the other half.

The depositing dock can dock vessels in the orthodox way but, due to the cut-out portion of the pontoon, it is capable of depositing them on to a grid-iron formed by groups of piles, each set of piles being spaced apart to admit the fingers of the dock pontoons. After the vessel has been lifted the dock is advanced forward so that these fingers pass between the groups of piles, and after sinking the dock again the vessel is left high and dry on the grid-

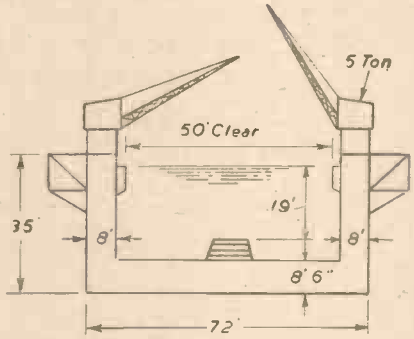


Fig. 6.—A destroyer dock.

iron. This type of dock has also been used in harbour construction for lifting large reinforced concrete blocks, which are built on a timber framework and then lifted off by the dock. Sinking of the dock allows the blocks to float off and they can be towed to their final position, where are are finally sunk. Frequently blocks as big as 2,000 tons each have been handled in this way.

The employment of concrete docks during the war was not so much with a view to saving the steel but to avoid the use of platers and other skilled labour. In this country they were built near the Thames estuary and at Hampshire, the method being to excavate a basin near to the seashore and after completion of the work the sea wall was broken down and the dock floated out. The amount of steel saved over an all-steel dock was only about 30 per cent., but it will be noted later that the weight of the complete dock was very much greater than for the equivalent steel dock, and it is for this reason that the saving in steel was so small.

The inflexibility of concrete compared with steel called for a variation in the normal method of working.

It is necessary to know the weight distribution of a vessel before lifting, and it is possible that a short heavy vessel cannot be lifted by a dock even though the total weight of the vessel is less than the lifting capacity of the dock. When lifting in a steel dock arrangements are made to assist in control, pumping out of the tanks, and to keep the bending moments in the different parts of the dock at zero. In the case of the concrete dock this is not possible, and all that can be done is to provide float indicators in the tanks to operate in conjunction with the weight curve of the vessel being lifted. Particular care is also required in towing.

In the case of docks required for naval use a self-contained power supply is essential and this is usually done from diesel electric sets. Full workshop equipment and cranes are needed with accommodation for the crew. Should they go to the tropics proper ventilation and lagging is essential.

Destroyer Dock

A concrete construction destroyer dock with a lifting capacity of 2,750 tons is shown in Fig 6. This actual dock was towed nearly 15,000 miles to Sydney. The total weight of the structure is 1,725 tons, which is increased to 2,470 tons in full working condition with all equipment. The time of construction averaged a year.. The overall length of pontoon which, as shown in Fig. 6, is 72ft. wide, is 350ft., and the whole dock is arranged with a draft of 19ft. The time to lift a vessel after it has been put into position is one-and-a-half hours, pumping being performed by four vertical spindle pumps each capable of pumping 25 tons of water per minute.

A larger type of dock, termed a cruiser dock, with a lifting capacity of 15,200 tons, is shown in Fig 7. The weight of this structure was 6,050 tons, and with full compliment of machinery, cranes, etc., the weight was increased to 7,560 tons in working order. The 117ft. by 14ft. pontoon is 527ft. long, and the maximum draft required is 26ft. 7ins.

The amount of water to be pumped out of a dock of this nature is naturally dependent on the weight of the ship being lifted and also its draft, as this will determine the extent to which the dock will be sunk. In the case of this cruiser dock the maximum requirement is such that 42,000 tons of water must be pumped out, and this can be done in three-and-a-half hours by employing four vertical spindle pumps which will each remove 53 tons of water per minute. The pumps, like other equipment aboard the dock, are electrically driven, and the main source of power is a 900 k.w. generating set.

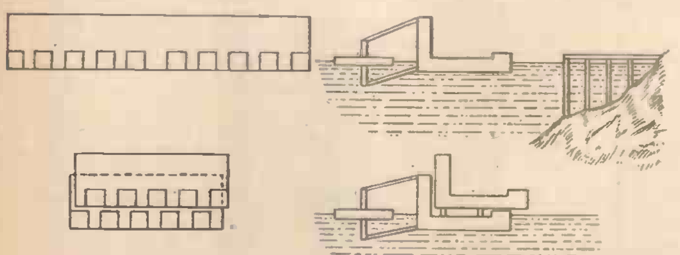


Fig. 5.—(Above) Depositing dock.

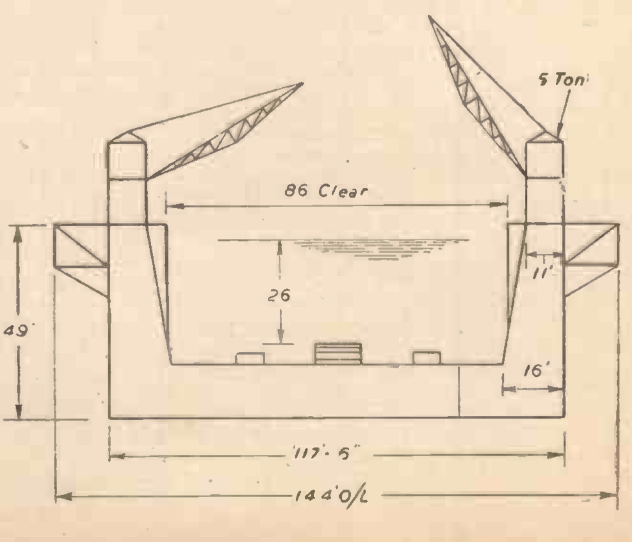


Fig. 7.—(Right) Diagram of a cruiser dock, having a lifting capacity of 15,200 tons.

A Print Glazer and Drier

A Simple Electrically Heated Apparatus for Glazing Photographic Prints.

By H. A. ROBINSON

THE drier and glazer for photographic prints shown in the accompanying illustrations is very effective and easily made. Essentially, it is a metal box containing a heater with a stainless steel or chromium plate for the top, upon which the prints are squeegeed. Unlike glass, prints will never stick to plates of this type, and when dry they peel off nicely with a high gloss.

Experience has shown the writer that stainless steel plates are in the long run better than chromium, as in time the chromium surface tends to wear away, leaving the base exposed, upon which prints certainly *will* stick. Stainless steel is the same material throughout and consequently never loses its surface.

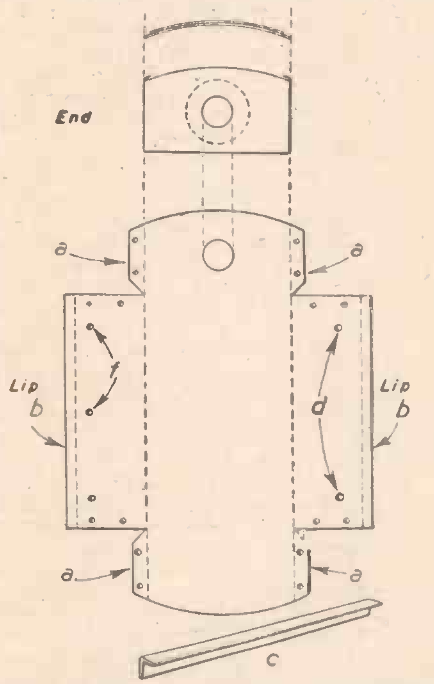


Fig. 1.—Details of the "blank" for forming the box.

These "high-polish" plates, which are sold for print glazing, can be obtained from photographic dealers in various sizes from about 10in. by 14in.

When the wet prints have been placed on the plate and squeegeed a canvas apron is fixed tightly over the top and left in position till drying is completed: it is important that this apron should be in tight contact with the prints all the time, hence careful fitting is essential. This all-over contact is assisted at the edges by the fact that the glazing plate is fastened to an under plate, thus making the glazing surface flush with the side lips of the box (see Fig. 2).

Constructional Details

The size of the box is dependent upon the size of plate that has been obtained and so dimensions have been omitted here, but these can be easily gauged with the plate to hand to work from.

The box is first cut, as Fig. 1, in thin tinplate, which is obtainable from any tinsmith. The flaps (a) are for turning over and riveting (or bolting) to the sides, when the box shape has been secured by bending along the dotted lines, as indicated in the sketch.

The most awkward part of this cutting and shaping is the forming of the two side lips (b) under which the plate on its base slides, and which, when in position, is kept arched and tight by the end pieces. It is best to cut the tin at the sides wider than shown at (b) to start with, and then make the bend to the correct angle and finally trim the lip to the desired width.

Should any real trouble be experienced here the lips can be made as separate strips (c) riveted in position.

To hold the electric bulb socket for the bulb supplying the heat, a circular hole is cut in one of the ends to take a standard collared socket, the main point here being that the bulb must stand out free without actually touching the top plates or bottom of the casing. Two holes are also drilled at (d) to take the bolt assembly (e) which holds the apron, and three holes are drilled at (f) to hold the end of the canvas apron, as shown.

Glazing Plate

The stainless steel or chromium plate is fastened by six flat headed rivets at the extreme edge to the under plate of aluminium (g) which in its turn is just big enough to arch over the ends of the box and slip under the lips (b), Fig. 2. The main point in the fastening of the two plates together is that the rivets must be put in at the extreme edge after holes have been drilled to prevent denting. Soft rivets must be used and should be tapped gently as they are flattened out, and finally the top of the rivet appearing on the top surface must be made as flush as possible with the surface compatible with strength. These precautions are necessary so as to lose as little glazing surface as possible. The rivets down one side can be put in on the flat, but the plate should be given the approximate final curve before drilling the further side.

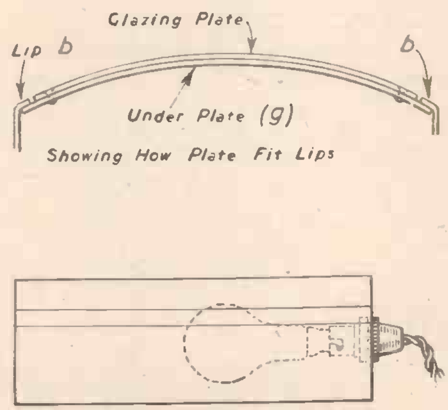
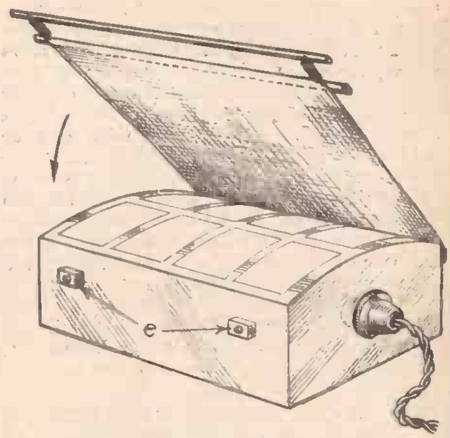


Fig. 2.—The glazing plate, and side view of the drier.



The complete drier and glazer.

Finally comes fitting the apron, Fig. 3. This can be made from a strip of fairly stout canvas. At the permanently fastened end it is wrapped once round a strip of metal (h) bored to agree with the holes (f) to which it is fastened by three small bolts. The further end is folded over and sewn back to form a small channel through which goes a stiff rod (k).

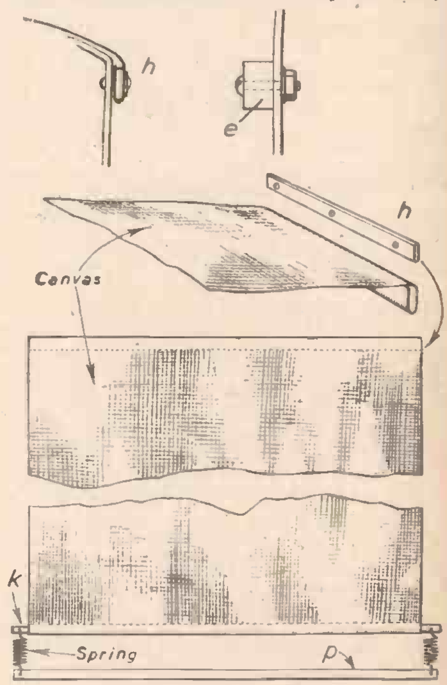


Fig. 3.—Details of apron.

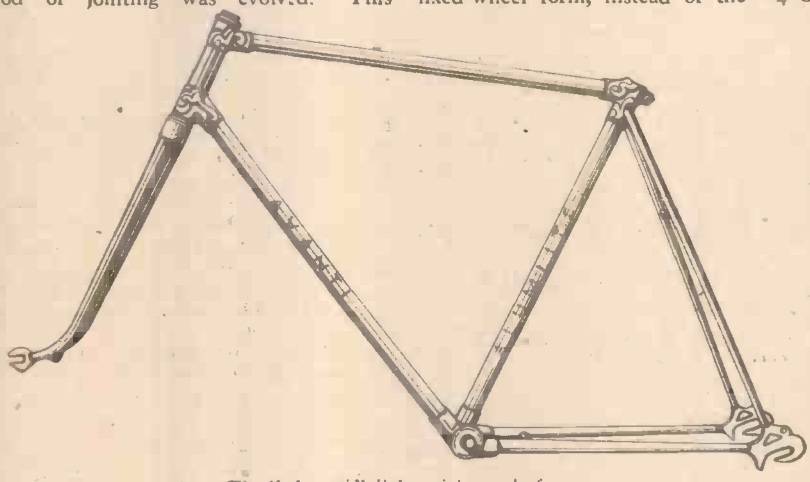
Two short coil-springs attach this to the second rod (p). Everything is arranged so that when pulled over the rod (p) will slip over the small blocks (e) and be under tension. It is best to adjust the length, if not right at first, by undoing the fixed end of the cloth and refitting after wrapping more (or less) canvas round the metal box.

Silver Jubilee Cycle Show

By R. L. JEFFERSON

EARL'S COURT seemed to be the bright spot on a dull London day. Once again emphasis was on colour, more so than last year. There is a more general use of alloy steel tubing: The gap—noticeable some years ago—between the small specialist maker and the larger manufacturers with regard to lightweights is closing; in fact, there is little to choose between them in their particular price range.

Coming to the exhibits, I was attracted by Alumlite, 59, Great Lister Street, Birmingham, 7. Here was shown for the first time the "Avanti" frame, Pat. No. 3620. After two years' intensive research a new method of jointing was evolved. This method eliminates welding together with costly filing and cleaning-up operations. On the particular model shown, the head angle was 73 deg. with a 71-deg. seat. The weight of the frame with interiors, less seat pin and chain wheel and cranks, was 4½lb.—a considerable reduction on a steel frame. The tensile strength of the tubing used is 25-27 tons per square inch.



The "Avanti" lightweight cycle frame.

Also shown were the popular "K.P." solid section alloy rim for H.P. tyres. These are supplied drilled for 32, 40 or 36 spoking. A range of handlebar stems in alloy and jointed by the same method as the "Avanti" frame were shown at competitive prices.

On Armstrong's stand, No. 28, the new model of their Continental range, the "North Road" was the centre of interest. Fitted with a double chainwheel, combined with a three-speed derailleur giving six speeds, it should fill the bill for the keen clubman. The price of this model is £39 9s. 4d. inclusive. All the well-known "Moth" range are retained for this season with additional refinements.

Lightweight Models

Stand No. 160, Bates of London, was attracting the lightweight enthusiast. A new finish, obtained by spraying two colours at once from the same gun, was most attractive. The "Eucadian," a new model in "531" tubing, caters for the cyclist of moderate means. The well-known "Volante," "Vendomes" and "Vegrandis" proved as popular as ever.

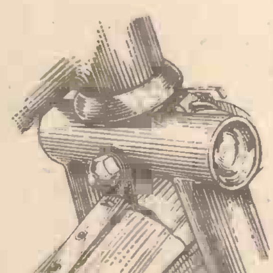
More manufacturers are now turning to the light tourist market, and this was evident on Stand 40, B.S.A. Here was a newcomer, the "Light Tourist 619A." Frame is of butted "531," sizes 21in. or 23in., shod with Tourist "Sprite" tyres and fitted with flat "all rounder" handlebars, brakes are the well-known B.S.A. centre-pull callipers, finish is green with gold lines. At £14 16s., single speed, it should prove popular. Optional extras are B.S.A. three-speed hub or B.S.A. "4 Star" chaingear at appropriate extra prices.

The supreme example of B.S.A. lightweights was the "Gold Column." This model has a "531" frame with upright angles, a Brooks saddle, Dunlop H.P. rims and tyres and is fitted with the "4 Star" chaingear. The price with this specification is £31 1s. inclusive. In double-sided fixed-wheel form, instead of the "4 Star" gear, the price is £28 7s. 4d. and the weight 22lb. 14oz.

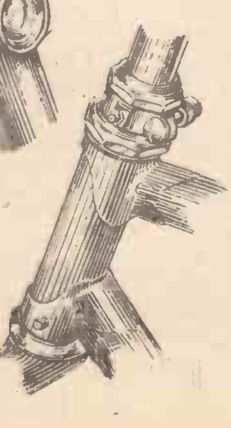
The B.S.A. "Snap" control for their three-speeds was also shown together with the twist-grip gear control, and, of course, the "Hub-lite" dynamo which attracted so much attention on its introduction last year. I found this stand very busy and equally interesting.

One of the largest stands at the show—No. 49—was occupied by Coventry Eagle. The new "claw" attachment of the seat stays to the seat lug proved of interest.

In all there are 20 models displayed at prices from £11 17s. 6d. to the super model 78 at £26 19s. 6d.



Mudguard attachment to Raleigh fork crown.



The neat head-lugs and Tecalemit lubricated head bearings.

Dawes 19in. Frame

A long-felt want has been filled by Dawes Cycles, Stand No. 53. This is the introduction of the "Shorts" model. The frame of this model has a 19in. seat tube, a top tube of 20⅝in. and a wheelbase of 40in.; for small women, youngsters and small men this should prove popular.

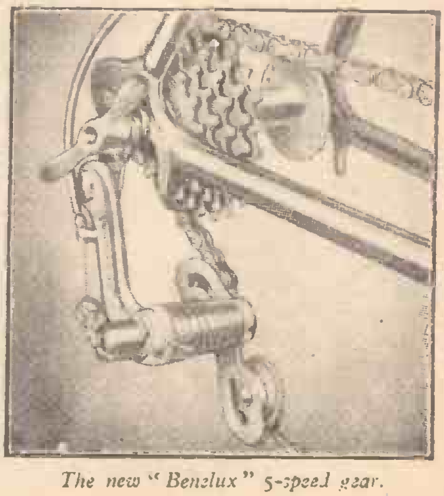
All Dawes sports models are now fitted with alloy bends as standard equipment. The "Courier" has its intricate lugs neatly outlined in contrasting colour. The "Imitape" sleeve grip so popular this season are also standard on all sports models.

A most attractive stand was that of Dayton Cycles, No. 15. Here the very popular "Amalgan" frame was in evidence, made up into several models of the road-racing range. The Dayton "Roadmaster" at £15 19s. 6d. presents exceptional value. The angles of this model are 72 deg./71deg. head and seat, 41½in. wheelbase. It may be had in red, yellow or light blue with contrasting lines. The weight is 26½lb. This is the cheapest model in the "Amalgan" framed range. At the other end of the scale is the "Classique," which has done so well during the past season.

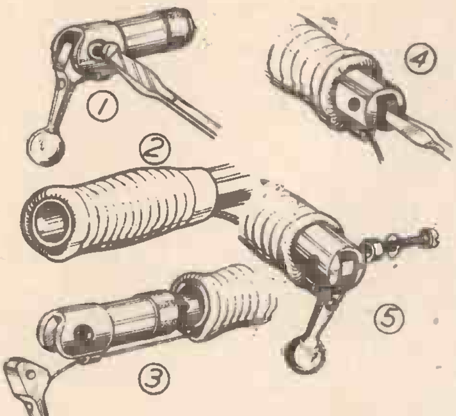
The old-established firm of Elswick Cycles occupied Stand No. 50. The centre of attraction in the Clubman range was the 1950 "Rapier." The frame of Reynolds "531" tubing has head and seat angles of 73 deg./71 deg. respectively, wheelbase 41in., seat tube 22in. (men's), 21in. (ladies'). Lugwork and fork crown are very attractive and individual, front forks are fully chromium plated. At £21 16s. this model should enhance the already high Elswick reputation.

The "Lightweight Tourer" at £18 1s. 9d. (men's) and £18 7s. (ladies') was good value. The frames are fully brazed-up with solid fork-ends, fitted with 26in. x 1⅜in. Dunlop Endrick rims and Tourist "Sprite" tyres, raised handlebars on a 3in. extension and a Sturmey-Archer medium ratio three-speed gear and black or coloured finish to choice.

The long experience in the lightweight trade of R. O. Harrison, Stand No. 159, was reflected in the models shown. The "Shortwin," introduced last year, has the down tube splayed into two "D" members and brazed widely at the bracket shell. The wheelbase of this model is 39in. At £12 12s. (frame only) it presents very good value.



The new "Benelux" 5-speed gear.



Assembling the components of the "Benelux" control.

"Kestrel" Models

The great success of the men's "Kestrel" model by Hercules (Stand No. 57) has led the firm to introduce an equivalent ladies' mount. The frame of Reynolds "531" tubing has the well-known Hercules double taper seat stays and is, of course, fully brazed up. The Endrick rims on narrow-barrel hubs are shod with Dunlop "Sprite" tyres. The finish is in polychromatic gold with decorative peaks and head. The single-speed model (21in. frame) weighs 28lb. and retails at £14 7s. 3d. New type callipers and rat-trap pedals are fitted to the "Kestrel" and certain sports models.

A new model also is the "Kestrel Lightweight Tourist." Sizes available are 21in. or 23in. seat tubes, frame of Reynolds "531" tubing is fully brazed up with cutaway lugs. This model is fitted with 26 x 1⅜in. Endrick rims, Dunlop Tourist "Sprite" tyres, a neat metal chainguard over the top run of the chain, flat "All Rounder" handlebars and the "Herailleur" chaingear. Black enamel with gold lining and a cream seat tube panel complete a most attractive mount which sells at £17 5s. 1d. inclusive.

Finally, Hercules have introduced the ladies "Shopping Model." This is a low built, black enamelled bicycle, with 26 x 1⅜in. rims shod with Tourist "Sprite" tyres and a spring seat saddle. Fitted with a cane shopping basket to the handlebars this model should appeal to the busy suburban housewife. It retails at £13 7s. 6d.

On Stand No. 170, Messrs. T. Higgins and Sons, Ltd. were showing an extremely neat tricycle known as the "Ultralite." This was fitted with a double chainwheel and a five-speed derailleur gear on the rear axle, giving a total of ten gears. Twin hub brakes were also fitted to the rear wheels. The well-known welded "Ultralite" and brazed "El Continenta" frames were attracting much attention.

There were many items of interest on Stand No. 32, occupied by Hobbs, of Barbican. The company have found that the majority of club riders are guided by the makers themselves, and are standardising their specifications accordingly. The "Blue Riband" models are for the benefit of those who like to select their own angles, wheelbase, etc. Three tandems, for racing, club and tourist use were shown. In addition, new introductions were a complete tricycle and a tricycle conversion set. A long-felt want has been filled by the introduction of the "Racelite" chainset with its 6¾in. cranks.

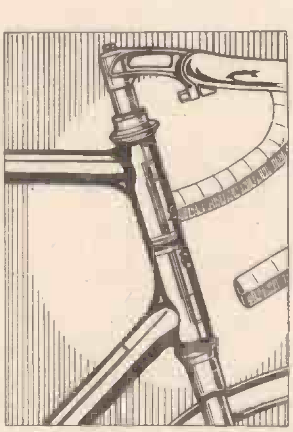
Tourist Machines

Coming to the Humber Stand, No. 18, was most refreshing. Subdued lighting added to the countryside effect, which was complete even to a waterfall and a rustic hump-backed bridge over a stream. I lingered here and inspected the new "Beeston Tourist" model, a frame of "531" tubing, round tapered forks and many alloy fittings made this a most attractive mount for the tourist. In single speed form it retails at £19 14s. 1d. inclusive.

The Humber "Royal" has all the well-known features, including Dyno-luxe lighting with a new filter switch giving automatic changeover from dry cell battery to dyno-hub, a Lucas bell and an alloy prop stand are also fitted. The price of this most complete bicycle is £22 7s. 1d. inclusive.

A late arrival at Stand No. 36, James Cycles Ltd., was an attractive lightweight tricycle. A single wheel drive was used. Shod with high pressure wheels and tyres, this model retails at £50.

The success of the "Superlux" range during the past season has guaranteed their retention with additional small refinements. The "James Olympic" is the most expensive, and light alloy fittings make this a most attractive mount for the discerning rider.



The head of the Roi-de-Velo all-alloy welded frame.

Another firm who are catering for the keen tourist is "New Hudson"—Stand No. 38. Model G.30 is their new "Light Tourist." Reynolds "531" tubing, Endrick rims and Tourist "Sprite" tyres are fitted. The machine is attractively finished in maroon enamel with gold lining. In single speed form this model is priced at £14 6s. 9d., hub or chain gears extra. Detailed refinements have been carried out to the New Hudson range for the new season, prices range from £12 6s. 8d. to £17 0s. 5d.

A most comprehensive display was that of Paris Cycles, Stand No. 164. Three tandems, a triplet, ten racing models and four tourist mounts were shown. Among the singles, the unorthodox "Galibier" was creating great interest. A curved rear seat tube on the tandem shortens the wheelbase and adds to the rigidity of the frame.

Stand No. 8—J. A. Phillips and Co.—was one of the largest at Earl's Court. A big variety of models were shown catering for every need, both here and abroad. The "Phantom" has a Reynolds "531" frame with angles of 73 deg./71 deg. head and seat, 41½in. wheelbase, Dunlop H.P. rims and tyres, Brooks B.17 saddle, weighs 24lb., and is finished in translucent blue, green, orange or rose. The price of this outstanding model is £27 19s. 6d. inclusive. The "Vox Populi" range in "531" at £14 15s. represents very good value.

Raleigh Dural-framed Lightweight

The focus of interest on the Raleigh stands, Nos. 47 and 190, was the new dural-framed lightweight. The model shown weighed 16lb. complete. The machine, of welded construction, was highly polished all over and certainly presented a "new look."

For 1950 Raleigh have redesigned the popular "Clubman" range. The head and seat angles are 73 deg./71 deg. respectively, and built with Reynolds "531" throughout. Thin taper seat and chainstays, 27in. stainless steel H.P. rims and Dunlop Road Racing tyres and many alloy parts are fitted to this model, which is finished in flamboyant electric-blue with chromium plated front and rear fork-ends. The weight (single speed) with kitbag comes out at 25½lb. and the inclusive price is £27 5s. 9d.

A neat feature on most roadster and light roadster models is the brazed on pulley for the Sturmey gear cable.

The "Superbe" range have had a great success since the last show, and in addition to the very complete specification, which includes Dyno-luxe lighting unit with the new automatic filter switch which gives a light whether the bicycle is stationary or moving, these models are now fitted with a light alloy prop stand.

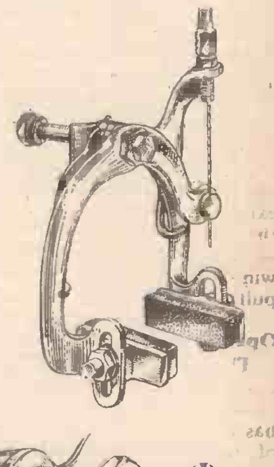
Stand No. 35—Royal Enfield—were again showing the "Bullet-3." This model of upright design now has a 3-pin flanged steel chainwheel with fluted cranks instead of the alloy set shown last year. The "Firefly" with its new blue head tube was also receiving its share of interest. The "Tourist" models are fitted with a large number of light alloy parts and cater for both sexes.

All the well-known Rudge features were on Stand No. 16. The sports models are now standardised in coloured finishes, and fitted with the new Dunlop "Silver Sprite" covers and 6in. sleeve grips. In addition, two show cases were on view, showing the process of manufacturing the celebrated Rudge fork crown and bottom bracket shell. Both of these units are pressings.

Stand No. 56, Sun Cycles, was very attractive. All the models shown were fitted either with Dunlop "Sprite" or high pressure tyres. The "Wasp" and "Manxman" were as popular as ever. I was very attracted by a cream "Wasp" tandem. The lugged frame with neat cut-outs was fitted with drum-hubbed wheels and the Sun patent heel brake. At £45 12s. 8d. it represented outstanding value.

All Sunbeams, Stand No. 39, are now fitted with the "little oil bath" and B.S.A. 3-speed hub as standard equipment, an attractive green finish is offered. The "Wayfarer" model S.W.3 now has a Reynolds "531" frame. The W.R.6 model is for the discriminating tourist and features are a 3/16in. raced bottom head bearing, brazed on brake pivots and concealed 3-speed cable. The hub gear is controlled by twist-grip. This model retails at £19 2s. 11d.

Several new models were introduced by Wearwell Cycles, Stand No. 62. The outstanding exhibit here was the new "Superjet" in "531" throughout. In addition the well-known and deservedly popular "Shadow" frame sets were also shown.



The Webb hooded lever brake, and details of pivot bearing and locking pin.

Tyres and accessories

Among those firms specialising in factoring tyres and accessories, I found the new "Benelux" gear, on Cyclo's Stand No. 87, of great interest. Three, four or five sprockets may be used. Also shown was the "Benelux" handlebar gear control, and this can be fitted either to the left or right handlebar end. No drilling is required and the control is adaptable to all Continental single wire racing gears. At 10s. 6d., with handlebar length transmission, it should prove very popular.

On Dunlop's Stand No. 72 was shown the new ultra-lightweight high-pressure cover and tube. Together these weigh 15oz. against the 19oz. of the standard high-pressure cover and tube. It is claimed that this combination will give the speed and liveliness of tubulars, and the cover is available in black or red. The tube, of highest grade red rubber, is fitted with a high pressure valve. The cover retails at 17s. 6d., the tube at 3s. 11d. At 8s. 9d. the "Silver Sprite" presents good value and outstanding appearance, available in sizes 26 x 1$\frac{1}{4}$in. and 26 x 1$\frac{3}{8}$in. it will also later be available in 27 x 1$\frac{1}{4}$in. This will be good news for clubmen who ride their 27in. wheels in the winter.

A serious bid to capture the growing lightweight tyre market is made by Firestone—Stand No. 74. They have introduced a new high-pressure cover and tube in size 27 x 1$\frac{1}{4}$in. only. The cover, of black carbon rubber, has a maximum weight of 13oz. Special features in the construction of the fabric help to restrict punctures.

The lightweight factoring company of W. F. Holdsworth, Stand No. 158, were again showing their now deservedly popular "Allez" accessories including the chainwheel set and feeding bottles. I was told that the alloy chainwheel is standing up well to wear. The "Roi-de-Velo" all-alloy frame was attracting much attention. It has been tested on the road during the last eighteen months and has proved light, rigid and responsive. Strengthening webbs are fitted to the junctions of the head and down tubes. The retail price of the frame in lustre finish is £17 17s. od. Output of this model is limited only by labour problems as these frames require a great deal of specialised treatment and inquiries and orders for this frame have been brisk. Also on view was the Tricycle Conversion Set which should enable those who so desire to taste the joys of tricycling at the reasonable price of £12.

Sturmey-Archer Gear

The re-introduction by Sturmey-Archer (Stand No. 155) of their ultra-close ratio gear is bound to create a great deal of interest in sporting circles. Now known as the A.C., it has an increase from normal of 6.6 per cent. and a decrease of 7.7 per cent. The A.C. gear, in common with the close, ultra-close and medium ratio hubs, has an alloy shell, thereby saving 4oz. in weight. Large scale coloured models of hub interiors showing their working were much appreciated by the public.

H. C. Webb & Co., occupying Stand No. 99, were featuring a new calliper brake, and a choice of two alloy levers is offered for the tourist and clubman. The lever is deeply valanced to prevent side-play. The arch of steel has a new feature, the pivot bearings are adjusted by a fine thread nut (26 to 1in.) against the face of the outer arch and secured by a locking pin. The well-known Quill racing pedal and the 3$\frac{5}{8}$in. rat-trap with Allen key fitting were also shown.

Export Boom

It is impossible in the space at my disposal to do justice to the wealth of display. One thing is certain—the cycle trade is quite definitely playing its part in the export field. I was informed on stand after stand that the orders are simply pouring in. One firm alone (Hercules) booked an order by phone for 10,000 cycles if shipped within a month. Yes, those machines will arrive on time.

I came away from Earl's Court happy to have met and spoken to men who have proved by results (£2,000,000 increase in exports in the first six months of this year) that, given the opportunity, the British are the peer of any race on earth when it comes to delivering the goods.

An Automatic Poultry Feeder

By S. HOWEY

ALL one needs to make this poultry feeder is an alarm clock, a toffee tin of the shape shown in sketch, length of cord, piece of thin steel wire, two small bolts or two small screws, and two strips of brass and extension rod for alarm winder.

The toffee tin will have to be modified, and this entails a slot being cut the whole width of bottom face "A." The two flaps to cover this aperture are made from separate pieces of tin, a hinge being formed up on each, and just where the two flaps meet a like formation is made as at "B."

One piece of the brass strip should be bent round so as to grip the clock, and two lugs formed at each end, these being drilled with a clearance hole for the two 4 B.A. screws. Now take the other strip, lay it flat, put the clamp around the clock, setting the lugs or feet on to the flat brass strip, mark off where the two holes should be drilled and drill with a No. 4 B.A. tapping drill, afterwards threading the holes. Always ensure that the clock is securely clamped before drilling the holes.

The flat strip should now be soldered across the container as at "C." A piece of tin should be drilled, bent up in the shape of a U, and soldered at the top of the container as at "D."

The clock should now be modified by the removal of the bell and alarm winder; the extension rod, which is threaded similar to the alarm winder spindle, has a nut fitted on one end and screwed on to the alarm winder spindle together with the 1in. wood pulley wheel as at "E."

Operation

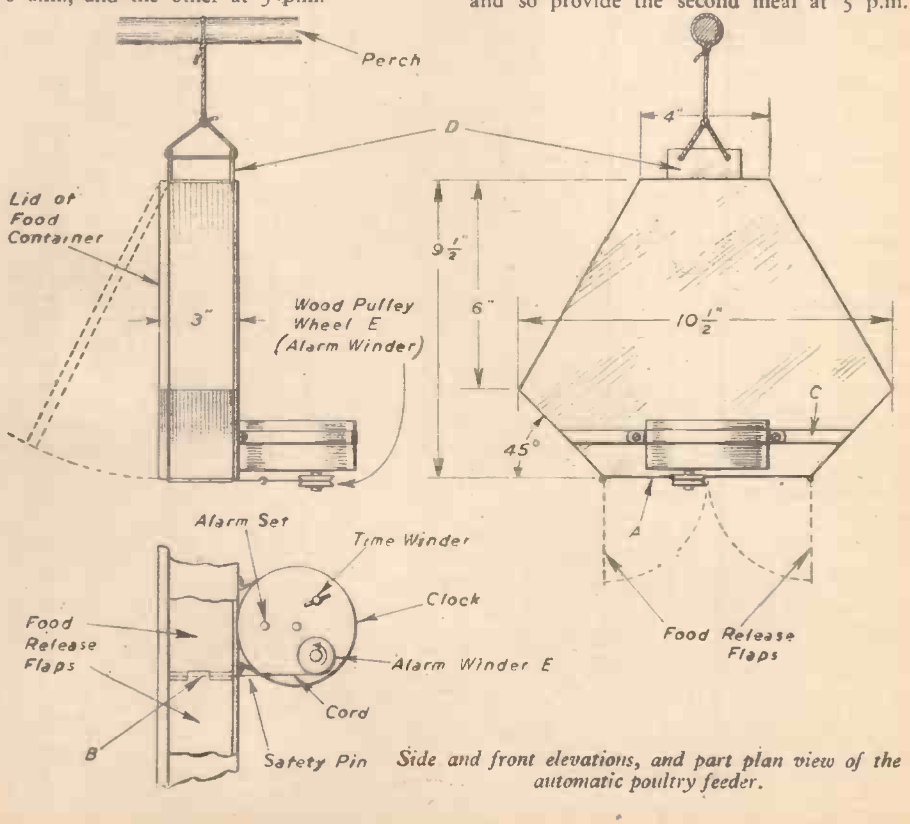
The clock should now be clamped to the food container, the two food release traps closed and secured by the safety pin which has a hook at one end for securing one end of the cord, the other end being passed around the pulley, threaded through a hole in the side and knotted. The centre of the pulley should be in direct line with the safety pin.

The lid of the container should be opened, the food inserted and secured again, and the clock wound up and set to the required time for feeding.

This device has been used by the writer over a long period without a single failure.

It is possible to fix two of these feeders the previous night, one to release, say, at 8 a.m., and the other at 5 p.m.

To enable this to be done the two feeders should be fixed side by side, the two clocks near each other, one clock being allowed to work normally while the other has a chock fitted to a cocked balance wheel. A cord is attached to the wood pulley of the first clock, the other end being tied to the chock in the second clock. The idea being that when the first clock functions the chock is pulled from out the balance wheel of the second clock, allowing it to start functioning, and so provide the second meal at 5 p.m.



Side and front elevations, and part plan view of the automatic poultry feeder.

The Elements of Mechanics and Mechanisms—26

Gear Tooth-forms (contd.)

Addendum Modification

IT will be seen that in order to avoid interference, the mating rack tooth profile should not be allowed to extend towards the centre of the gear beyond the point C (Fig. 33). In other words, the working addendum of the mating rack should not

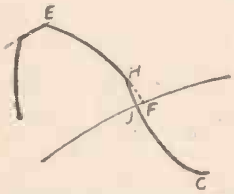


Fig. 34.—Undercut tooth resulting from interference.

exceed PR. From consideration of the right-angle triangles OPB and PBR, it can be shown that $PR = OP \sin^2\Psi$.

Now PR is the working depth of the gear tooth minus the addendum, whilst OP is the radius of the pitch circle or

$$OP = \frac{tp}{2\pi}$$

where t = number of teeth in gear
and p = pitch of cutter or addendum.

The working depth is the sum of the addenda of wheel and pinion, and this is always equal to $2\pi/P$ whatever the values of t and T.

Limit to Increase in Addendum

When using standard tooth depth and

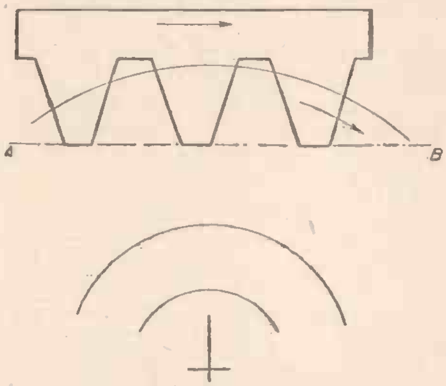


Fig. 35.—Rack rotating with gear blank.

clearance, increase in addendum of one gear means reduction in addendum of the other gear, with consequently a tendency towards interference. This sets one limit to increase in addendum.

above is a compromise that satisfactorily meets all ordinary requirements.

Rack Generation of Involute Gear

The characteristic of rack generation is the uniform motion of the rack (see Fig. 35) in the direction AB in conjunction with uniform rotation of the gear blank in the clockwise direction. Now it is important to note how the pitch line of the rack is determined, because its position has no essential relation to the position of the tips or roots of the rack teeth.

The pitch circle of generation of the gear is that circle whose circumferential speed is equal to the speed of the rack. The size of this circle is not controlled in any way by the distance of the rack from the centre of the gear.

The pitch line of the rack is the line which touches the pitch circle and lies parallel to AB.

In a gear-generating machine working on the rack principle, the set-up is such that the circumference of the pitch circle of generation is equal to the pitch of the rack multiplied by the number of teeth required in the gear. By adopting different blank diameters the tip circle of the gear may be placed in any desired relation to the pitch circle. An indication of the variety of tooth forms which may be produced by the same

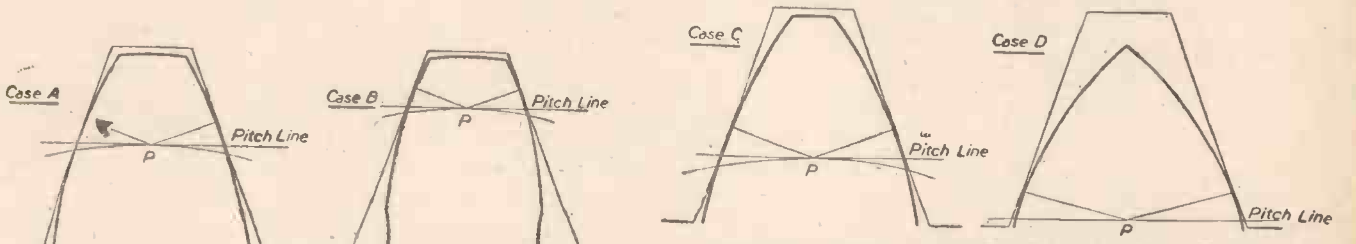


Fig. 36.—Different tooth forms generated by the same rack.

With the British Standard pressure angle of 20 deg., the minimum values of the addendum, expressed as a multiple of the working depth, for a few values of t are :

Number of teeth	Minimum addendum for no interference
12	0.645
14	0.585
16	0.526
20	0.407
25	0.260
30	0.112

In many circumstances there is advantage in making the addendum appreciably larger than the minimum required to avoid interference, and the British Standard practice fixes the addenda of pinion and wheel by the formulæ given below :

Number of teeth in pinion = t
Number of teeth in wheel = T
Addendum of pinion = a
Addendum of wheel = A

$$\text{Then } a = \frac{p}{\pi}\left(1.4 - 0.4\frac{t}{T}\right)$$

$$A = \frac{p}{\pi}\left(0.6 + 0.4\frac{t}{T}\right)$$

An exception arises, however, if (t + T) is less than 60.

Another limit is produced by the fact that the tooth tends to become sharp-pointed when the addendum is increased. This position is undesirable from the point of view of strength of the tip of the tooth, and, in fact, the tip width should preferably be not less than one-twentieth of the pitch.

Between the lower of these upper limits and the minimum value dictated by avoidance of interference, the addendum may be varied considerably without seriously affecting the efficiency of good-running qualities of the gears. The British Standard formula given

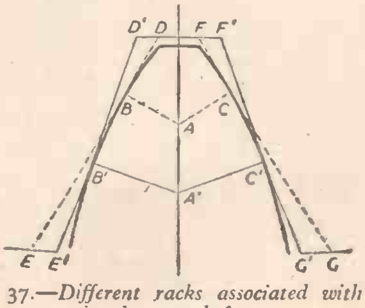


Fig. 37.—Different racks associated with an involute tooth-form.

rack when placed in different positions relatively to the pitch circle is given in Fig. 36.

Case A shows a normal condition with the pitch line about half-way down the depth of the rack tooth. Case B shows the pitch line near the tip of the gear tooth (short addendum). Part of the profile lies inside the base circle, and is therefore of trochoidal form, the tooth being undercut. Case C shows the pitch line near the root of the gear tooth (long addendum). Here the right- and left-hand profiles almost meet at the tip circle and the tooth is nearly sharp-pointed. Case D shows the pitch line still farther from the root of the rack. Here the involute profiles intersect at a point inside what would normally be the tip circle, and a sharp-pointed tooth or reduced depth results.

It is important to note that, in spite of the considerable differences between appearances of these gear teeth, each profile (except the part inside the base circle in Case B) is part of the same involute.

Generation of One Tooth Form by Different Racks

Just as one rack may produce any number of different involute tooth-shapes so any

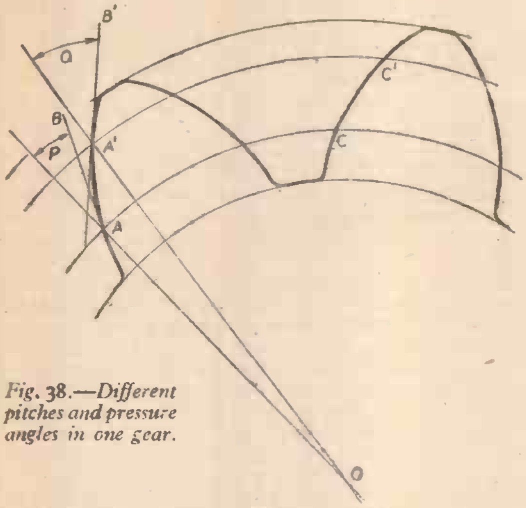


Fig. 38.—Different pitches and pressure angles in one gear.

involute tooth-shape may be produced by any number of different straight racks with straight-sided teeth. Thus in Fig. 37, the pitch circle of generation might intersect the centre line of the tooth at A. From A, lines AB and AC are drawn perpendicular to the tooth profiles. Through B and C lines DE and FG are drawn perpendicular to AB and AC, and therefore tangential to the profiles. The lines DE and FG mark out a rack tooth profile which would generate the given tooth profile.

But the pitch circle of generation might have intersected the centre line of the teeth at any other point such as A′. The same geometrical construction shows that the rack tooth profile in that case would include the straight lines D′E′ and F′G′. This is obviously a different rack from the first one, the pressure angle being smaller.

It will be seen that an involute gear tooth profile cannot be said to have any particular pressure angle. A pressure angle that is specified without qualification may be taken to refer to the rack form by which the tooth was generated. This usually has a standard pitch and pressure angle.

Pitch and Pressure Angle of Involute Teeth

If O is the centre of an involute gear (Fig. 38) and A any point on the profile of a tooth, the angle between OA (extended) and the tangent AB to the profile at A is the pressure angle P. Similar construction at any other point A′ gives a different pressure angle Q. Thus there is nothing in the gear tooth itself to decide that it possesses any particular pressure angle.

Also, the pitch of the teeth measured on circle AC is less than that on circle A′C′, and there is nothing in the gear teeth themselves to decide which is to be called the pitch.

If, however, any particular circle is selected, the pitch and pressure angle can be determined. At the base circle (which may not intersect the the actual tooth profiles) the pressure angle is zero, and the pitch is the base pitch. On any other circle, the pitch is equal to the base pitch multiplied by the secant of the pressure angle.

Tip Relief

Although a gear may be made with accurately pitched teeth of correct geometrical form, it may not operate so well as would be the case if the tooth form were slightly modified. This is because each tooth is deflected relatively to the other when the load is applied to it. The loaded tooth of the driven gear is deflected in the direction of rotation, with the result that the next following tooth on the driven gear is out of pitch by that amount and is late in reaching the path of contact. (See Fig. 39.)

On the other hand, the loaded tooth of the driving gear is deflected in the opposite direction to that of rotation, with the result that the next following tooth is out of pitch by that amount and is early in reaching the beginning of the path of contact. Thus the second pair of mating teeth do not reach the beginning of the path of contact at the same time, the effective profile of the driven tooth attempting to enter a space already occupied by part of the second driving tooth. This naturally produces uneven tooth action and the greater the tooth-loading the worse does the effect become. Gears suffering from this imperfect action usually show evidence of heavy contact near the tips of the teeth.

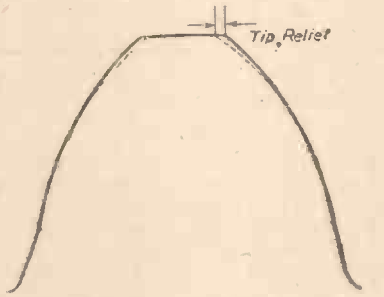


Fig. 40.—Tip relief to reduce effects of tooth deflection.

A way of avoiding the difficulty is by providing "tip relief" as indicated in Fig. 40. The width of the tip of the tooth is reduced by modification, of the involute profile as shown by the dotted lines. Thus, when the tooth is in a driven gear its lateness of arrival at the beginning of the path of contact is balanced by the advancement of the tip of the trailing profile. It is clear that any particular tip relief can be exactly right for only one particular tooth-loading, but nevertheless tip relief certainly improves the smoothness of running under loaded conditions and may be regarded as essential.

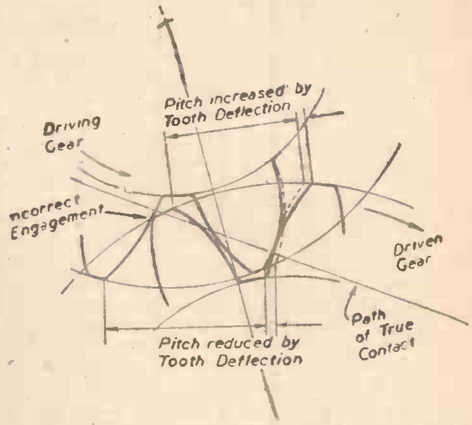


Fig. 39.—Tooth deflection produced by load

British Standard Basic Rack

THE British Standard basic rack for 1in. pitch is shown in Fig. 41. The greater part of the working profile is straight, with a pressure angle of 20 deg., but tip relief is provided. The process of generation shows that the amount of tip relief in gears corresponding to the basic rack is smaller the smaller the number of teeth: in small pinions there is none at all. This is because the tip circle of a small gear intersects the path of contact at a point which allows the generating process to be completed without using the modified part of the basic rack profile (see Fig. 42).

The addendum and dedendum of the basic rack are respectively 0.3183 and 0.3979 times the pitch. They are measured from a reference line situated in such a position that the width of the tooth measured on it is equal to half the pitch. The reference line is sometimes called the "nominal pitch line," but the term is not altogether satisfactory, as the rack has no pitch line (in the true sense) unless it is meshing with a gear, and even then the pitch line may be anywhere within the depth of the tooth or even slightly outside it.

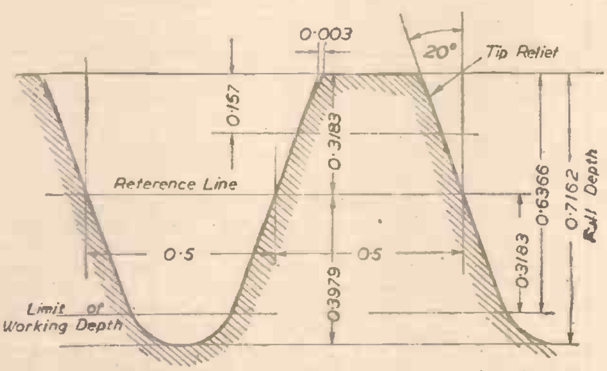


Fig. 41.—British Standard basic rack form.

The total depth of the tooth is 0.7162 times the pitch, but the tooth of a mating gear projects into the corresponding rack tooth space by an amount equal to 0.6366 times the pitch, measured from the tip of the rack tooth. This is consequently the "working depth" of the tooth. The difference between these quantities (0.0796 greater than is really necessary for clearance purposes) and the excess over the amount required for that purpose makes it possible to use root fillets of comparatively large radius. This is of value in increasing the strength of the gear tooth from the point of view of resistance to fatigue.

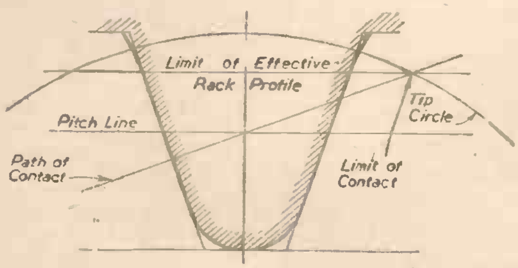


Fig. 42.—Diagram showing that a full involute profile is generated without using all the rack profile.

Optical Illusions

Some Simple Experiments

By Prof. A. M. LOW

IT has often been said that the human body is a mass of imperfections due to the manner in which we have tried to adapt ourselves to civilisation as a part of the process of nature.

Children are very commonly damaged in regard to the focusing of their eyes by straining to see objects when the muscular and other systems of the eyeball are not properly formed. It is well known that certain professions, such as that of the old-fashioned cobbler, tend to a peculiar enlargement of the thumb joints, while the whole of our internal economy is a mass of examples of compromise.

One of the most striking and easily established examples of this circumstance is afforded by the eye, which as a miracle of accomplishment is beyond all human appreciation, but which as an optical instrument is so faulty that no manufacturer worthy of the name would dare to put it upon the market. In brief, the eye sees by the focusing of an image or any view through a system of lenses on to the retina or sensitive portion. This part is composed of myriads of microscopic portions set together in the fashion of a mosaic brick, each of which communicates with the brain by its own nerve.

The eye is sensitive to colour on account of one set of sensitive slots comparing to the cement in which each mosaic stone is set and to " form " by virtue of the pieces from which the pattern of such a mosaic would be composed.

Defects of the Eye

A number of minor defects occur in every eye, some of the lenses may be incorrectly formed and, in fact, are not round in the usual sense at all. One has only to look at a star or to look through a pinhole in a sheet of cardboard to notice that rays seem to spread out in all directions. This is simply on account of the piecing together of the lens during its formation, and in the eye of a young child this building up is so poor that there are often clumsy sutures of this nature.

Even this little experiment with the card illustrates another fault of the eye, that of irregular astigmatism. The lenses of the eye are not curved identically in the horizontal and vertical directions so that these images are shaped and focused in different fashion for each eye. (Fig. 1.)

Chromatic Aberration

A more astounding fault leading to many illusions of vision is that of chromatic aberration. The defect seems all the more extraordinary when it is realised how easily it might have been avoided during the designing of an eye. To produce a combination of lenses which was achromatic would seem to be perfectly simple, for it is invariably adopted by every instrument maker worthy of the name. The point is not difficult to illustrate for if a simple lens or burning glass is used to focus a red light upon a piece of white paper a clear image will be produced in the ordinary fashion. Substitute violet coloured light and it is at once discovered that the paper upon which the image rests has to be moved in order to secure sharpness. Violet light is more easily refracted or bent by the lens than the red, so that it is not practicable properly to focus an image when the source of illumination is composed of a number of different colours of the spectrum.

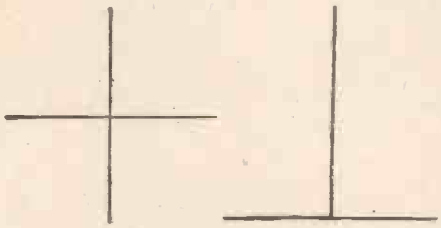


Fig. 1. Fig. 3.
A simple test with horizontal and vertical lines.

Fig. 2.—Test for astigmatism.

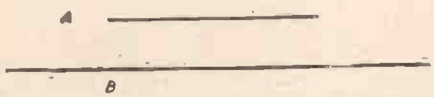


Fig. 4.—Does line B look twice as long as line A?

No single lens used with daylight can be made to give a perfectly distinct image at all, yet this feature of the eye becomes forgotten by nature's accommodating provision of a brain to meet the case. The very idea of distance to which our eyes form the necessary focus is always associated with certain colours. Nearly everyone will consider that a room seems far larger when painted a blue violet rather than a red, while a red spot upon a blue ground appears to be distinctly proud of the surface for the same reason. Anyone looking at a red object has to adjust the crystalline lens of the eye by muscular effort, but for a blue or violet object the muscles are relaxed and the curvature of the eye reduced as if the onlooker was looking towards the horizon.

We all attempt to estimate distance, but the amount of effort needed to produce the muscular focusing varies so that this has caused red to be associated in our minds with a foreground and violet with something which is far away. To look at the filament of an electric bulb through a piece of ordinary blue cobalt glass it to cut out the middle of the ordinary spectrum. From a distance of a few inches the filament seems to be pale blue, but at 6 or 8ft. away the light filament looks distinctly red. Probably the commonest of all optical effects due to our faulty eyes is that of the blind spot and of the manner in which the portion of the sensitive retina immediately behind the centre of the eye seems more sensitive to colour than to form.

If you will make a spot and a circle upon a piece of paper about 2½ inches apart it is found that when fixing the eyes upon the circle and bringing the paper slowly towards the face the spot forms an image which falls on the point where the main bundle of optical nerves enters the eye and connects with the recording system. This place is entirely insensitive, so that no image can be sent to the brain.

Looking at a clock in a dimly lit room, the time is much more easily seen by directing the gaze a few inches to either side of the timepiece, when the modest amount of light available for vision falls upon a more sensitive part of the retina than would otherwise be available. This is quite useful in everyday life as a means of finding door handles or keyholes.

Astigmatism

The difficulties of astigmatism due to the irregular shape of the eye, which is often more like the bowl of a spoon than spherical, leads to the case when vertical and horizontal lines are seen with quite different degrees of distinction. (Fig. 2.) If this experiment is repeated by looking at a small spot of red light, a concave lens will cause this spot to appear as a number of small bright round spots upon a dual background.

This is another type of fault probably due to some complicated structure in the eye near the crystalline lens itself. There are a number of optical illusions which really depend upon the association of the mind with the faulty images of the eye in accordance with habits or custom. We are used to thinking that a monument with a large base must have a high tower upon it and, to give another example, when we have looked at something which is extraordinarily big our mental standard of size is educationally altered.

Comparative Length of Lines

If, as in Fig. 3, two lines are drawn, one upon the other, of equal length, the mind doubtedly sees that the vertical is the longer of the two, and if this comparison is made relative to two objects in proximity, but differing in size, there is a distinct attempt on the part of the brain to co-ordinate the size.

In Fig. 4 the lower line is twice as long as the upper although the difference certainly does not seem nearly so much. This effect is well known to those who have toured in mountainous country and discovered that

Fig. 5.—Which line looks longer?

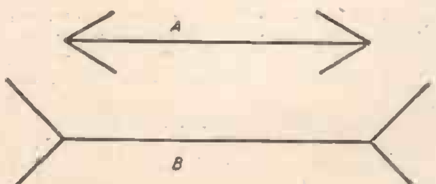


Fig. 6.—A similar test to Fig. 5.

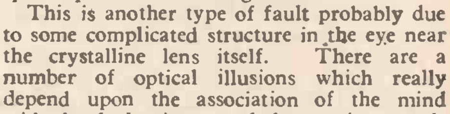


Fig. 7.—A question of spacing.

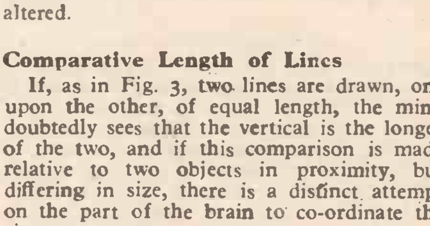


Fig. 8.—Imaginary horizon.

beyond a certain size of hill, dimensions are rather disappointing.

It is very easy by means of Fig. 5 to suggest that the line A is much longer than B, merely by varying the subconscious standard which is applied in this test. If two more strokes are added to each line, as in Fig. 6, the variation of mental impression is even more pronounced.

Looking casually at Fig. 7 it would hardly be suggested that the space between the extreme lines was not equally divided by the middle line, for the left-hand portion at a casual glance seems far longer. There is a further experiment when an individual is asked to mark from the floor the height of an average top-hat. The point is usually made far too high due to the estimation taking place relative to something smaller than a room. Nearly every hill is referred to in terms of its position relative to the horizon, so if this imaginary horizon is not clearly fixed the eye gives quite a wrong idea of gradient. Fig. 8 is a good example, for the lines running along the peak seem to be tilted downwards at one end when in fact it

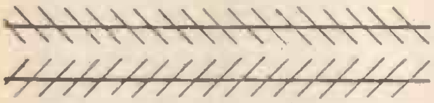


Fig. 9.—Diagram demonstrating the illusion of altered gradients.

is level, simply because the crossing line has altered our standard. The more usual method of demonstrating this illusion is shown in Fig. 9, when no one would believe the heavy lines to be parallel, as in fact they are.

Rapidly Moving Objects

Illusions due to motion, entirely a relative term, are very numerous, the most familiar of all being that of the ordinary cinematograph; in this machine the series of images showing a moving object in slightly different positions are thrown upon a screen. Thanks to the fact that these images take time to die away from the eye they can be superimposed to give the effect of smooth movement instead of a series of uninteresting jerks.

A very interesting demonstration of the fashion in which the eye forms a standard of speed is shown by Fig 10, in which a card has a slot cut in it and is fitted with another card behind equipped with a spiral slot. If this is looked at in a dark room when illuminated from behind, turning the spiral disc will give the impression that a bright spot of light is slowly travelling upwards to disappear at the top and begin again at the bottom. When this is watched for a few minutes steadily and suddenly stopped the bright piece does not appear to remain stationary, but seems to move downwards for quite a long time due to the relative impression of movement formed by the mind and the eye.

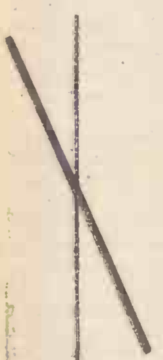


Fig. 11. — Test for estimating the rate at which a card is moved.

In another test (Fig. 11) the eye estimates the rate at which the card is moved by looking at the two intersecting lines at a distance of about 10 inches and moving the card up and down. The dark lines seem to swing slightly as if they were not drawn in a fixed position upon the paper. No ordinary human being can estimate brightness successfully, and if a number of strips of transparent paper are pasted one over the other, as in Fig. 12, each square seems to be brighter at the left than at the right by virtue of the contrast obtained. This is in no way due to tiring of the eye as can be proved by illumination of the picture for only a fractional part of a second. From our earliest years we have become accustomed to distrust our eyes, for no one imagines that a rapidly twirling match is, in fact, a ring of fire.

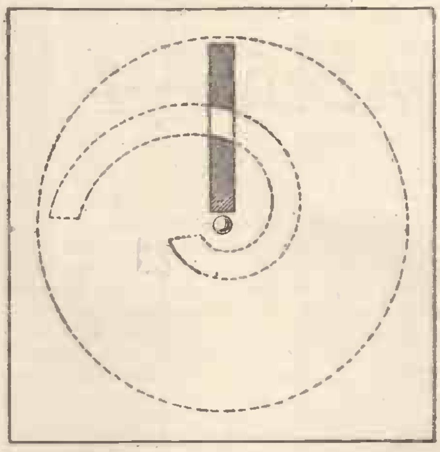


Fig. 10.—Simple device for demonstrating how the eye forms a standard of speed.

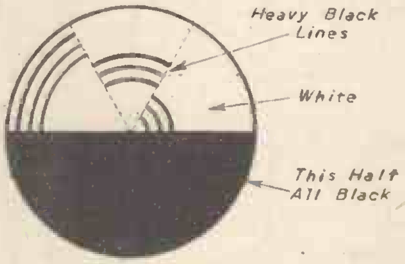


Fig. 14.—The spinning disc illusion.

Colour Effects

There is another experiment due to some sympathetic effect upon the nerve fibres of the eye which are accustomed to deal with colour. If an ordinary printed page is looked at near a brightly lighted lamp for a moment, and a dark screen is then put between your eyes and the paper the printed letters will for a moment appear quite red as the shield is suddenly removed.

If a disc is cut with a sector removed and is spun upon a long pin over the printed paper, as in Fig. 13, the letters seem quite red when observed through the gap. It is sometimes also noticed that if a red spot is looked at upon a sheet of white paper a green spot will be seen when looking at either part of the white surface. This is probably due to the retina in use with the red image becoming tired, so that the red components of the white light are afterwards not visualised and the complimentary colour therefore predominates.

In any of these experiments it is hardly practicable to distinguish between the eye and brain for, indeed, they are linked together by a mixture of custom, growth and carelessness which can help the eyes to entertain or irritate with a facility attributable to no other forms of optical apparatus.

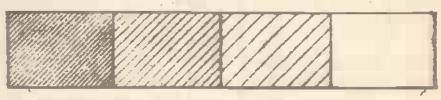


Fig. 12 (Above).—Test for estimating brightness.

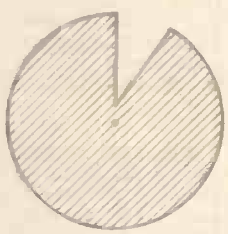


Fig. 13.—Another simple colour test.

Try Fig. 14 as a final experiment. Spin the disc on a pin in a bright light and make a note of what you think you see. The disc should be about 3in. diameter with very thick dead black lines.

Rotary Cam Poppet Valve Gear for Locomotives

ONE of the D.49 class, 4-4-0 type, three-cylinder locomotives (No. 62764, *The Garth*) of the Eastern and North Eastern Regions of British Railways has recently been fitted with an infinitely variable rotary cam poppet valve gear, type "RR," supplied by Messrs. Locomotive Valve Gears, Ltd., in accordance with the Reidinger patents.

The leading dimensions of the locomotive are as follows:

Cylinders, dia. and stroke, 17in. x 26in.
Wheels coupled, diameter, 6ft. 8in.
Working steam pressure, 180lb./sq. in.
Total heating surface, including superheater, 1,669 sq. ft.
Grate area, 26 sq. ft.
Tractive effort, 21,556lb.
Valves, steam, 6 5/16in. dia.
Valves, exhaust, 7in. dia.

In fitting the gear at the Darlington works only minor alterations were required to the engine, which was originally fitted with the "RC" gear, and the original driving gear and reversing gear were retained.

The cylinders are in three separate castings, the cam shaft being situated above the cylinders with its axis horizontal and at right angles to the centre line of the locomotive. The steam and exhaust valves are arranged in the horizontal plane, there being a separate steam valve and a separate exhaust valve at each end of the cylinder.

The cam shaft is driven by means of a worm gear box fitted on a return crank at the right-hand side of the engine through a tubular driving shaft extending forward to a bevel driving gear mounted on the cylinder casting. The cam shaft is housed in a circular cavity cast integral with the cylinders, and the whole of the cam-operating gear can be fitted and removed as a unit.

Two inlet and two exhaust cams are provided for operating the four valves of each cylinder. The two cams operating the admission valves have a differential action transmitted to the valve spindles through the medium of intermediate levers, fitted with swing beams and follower rollers.

The differential action of the steam cams permits of an infinite variation in the range of cut-offs between full gear and mid gear in each direction of running, and provides a full valve opening to steam at all cut-offs between full gear and about 12.5 per cent. cut-off, whilst at 10 per cent. cut-off the valve opening is equal to 90 per cent. of the maximum area through the valve.

The locomotive has been in passenger service on the North Eastern Region and will be fully tested at the Locomotive Testing Station, Rugby.

NEW SERIES

Wood Turning—4

Faceplate and Cup-chuck Work

By FREDERICK JACE

Faceplate Work

IT will be noted that nearly all work turned between centres has the grain running lengthwise. In the early stages the beginner should not attempt to turn long pieces, but to gain skill on work not greatly in excess of 9in. in length.

When a large number of pieces are required of similar shape it is convenient to turn them all in one length, and to part down to within a ¼in. of the centre of the work and then to remove the piece from the lathe, separating the pieces with a hand-saw. In general, when the work is greater in length than in diameter the grain should run lengthwise, but when the diameter exceeds the length the grain should run in the opposite direction.

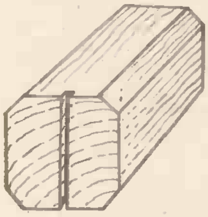


Fig. 20.—A saw cut in the end of the work to receive the fork centre, and edges planed away to reduce turning time.

Turning Discs

Thin circular pieces, for example a bread board, are turned by screwing the blank or fixing it by some other means to a faceplate attached to the mandrel nose; thus, the back centre and the fork centre are unnecessary. Sometimes it may be necessary, where the screw holes would be unsightly, to glue the blank to another piece of wood which is screwed to the faceplate, finally planing the fastening piece away when the turning is complete. Fig. 22 illustrates these points. It will be noted that the faceplate screws on to the nose of the mandrel, locking against the shoulder on the latter. It has a number of holes in it through which screws may be passed. Only short screws must be used, of course, and they must not penetrate into the work sufficiently to foul the cutting tools.

It is a good plan to fasten a piece of wood to the faceplate and to cut in it circles of varying diameters to aid in the rapid centring of any disc work which has to be turned. Fig. 23 indicates that the screws are placed into the work very much outside the finished diameter. Thus the majority of the turning should be finished, and the final cut should be a parting cut which would release the finished piece from the waste wood.

Some faceplates are provided with a central taper screw as shown in Fig. 24, and this is suitable for very small work where screws would be out of the question. Such plates usually have four screw holes for use as occasion demands. It is obvious that the work must be of sufficient thickness to allow for the penetration of the taper screw and so a fair amount of wood must be turned to waste—often unavoidable when turning small peices.

Sometimes when turning very thin discs it may be necessary to screw the work itself to a wooden disc secured to a faceplate. To save turning time thin discs are often planed dead smooth before being mounted on the faceplate, the turning being confined to finishing any beading round the edges and cutting to finished diameter. Obviously, the finished form the work is required to be will decide the methods of attachment—whether by glue, screwing or nailing (see Figs. 25 and 26). It is desirable but not always necessary for the plate to be larger in diameter than the work. The exception is when the work is screwed direct to the plate when the latter should be smaller than the work, thus enabling the edges of the work to be turned.

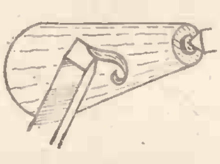


Fig. 29.—Direction of cut on paper work.

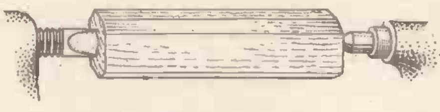
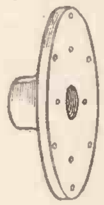


Fig. 21.—The work mounted between centres.



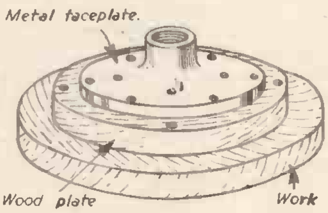
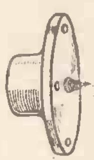


Fig. 22.—(Left) Faceplate.

Fig. 23.—(Right) Wood mounted on faceplate.



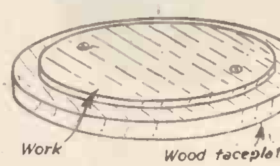


Fig. 24.—(Left) In this type of faceplate a taper screw is attached.

Fig. 25.—(Right) Thin disc attached by means of screws.

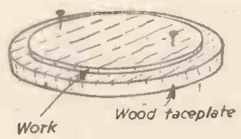


Fig. 26.—Nails used to attach thin disc to faceplate.

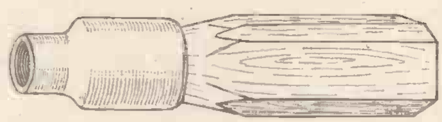


Fig. 27.—Work prepared for cup chuck.

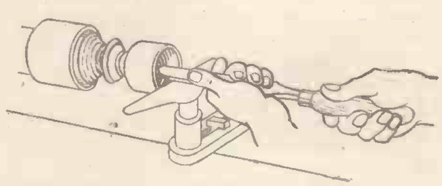


Fig. 28.—How the cup chuck is used.

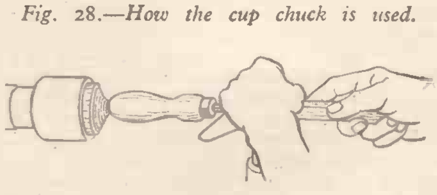


Fig. 31.—Turning a hole in the end of a piece of work.

The Bell or Cup Chuck

Certain kinds of work are unsuitable for turning between centres or on a faceplate, and the cup or bell chuck is then used (Fig. 27). This has an internal diameter of about 2in. and the work itself is turned to fit this. It is used in conjunction with the tail stock centre. The cup chuck is useful, however, in turning work without the use of a back centre, for it enables the end of the work to be faced off nicely. This practice, however, can be adopted only when the overhang is not greatly in excess of the diameter of the work (see Fig. 28). As the drive will be by friction of the work in the chuck the piece of wood must be driven in and so turned, in the preliminary stage, a good tight fit. As the cup chuck is hollow, the unwanted stump left in the chuck after the work is turned and cut off can be driven out by means of an iron punch and a mallet. If the work does not permit preliminary turning to suit the cup chuck it can be roughly chiselled, slightly tapered and driven in.

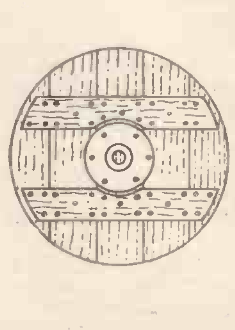
Fig. 32.—Example of work turned between centres.

Removing Chucks, etc.

The cutting action of the tool tends to tighten the chucks and faceplates screwed on to the mandrel. This sometimes makes removal difficult, but by holding the belt or jamming a piece of wood between the spindle and the shears of the bed they can be jarred free. It is important to grease the threads of the chucks and the mandrel occasionally. In the event of a burr forming on the mandrel thread it should carefully be removed with a triangular file.

Avoid as far as possible turning against the grain. When turning a taper article, for example, the cut should be from the larger diameter to the smaller to obtain a smooth finish, to avoid lifting the grain and possibly splitting the work. Also in reducing a large diameter to a smaller one the cut should be from the larger diameter to the smaller (see Figs. 29 and 30).

(*To be continued*)



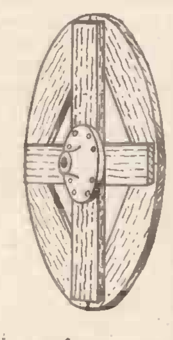


Fig. 33.—(Left) Work built up from several pieces of wood before turning.

Fig. 34.—(Right) This method may be adopted for building up work before turning.

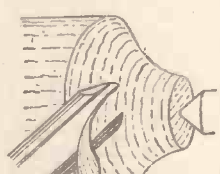


Fig. 30.—Direction of cut when turning down ends.

Our Lathe Competition

R. G. Marston's Design for a 3½in. Centre Back-geared Lathe which was Awarded Second Prize

In this lathe the headstock spindle bearings are of phosphor bronze. The tail stock tube is marked 0in.-3in. in 1/16ths. Tumbler reverse gear for traverse feeds is provided. The change gear support arm swivels on the front lead-screw bearing and is locked by a split ring and clamping nut. Components are of cast iron except where otherwise stated, and all bearing surfaces are ground. The suds pump can be mounted on countershaft brackets if desired, taking coolant from a suitable tray under the bed of the lathe, through flexible pipe and delivering to the work by a flexible pipe and bracket mounted on the lathe.

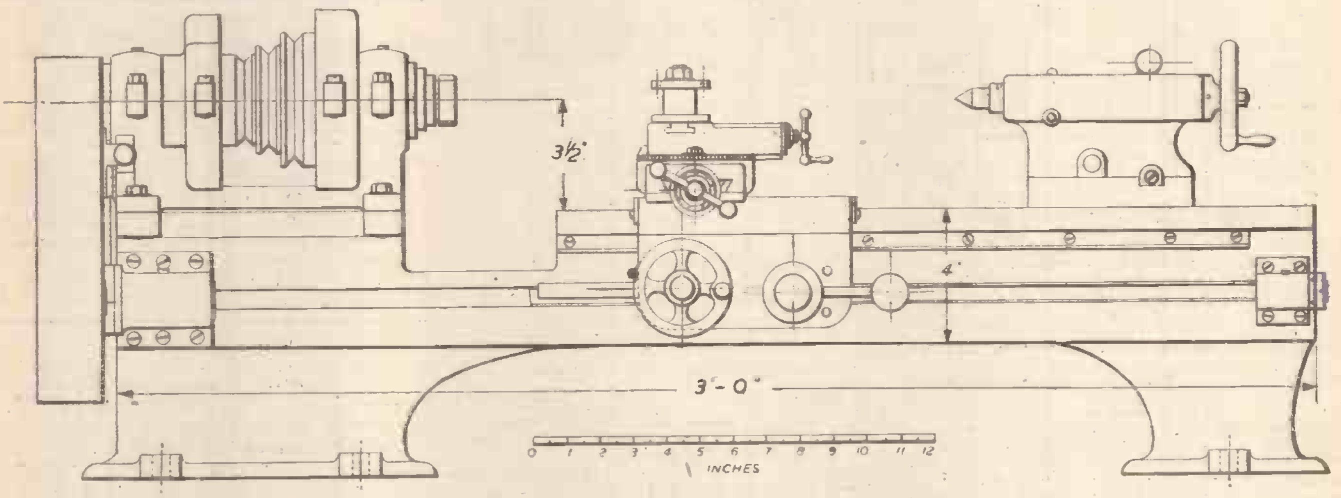
GENERAL SPECIFICATION

BED

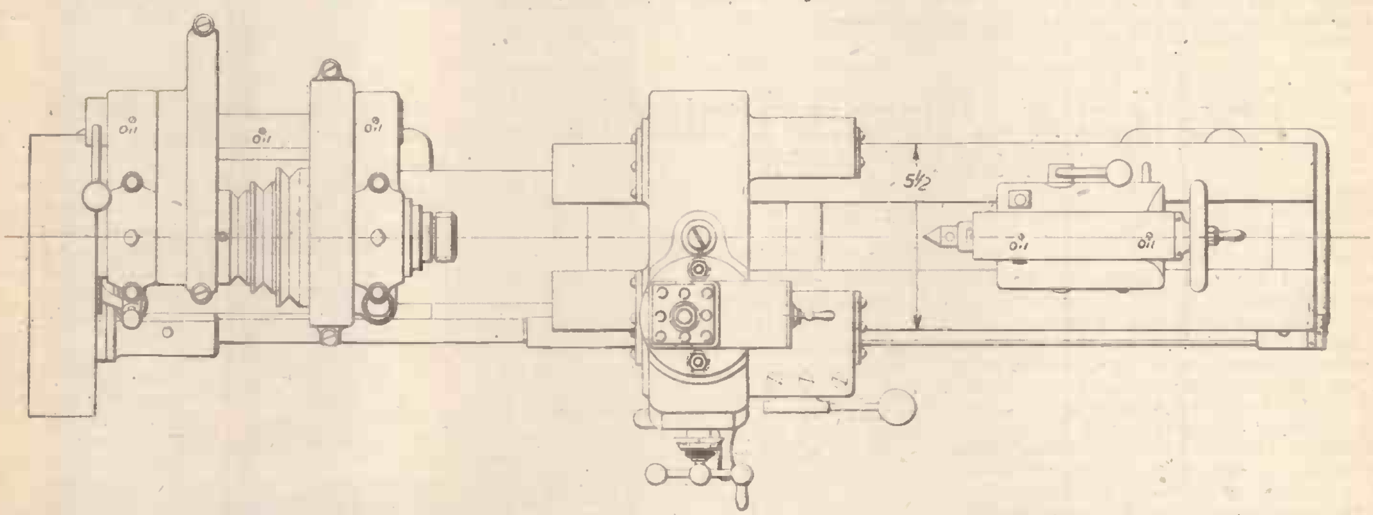
Overall length	3ft.
Width across shears	5¼in.
Depth of shears	⅞in.
Swing over bed	7in. dia.
Maximum admitted between centres	1ft. 6in.
Swing in gap	10in. dia.
Depth of bed	4in.
Spindle nose thread	1⅛in. × 12 T.P.I.
Spindle nose bored	No. 2 Morse
Spindle bored through	17/32in. dia. (½in. + 1/32in. clr.)
Back gear reduction	6 to 1 approx.
Size of headstock vee belt	½in. standard "V" belt
Face plate diameter	8in. dia.

SADDLE

Swing over cross-slide	4in. dia.
Cross slide travel	5in.
Top slide travel	2in.
Top slide revolves completely round centre post	360 deg.
Top slide and cross-slide feed screws	10 T.P.I. (Acme)
Micrometer dials division	0.001in.
Lead-screw	8 T.P.I. (Acme)
Screw range	8-36 T.P.I.



Front elevation of Mr. R. G. Marston's 3½in. centre lathe.



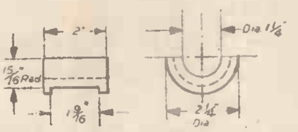
Plan of lathe.

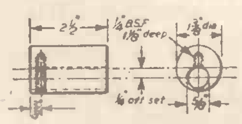
Note the covered gears, general layout of saddle and cross-slide.

HEADSTOCK

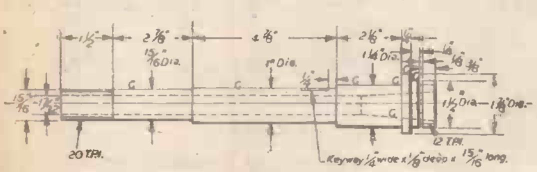
Centre height	3½in.
Length of seating	8¾in.
Width of seating	5in.
Front bearing	1¼in. dia. × 2in.
Rear bearing	15/16in. dia. × 2in.
Thrust ball bearing	15/16 int. dia.
Spindle nose register	1⅞in. dia. × ¼in.

Front spindle bearing.

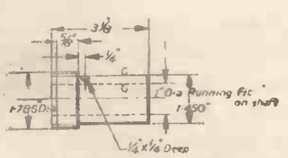




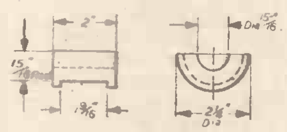
Back gear spindle cam.

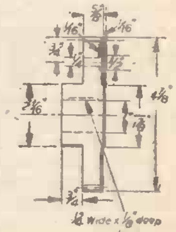


Headstock spindle.

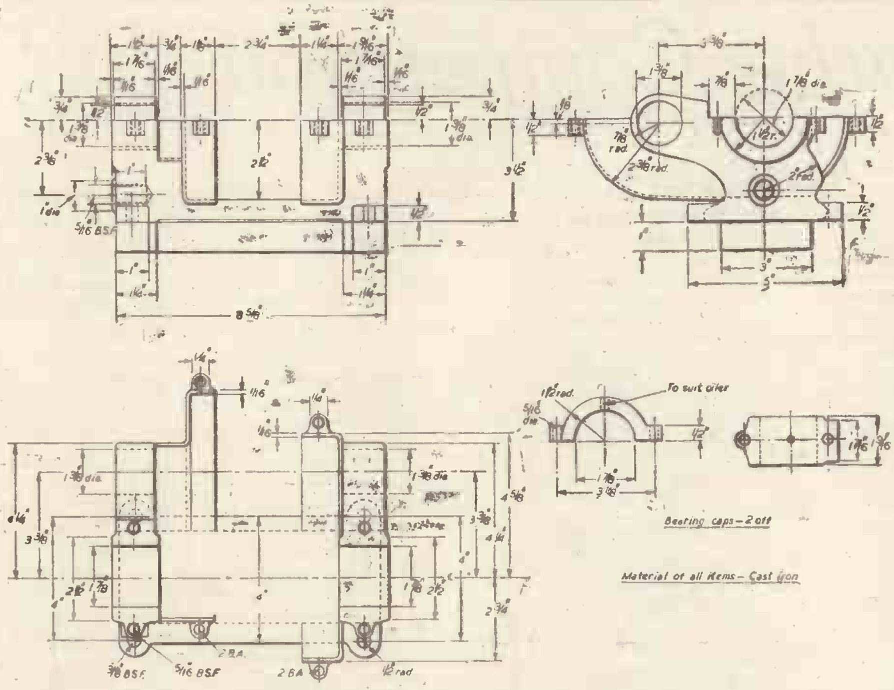


Small gear bush.





(Above) Rear spindle bearing.
(Right) Large gear bush.



Details of headstock and bearing caps.

Metric threads (if desired)	..	5.0 mm. to .5 mm.
Slow feed	..	.005 approx./rev.

TAILSTOCK

Barrel bored (nose)	.. ..	No. 2 Morse
Barrel bored	.. .. ..	½in. dia.
Barrel travel	.. .. ..	3in.
Set over (front)	.. .. ..	⅜in.
Set over (rear)	.. .. ..	⅜in.

STANDARD EQUIPMENT

Face plate, catch plate, back plate for chuck, 14 change gears (2-20T, 2-30T, 35, 38, 40, 45, 46, 50, 55, 60, 65, 73), 1 set spanners, one whol : centre, one halve centre' Size of back gears. 23T-66T, 21T-68T. All gears' 14 D.P.

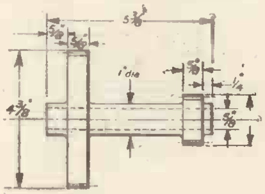
Threads per in.	Driver		Driven	
	1	2	3	4
8	30		30	
9	40	20	30	30
10	40		50	
11	40		55	
12	20		30	
13	40		65	
14	20		35	
16	20		40	
18	20		45	
20	20		50	
24	20		60	
26	20		65	
28	20	30	35	60
32	20	30	40	60
36	20	20	40	45
40	20	30	50	60

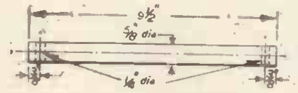
FINE FEED

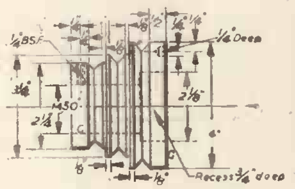
.011 20, 50, 30, 55, 20, 60 }
.005 20, 55, 30, 65, 20, 73 } Arrangement Driver, driven, driver, driven, etc.

METRIC THREADS, IF DESIRED

Pitch	Drivers	Driven	Pitch	Driver	Driven
5.0	50 46	20 73	1.6	46 40	50 73
4.50	46 45	20 ,,	1.5	46 30	40 73
4.0	46 40	20 ,,	1.25	50 46 30	40 60 73
3 50	46 35	20 ,,	1.00	46 20	40 73
3 00	46 45	30 ,,	0.75	46 30 30	40 60 73
2.75	46 55	40 ,,	0.50	46 30 20	40 60 73
2.50	46 50	40 ,,			
2.25	46 45	40 ,,			
2.00	46	,,			
1.75	46 35	40 ,,			







(Left) Back gear spindle.
(Above) Back gear running spindle.
(Right) Cone Pulley.

The Law About Patents

Your Statutory Reward

By W. J. WESTON

ONE purpose of our patent law is to reward the inventor, and if he fulfils certain formalities prescribed by statute and pays some not at all negligible fees, he is granted a monopoly. He obtains letters-patent—letters available for all to see, giving him a licence to manufacture, sell, or deal in an article to the exclusion of all other persons. To use the precise and all-embracing official description he has the exclusive right of making, using, exercising, and vending a manufacture new within the realm.

It would be well, perhaps, to point out that the making, by another than the inventor, to be good ground for action, must be for use or sale, not merely for experiment. You can make for yourself and for purposes of testing any of the patents described from time to time in PRACTICAL MECHANICS without incurring an action for infringement.

The monopoly accorded to the inventor is not absolute ; the Bill now before Parliament has provisions whereby the patentee is obliged to grant licences to others. Nor is it perpetual ; it lasts for sixteen years, with a possible extension, at the discretion of the Court, of ten more years. Doubts may, indeed, very well arise about the adequacy of the reward given to the inventor. It is quite true that some people have made fortunes through the exploiting of their patented inventions ; some have shared a fortune made by others as a result of their inventions ; but the vast majority have reaped but a meagre monetary harvest, or have actually lost through their efforts. They have had to content themselves perforce with their delight in the evolution of their invention, and their thrill of triumph at its perfection.

This lack of monetary reward is at times well-nigh inevitable. The inventor has invented something before a demand for that thing exists, and his means are not enough to create the demand. That is to say, many an inventor beats the air in vain so far as material reward goes ; fruit of first rate ingenuity though the invention is, no market for it exists. Additionally, it would be wise to ask oneself what practical purpose the perfected invention will serve before lavishing time, thought and money spent upon it.

Monopoly

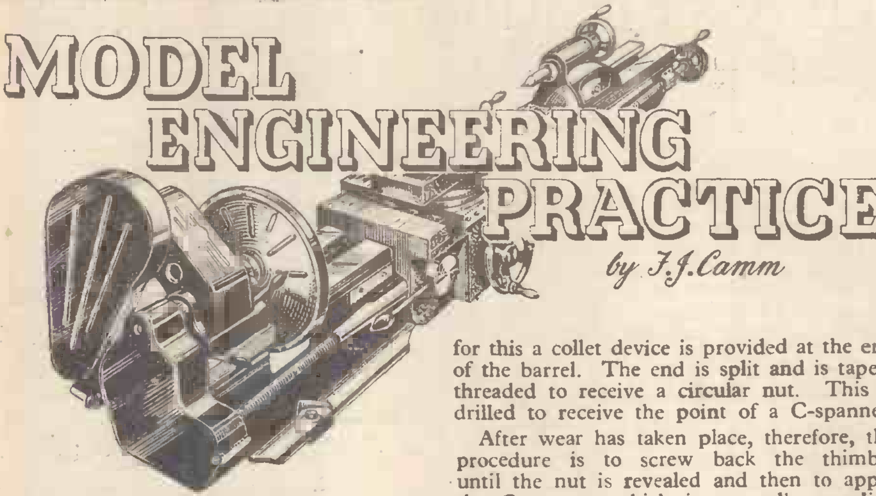
Our patent law gives its reward so that the inventor does not keep his invention hidden from his fellows. For his disclosure he has a monopoly. He becomes an exception—authorised by Act of Parliament—to the general prohibition of monopolists.

The letters-patent are expressed as though the Crown conferred a privilege on the holder, or the patentee as he is called. In fact, the patent is good even against the Crown, though—on terms agreed to by the Treasury—the patentee may be required to allow the Crown to use his invention. The patent is, in reality, intangible property assured to the patentee by Act of Parliament ; and its being intangible does not prevent a patent from being, at times, a source of great profit to the patentee as well as of great worth to the community.

6th Article of a New Series

MODEL ENGINEERING PRACTICE

by F. J. Camm



ANOTHER item which should receive attention while setting the micrometer to measure a diameter or thickness is that the thimble should be turned so that the material under test is made a close, but not tight, fit. It should just be possible, for example, to move a rod through the gap by applying slight pressure. Before taking a measurement see that the metal is clean and free from grease or oil.

The Ratchet Stop

To simplify the setting many of the better-class micrometers are fitted with a ratchet device at the end of the thimble. This operates on the principle of a slipping clutch. Thus, when the spindle encounters resistance to further movement a pawl slips out of engagement with the ratchet teeth. Once the "feel" of the gauge has been obtained from a certain amount of experience, the instrument

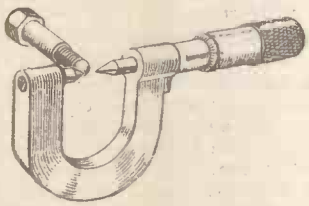


Fig. 64.—Screw thread micrometer.

can be used easily and with confidence. But practice is necessary, despite the apparent simplicity of construction.

Adjustment for Wear

It is to be expected that with a sensitive gauge of this kind slight wear may throw out the readings. Wear is most likely to occur on the spindle thread, and to compensate for this a collet device is provided at the end of the barrel. The end is split and is taper-threaded to receive a circular nut. This is drilled to receive the point of a C-spanner.

After wear has taken place, therefore, the procedure is to screw back the thimble until the nut is revealed and then to apply the C-spanner which is generally supplied with the gauge.

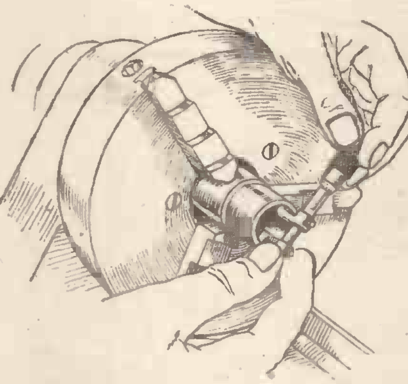


Fig. 68.—How the micrometer shown in Fig. 67 is used.

It is possible that, after extended use, or if the gauge should have been accidentally dropped, the accuracy of reading may be impaired due to movement of the anvil. Therefore, on most high-grade instruments an adjustment is provided by means of which the anvil can be moved so that the gap is just closed when the reading is zero. In some cases the anvil must be lightly tapped after removing a set screw; in others the anvil can be turned on a thread by using a spanner provided; in other cases the outside end of the anvil has a screwdriver cut, and the threaded anvil may be turned after slackening a locking nut.

Sizes

The usual sizes of micrometer are 1in. and 2in., this representing the largest opening. For most purposes the smaller size is suitable, but the latter may be required for larger work. Sometimes the frame is made deeper so that sheet metal can be more easily dealt with. Other models have a cut-away frame, the frame being narrowed at the anvil end so that it can be used in places where the ordinary frame may be too big.

A modification of the normal type of micrometer is one made for measuring threaded rods. In one type there is a V-cut in the anvil and the end of the spindle is turned down to a point. In other cases both anvil and spindle are pointed.

Inside Micrometers

Besides the outside micrometer, which has been considered so far, there are inside-measuring types. Two examples are illustrated in Fig. 66. In this type the frame is omitted, and there is simply a barrel, thimble and short spindle. Additionally, however, there is a set of interchangeable spindles in $\frac{1}{2}$in. ranges. The movement of the screw is limited to $\frac{1}{2}$in., but any diameter can be measured simply by using the appropriate spindle.

There is another form of micrometer for inside diameters, and it may be seen from Fig. 67 that this closely resembles the outside micrometer in general design. The bowed frame is replaced by a fixed jaw, whilst a second jaw is fitted to the end of the spindle; this is moved backward and forward by turning the thimble. It will also be noticed that the horizontal scale is "in reverse," the figures 5, 4, 3, etc., reading from the left. This type of micrometer is not very widely used, but is valuable for certain types of special boring work; it is shown in use in Fig. 68.

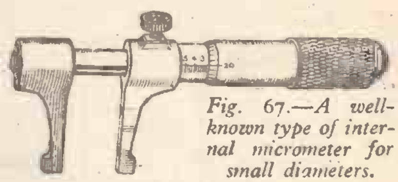


Fig. 67.—A well-known type of internal micrometer for small diameters.

So far I have dealt with the tools which model engineers should acquire and have explained their use. In succeeding articles I shall now describe the various processes employed in construction, such as drilling, lathe work, soldering, brazing, milling, rivetting, pattern-making and casting. Examples of actual work will be included. Readers wishing for a useful work of reference should obtain a copy of our "Practical Mechanics Handbook," which is published at 12s. 6d. or 13s. by post, from the publishers, George Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

(To be continued)

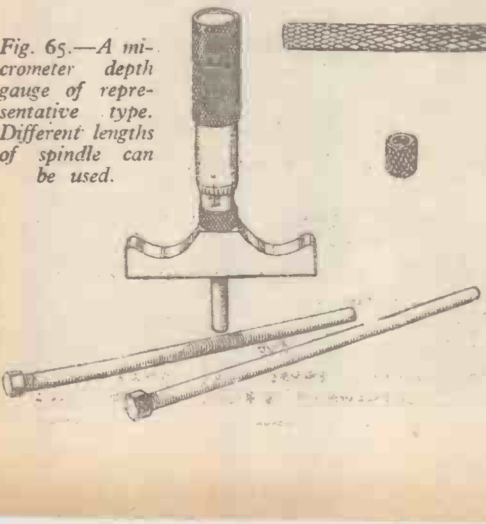


Fig. 65.—A micrometer depth gauge of representative type. Different lengths of spindle can be used.

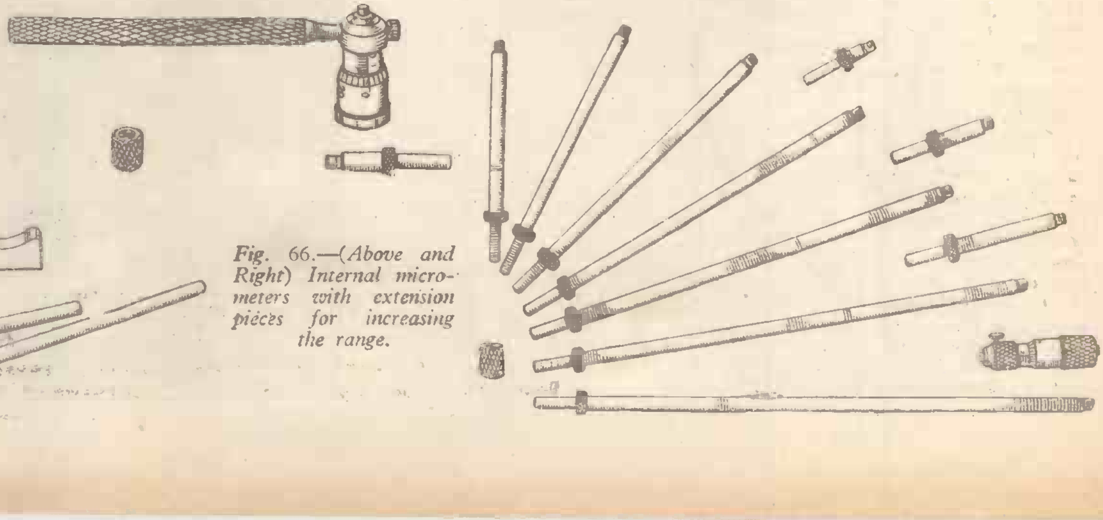


Fig. 66.—(Above and Right) Internal micrometers with extension pieces for increasing the range.

Model Internal Combustion Engines

A Review of British Commercial Model Engines

By C. E. BOWDEN, A.I.Mech.E.

IN a short series of articles I am reviewing model internal combustion engines obtainable on the British market. America has long been noted for her very large sales of model engines, and accordingly has devoted much effort to their development along flow and massed production lines. As a result, uniformity of excellence and easy starting attributes have resulted. Wherever a large demand for a commodity exists, manufacturers invariably respond by laying down expensive flow production machinery. America has for years been a leader in production of model engines.

Before the last world war Britain lagged seriously behind. The market appeared to be limited, and, therefore, did not encourage manufacturers with large resources to risk their capital in the venture. Since the war, the whole picture has changed for the British market. A large demand has been built up, and American engines are not normally purchasable owing to dollar restrictions. Flow production over here has been introduced, and many thousands of engines sold. Quite a number of firms have fallen by the wayside in the development process, leaving the more successful in the field, a true case of the survival of the fittest. Prices have been reduced and reliability increased with fine performance thrown in, until to-day we have an excellent range of high-class engines available, and find ourselves the world's leaders in model diesel production.

All types and cubic capacities are represented, but owing to the fact that this is a highly populated country running on austere lines, with restricted space to operate models over, and with overcrowded public transport facilities due to petrol shortage, the small diesel engine has become the most popular as regards numbers sold. In spite of this there are some remarkably good larger capacity petrol and glow plug motors sold, as well as jet reaction engines.

The two-stroke remains almost supreme as a type, for it is cheap to make and easy to operate, and suffers less damage in model aircraft. Little diesels along these lines can be bought for sums as low as 45s.

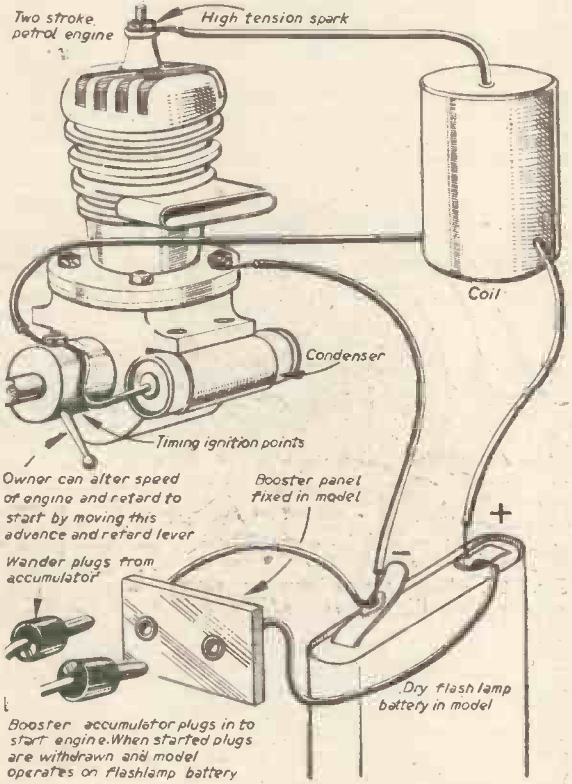


Fig. 1.—The layout of a spark ignition petrol engine. The weight of ignition gear often weighs more than a small size petrol engine, but the advantage of the petrol engine lies in variable speed control by timed spark ignition.

The Petrol Engine

Briefly summing up the various types, we find that the petrol motor requires a coil, condenser and battery to be carried by the model, with a ground booster battery for starting. In the smaller sizes of the engine this electrical spark ignition gear often weighs more than the whole engine. It therefore makes the very small model aeroplane, car or boat a difficult problem when powered by this particular type. In the larger sizes the power of the engine and the size of the model is sufficient to carry the weight of ignition gear. On the other side of the picture, the electrical ignition engine has the advantage that it can be advanced or retarded, thereby altering the engine speed as desired, which is useful for radio controlled models, and enables a large capacity engine to be retarded when starting up. This prevents a "kicking back" engine. The petrol engine is run on a mixture of petrol and mineral lubricating oil, except in the case of certain racing engines which may use an alcohol and castor oil mixture.

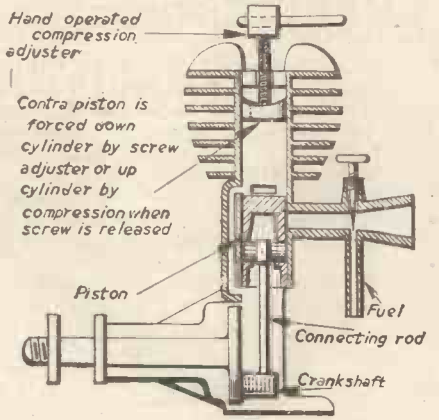


Fig. 3.—The model diesel's compression ratio can be altered by moving the contra-piston up or down in the cylinder.

The Glow-plug Engine

This is, in effect, a petrol two-stroke engine without timed electrical ignition. *There is no weight of ignition gear to be carried by the model.* This permits very small models being built with engines of small capacity. It lightens the load for speed and stunt control line aeroplanes with larger capacity engines. Instead of spark ignition, there is a heater plug called a "glow plug," which is about the same in appearance and size as a sparking plug and which screws into the cylinder in the same place. This plug has a wire coil of platinum iridium which is heated to a red glow *for starting only*, by clipping on a detachable lead to the plug and another to "earth" on the frame of the

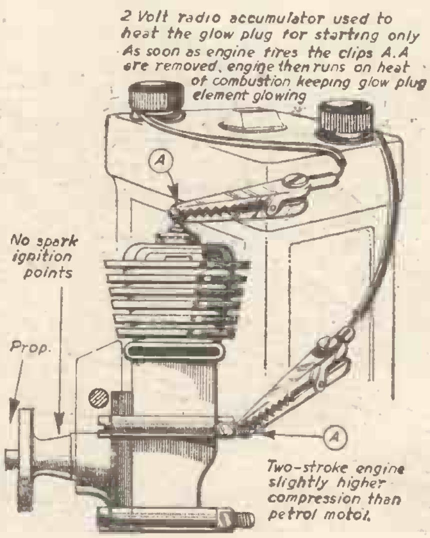


Fig. 2 (Left).—The glow-plug ignition set up.

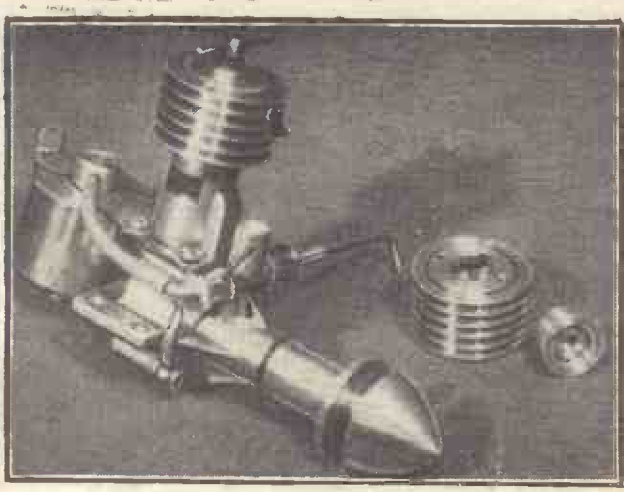


Fig. 4 (Right).—The E.D. Mark III diesel of 2.49 c.c. holds the world's car class record, It can be converted to glow plug ignition by the special head seen on the ground beside the engine.

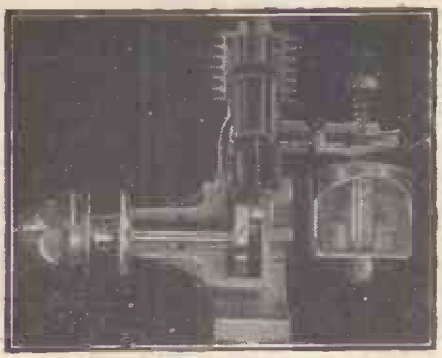


Fig. 5.—This sectionised view of the Mark II 2 c.c. diesel shows the contra piston, adjusted on this particular engine by a slot in the cylinder head. The fuel needle valve can be seen in section located in the induction pipe. Note the long and adequate plain bearing giving steady running.

engine, from a 2-volt accumulator if an American plug, or a 2-volt accumulator if a British plug. The engine is started by the usual "sucking in," and swinging of the propeller or flywheel. The glowing plug element ignites the compressed gases as the piston comes to the top of its stroke. As soon as the motor starts, the battery leads are detached, and the motor carries on firing due to heat retained by the glow plug element from combustion. A special methanol fuel mixed with castor oil is used, the compression ratio being higher than that of a normal non-racing petrol engine.

Design is usually a compromise, and the glow-plug engine is no exception, for we gain certain advantages such as simplicity and less weight for the model to carry, but there is one offsetting disadvantage. Since the glowing element is "awaiting the charge," it amounts to "advanced ignition," which cannot be retarded, for there is no alteration of spark position as there is on the petrol motor. This means an engine which can virtually only be run *flat out*. As most models only require an engine to run flat out, this fact is of little moment, except for large radio-controlled models which may want to control climb on engine speed alteration. In this case the petrol engine may be considered by some to be the best, for the ignition can be controlled. Small glow-plug engines are very easy to start, because they can be easily bounced over what amounts to their "advanced ignition effect," but the larger glow-plug engine may kick back unless fearlessly handled by a mighty swing and a gloved hand. In actual practice I have found that I do not get much difficulty in starting the larger glow-plug engines by hand, but anyone who has tried to hand-swing a car engine with advanced ignition will appreciate the necessity for a quick and vigorous swing. Half-hearted measures ask for a protesting kick.

Here is an important point in successful glow-plug engine operation: Anyone who tries to run a glow-plug engine with a large propeller which holds down revolutions will have little success. *The secret of glow-plug operation is to keep the engine running at high revolutions by a small airscrew or water propeller. Let it howl with its "advanced ignition effect" and it is a fine engine. Correct propeller size and pitch is therefore vital.*

Readers will note from photographs, and notes of engines in this review, that the best glow-plug motors all have large ports and are often provided with either disc or rotary inlet ports, and sometimes with circular ring exhaust ports, or with very large exhaust ports having supporting bridges in the cylinder liner. These are to allow quick "breathing" in of the gases and speedy exhaust in order to obtain very high r.p.m.

The Diesel

This is the most simple of the reciprocating internal combustion engines. There is no electric battery, even for starting. The model again has no weight to carry other than the engine. The owner can take his diesel model to the flying field or pondside, or race track, with nothing more than a bottle of fuel, and perhaps a spare propeller in case his aeroplane crashes.

The diesel is, in effect, a strengthened-up petrol two-stroke engine, for the compression ratio is considerably higher, the average model diesel having a ratio of between 12 to 1 and 20 to 1, whereas the *non-racing* petrol motor has a ratio around 5 to 1 and 7 to 1, and the glow-plug motor around 8 to 1 and 10 to 1.

Special Fuel

The diesel engine burns a special fuel, generally using ether to increase its ignitability, but recently an etherless fuel called "Mercury No. 6" has proved very successful. Lubricating oil is contained mixed in the fuels. Ether evaporates quickly and therefore must be kept in a corked bottle.

Fig. 6.—The E.D. Mark I "Bee" 1 c.c. diesel engine.

The only adjustment that a diesel requires apart from the usual fuel needle valve, is done by the compression lever. This lever moves a contra-piston up and down inside the top of the cylinder.

Thus, when the lever is screwed down it forces the contra-piston closer to the engine's piston which it rises to top dead centre. This gives a smaller space for the gases to be compressed into and so raises the compression slightly for starting. When the lever is unscrewed the contra-piston is allowed to rise and so increase the compression space and lower the compression, as the engine warms up and gases are more expanded. The reader will understand that a diesel fires its charge automatically by compressing the gases to a great amount which heats them until they ignite.

The extreme simplicity of the diesel has brought power flying to hundreds of people who otherwise might not have essayed this intriguing pastime. The diesel is not often made in sizes greater than 5 c.c. in this country, but there was one perfectly satisfactory model diesel made, having a capacity of 50 c.c. This was eventually used to drive a full-size dinghy, proving that there is no insuperable difficulty about the larger diesel. The Italians market a 10 c.c. diesel which I have seen in operation.

The "Jet" Engine

Finally, we come to the last type of model internal combustion engine. This is the jet reaction engine. An article of mine recently appeared in PRACTICAL MECHANICS discussing the type in some detail. I have written a book on each of these main types of model I.C. engine under the following titles: "Model Jet Reaction Engines," "Model Diesel Engines," "Model Glow-plug Engines," published by Percival Marshall and Co., Ltd.

The jet engine is a recent comer from America, where the type was developed after the war from the German buzz bomb. The model engine is far more simple and generally superior. It is characterised by great power for light weight. Approximately 3½lb. static thrust is obtained for about 1lb. in weight, in the case of the average "flutter-valve" resonance type of engine. Britain now has followed along American lines and has two model jet engines on the market.

Owing to the very large static thrust, which increases considerably as the model increases its speed through "ram effect," these motors are generally used for control-line racing models or hydroplanes. I recently witnessed a model jet hydroplane speed attempt on a local pond. After the second lap round the tethered course, this model accelerated violently due to "ram effect," and actually took off the water as air got underneath the steps and centrifugal force flung the model out flat from the tethering pole. The model looped! These motors are extremely simple mechanically, but require sound design to obtain good harmonic balance. The only moving part is the springy steel "flutter-valve" which vibrates back and forth about 280 times per second as the pulses or "explosions" occur in the simple tube body of the engine. At this speed they naturally make a wonderful noise!

Thrust is by reaction within the body of the motor, the exhaust end being open. A tyre pump is used to start the initial blast of air which picks up the fuel, and a trembler coil is used to provide the initial starting spark to fire the charge. As soon as started the heat of combustion fires the subsequent gas charges, and pump and coil are withdrawn. The fuel used is ordinary car petrol and no lubricating oil is required.

There is another type of quite small jet motor on the British market to-day which was conceived in this country, and which is most suitable for boys' small free flight models or baby balsa hydroplanes weighing a few ounces. The motor weighs an ounce or two and has a perfectly even and constant thrust, whilst the special solid fuel burns for about 15 seconds to 40 seconds according to the size of motor, which is made in four sizes.

These little motors are quite safe and are great fun, and although they are on the rocket principle and not true internal combustion engines "breathing" in air like all the other types we have discussed, the old

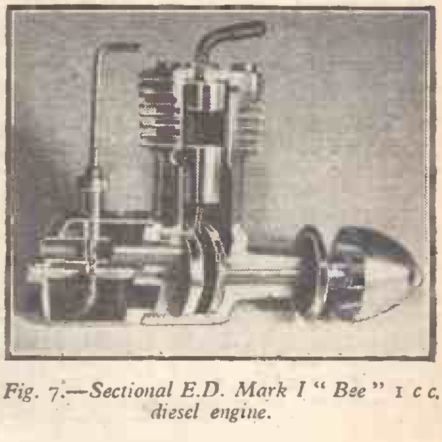


Fig. 7.—Sectional E.D. Mark I "Bee" 1 c.c. diesel engine.

idea of the rocket having one glorious swoosh and being dangerous is a thing of the past. I have flown these Jetex engines in small balsa aeroplanes and run them in tiny balsa hydroplane races and find them most reliable.

We should remember that jet engines in general do not suffer from the turning over torque reaction which a propeller engine gives. It is therefore easy to obtain lateral stability for jet-driven models.

Cubic Capacities

(1) *The* 30 *to* 15 *c.c. Class*

This is normally the largest size met with on the British market. The size is not often used to-day except for hydroplane racing, cars and large radio-controlled models.

In the early days of the model engine it was the standard size. Now the 10 c.c. motor is rapidly superseding this capacity.

(2) *The* 10 *c.c. Class*

For practical purposes this is becoming the "large" racing and speed class. It is used for large radio-controlled models, for planing speed-boats, cars, stunt and control line speedsters. At the moment of writing this capacity holds the world's model speed records (reciprocating engines) on land, water and in the air. It is interesting to realise that not so many years ago we thrilled to get "such a small engine" for model work, and I still have the first "Brown Junior" to come into England. This was hailed as a wonder engine, and although astonishingly powerful for its day, the latest racing 10 c.c. engine's enormous power output is scarcely recognisable when compared with the limited output of those days.

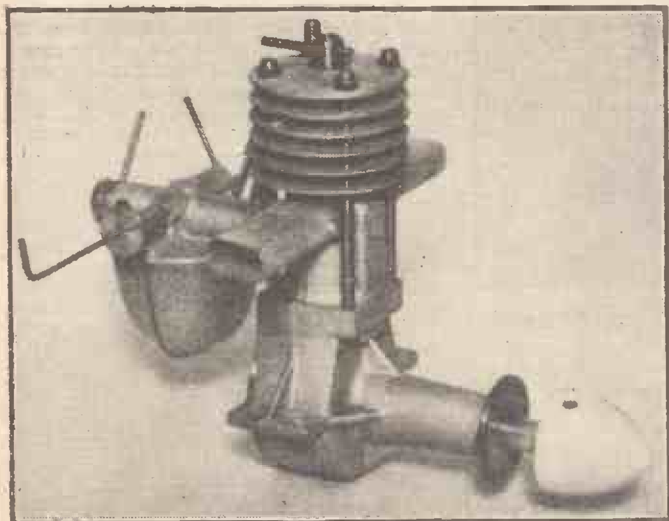


Fig. 9.—*The ETA* 5 *c.c. diesel is noted for its fine detail finish, reliability and sound performance in the "large" size of diesels.*

(3) *The* 5 *to* 6 *c.c. Class.*

This is a very useful size of medium engine for models having wingspans of approximately 6 to 7ft. for free flight, or boats up to about 3ft. 6in. in length. The 5 c.c. class seems at the moment to be the largest diesel. It is a useful size for power radio-controlled model aircraft of the smaller size.

Fig. 8.—*An E.D. diesel engined model is seen in the air being controlled by an E.D. radio set under demonstration to the Dutch Army and Air Force.*

(4) *The* 4-5 *c.c. to* 3-5 *c.c. Class*

This is a powerful but smaller "middle class." Free-flight aircraft of about 5 to 6ft. wingspan and boats up to about 3ft. in length are served by this capacity engine.

(5) 2-4 *c.c. to* 2 *c.c. Class*

A very good size with an excellent reserve of power for small free flight and control line models of the "hot" variety, also for small speedboats just below 3ft. in length. Wingspans of about 48in. for free flight. This size has put up some impressive speed records in its class on car track and in the air.

(6) 1-3 *c.c. to* 1 *c.c. Class*

A very popular size of engine for boys, because it is a reliable runner with good power for models around 45in. wingspan, free flight, and little boats of about 23in. in length. It is just large enough to be an easy starter, without any particular knowledge or skill. It is also cheap to buy.

(7) 0-2 *c.c. to* 0-8 *c.c. Class*

This is the baby class, and in diesel or glow-plug engine permits really midget models to be built. In America at the moment the "Infant" 0-2 c.c. glow-plug engine is becoming very popular. These tiny engines as a class require a certain amount of care when starting because the combustion chamber is so minute, and the fuel jet so small, that too much fuel can cause a rich mixture which may either fill the combustion space with neat fuel, causing a "stiff" or hydraulicing engine, or a mixture that will not fire. On the other hand, when these engines are well made to fine limits and sensibly handled they make grand little motors, and are most reliable nowadays. They also have the advantage that the model will go into an attaché case with other accessories for a day's flying fun!

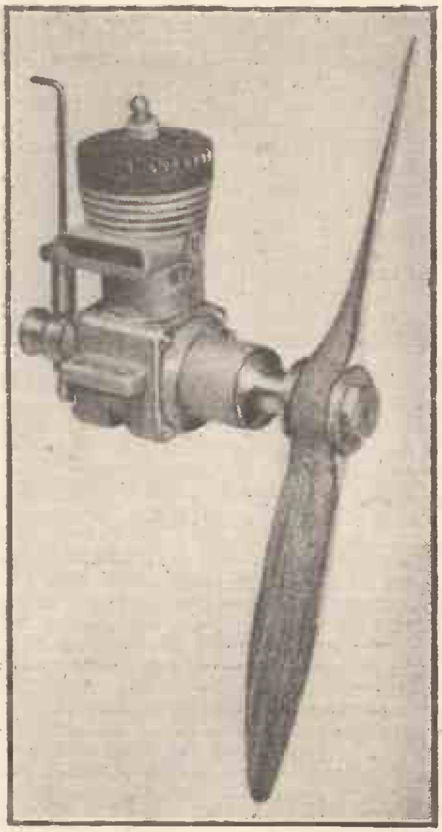


Fig. 10.—*The ETA* 29 *is a new glow-plug engine having a particularly fine performance.*

E.D. Engines

Electronic Developments (Surrey), Ltd., 18, Villiers Road, Kingston-upon-Thames, Surrey, are responsible for a well-known and tried range of diesel engines. This firm has recently produced a radio set for controlling model boats and aircraft, and shortly a 5 c.c. and a 10 c.c. petrol and glow-plug engine will be placed on the market. To act as ancillaries to this range, plastic propellers and a clockwork timing device are being provided.

E.D. engines hold speed records for model car and aeroplane, and speeds of 25 knots have been obtained with a hydroplane powered by a 2 c.c. diesel, whilst marine models weighing up to 6½lb. have been successfully operated. Suitable flywheels are provided for the firm's motors.

The Mark III 2.49 c.c. diesel

This is the largest diesel in the range and was specially designed for "C" Class race cars and control-line flying. This engine holds the world's car speed record in its class, of 50.5 m.p.h., at the time of writing. I have personally used this motor for the first control-line flying boat to take off water in Britain.

The engine has a rotary crankshaft valve and specially extended propeller shaft to simplify streamlining the nose of a model aircraft. A separate conversion cylinder head is used for glow-plug operation if desired. The makers recommend that the engine should be run in first and well eased up as a diesel engine. The fuel to be used in this engine is two parts ether, one part castor oil, one part paraffin oil. Rotation anti-clockwise. Flywheel, if fitted, weighs 4½oz. Bore, .550in. Stroke, .625in. Weight, 6oz. Height, 3¼in. Length, 5in. Width 1⅞in. Airscrew (free flight), 10in. diam., 5in. pitch. Control line, 9in. diam., 11in. pitch. R.p.m. under load, 8,500. Static thrust, 26 to 28oz.

Competition Special 2 c.c. Diesel

This engine is a "hotted up" version of the 2 c.c. Mark II, details of which are given below. The motor has made a considerable name for itself in control-line flying, stunt and speed competitions. It produces a static thrust of 23oz. The recommended propeller is 11in. diam, 5in. pitch for free flight and 9in. by 11in. pitch for control line. Bore and stroke as for Mark II.

Mark II Diesel

Amongst the earliest 2 c.c. diesels in Britain, this little motor set a high standard, producing a static thrust of 16 to 18oz. Using an airscrew of 10in. diam. and 5in. pitch the engine develops ⅛ h.p. according to the maker's claim. A special fuel is used: one measure ordinary burning oil, one measure castor oil, one measure ether.

Bore ½in., stroke ⅝in., height 3in., width 1⅞in., length 4in. Weight, with airscrew, 6½oz. Efficient working r.p.m. 4,500 to 6,500. Flywheel, when fitted, 4½oz.

The E.D. "Bee" 1 c.c. Diesel

A very compact little motor for small models having the interesting feature of a disc inlet valve with induction pipe going through the centre of the fuel tank. The bore is .437, stroke .400in., height 2¼in., weight 2¾oz., length 3in. Static thrust is 12oz. plus, r.p.m. 7,000 plus, props., free flight, 8in. diam, 4in. pitch. C/L, 7in. by 6in. pitch.

The 1 c.c. "Bee" E.D. diesel is a compact little motor with a punch (Figs. 6 and 7).

As I write this review, the E.D. Mark IV of 3-5 c.c. (diesel) has just been released on to the market. This motor has a very exceptional performance and is useful for radio controlled models of the medium to smaller size.

E.D. Radio Set for Model Aircraft and Boats

Mention of this set is made, as many readers who buy engines to-day wish to control their models by radio. Fig. 8 shows an E.D. diesel engined model flying and under control by an E.D. commercially obtainable radio set, which is operative up to three miles.

ETA 5 c.c. Diesel

Eta Instruments Ltd., Otterspoolway, Watford By-pass, Watford, Herts, manufacture a large model diesel noted for its excellent finish and sound performance. This is a 5 c.c. engine, a capacity which will gain increasing popularity as medium-size radio control models come into greater use. There is a great interest in the radio-controlled model to-day now that sets are coming on the market for quite reasonable sums. I have found the 5 c.c. ETA diesel fly quite large, slow, free flight models up to about 7ft. in span and drive my planing type speed boats up to about 3ft. 6in. in length.

This firm have recently turned their attention to a glow-plug engine called the ETA 29, which is a most happy combination of correct compression ratio, easy starting and reliability with high performance, whilst retaining the well-known high finish of ETA products.

This engine has a contra-piston control stop to prevent damage by the novice, a choke operating lever which can be operated by remote control, and a cut-off which can similarly be operated by time switch. Bore 0.678in., stroke 0.8593in., capacity 4-9 c.c., weight 9½oz., height 4.25in. Best propeller is one between 12in. to 14in. with 6½in. or 9½in. pitch. Consumption tests by the makers show an average running time of one minute per 3 c.c. of fuel. The tank holds 21 c.c. Detachable exhaust stacks are fitted and filler tubes of varying lengths are available to suit cowlings. The contra piston has a developed contour. Static thrust of 32oz., using a 13in. by 7in. pitch airscrew, is claimed.

The "ETA 29" Glow-plug Engine

Made in two types. Type S.30 Model A for aircraft, including extension drive assembly. Type S.30 Series G.P. Model B/C for boats and race cars, including flywheel assembly. Capacity .296 cu. in., bore .750in., stroke .672in., weight 6-5oz. Compression ratio 9 to 1 approx. Speed, no load, 20,000 r.p.m. plus. One ⅜in. and one ½in. ball race support the crankshaft. There is a rotary inlet valve with bushed disc and large-bore venturi fitted at the rear of the crankcase. Two piston rings and die castings are used. Fuel 70 per cent. methanol, 30 per cent. Castrol R. Using a nitro-methane base fuel, power in excess of .56 h.p. has been recorded.

(To be continued.)

A Radio Time Switch

A Simple Device Made from an Alarm Clock

By E. J. DUDLEY

An easily contrived radio time switch.

THIS time switch can be made in an evening with a few common tools found in every workshop, and costs about 7s. 6d. The main item, apart from the clock, is a micro-switch, which can be bought at any radio shop that stocks ex-Government radio parts.

Fitting the Switch

The micro-switch is secured to the back of the clock in such a position that when the alarm bell rings, and the alarm winder rotates, it presses the button on the switch. To fix the switch to the clock, mark where the two holes will be on the back of the clock. Then remove the back and drill two holes, put a pair of long bolts through the holes and tighten into position with a nut on each, replace the back of the clock, slide the switch down on to the bolts and secure with two more nuts. If the alarm winder is made of a metal loop, like the one on the movement winder in the illustration, remove the loop and drill a hole through the top of the threaded base, push a piece of rod, bent as shown, through the hole and solder into position. The modified winder should be screwed into place before the switch is put on to the two bolts.

Having fitted the switch, connect a length of twin flex on to the solder tags on the switch. A special adapter is fitted to the end of this flex, the adapter consisting of a plug and socket of the same type, as used with radio. For this particular time switch I had to use a two-amp. three-pin plug and socket; these were screwed, one on each side of a piece of plywood, cut to the same size as the back of the socket. This is clearly shown in the illustration. One of the wires from the switch is connected to one terminal of the plug, the other to one terminal of the socket, the other terminal on the plug and socket are connected to each other.

To use the time switch, plug the adapter into the electricity point, plug the radio into the adapter socket and release the alarm; then switch on the radio, tune it to the desired station and adjust the volume, tone, etc. When this has been done, wind the movement of the clock and set the alarm, then give the alarm winder half a turn and the radio will go off.

In the morning you will be awakened at the desired time to the strains of radio music.

The WORLD of MODELS

Model Engineering Exhibition at Leicester : Model-making in France : A Unique Scale Model Factory

By "MOTILUS"

THIS year I once again had the pleasure of visiting the annual exhibition of the Leicester Society of Model Engineers. This was held, as on previous occasions, at St. Mark's Schools, Belgrave Gate, and all the exhibits were varied and worthy specimens of model-making.

The exhibition filled two of the large schoolrooms and extended into the playground, where a short 5in. gauge running track had been erected for the operation of a passenger-carrying railway. Steam locomotives were used whenever drivers were available, but at other times the trucks were hauled by a sturdy tank locomotive, built of hard wood and electrically driven. Like all passenger-carrying railways, this was a popular attraction for the younger generation.

The Leicester Model Railway Group have as their president Mr. E. A. F. Dallaston, who is also secretary to the Leicester S.M.E. This year the group display at the exhibition consisted of an excellent variety of OO, O and 1 gauge locomotives and passenger and goods rolling stock, featuring altogether some 40 separate items. They included several attempts at out-of-the-ordinary model-making. A gauge O model of the "Irish Mail" express, for instance, made by Mr. C. P. King for electric drive, was made entirely of cartridge paper, except, of course, for wheels and under-carriage work; it was so well painted and finished that it would be difficult to tell that the basic material was so light, without handling the model coaches.

Another novelty was a model locomotive and coaches of the old Festiniog narrow-gauge railway, which was demolished in 1935. This train boasted a double-headed locomotive, and the unique prototype design of a once well-known and popular mountain railway made a most unusual miniature, the work of Mr. R. Tustin. A model of the Lynton and Barnstaple narrow-guage railway (which was recently also demolished) added still more to the variety on the stand) for which this model railway group were responsible.

Stationary engines were well represented, many of them working by compressed air. Probably the most outstanding exhibit in this section was an old two-tier table engine (Fig. 1) discovered and loaned by Mr. F. W. Chapman, President of the Society. This model is thought to date back to about 1830 and is a very good example of the model engineering of that period.

Fig. 3.—(Right) A model of the Houses of Parliament: one of Mr. J. Ward's matchstick creations, built in eight months' spare time, using 18,000 matchsticks.

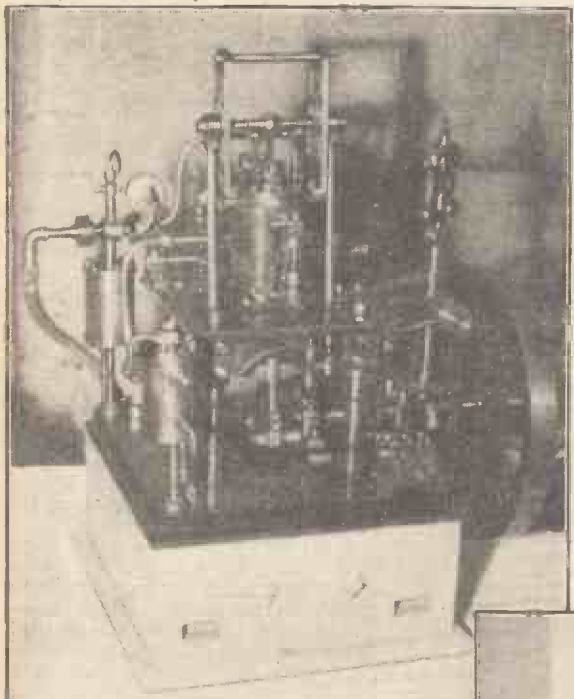


Fig. 1.—The old model of a two-tier table engine, in excellent condition, which was loaned for the Leicester Exhibition by Mr. F. W. Chapman, President of the Society of Model Engineers.

Fairground Models

Leicester model-makers must be fond of fairground models! In addition to a large display at one end of the exhibition, showing models of various attractions that appear on many fairgrounds, there was also a sturdy working model roundabout with galloping horses made by Messrs. S. & R. Taylor

Fig. 2.—The 1¼in. to 1ft. scale, steam-driven model roundabout with galloping horses. The work of Messrs. S. and R. Taylor, this was certainly one of the big attractions seen at the Leicester Society's Exhibition.

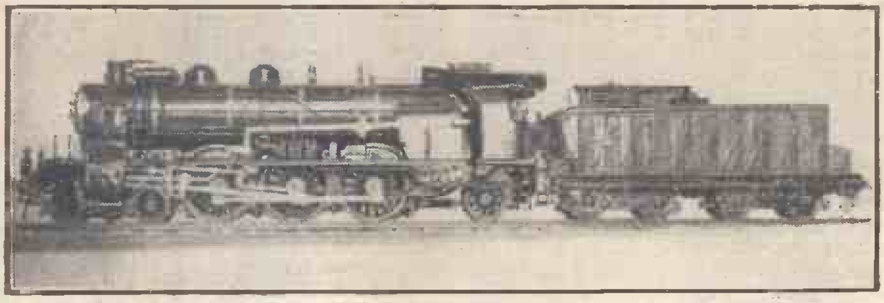


Fig. 5.—An interesting French-made model, by Mr. Agnaut. This gauge 1 model is of a 231 "Pacific" P.L.M. locomotive, and is outstanding in the amount of detail shown. The model is coloured olive green, with red lining.

(Fig. 2). This model was to a scale of 1¼in. to 1ft., well made and well finished in detail; it was working during most of the exhibition to an accompaniment of cheerful music.

Model locomotives were plentiful; first prizewinner was Mr. J. Briars, who entered an excellent ¾in. scale, 3½in. gauge British Railways locomotive model No. 45610. The model is coal-fired, has a Walshaerts valve gear, mechanical lubricator, axle-pump feed and emergency hand pump in the water-tank in the tender. The working pressure is 95lb. per sq. in.

Mr. R. B. Thorpe's first attempt at modelling a power boat won him second prize in the exhibition, even though it was unfinished. This is a model cabin-cruiser, which is later to be fitted with twin-cylinder engine and boiler to the builder's own design. All the detail fittings for this model were made by Mr. Thorpe himself.

A glass-case ship model that attracted much attention was Mr. J. B. Taylor's clipper, *Caliph*, to a scale of ⅛in. to 1ft. This is a most fascinating ship to model, as the lines of the hull are so lovely. Launched in 1869, the *Caliph* was used in the China tea trade service. Mr. J. A. Thompson's model of the *Lexington*, an American 16-gun brig-of-war of 1775, was also much admired.

Mr. D. Dickens's model turntable ladder fire-escape, to a scale of 1/16th, deserves mention, as it was made during the war with only hand tools, yet shows good detail work in its construction. Handcraft work, model omnibuses and numerous loan models kindly sent by neighbouring societies and clubs all helped to make this exhibition a most interesting display of craftsmanship productions.

Models Made with Matchsticks

Matchsticks—from five to 50,000—are the building materials of Mr. J. Ward, of Oldham. It is surprising what a variety of models can be constructed from such small beginnings, aided by a quantity of glue and paint, razor blades and a pair of tweezers. Square matchsticks are preferable, I understand, and particulars are taken mainly from photographs, with reference to drawings if they are available.

This novel hobby was started by Mr. Ward in 1933, when he obtained a picture of T.S.S. *Lancastria* from a local travel agency. With this as his sole guidance he proceeded to build a 6ft. model of the ship from 41,854 matchsticks. This amazing model included all the usual details, with 32 lifeboats, swimming pool, deck games, etc. Working about four hours a day, this took 12 months to complete.

Since then Mr. Ward has built several more models, the smallest being a miniature *Queen Mary*, from five matchsticks only. This model was graciously accepted by H.R.H. the Prince of Wales in 1935. A further matchstick model, 6ft. in length, of R.M.S. *Mauretania*, was unfortunately smashed by accident, the only "salvage" being the lifeboats. These Mr. Ward used on his next model of R.M.S. *Queen Elizabeth*. This was a working model, but was built from old tins and scrap plywood instead of matchsticks for a change.

For his latest model Mr. Ward has returned to matchsticks, but has forsaken ships for architecture. He has made a 4ft. long model of the Houses of Parliament, using 18,000 matchsticks. This unusual model (Fig. 3) has been exhibited in many of the largest cities in England and Scotland and has been much admired.

Model-making in France

I am sure that news of activities of amateur model-makers in France must be of interest to readers. I correspond occasionally with Mr. J. Fournereau, Editor of "Loco-Revue," a French magazine devoted entirely to railway models. Recently Mr. Fournereau sent me a selection of photographs of gauge 0 and gauge 1 model locomotives and coaches of various types, made by French amateurs.

I would like to describe one of these, which is outstanding in many ways. It is a gauge O model of an 0-6-0 tank locomotive, built by Mr. St. J. Fournereau, son of my correspondent, for the Conservatoire des Arts et Métiers, Paris. I had the pleasure of handling this fine model (Fig. 4) when Mr. Fournereau and his son visited England last April: it is certainly superbly built, in brass, with a wealth of detail. It is not surprising that it represents 650 hours of hand work on the part of young Mr. Fournereau. Painted in a matt black, with red lining and nickel parts, the model has a very smart appearance. For the benefit of French amateurs who wish to build similar models, wheels, domes, chimneys and others of the more difficult parts to construct, are available for purchase at reasonable prices, ready for building up.

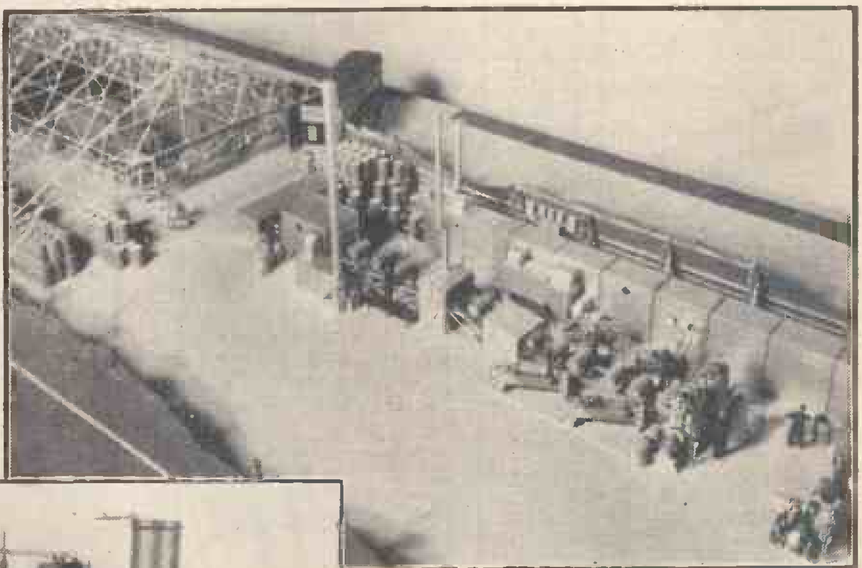


Fig. 6.—(Above) Bird's-eye view of the far end of the oil-drum factory model, showing final processes. The drums are completed, tested, painted and dried and then conveyed for loading on to road or rail transport vehicles.

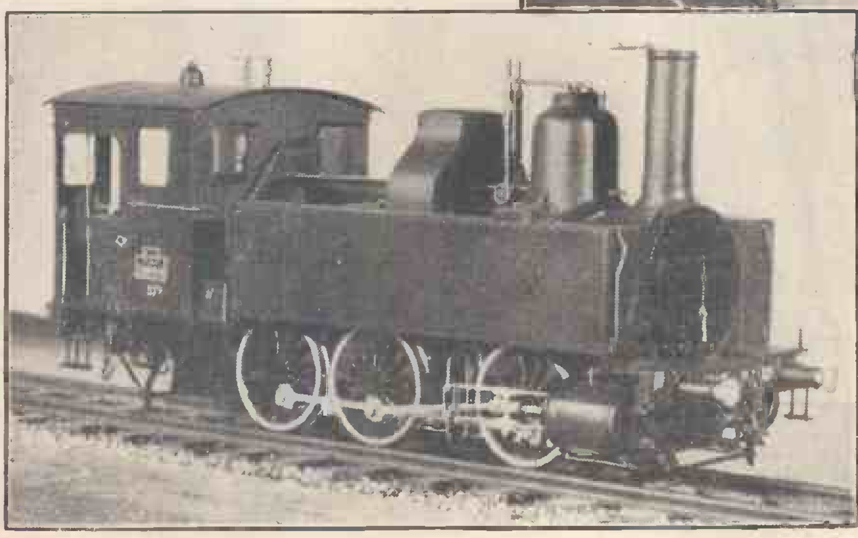


Fig. 4.—(Left) A gauge O, French-made model of an 0-6-0 tank locomotive, the work of Mr. St. J. Fournereau, of Montchauvet. Supreme workmanship is found on this model, even in the smallest details.

The prototype of this model is a locomotive still in service in South Eastern France, and its origin goes back to 1857, although it has been converted in the interval to its present form.

Some of the locomotives that receive much attention from French railway modellers are those on the French P.L.M. line. Another interesting photograph I received from Mr. Fournereau is of a model 231 " Pacific " type P.L.M. locomotive, built by Mr. Agnaut. This is a gauge 1 model, in copper and steel, finished with olive green paint and red lining. Again, here is a model notable for detail. Mr. Agnaut made it entirely by hand (except for the wheels), over a period of eight months, working on Sundays and holidays. In writing of his model, he states that the tender gave him more trouble than any other part. Readers will notice, from the illustration (Fig. 5), the riveting, which is so often prominent on French locomotives.

Scale Model Factory

A unique and interesting complete working factory model has recently been made by a well-known firm of model-makers at Northampton for Van Leer Equipment, Ltd. This is a $\frac{3}{8}$in. to 1ft. model of their large drum-making factory at Ellesmere Port, where steel drums for holding oil are manufactured.

The main feature of the model being the internal details of the factory, a cut-away process was adopted for modelling the roof and walls. These are shown, complete with steel ribbing, at either end of the factory, but in the centre the whole of the roof, supports and part of the walls have been omitted, to reveal an uninterrupted view of the interior. Every machine used in the process of manufacturing oil drums is shown on this model, starting with the cutting of the raw material and finishing with the drums on the conveyor, ready for transport.

The different types of working model machines include presses, guillotines, a seam welder, stripping machines for cleaning joints; a brushing machine, flanging machine and a small corrugator: in addition there are four testing tanks (as every drum must be air-tight), a gas drying chamber, a spray painting booth, a long gas-heated drying oven through which drums pass after painting, and lastly, the Monorail conveyor to carry the finished drums to waiting road or rail transport (Fig. 6).

Transport facilities are also shown in the model, as they are in close proximity to the factory. On the road approaches around are model transport wagons: at one end of the factory is a static model railway, including track, saddle tank locomotive and six wagons. Also included at the other end is a model Morris mobile crane, which in the prototype is used in the unloading of raw material from lorries for conveyance to stacks in the storage shed.

Scale appearance and final realism are added to the model by the use of scale model figures throughout: working in various positions at the machines, about the factory, on the mobile crane, and on the road approaches.

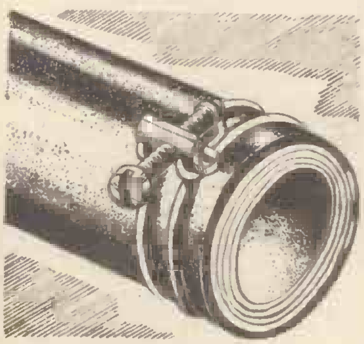
Underneath the model, below the wooden base, there is of necessity a mass of mechanism, with complicated and intricate devices for the electrical working of the model machines, etc. Regarding the model at eye level, with all the machines working, one has a distinct impression of distant realism.

Christmas is nearly here again, soon to be followed by the close of the old year. I hope all enthusiastic model-makers have been able to add to their collections during the past year and can record good prowess in their model-making, whether it be railways, ships, aeroplanes, engines or experimental work. I hope you all have a good Christmas, with opportunities of meeting friends for a gossip on model-making topics.

Trade Notes

Wingard Hose Clip

MESSRS. WINGARD (M.A.) LTD, Chichester, Sussex, have just introduced a new screw-action hose clip which combines all the essentials of a perfect clamping device. The tongue-free overlapping clamping band exerts powerful even pressure without damage to the hose, and eliminates



The Wingard Hose Clip.

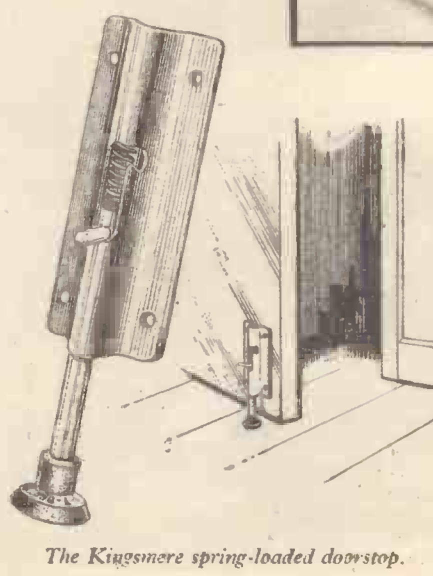
any weakness or pinching at the point of tightening. Leaks are eliminated, even at the highest pressures and temperatures. The clip, which is priced at 9d. retail, is easily and quickly assembled, and is made in six sizes. The plated assembly affords complete protection against corrosion.

A New Doorstop

AN ingenious metal, spring-loaded, quick-release bolt, fitted with rubber suction grip for attachment to doors, has recently appeared on the market. The device is designed for use in the home, factory or office where doors may be required to be held open for occasional periods.

A boon to the housewife when carrying hot dishes from room to room. The easy way of holding the door for allowing a current of air between rooms.

The doorstop is obtainable from ironmongers and hardware stores, price 2s. 6d., or by post direct from The Kingsmere Promotion Services, Kingsmere House, 31, Lynton Road, New Malden, Surrey, price 3s., including screws for fixing, packing and postage (Gt. Britain and Northern Ireland only). Trade inquiries invited.



The Kingsmere spring-loaded doorstop.

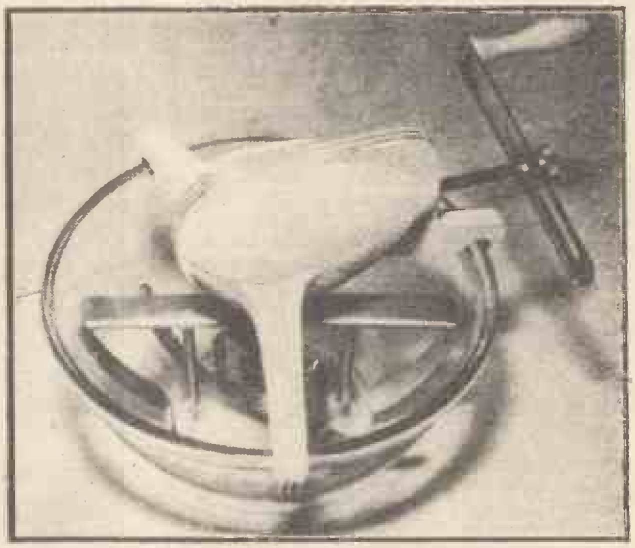
A Hand-operated Mixer

A HAND-OPERATED mixer and beater, the " Quick-Mix," which can handle kitchen jobs almost as quickly as an electric mixer, is now on sale in Australia.

The new mixer, Australian-invented and built, retails at £3 19s. 6d., about a fifth of the cost of the best power mixer on the Australian market.

The main feature of the " Quick-Mix " is a set of twin co-axial beaters—one operating at high speed, one at a slow rate, an improvement on power models.

The beaters are actuated by a train of gears housed in a metal body of which the three arms clamp on to the rim of a standard-sized bowl. A crank handle sets the beaters whirring.



A new hand-operated mixer and beater.

The patented action of the " Quick-Mix " beaters throws the mixture from the fast beaters in the centre to the walls of the bowl, where it is scraped off by the slower-moving blades and returned to the centre. This dual action ensures the aeration and even texture essential to good cooking.

A cream mixture can be beaten up from butter and sugar in only two minutes. Four minutes is the time for handling a heavy cake mixture. The handle of the " Quick-Mix " has been designed to turn easily. It can be adjusted in three positions for the handling of heavy fruit mixtures, medium-sized cakes and light sponges. Of stainless steel, the beaters are easily detachable for cleaning.

Contact Lenses

SIR,—I was interested in the article, "The Story of Spectacles," which appeared in your October issue. As a wearer of contact lenses for over five years, I find they have many advantages over ordinary "framed" spectacles. The greatest and foremost of these is that vision is improved 100 per cent. over ordinary glasses worn on the nose.

My eyes and lungs were very badly burnt and scarred by an almost fatal dose of mustard gas received in 1918 while serving in France. About five years ago I had a severe attack of ulcerated eyes which altered my vision again and rendered the spectacles I was wearing useless. As no stronger glasses could be found for me, contact lenses were ordered and fitted. Now I can see objects in the far distance as well as the next man and I cannot do without them.

For reading, a pair of extra spectacles are needed, and these are worn on the nose while the contact lenses are still in use.

I usually insert my contact lenses on rising in the morning about 7 a.m. and do not remove them till about 9 or 10 p.m. in the evening. They are then washed, dried and placed in a small velvet-lined case, about half the size of a spectacle case. It took me about two months to get used to my lenses, and when in use, they are almost invisible, even at a range of 12 inches.

They are ideal for wet weather and riding and driving in rain—no rain drops can settle on them, as the eyelids act as "windscreen wipers." Also they do not steam over when entering a warm room from the cold air outside or when one drinks a cup of tea.

There is one slight disadvantage which is sometimes troublesome. The lenses are inserted in the eye, using a small quantity of saline solution (cooking salt in boiled water) as a lubricant, and sometimes a bubble forms between the eye and the lens. This tends to distort the vision until removed by placing a finger in the outside corner of the eye and applying gentle pressure.—C. PALLONZA (Hull).

Electrified Fence Construction

SIR,—Regarding Mr. J. M. Fraser's letter on the above subject in the October issue, one gets the impression that Mr. Fraser, in making his downright condemnation of the article on the electric fence in the August issue has not studied the offending subject but has sounded an alarm on orders from headquarters.

Mr. Fraser does not mention the use of a spark coil. Even assuming the worst, with full mains voltage in the primary of the coil, does he expect the 36 S.W.G. secondary to carry the current to the fence "to the danger of animals and humans, etc."? "The fault in the apparatus" to which he referred means the transformer, I presume, what then of all the small mains transformers on bells, train sets, etc.

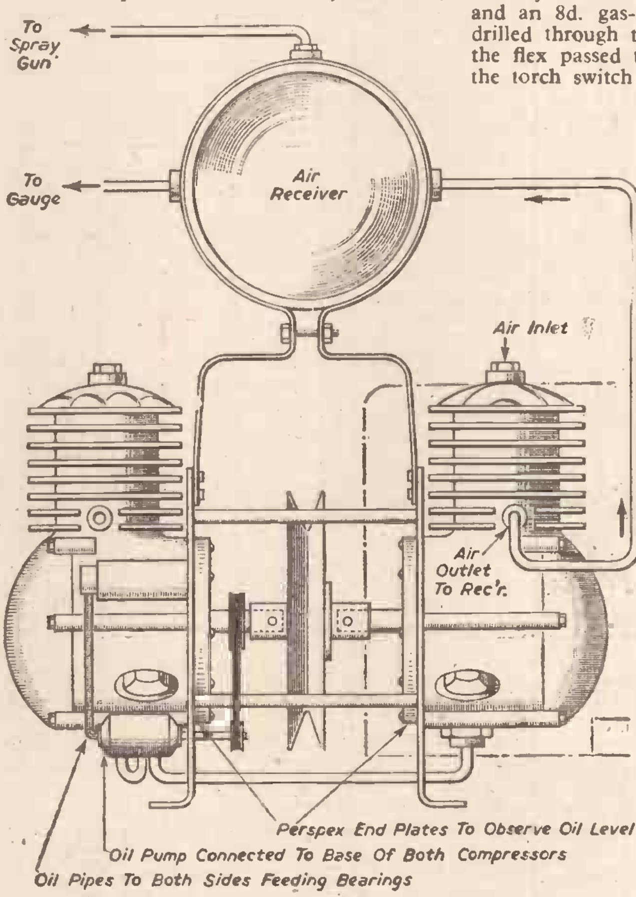
Mr. Fraser cannot fairly criticise one particular circuit and allow the use of mains transformers in general.—W. A. FURNESS (Essex).

A Tandem Air Compressor

SIR,—I have completed a tandem air compressor made up from R.A.F. surplus stock to suit the B.E.N. "S" model spray gun, described in "Trade Notes" in the June issue of PRACTICAL MECHANICS.

I thought the following particulars and sketch might be of interest to other readers.

The compressors are mounted, as shown,



A tandem air compressor devised from surplus components.

and give a constant pressure of 30lb. at 560 r.p.m. One cylinder is in compression while the other is on suction to give even drive.

The compressors, type SH6/2 are advertised in many daily papers and may be adapted to do the job. Most of these types use two-stage compressors made to compress up to 300lb. per sq. in. As the pressure required is only 30lb. I removed the valve on the second stage. If this is not removed, the power needed to drive them is twice as much. The motor I use is $\frac{1}{4}$ h.p.

The oil is circulated by a worm oil pump which is quite easy to construct, and it circulates the oil through the bearings, etc., as originally designed. The pump is driven off the compressor shaft by a small belt.

The end plates of the compressor are made of Perspex and are fitted to show the level of oil.

I find that some arrangement must be made to cool the fins of the compressor heads as they are liable to overheat. This can be easily overcome by fans driven off the motor, which in the present case is a hair-drier motor.

The cost of this unit is very low—two SH6/2 compressors at 25s. each, one 5in. pulley at 4s. 6d., 4ft. of $\frac{3}{8}$in. diameter copper tube, and odd scraps of brass, etc. Many parts, like the air receiver and safety valves, I made myself.—A. WEBSTER (New Malden).

Electric Gas Lighters

SIR,—I have read, with interest, the article in the September issue on making a gas lighter; but why all the added complication of the ignition coil, bell, condenser and 12-volt transformer? I recently made two lighters for my kitchen which operate satisfactorily direct off the 3-volt tapping of the existing bell transformer.

They consist merely of a 2/- torch case and an 8d. gas-lighter element. A hole is drilled through the bottom of the case, and the flex passed through and wired so that the torch switch is operative.

It is doubtful if the lighter would operate while the bell was ringing, but in three months' usage no such coincidence has yet occurred.

The length of wire required to reach the transformer evidently provides sufficient resistance to give the voltage drop.—W. A. WELLS (Moulton).

L.P.R. Records

SIR,—I was interested in the article in the September issue on "L.P.R." records operating at speeds as low as 33/45 r.p.m.

In the early 1920's a gramophone and records were marketed — and may still be for all I know — the starting speed of which was very low (somewhere about 40/50 r.p.m.), the rotation being gradually accelerated until a speed of 100/120 r.p.m. was attained at the end of the record.

The idea behind the device—it was called the "World Record Controller" I believe—was that with the diminishing diameter the actual amount of the playing groove passing under the needle likewise diminished as the tone arm approached the centre. In round figures a 12-inch record of orthodox type gave three feet of groove per rev. at starting, but only one foot at the end. The ideal amount was asserted to be about two feet per rev., and by this speeding-up process this optimum amount was sustained throughout the complete run of these records.

Control was effected by a second governor actuated by the position of the tone arm, but, while it no doubt did all that was claimed for it in reducing record wear and giving higher fidelity in reproduction, the disadvantage was that special records, recorded in a like manner, were necessary for its operation, and the selection offered was naturally more limited than with records of the normal type.—S. JAMES (Birmingham).

Screwdriver Theory

SIR,—There seems to be a good deal of controversy concerning long- or short-handled screwdrivers, as to which gives the greater mastery over stiff screws. I have observed two oversights in the reasoning so far given by your correspondents:

(a) To regard the turning action applied to the blade as the *only* physical requirement.

(b) To regard the blade and handle of the screwdriver as the only mechanical parts involved in the turning action.

Taking (a) first, a secondary but equally important factor in turning screws with a screwdriver is to maintain the tip of the blade fully engaged in the slot of the screw. As much effort is frequently used for this purpose as for actual screwing.

With regard to (b), the complete mechanical system involves not only the screwdriver itself but the hand and bones of the forearm. It can be seen from Fig. 1 that in normal holding the butt of the screwdriver handle is normally held in the centre of the palm, so that the bones of the forearm are almost 1in. out of line with the axis of the screwdriver shaft. This means that any turning movement applied will be of the "crank" variety, which in turn means that a "wobble" is imparted to the shaft, making it difficult to keep the tip engaged in the screw slot.

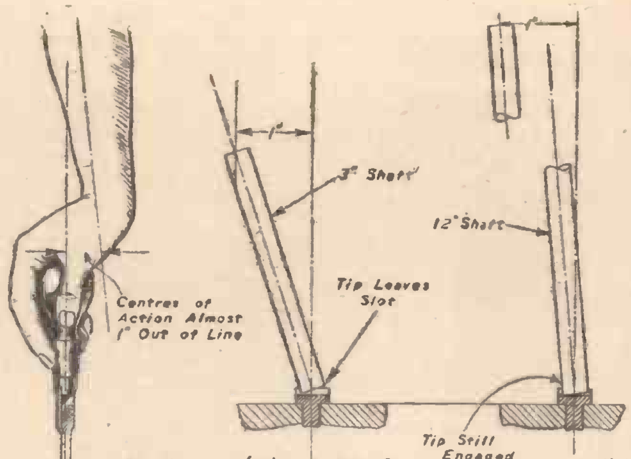
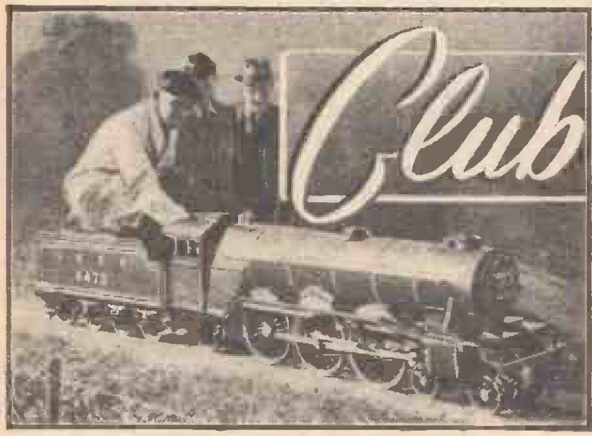


Fig. 1. (a) Fig. 2. (b)

Diagrams illustrating turning movements of a screwdriver.

Reference to Fig. 2 (a) and (b) demonstrates the difference when a "wobble" of 1in. is imparted to a 3in. and a 12in. shaft respectively: (a) shows that the tip is leaving the screw slot, (b) shows that the same degree of "wobble" leaves the tip still engaged in the slot. The effort required to keep the screwdriver tip in the screw slot is reduced when using a long-shafted tool, which makes available more effort for actual turning, and consequently easier operation.

It will be noted that this effect is independent of handle diameter, although obviously the larger this is the greater is the true leverage in turning the shaft.—E. B. DEW (Stoke-on-Trent).



Club Notes

Club secretaries are asked to note that the latest date for receiving copy is the first of the month for the following month's issue.

Welling and District Model and Experimental Engineering Society

THIS society, in conjunction with the Erith Technical College, will be holding an evening class each Monday evening at the Erith College. The class commenced on September 26th, and the times will be the same as last year, from 7 p.m. to 9 p.m. The class is not restricted to members of the society only.

At a recent meeting it was decided to set aside a sum of money to aid in the financing of purchases of tools by members; a tool club has been started in this connection. Briefly, the scheme is one in which members can buy tools by subscription, either before the purchase or after, and is at the moment on an experimental basis, the scheme being due for review after three months' operation.

Details of fixtures for the winter session can be obtained from MR. J. A. KING, Hon. Sec., 150, Sutherland Avenue, Welling, Kent.

Cambridge and District Model Engineering Society

THE above society held their second model exhibition in the Co-op Hall, Cambridge, from Monday, November 14th to Saturday, November 19th, 1949 inclusive.

The exhibition was opened by the Mayor of Cambridge, supported by influential gentlemen of Cambridge.

The exhibition, which was staged at the request of numerous patrons who supported our first exhibition, was considered by the huge attendance to have been one of the finest exhibitions of model work held in Cambridge.—Hon. Secretary, MR. J. W. ATKIN, 16, Ross Street, Mill Road, Cambridge.

Portsmouth Model Engineering Society

AT the model engineering exhibition held at the Assembly Hall, Worthing, in September, Portsmouth modellers' magnificent show captured most of the prizes, and their stand attracted great admiration from viewers. The prizes were awarded as follows: Mr. E. Scott, for a $2\frac{1}{2}$in. gauge Princess Royal locomotive—a silver shield; Mr. T. A. Bedford, for a waterline setting of H.M.S. *Tuscan* and S.S. *Empire Viceroy*—a silver shield; Messrs. W. and C. Chandler, for an Austin-type model car—the Worthing Town and the Anston-Walton Silver Challenge Cups, and for a racing hydroplane—a certificate of merit; Mr. C. Chandler, for an automatic electric tuning apparatus for timing race cars—a silver shield. The Austin car, hydroplane and timing apparatus were entered as a team and was runner-up for the Crusader Trophy which was won by Brighton M.E.S. Other entries were submitted by Messrs. Dreier, N. Norway, T. Bedford, Mrs. G. Buth, Capt. A. C. Hall, and Commander F. Allison.

During National Savings Week in October, the society staged a pocket exhibition in the foyer of the Regent Cinema, Portsmouth, which proved a good advertisement for the society. It was virtually a preview of the models that will be on show at the society's full-size exhibition to be held in March of next year.

Further particulars from the Hon. Secretary, Commander F. Allison, 21, Carmarthen Avenue, Cosham, Portsmouth, Hants.

Harrow and Wembley Society of Model Engineers

THE above society has arranged a meeting for December 14th, when a talk on "Electricity in the Home and Workshop" will be given by M. Ashley. The meeting will be held at Heathfield School at 7.30 p.m. J. H. Summers, hon. secretary, 34, Hillside Gardens, Northwood, Middlesex.

A CHRISTMAS GIFT FOR YOUR FRIENDS

AT the present time, when so many of the good things of life are in short supply here at home, the Christmas gift season presents many problems, particularly for those who have friends or relatives overseas.

There is, however, a simple solution—you can send your friends subscriptions to PRACTICAL MECHANICS. These gifts are not only original, acceptable, and free from all restriction, they have also cumulative value in that every issue throughout the year serves as a reminder of your good wishes.

We shall be pleased to arrange as many overseas gift subscriptions as you may wish to send at the normal annual rate of 10s. 6d. (Canada 10s.). In addition, an attractive special Greetings Card will be sent in your name with the first copy of each subscription.

There is still some time for you to send in your order, but hurry! Address your envelope to the Subscription Manager, PRACTICAL MECHANICS, Dept. G.3, Tower House, Southampton Street, Strand, London, W.C.2, enclosing the addresses of your friends, with remittance to cover, and we will do the rest.

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Crystal Sets. Our latest Model is a real radio receiver, which is fitted with a permanent crystal detector. Why not have a set in your own room? 9/6, post 6d. De Luxe Receiver in polished oak cabinet, 18/6, post 1/-.

Spare Permanent Detectors, 2/- each. When ordered separately, 2/6. With clips and screws, 2/10, post 3d. Headphones, brand new, S. G. Brown, G.E.C., etc., 15/-, 23/-, and super-sensitive, 30/- a pair, post 8d.

New Headphones. 10/- a pair. Balanced armature type (very sensitive), 12/6 a pair. Both post 6d. New **Single Earpieces,** 3/6. Bal. armature type, 4/6; ex-R.A.F. earpiece, 2/-, post 4d. **Headphones,** in good order, 4/6 and 5/6 (better quality, 7/6), all post 6d. **Headphones** with moving coil mike, 15/-. Similar phones with throat mikes, 12/6, post 8d. **Headphone Cords,** 1/3 a pair, post 3d. **Replacement Bands,** 1/3, post 4d. **Wire Bands,** 6d. **(All Headphones listed are suitable for use with our Crystal Sets.)**

Bell Transformers. These guaranteed transformers work from any A.C. Mains, giving 3, 5, or 8 volts output at 1 amp., operate bulb, buzzer or bell. Will supply light in bedroom or larder, etc. PRICE 8/-, post 6d. BELLS for use with either the above or batteries, 6/-, post 6d.

Ex-R.A.F. 2-valve (2-volt) Microphone Amplifiers as used in 'plane inter-com., in self-contained metal case; can be used to make up a deaf aid outfit, intercommunication system, or with crystal set; complete with valves, 20/-, post 1/6. Useful wooden box with partitions to hold amplifier, 2/- extra. Ditto, less valves, 10/-. One valve amplifier, complete with valve, 9/6, post 1/-.

Hand Microphones, with switch in handle and lead, 4/-. Similar instrument, moving coil, 7/6, post 6d.

Sparking Plug Neon Testers, with vest-pocket clip, 3/3, and with gauge, 3/6, post 3d.

S.B.C. Neon Indicator Lamps, for use on mains, showing "live" side of switches, etc., 3/6, post 4d.

Soldering Irons. - Our new streamlined Iron is supplied with two interchangeable bits, one each straight and curved; 200/250 v. 50 watts, 9/-, post 6d. **Standard Iron** with adjustable bit, 200/250 V., 60 watts, 9/6, post 6d. **Heavy Duty Iron,** 150 watts, 12/6, post 8d. All parts replaceable and fully guaranteed. **Small Soldering Irons,** for use on gas, 1/4, post 4d. Resin-cored solder for easy soldering, 6d. packets, or 1lb. reels, 6/-, postage extra.

Microphones.—Just the thing for impromptu concerts, room to room communication, etc. Bakelite table model, 6/9; Suspension type, 8/6. Post 6d. **Mike Buttons** (carbon), 2/-. **Moving Coil,** 4/6; **Transformers,** 5/-. All post 4d. each.

Rotary Transformers, 12 v. D.C. input, in soundproof cabinet, for Car Radio, etc.; will also light two 230 v. 25 w. lamps in series, or as a motor, 22/6 each, carriage 2/6. 24v. input; Output 1,230 v. .2 amp. in case with suppressors, etc., easily converted to run as a high voltage motor, 25/-, carr. 3/6. Also 12v. input: Output, 6v. 5 amp., 150v. 10 mA., and 300v. 20/240 mA., 22/6, carriage 3/6.

Morse Keys.—Standard size keys wired to work Buzzer or Lamp, 3/-, post 6d. Slightly smaller keys, 2/6, post 4d. **BUZZERS,** 3/-, or heavy duty, 4/6, post 5d.

Terminals, brass, 2BA, mounted on strip, 6d. pair. .0005 Airspaced **Variable Condensers,** 2/6, post 4d. .00003 twin gang with trimmers, 2/6, post 4d. 24-volt 15 m/m. **M.E.S. Bulbs** for Christmas Tree Lights, model railways, etc., 1/- each, 10/- doz., post 4d.

Fuses.—1 amp., 1¼in., packet of 10, 2/6, post 3d. Also 150 mA. and 250 mA. same price. **Bargain Parcels** of really useful equipment, containing Switches, Meters, condensers, Resistances, Phones, etc., 10/-, or double assortment, 17/6; treble, 25/-. All carriage paid. This country only.

Field Intercommunication Sets, complete with ringing hand generator, bell, signal lamp, morse key, relay, in strong metal case with circuit diagram, 20/- each, carr. 2/6; 37/6 pair, carr. 3/6. Ex-G.P.O. Telephone Twin Bells, with box, 5/-, post 9d. Telephone hand generator, with handle, 7/6, post 1/6; Bell, 4/6, post 6d.

Meters. 15v., 2½in., m/c, 9/6; 150v., 2in., m/c, 10/-; 300v., 2½in., m/i., 13/6; 3,500v., 3½in., m/c, 20/-; 6,000v., 3½in., m/c, 57/6; 15/600v., 2in., m/c, double reading, 8/-; 100 mA., 2in., m/c, 7/6; 40/120 mA, 2in., m/c, double reading, 8/-; 3.5 amp. 2in. T.C., 5/-; 4 amp., 2½in., T.C. in case with switch, 7/6; 20 amp., 2½ in., m/i 9/6. Meter Movements, 2in. size with magnet and case (500 microamp.), 2/6. Units containing two movements, 5/-, or with one 100 microamp, and one 500 microamp, 5/6. All meters post extra. Money refunded if not completely satisfied.

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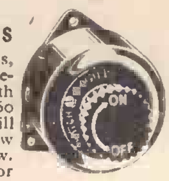

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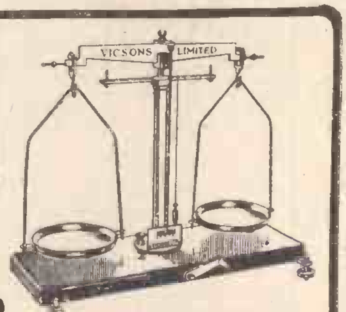

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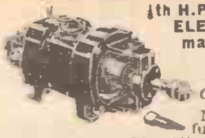

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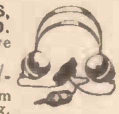

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QUERIES and ENQUIRIES

A stamped addressed envelope, three penny stamps, and the query coupon from the current issue, which appears on page 24 (THE CYCLIST), must be enclosed with every letter containing a query. Every query and drawing which is sent must bear the name and address of the reader. Send your queries to the Editor, PRACTICAL MECHANICS, Geo. Newnes, Ltd., Tower House, Southampton Street, Strand, London, W.C.2.

Covering for Concrete Floors

COULD you please suggest an inexpensive method of treating, or a covering for, concrete floors? I find that linoleum "sweats" and rots.—B. Cutter (Shaftesbury).

CONCRETE floors are not damp-resistant. Possibly, therefore, dampness is rising up through your concrete floor and is thus causing the trouble of "sweating" of which you complain. Unfortunately, there is no simple cure for this trouble. The best way out of the difficulty would be to get a local firm of asphalters to lay down a ½in. coat of black or coloured asphalt, but this would be an expensive operation, costing anything up to 15s. per square yard.

The only other way in which you can attack the trouble is to give the surface of the concrete two or three coats of a good bituminous paint. After this has dried and hardened, lay the lino on top of it. Do not, however, apply the bituminous paint if you do not intend to cover the floor with lino, for the paint, even when hard, might be very slightly tacky, sufficient, indeed, to attach itself to footwear and thus get trodden all over the house.

There is, of course, a third alternative, and that is to remove the whole of the concrete and to have it replaced by "waterproof" concrete. Such material, however, whilst very effective at first, cannot be guaranteed to remain waterproof for an indefinite period.

If, however, you decide not to interfere with the floor at all, lay an open mesh matting over it. This will enable the rising damp to evaporate away. It is, in our opinion, the simplest remedy for a very difficult situation.

Yeast Cultivation

I SHALL be obliged if you will inform me whether, given a small quantity of baker's yeast (which may or may not be brewer's yeast), it is possible to produce a further quantity by feeding the yeast with dough, or by any other method.—P. J. C. Westall (Whitstable).

IT is not very easy to grow and to cultivate good strains of yeast on a small scale. The bulk of commercial yeast nowadays is grown in special extracts of grain (rye, barley, etc.) called "wort," after which it is skimmed off the surface, mixed with starch and suitably compressed.

You can imitate this process by making a hot-water extract of wheat and/or barley or other grain and by adding a little sugar to the extract, say 10 per cent. of sugar. The yeast should be grown in this extract at a temperature of about 22 deg. C. (71 deg. F.). The yeast should not be grown to finality, since when the alcohol which is produced attains a percentage in the solution of about 14 it will kill the yeast.

Alternatively, you could use a "mineral" solution for yeast growing. Such a one is the following:

Potassium hydrogen phosphate ..	2 grams.
Magnesium sulphate	1 gram.
Calcium sulphate	0.2 gram.
Ferrous sulphate	0.01 gram.
Water	1 litre (1,000 c.cs.).

(Distilled water is preferable here.)

Four parts of the above solution should be mixed with 1 part of barley extract prepared as above, and by adding about 10 per cent. of sugar. A trace of lactic acid (two or three drops) is said to improve the efficiency of this nutrient medium.

Cutting Speeds for Tools

WHAT is the correct speed, in revolutions per minute, at which to run the following tools:

Slitting saw, 7in. diameter × 5/32in. H.S.S.
Side and face cutter, 3in. diameter H.S.S.
End mills, ⅜in. to 2in. H.S.S.

Also, what thickness of mild steel will the slitting saw cut in safety?—M. Braddish (Widnes).

THE speeds for the tools you mention are as follows: Saw—50 r.p.m.; side and face cutter—120 r.p.m.; End mills—700 r.p.m.

These speeds are obtained on the assumption that the mild steel is machinable at a surface speed of 90ft. per min. The very simple formula $N = \frac{C \times 12}{D \times 3.1416}$ where N = No of revs., C = cutting speed in ft. per min., D = diameter of cutter.

The latter half of your query regarding the actual depth of cut of the above saw, is rather difficult to answer with definite figures. Much will depend on the hardness of material and rate of feed which incidentally is in the region of 2 to 3½in. per minute.

With a saw of this nature actual experience will best determine the most satisfactory cutting depth. We hazard a guess of 2in. but are quite prepared for this figure to be wide of the mark.

The section on speeds and feeds in Newnes Engineer's Reference Book will give you much more information than we can supply in a few short paragraphs.

Opalising Glass Windows

WE should like some advice as to the manufacture of a paint or similar preparation suitable for opalising or obscuring some glass windows which, while preventing or at least appreciably restricting vision, will let through considerably more light than stippling with white paint. Owing to the opaque pigment in the latter this seriously restricts light from outside entering.

It is desirable that this should not have any permanent effect on the glass, such as etching or sandblasting might cause, as we are using, at least temporarily, a front showroom with large plate glass windows as a workshop, which it might be desirable to restore at a later date.

What is wanted is something that will offer the least obstruction to incoming light and at the same time prevent outsiders from seeing in.

In the event of a commercial preparation not being available is it possible to make up something suitable?—"Windows" (Ipswich).

Readers are asked to note that we have discontinued our electrical query service. Replies that appear in these pages from time to time are old ones, and are published as being of general interest. Will readers requiring information on other subjects please be as brief as possible with their enquiries.

IT is possible that you may be able to purchase, ready-made, a semi-opaque lacquer of a suitable type from one of the following firms: Messrs. Nobles and Hoarse, Ltd., 3, Cromwell Road, London, S.E.1; Messrs. Wm. Canning and Co., Ltd., Great Hampton Street, Birmingham; Messrs. R. Cruickshank, Ltd., Camden Street, Birmingham, 1.

Alternatively, a suitable preparation for your own use would, we think, be a simple solution of gelatine in water. Dissolve, say, 10 parts (by weight) of ordinary commercial gelatine in 90 parts of water. To the solution, add about 1 teaspoonful of carbolic acid per gallon. This solution must be kept warm, for it will set to a soft jelly on cooling. The jelly, however, can again be melted as required. Stir into the solution about ½lb. (more or less) of common fine whiting per gallon. Keep the solution stirred so that it has a milky appearance, and, with a soft flat brush, coat it on to the inside of the windows, giving only a thin coating to the glass. The glass will thus receive a gelatine film containing whiting which will serve as an opacifier. The film may be removed from the glass at any time by swabbing it with warm water, and it will not affect the transparency of the glass itself in any way. If it is desired to harden the gelatine film and to make it resistant to water, it may be sprayed with a mixture of equal volumes of formalin and water. This insolubilises the gelatine but, in this case, the removal of the gelatine film would be much more difficult, and scraping would be necessary.

Converting Latex for Dipping

I HAVE a quantity of latex solution, for use as a leather adhesive, which I wish to use for dipping. Can it be converted for this purpose?—Frank Tobin (Dublin).

THERE are so many kinds of latex "solutions" and other preparations that we are rather uncertain of the exact variety of the composition which you possess. In general, however, these "solutions" are not suitable for dipping purposes and for the production of latex films and sheets. For such purposes a special latex suspension is required, one which will vulcanise at a low temperature and which will give a film of considerable strength. These latex preparations cannot be "converted," or changed in any manner from one composition into another. Latex is tricky stuff to manipulate, and its preparations have to be compounded specifically for special purposes.

Tinting a Plastic Lens

CAN you suggest any method by which a plastic lens can be tinted in various colours, and yet retain its original optical definition and transparency?

Any technique employed, however, must not involve subjection to a heat process, as this would deteriorate the desired optical properties of the lens.—R. Savage (London, N.15).

THE only way in which you can colour your plastic lens is to coat it with a solution which will deposit a thin stained film over it. For the very highest degree of optical resolution, this is bound to affect the performance of the lens, but since plastic lenses are never made to such degrees of accuracy we think that, with care, you should be able to stain the lens without affecting its degree of resolution and definition. Unfortunately, you do not mention the type of plastic material from which your lens has been made, but we assume that it has been fashioned from some variety of polymerised methyl acrylate, in other words, "Perspex."

Perspex is soluble in trichlorethylene and in glacial acetic acid. If, therefore, you make a dyed solution of "Perspex" in either of these liquids and paint it very cautiously over the lens, you should be able to get a film coating without affecting the lens itself. Trichlorethylene is the better solvent to use on account of its greater volatility, although acetic acid is the easier to obtain. You must procure a suitable dye which is soluble in the liquid you elect to use. Then, in the coloured liquid, dissolve scrap perspex powder until you get a liquid of thin varnish consistency. This is to be painted thinly over the lens surface. Do not swamp the lens surface with the "Perspex" solution, otherwise you will dissolve it or, at least, deform it. Using a soft brush, paint the coloured solution on very thinly and very carefully. If, for any reason, you do not get a good result, wipe the coloured film away quickly with a soft cloth charged with plain trichlorethylene or acetic acid (glacial).

There is no possible way of staining the "Perspex" lens bodily through and through. You cannot, as it were, actually dye the lens, since this would imply complete immersion of the lens in a dyebath of a solvent, and the result would mean the complete disappearance of the lens!

Painting an Asbestos Chimney to Withstand Heat

COULD you advise me on a satisfactory method of painting an asbestos chimney?

I have a small cooking range, and the chimney for this stove consists of a length of asbestos pipe, the asbestos being about ½in. thick. As this bare asbestos looks unsightly against a wall decorated with cream distemper, I should be obliged if you could inform me of a satisfactory paint, preferably cream in colour, that would withstand the heat and not peel off.

I have some "Cerrux" plaster primer and cream gloss paint; would this be a satisfactory treatment?—Ronald Godfrey (Shrewsbury).

YOUR stove chimney will not be of pure asbestos. It will comprise an asbestos-cement, composition. As such, it will get fairly hot on the outside, so that there will not be any normal paint which will be able to withstand the temperature to which the chimney will be raised without discolouration and/or peeling, flaking or chipping.

We think that your best procedure will be to give the chimney a very thin coat of a flat grey priming paint. On top of this, you can put a zinc white paint, preferably made up in a bakelite medium. This can sometimes be obtained from paint shops. Alternatively, you could learn sources of supply by writing to Bakelite, Ltd., 18, Grosvenor Gardens, London, S.W.1. It is essential that the paint selected should NOT contain white lead, since this would gradually go brown (and even black) on exposure to cooking fumes. The paint should be based on either zinc white (zinc oxide) or titanium white (titanium oxide), or both.

You might, perhaps, care to contemplate using an aluminium paint in place of the cream paint. This can be obtained in a bakelite medium and it will, we think, give better service than a cream paint.

If you care to take the trouble, you may be able to make a suitable heat-resisting paint for yourself based on asbestos powder and zinc oxide in a medium of hydrolysed ethyl silicate. The latter can be obtained from Silicaseal, Ltd., Westgate Hill Grange, Newcastle on Tyne, 4. Asbestos powder can be obtained from Messrs. Turner Bros., Asbestos Co., Ltd., Rochdale, Ltd. Zinc oxide can be obtained locally. Mix together equal amounts of the zinc oxide and asbestos and then grind the mixture into the ethyl silicate solution until you have a medium of paint consistency. For the use of the hydrolysed ethyl silicate, you will have to refer to Silicaseal, Ltd., address as above. This type of paint should give the maximum resistance to heat. It should be noted that zinc oxide when heated strongly goes yellow, but recovers its whiteness again on cooling. If you want to avoid this effect, you will have to use the more expensive titanium oxide.

By inquiring at the National Federation of Associated Paint, Colour and Varnish Manufacturers of the United Kingdom, Tavistock House, North Tavistock Square, London, W.C.1, you may, perhaps, be able to make contact with a paint firm making these silica heat-resisting paints.

Whether the ordinary oil paint (cream) which you mention would serve your purpose depends on the temperature of the stove pipe. Generally speaking, an ordinary gloss paint would not withstand this temperature without turning brown. An ordinary silver (aluminium) paint would be much better.

Sawdust Blocks

IS there a satisfactory binding substance for sawdust with which to make sawdust blocks? —S. Vaughan (Workington).

WE take it that you are not able to use heavy compression in connection with the bonding of your sawdust. In this case, you will have to impregnate the sawdust with a hot solution of 10 parts of glue in 90 parts of water. Make the sawdust into a mortar-like paste, pack it into moulds and allow it to set therein. Subsequently, immerse the bricks ovenight in a solution made by diluting formalin with an equal bulk of water. The formalin insolubilises the glue and thereby makes it damp proof.

Another method is to melt some medium-soft bitumen (obtainable from any local asphalting firm) and to work the sawdust into it. This will make a black, plastic mass which will set dead hard and water-resistant on cooling. A thick tar can be used for the same purpose, but the bricks will be more brittle in this case.

Still another way is to mix the sawdust with, say, a quarter of its bulk of dry cement, and then to slake it with water to mortar consistency.

A Gas-Proof Leather Dressing

I SHOULD be grateful for a formula for the following dressing oil: An oil suitable for dressing the leathers (Persian sheepskin), which are used in gas meters; it must make the leathers gas-proof and also keep them pliable and long-lasting.—C. Floyd (Rhondda).

THE leather dressing most suitable for the purpose which you describe consists of two parts of castor oil mixed with one part of good quality neatsfoot oil. Crude castor oil is quite suitable, but the neatsfoot oil should be of the refined grade. The mixture is warmed and then rubbed sparingly on both sides of the leather to be treated. Some people prefer to have a little beeswax dissolved in the oil in order to give the leather greater water-resisting properties. This is a good plan, but if the proportion of wax is too high it will tend to reduce the resiliency of the leather. Do not dissolve more than five parts of the wax in every 95 parts of the mixed oil.

For very delicate leathers, sperm oil has been recommended, but it has not the "body" of the mixed oils above mentioned. Sperm oil is used for lubricating clocks, and you will be able to obtain a little of it from any clockmaker or dealer in horological materials.

Aluminium Anodising

PLEASE inform me how to make up an aluminium anodising and dyeing system for small articles. Also, if anodising is proof against corrosion of aluminium by fruit acid.—J. E. Armstrong (Stoke-on-Trent)

THERE are two main processes for anodising—that employing chromic acid and that utilising sulphuric acid. Although you do not give us any indication of the scope of your proposed work, we think the sulphuric acid process will be the more suitable for your purpose, and it is more readily worked.

You require a glass, porcelain or stoneware vat containing pure sulphuric acid of strength about 20 per cent. The articles to be treated are made the anodes of the circuit, the cathode being a plate of carbon. Voltage should be from 10-20 D.C. Current density (amperage) should be around 20 amps. per sq. ft. of surface undergoing treatment. Average duration of treatment is 20-30 mins.

The anodised articles are well swilled in water and then transferred to a cold dye-bath containing about 5 per cent. of any "basic" type of aniline dye, such as Brilliant Green, Methyl Violet, Malachite Green, Acid Scarlet, etc. The dye bath is raised slowly to boiling-point during 1 hour, maintained at that temperature for 20 minutes, after which the articles may be withdrawn and rinsed. For the sake of evenness and constancy of colour, the surface of the articles must be very clean before anodisation. Concentrations and temperatures of dye-baths must also be well regulated.

You will be able to obtain materials for the anodisation and dyeing processes from Messrs. W. Canning & Co., Ltd., Great Hampton Street, Birmingham, 18.

Anodisation is not usually considered proof against prolonged attack by fruit acids, particularly if such acids would attack the untreated aluminium. It certainly offers a higher resistance to such acids than does untreated aluminium, but the anodised surface is not positively proof against them. Proofing of such surfaces is usually obtained by various lacquers, rather than by anodisation.

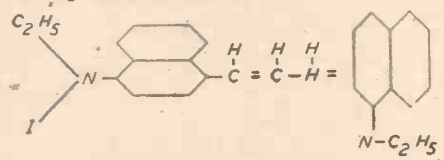
Grain Alcohol: Dicyanine Dye

WOULD you please supply me with the common names and chemical names of: 1. Grain Alcohol and 2. Dicyanine Dye. Where can these substances be obtained.—W. H. Sherwin (Birmingham).

(1) Grain alcohol or grain spirit, as it is more usually called, is ordinary "common alcohol," that is to say, ethyl alcohol, having the chemical formula, C_2H_5-OH. In the form of rectified spirit, it can be obtained from any pharmacist, but it is costly stuff on account of the heavy excise duty on it. Rectified spirit is ethyl alcohol with about eight per cent. of water. The purest form of alcohol sold commercially is "absolute alcohol" which contains more than 99 per cent. of ethyl alcohol.

(2) Dicyanine is a member of the class of carbocyanine dyes. It is a blue dye and it was formerly used for sensitising photographic emulsions to the red and infra-red rays of the spectrum. It was first produced commercially in Germany about 1906, but was very little used at that time.

"Dicyanine" is the popular name of the dye. Chemically, it is a 2 : 4 carbocyanine, and is represented by the following structural formula:



Structural formula for dicyanine.

You may be able to purchase small amounts of it from Ilford, Ltd., Ilford, London, or from a firm of laboratory suppliers, such as Messrs. Vicsons, Ltd., 148, Pinner Road, Harrow, Middlesex. Messrs. Philip Harris and Co., Ltd., Birmingham, might also be able to supply the dye. It is a very costly material.

Filling Cracks between Floorboards

WOULD you please give me advice on the following:

I wish to fill in the gaps between floorboards, after which I intend to stain and polish, using a medium colour. Would you please give ingredients for the filling (not wood strip), and also a good stain and polish for finishing.—G. Upton (Hove).

MAKE up an ordinary glue solution and work into it sufficient sawdust to form a sloppy paste when warm. Into this paste work sufficient dry colour (or mixture thereof) to match approximately the colour which you require the finished floor to be. You will be able to attain such a shade by using a judicious mixture of red oxide, soot, raw or burnt umber, ochre, etc., all of which dry colours can be obtained cheaply from any paint stores. The final product (when warm) should be a fairly stiff paste. This is packed into the floorboard chinks and crevices with the tip of a trowel in much the same way as you would apply mortar between bricks. Take care to scrape away any surplus filling before it sets hard on the wood.

Allow the filling to set and harden overnight. Then brush over the lines of filling a little formalin (obtainable from any druggist) and allow this to dry of itself. The formalin will render the glue insoluble so that the floor can be washed, if necessary, without loosening the filling material.

If you plan to have a dark floor, the best thing is to make up a mixture of equal parts of turpentine and raw linseed oil, and to stir into this a small amount of soot, just sufficient to give it a dark colour. This is brushed on to the boards and left for a week. The floor is then wiped over with a cloth and then wax polished. This type of stain will last at least 10 years.

On the other hand, if you require a lighter stain, you will have to obtain one or other of the staining dyes (spirit-soluble dyes), dissolve it in methylated spirit and then brush the liquid on to the wood. The wood is then given a light coating of shellac polish and finally wax polished. If the shellac surface is not protected by the wax polish, it will have a very high lustre, but it will very quickly wear under traffic.

Projection Lenses for Enlarger

I HAVE just taken up photography as a hobby and started to construct an enlarger. I should be grateful for your opinion as to whether a lens 2in. f.3.5 from an ex-Air Ministry gun camera would be suitable for negatives 1¼ in. x 1¼ in. Also, if a lens advertised as a 35 mm. projector lens 91.44 mm. f.1.9 could be used for enlarging 2¼ in. x 2¼ in. negatives.—J. Cashin (Glamorgan).

THE usual working rule in regard to enlarging lenses is that the focal length of the lens should at least be equal to the diagonal of the negative which is to be enlarged. Your proposed 2in. lens will, therefore, be quite suitable to cover your 1¼ in. x 1¼ in. negatives. You must not expect to use the lens at its best at its open aperture of f.3.5. You will get better focusing and a clearer image if you stop it down to f.8 or f.11. You will probably have to make yourself a set of fix stops for this purpose.

The advertised projector lens would not be suitable for enlarging. You would get much better results with a 4in. lens, even of the simplest design, although in the case of a non-astigmatic lens considerable stopping down would be necessary.

Renovating Leather

COULD you give me particulars of the method of renovating leather easily and cheaply.

I have a leather saddle, parts of which are now very rough; is there any means of treating the rough parts to give them a reasonable polish to tone with the rest of the leather?

Also, could you tell me materials to use and where to obtain same.—E. G. Hopper (London, S.E.10).

IF the surface of your leather saddle has been actually abraded there is nothing which will bring it back to its original condition. If, however, the leather has merely lost its resiliency and has become dry and tending to crack, there is nothing better for reviving it than a mixture of equal parts of castor oil and neatsfoot oil used hot. Brush the mixed oils, after heating them in a jar surrounded by boiling water, on to the leather and allow them to sink in. Then repeat the process and go on doing so as long as the leather will take up any more of the oil. If you want a shiny surface on the treated leather, dissolve a little candle wax or beeswax in the hot oil.

After the final oil application put the saddle aside for a week for the oil to sink deep in, and then rub the leather surface with a soft clean cloth to bring out a good appearance. The oil treatment will, of course, deepen the colour of the leather, but it will revivify it and will render it completely waterproof.

You can obtain castor and neatsfoot oils from any pharmacist and often from paint shops.

Making a Composite Floor

WHAT are the correct proportions of cement and sawdust and any other constituents for making a floor, sometimes known as Lytosilo or Litosilo.

When laid over old boards or concrete base, it has a smooth, hard surface with a certain amount of resilience and is a red colour.—Bernard Linnett (Cheshire).

THE flooring material to which you refer is one of the very many varieties of "composition" or "magnesite" floorings. We do not know the exact composition of this particular brand, and even if we had such knowledge you would not, we feel sure, expect us to reveal the composition of a proprietary material.

However, you can make a suitable flooring of this nature in the following manner:

Mix together 1 part calcined magnesite, 1 part sawdust and 1 part of any finely ground inert material, such as limestone (not lime), fine sand, brick dust, etc. If you want the floor coloured, include any suitable earth pigment here.

Grind the mixture up well and slake it to mortar consistency with a solution made by dissolving 40 parts magnesium chloride in 60 parts of water. Spread the mixture over the floor, using a large trowel or similar tool. It will harden within 36 hours.

A plain mixture of cement, sawdust and fine sand in equal parts, slaked with water, will also give a suitable flooring material, but it will not be as hard as the magnesite variety. It can, also, be pigmented in the above manner.

Re-staining Dark Oak Furniture

I HAVE some dark oak furniture that I wish to make a light or smoked natural colour.

Will you please tell me the best method of removing the dark stain. At present I am scraping it off with a piece of glass, but I think there must be some preparation that would do it easier. Also, is there something I could use for treatment afterwards?—N. Williams (Birmingham).

DO not use a piece of glass for removing the surface from an article of furniture. Use an ordinary copper coin, applied edge-on to the surface. This will remove all the surface varnish and will not injure the underlying wood. Of course, the method requires patience, but it is an excellent one and used by many of the first-class furniture "restorers."

After you have got rid of the applied woodwork surface in the above manner, rub the surface down with methylated spirit and let it dry out. The wood may then be sufficiently "natural" to satisfy you. If not, give it a good scrubbing with soap and hot water. Let it dry slowly (not by means of heat). Then give it a rubbing over with fine sandpaper. If it is still not white enough, dissolve 1 part of caustic soda in 15 parts of water and scrub this liquid over the wood. Then use plenty of water to remove every trace of the caustic. If you have difficulty in getting rid of the "soapy" feel due to the caustic, go over the woodwork with plain vinegar. Then wash away the vinegar with water and finally let the woodwork dry out slowly. Again apply sandpaper. The wood will now be in its natural colour and the surface will be smooth. You can apply a light varnish or clear lacquer directly, or, alternatively, you can colour the wood with a light spirit stain of your choice and then apply a varnish or lacquer.

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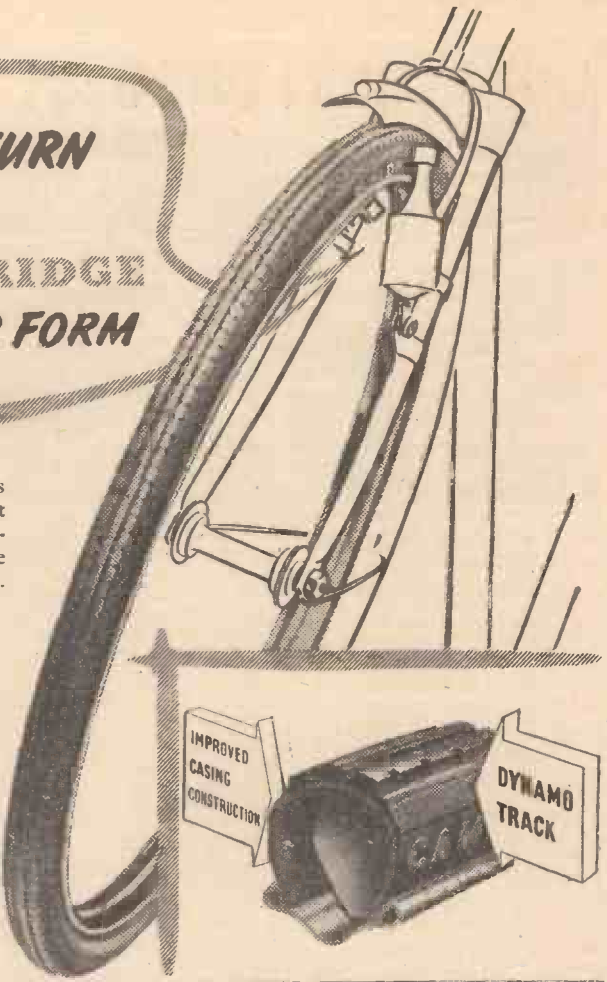

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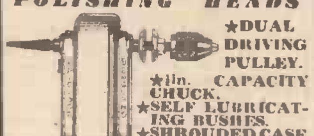

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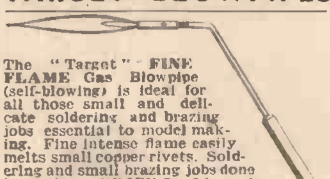

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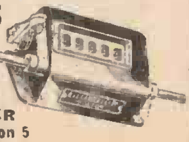

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Editor: F. J. CAMM
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Phone: Temple Bar 4363
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Comments of the Month

By F. J. C.

THE LIGHT-WEIGHT CYCLING ERA

VISITORS to the cycle show must have been impressed with one outstanding feature of it, a feature indeed which transcended all others. We are referring to the fact that most of the large makers have now entered the light-weight bicycle field, and thereby tacitly confirmed the rightness of the policy of those many smaller firms who for years have been ploughing a not altogether lonely furrow and preaching the gospel of the light-weight machine.

It is interesting to conjecture as to what effect this intense competition by powerful companies will have upon the small makers. It is evident that the public is now demanding that bicycle manufacturers should take full advantage of the new light alloys and the lighter steels as well as the new non-metallic materials and methods of construction available to them. Other industries, of course, have taken full advantage of them long ago.

The tailor-made bicycle manufactured in the belief that for really enjoyable cycling the cyclist requires "as little bicycle as possible" has been the choice of the discerning clubman for over 30 years. The larger makers, however, thought that it would be but a passing phase, and although some of them included a light-weight machine in their range it was not accented in their advertisements nor in their catalogues. The belief seems to have been that lightness and reliability cannot go together. Moreover, they thought it best to await the results of the experiments on the part of the light-weight bicycle makers to see whether the demand was a passing phase, the result of a new fashion and, presumably, whether the machines would prove reliable.

It is certain that the smaller makers cannot for obvious reasons make a machine to a given specification so cheaply as the large one. In the first place, their factories cannot be so fully equipped as a large one, they cannot afford to introduce real mass production methods to cater for a comparatively small demand, and they must perforce make use of hand methods, such as blow-lamp brazing of the frame, whereas a large factory would employ dip-brazing, followed by normalising.

COLOUR SCHEMES

The light-weight bicycle manufacturers gave greater attention to the colour schemes of their products. There has been a stodginess among the large manufacturers in this respect. Their popular models have been black with perhaps gold, red or green lining. Whether it is good to have bicycles decked out like Joseph's coat of many colours is open to argument. The dignified individual may prefer the sober and sombre black, but youth will be served, and if it prefers colour schemes more appropriate to a circus or an ice-cream barrow, or to a gypsy's caravan, well, the demand must be satisfied. The customer is nearly always wrong!

Now that the large makers have staged this mass onslaught on the light-weight market it will be interesting to see whether the small firms who have pioneered the light-weight bicycle industry, and indeed at one time ran their own exhibitions, will be able to stay the course. None of them has a large turnover and fierce competition may send some of them to the wall, or at least reduce their sales. In twenty-five years' time we shall look upon the touring bicycle of the 1940s much as we to-day regard Lawson's first safety bicycle.

It is wise, however, to remember that within practical limits the advantages of a light-weight bicycle (and by this we mean one which weighs a couple or so pounds lighter than the standard "Dreadnought" tourist's model) is often more psychological than actual. Its chief advantages are that it requires less power to start and less power to stop. Once a machine is in motion less power is required to maintain a given speed on a heavier machine, momentum being equal to mass times velocity. But if the effect of riding a light-weight machine is to cause the riders to *believe* that it was easier to propel, the means justifies the end. There is no evidence that a light-weight machine is less reliable than the tourist's model. Tyre wear perhaps is a little more rapid because of the smaller section tyres mostly employed, and the thinner chain wheels and sprockets may need replacement a little more often. The light-weight machine also may not emerge from a minor collision with a kerb or a wall so scathlessly as the heavier machine.

A 16lb. MACHINE

One manufacturer gave us an indication of the shape of bicycles to come by exhibiting a machine mostly constructed of alloy, weighing only 16lb. It was not the lightest machine in the show. All metal components except those used in the transmission such as chain and bearings are made of light alloy. This represents a saving of five pounds in weight on the usual racing bicycle which weighs 21lb. or so. This machine is not yet on the market and is still undergoing exhaustive tests. The average roadster in this country weighs between 30lb. and 40lb., whilst the American bicycle with its imitation petrol tanks and balloon tyres weighs nearly 20lb. more.

THE LUG DIFFICULTY

There have been alloy frames before, but the difficulty has always been to find a satisfactory method of joining the tubes to the lugs. Alloys do not take kindly to the welding process and brazing is, of course, out of the question. The makers of the 16lb. machine have ingeniously got over this difficulty, producing what appears to be a lugless frame. A French machine, the Caminargent, had cork inserts in the lugs and locking bolts. It was not, however, satisfactory. The problem with all light-weight machines irrespective of the material used is to obtain lightness with rigidity.

A French track machine shown at the Paris Show weighed only 6½lb!

In future, there will not be two distinct types of cyclist such as the club man riding light-weights and the tourist riding heavy-weights. It is certain that the weight of bicycles will steadily be reduced. A tendency to regard the light-weight as the thoroughbred and the tourist as the carthorse has vanished. This is the era of the standardised light-weight machine.

The old parlour of the GREEN MAN. HATTON

Paragrams

The fine wool church dating from the late 15th century. The grotesque gargoyles at the aisle roofs are of great interest.

New Club

ANOTHER cycling club has been formed at Boston, Lincs, the Holland Bros. Cycling Club, by a number of youthful enthusiasts who are employees of the local firm of motor engineers, Messrs. Holland Bros. Although all the riders are not yet equipped with the cycles they would like to have, they put up quite a good show at their first annual event, a 10-mile trial and handicap. Best rider in the time trial was B. Golland, with a time of 27 mins. 37 secs., while Beck, the winner of the handicap, had a time of 24 mins. (handicap 4 mins.). Cups and prizes were presented to the winners by Mr. Charles Holland, Senior, who is 91 years old. In his younger days he was a keen rider himself, and 71 years ago he won the first cycling race from Boston to Kirton on a penny-farthing.

One Up for Lincolnshire

PETER BROTHERTON, of Barton-on-Humber, Lincs, 18-year-old member of Barton Wheelers, becomes the first Lincolnshire cyclist since 1935 to hold a national title by winning the half mile grass track championship at Clay Cross, Derbyshire, in a time of 1 min. 8.5 secs. Three years ago, as a member of Boston Cycling and Athletic Club, he started to ride on an old machine which he had rebuilt to suit his own ideas, and he soon started to make his mark in local events. Later he and his parents moved to Barton-on-Humber. So far, in addition to the national championship, he holds the 5-mile, mile, half mile and quarter mile county titles.

Follow the Colours

COL. R. P. A. HELPS, chairman and managing director of Tyresoles Service, Ltd., Wellingborough, is putting forward for the consideration of the Ministry of Transport a plan for marking all major roads by coloured discs. Col. Helps feels that in large towns it is very difficult to find the correct and nearest way out, and his idea is that discs, single or multi-coloured, should be fixed to lamp posts or other posts to mark the route. The distance between the discs on the open road would, of course, be longer, and for those motorists and other road users who are colour-blind route numbers would be superimposed on the discs.

Diesel Engine for Cycles

THE Lohmann Company, of Bielefeld, Germany, is now marketing a diesel engine weighing 11lb. for attachment to any ordinary bicycle. The fuel used can be almost anything from heavy oil to paraffin, and the quarter-gallon tank is said to give a range of 100 miles. The engine clamps to the bottom bracket under the pedals and there is a friction drive to the rear wheel. Producing 0.6 h.p., this engine is stated to provide speeds up to 12 m.p.h. on the level and will pull up any reasonable gradient. The pedals are retained and are used to assist the engine when it shows signs of flagging.

Up and Down!

A RATHER interesting vision is conjured up by the description of a patent applied for by a brainy inventor. He submitted to the U.S. Patent Office details of a new type of bicycle. The seat is attached to an air-pump plunger and the up-and-down movement of the seat pumps air into a cylinder, from which it goes to drive a compressed air motor, which in turn drives the rear wheel. In order to provide a bumpier ride and more air, there are special strips attached to the rear tyre. The more bumps there are the more air goes to the motor and the faster goes the cycle, which in turn means more air, more bumps and more speed—but how does one stop? Such a strenuous ride would seem to use up far more energy than plain pedalling.

Square Wheels Next?

PROBABLY a long, weary ride back home with two flat tyres and wheels feeling as if they were all shapes, gave Mr. John F. Kopczynski, of North Tonawanda, N.Y., his idea that wheels need not necessarily be round. He has produced a light vehicle having four egg-shaped wheels and designed so that when one pair of wheels is on end the other pair lies at right angles. The wheels are connected to the vehicle in such a way that although they go up and down the vehicle itself remains steady. It is claimed by the inventor that his new wheels will go through sand, mud and snow where round wheels slip, and are just as efficient as round wheels on a smooth road.

Tandem Successes

THREE pairs of Peterborough Cycling Club riders, who had never before ridden together in an event, put up a good show in the Oak Tandem "100." Beating the club record by seven minutes, S. White and N. G. Perkins completed the course in 4 hrs. 1 min. 12 secs., gaining the third fastest award and second place in the handicap section. Next came R. Needle and W. R. Clark, who, after a crash in the early stages, finished in 4 hrs. 8 mins. 25 secs. B. A. Kelly (with an injury to one hand) and W. Simons followed with a time of 4 hrs. 10 mins. 15 secs.

Man Bites Dog!

THE old gag about the man who bit the dog being news, was illustrated in Leicester the other evening when a cyclist, who was riding along London Road, saw approaching him on a cycle a policeman who had no lights. He pointed out this shocking breach of the lighting regulations to the constable, who dismounted, grunted: "Gone out again!" and started to look for the fault in the wiring from his dynamo.

Speedway Progress in Leicester

CYCLE speedway is making considerable progress among the youth of Leicester, and plans are on foot for the formation of a local league. Ready to support the proposed league are the Leicester Spurs, Eagles and Glen Rockets, but at least three more teams are needed, with a top age limit of 17. The league organiser is 15-year-old Neil Bowen, of Wyggeston Grammar School, Leicester, secretary of the Spurs, and he is doing his best to have the league formed for track racing in the late autumn.

Matter of Opinion

"I THINK you are better off riding on the pavement with all this traffic about," said a young cyclist who was told by a Chesterfield police constable that he would be reported for riding on the footpath. The magistrates felt that the safety of pedestrians on the pavement was more important than the cyclist's safety, so they fined him £1 and suggested he had better keep to the road in future.

Any Offers?

IF there are any worse level-crossings in the country than those in Cambridgeshire, in the Isle of Ely, the Isle of Ely Highways Committee would like to hear of them. Members suggested that a better description of these monstrosities would be "unlevel crossings," and the county surveyor has been instructed to take a look at all the crossings in his area in readiness for comments on the subject to be made to British Railways.

Leicester Cycle Speedway

FURTHER progress has been made towards the formation of a cycle speedway league at Leicester. Some 17 teams have already notified their willingness to join the league, the idea of which was sponsored by a 15-year-old local schoolboy, Neil Bowen. The league is to be divided into two sections, senior and junior. Riders over 16 can take part in senior events, but should there be any member of the junior league who is sufficiently proficient to ride against the seniors he will be allowed to compete. The track used will be 100 yards in circumference.

Traffic-trained Dogs!

THE National Canine Defence League has available for demonstration purposes teams of dogs which are stated to know how to behave in traffic. The dogs and their attendants can be hired during Road Safety Weeks to show how a dog should behave on the road. The thousands of cyclists who have been nearly killed by obviously half-witted dogs shambling about busy roads should be good customers at these displays.

Donington Park Free Soon

LOCAL cycling organisations are hoping that it will not be long before they are able to arrange events at Donington Park, near Grantham. Since the early part of the war Donington Park has been used by the War Office as a vehicle depôt, but they say it will soon be derequisitioned. However, no date for derequisitioning was mentioned, and as Government departments are not noted for speed it does not do to be too optimistic.

The little GREEN MAN at HATTON

A famous haunt of Highwaymen who used the inn as a hiding place. It stands in an unspoilt corner of Middlesex surrounded by old farms and orchards.

I was particularly interested in the detail improvements. Brakes, for example, now exert a greater pressure on the wheel for a lighter pressure at the lever. Last year, you will remember, I commented on the new Resilion lock lever which renders the bicycle thief proof. A small yale lock is incorporated in the fulcrum of each lever, so that the brake can be locked in the "hard on" position. The bicycle thus cannot be ridden away. I also noted the alloy model of the Cantilever brake, which discerning cyclists are specifying for their new machines in increasing numbers. I have had a pair of these Resilion lock levers fitted to my machine for over a year and I must say that I now prop my machine against the kerb whilst I adjourn for my cup of tea (or a beverage of a stronger character) with a greater feeling of security than I have ever had before. Every cyclist knows that apprehensive feeling when the machine is left. A pair of these brakes complete with the lock lever is a handsome Christmas present to make to yourself or to a cycling friend. They are marketed by the Resilion Co., Ltd., 200, Liverpool Road, London, N.1.

I also noted the larger numbers of juvenile bicycles and tricycles now being made. These are not the toys of a few years ago, but machines made every whit as well as the senior machines.

Around the Wheelworld

By ICARUS

Highest Inns

IN my recent paragraph dealing with highest inns I omitted to mention the Black Lion Hotel at Llangurig. This is well over 1,000 ft. high and it is one of the very few places in the district where cyclists can get a meal on Sunday. The "Black Lion" is a 10-bedroomed hotel on the main road to Aberystwyth. Its present host, Mr. J. V. Roberts, says that he has about 12 miles of fishing on the Wye and the Clywdog, and 3,000 acres of rough shooting. It is an excellent centre for cycling and hiking. It is within easy compass of the sea-coast, the spas of central Wales, and is situated in the highest village in Wales. Cyclists who love touring in the principality may like to make a note of this.

Continuous Light for Cyclists

AS a user of the Dynohub for several years (I use one of the 12-volt models) I was interested in the new device introduced at the Cycle Show by Raleigh Industries, and which gives a continuous light on dynamo-equipped bicycles. A filter switch has been incorporated in the Dynohub lighting set which automatically and progressively changes from the dry batteries to the dynamo as speed increases and back again when the speed decreases and when the bicycle is stationary. This has been achieved by placing two rectifiers in the circuit which allow current to come from the more powerful of the two sources—the batteries or the dynamo—according to the speed. The Dynohub progressively takes over from the batteries at three m.p.h. until they are cut out completely at 10-12 m.p.h.

Having no moving parts, the filter switch is practically foolproof and requires no servicing. It minimises the drain on the batteries, and even when they are exhausted the Dynohub will operate as a direct lighting unit until new batteries are fitted.

For the time being, the filter switch will be fitted only on the Raleigh Superbe, Humber Royal and Rudge-Whitworth De Luxe models.

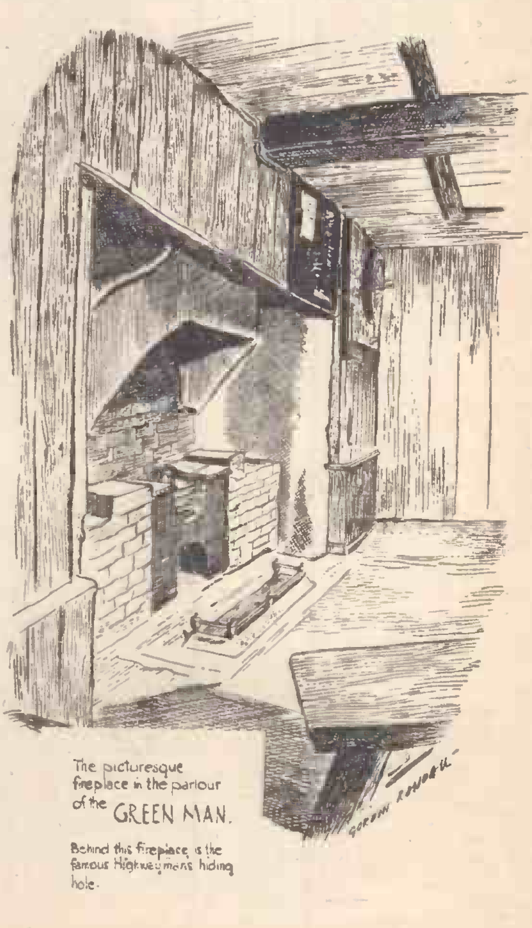
The Cycle Show

THIS year's cycle show, which celebrated the Silver Jubilee of the present series of exhibitions, had some of its pre-war glamour. It had an all-time record for attendance when it closed on October 29th, for in the eight days it was visited by 189,671 people, as against 177,223 in 1948, the previous highest. This was possibly due to the fact that the exhibition opened on the Friday, thus including two Saturdays. Over 2,000 bicycles with the full range of their accessories were shown, and the visitor was able to compare British products with continental. There are certain unknowledgable cyclists in this country who think that there is some special magic in that word continental, and that continental fittings and accessories are better than British. Comparison showed that British products are far superior. The unrestricted imports of continental fittings enables the buyer to make his choice, and the choice at the show was undoubtedly for the home-made products. There were many excellent machines at £14, including tax, whilst in the luxury class they were some at £30 and a few at over £50.

Many of the models were obviously designed for the export market. Already Britain exports over 2,000,000 bicycles a year, and the overseas demand is on the increase. The features introduced to render the machines suitable for the roads of foreign countries include extra frame tubes to strengthen the machine for use on bad roads, special guards for foreign cyclists wearing flowing robes, and chain covers for keeping jungle grasses clear. One manufacturer fitted stands to his bicycles for a country in the Middle East where the towns have no kerbs.

Twenty-five Mile Restriction

THE Minister of Transport has fixed February 1st, 1950, as the appointed day for the 25 mile restriction under section 52 of the Transport Act, 1947. After this date it will be illegal for goods to be carried for hire or reward in a vehicle if it is more than 25 miles from its operating centre.

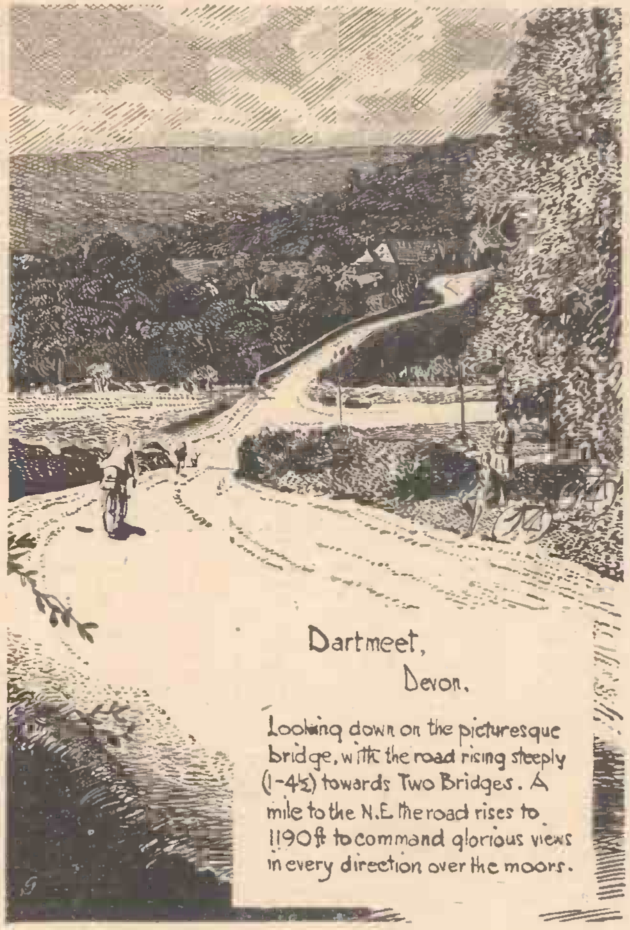


The picturesque fireplace in the parlour of the GREEN MAN.

Behind this fireplace is the famous Highwaymen's hiding hole.

Wayside Thoughts

By F. J. URRY



Dartmeet,
Devon.

Looking down on the picturesque bridge, with the road rising steeply (1-4½) towards Two Bridges. A mile to the N.E. the road rises to 1190ft to command glorious views in every direction over the moors.

Over the Hills

NOT long since I was in Edinburgh with a bicycle among my equipment. When the business end of that journey was over a number of my Scots friends saw me to the ridges of the Lammermuirs, and, to be candid, they did not think much of my choice for the southern journey. But for long enough I have wanted to traverse those hills and drift along and across the valleys of the Whiteadder and the Blackadder. Often enough I have seen the rise of those slopes from the coast and from the Peebles road and they called to me for investigation. Actually, it was just the time of year to cross those comely hills, when Spring had grown up but Summer was yet young, for the colours were at their best under the glorious sunshine, the way was lovely and, when we drummed-up for lunch just south of Gifford in a glen musical with running water, I wondered why the native of the soil had so slight a love for the Lammermuirs. They were dull and drear in winter, that was the answer, but on this day they gave me the loveliness of kinship with the Cotswolds minus the Cotswold villages. When my Edinburgh friends turned for home, four of us were left to drift down the southern slopes to the small township of Duns, where we found good food and shelter, and to spend the next three days along the Border, occasionally crossing the Tweed into England, with the sun as our daytime companion and the wind a friendly pressure behind. We still drummed-up, for a couple of Glaswegians were of the party and naturally the Scots custom prevailed; and actually I want nothing better than to eat good food with the sky as roof, a bank as a back-rest and a shelter from the wind. We pottered about from place to place amid the richness of the Tweed valley, and always in the background was the dim, blue goodness of the hills.

Home from the Border

NORHAM TOWER we visited and, from that sleepy little town right on the Border, pedalled pleasantly through the trim valleys to Coldstream, and just beyond it, on the banks of the Till, to a cooked lunch of most succulent fare, though the primus ran out of paraffin before our second brew of tea was made, so we drank the milk. Kelso looked as Scotch as ever with the wide Tweed at its feet. One of the party bought a pair of pedals to replace an ancient outfit, one of which had developed a twist that continuously tightened the bearing. That evening we came to Melrose, with the sunset lending fire to the rounded Eildon Hills, and, after food, viewed the Abbey under a half moon. Of course, we visited Abbotsford, that famous granite pile, Selkirk, and then the Waters of Yarrow and the lovely ride to St. Mary's Loch. That was a great day for me over the familiar ground that James Hogg, the Ettrick Shepherd, roamed, whose granite image faces the valley where St. Mary's Loch and the Loch of the Lowes almost join. That evening we celebrated a birthday with the best the Rodono Hotel could provide, for on the morrow the ways parted, the Scots for Glasgow and the Sassenachs for the Esk Valley and Carlisle. The two of us, now bereft of the drumming-up tools, toiled into the hills over the rough track leading to the upper Ettrick Valley. A glorious morning, but the wind had gone round and we were facing it, and it was quite a bucketful. Three miles after you step on to the tarmac you descend in long sweeps amid the lovely hills to Tushie Law Inn. It was only 11.30, but I knew the road to Langholm gave little hope of other sustenance. So in we went for a late elevenses that developed into an excellent lunch, and we were glad of it even before we crossed the low divide between Ettrick Water and the Esk. This is a wild country of tumbled hills where the quiet sheep feed, and years and years ago one can imagine it the land of the outlaw and the wolf. In five-and-twenty miles not a sign of food and we were getting hungry again; then a neat farm loomed up and my friend said you must do something about this sinking feeling, and that my white head would work the miracle. It did; we could have tea, and when we got inside we so admired the shape of a cut ham hanging from the rafters that the good dame slightly altered its outline to satisfy our desires. An hour later we were sitting on the granite bench by Glendinning erected to the memory of the road god—Thomas Telford—who saw his beloved Esk from this spot as a youth. Then Langholm's cobbles, where the Crown gave us a delightful welcome, and the morrow morn followed that saunter by Eskside to Canonbie, one of the loveliest valley rides along the Border. The hills flattened out to tame levels as we entered England, but ahead of us loomed the great bastion of the Lake Mountains, blue and mysterious; but, alas! we could not answer the call, nor would the southbound train wait while we lingered.

Such Days are Rare

APROPOS my recent run to visit the Anfield B.C. last October, the day was a glorious one. Between the storms the sun was brilliant, and now I was out in the country I could see the rain coming in from the west, choose a shelter and let it sweep over while I smoked. I was in no hurry, for in these days I allow myself a full margin of time for my journey. Never had I seen the pleasant country over which A5 strides beyond Brownhills looking so ethereal. It was the light and the wind, the fierce clarity of the day that made even the distant mine-mounds on the edge of Cannock Chase take to themselves the might of scree-clad shapes. I must have travelled this route a hundred times, and a hundred times failed to have seen the beauty with which it was invested on that morning. Near to Ivetsey Bank a sturdy rider joined me as he emerged from shelter, and we went on together into that wind howling over us. I gave him the opportunity to push ahead, for the beat of my cranks was tempered to the breeze, but for the moment he was content. Up came another storm violating the brilliant scene, just as we made the Bradford Arms, claiming shelter for overselves and our bicycles; and that seemed a convenient moment for lunch where my friend joined me. He was off to Tong and then for Wenlock Edge and the Wilderhope Y.H. to make a little tour of the holiday break: and after an excellent meal I put him on his way rejoicing, I hope.

The Spirit of Cycling

I went on to Shrewsbury over the Severn plain. The day was now all high-lights, wind and sunshine, and I'd never seen the prospect so clearly distinct, so full of detail. The hills were almost as forward in perspective as the wide acres they framed, and the whole livid picture was soaked in colour. Never will I see Salop looking fairer. But I had to pedal quite briskly down the Wellington slopes to Atcham Bridge as those breezes came whooping towards me. That evening I sat among the Anfield boys and their numerous guests of all sizes and ages and we celebrated the 70th year of the club. And what a club! In all that long period only three public functions have been held, all on the roadside, as it were, when they were at 50, 60 and 70 years of age, and I've been there to help. These Anfielders understand loyalty, understand cycling and all that connotes club-life. Business may banish them from the Anfield area of activity, but they remain Anfielders; cycling ideas may alter, but they play the game in the best sporting spirit, win or lose, and if the other fellows do the same, love their neighbours as themselves. A great example to the cycling sport of Britain, may the spirit never die in them, or the good old game. I had to go home on the Sunday; it was necessary, and as I rode up the Wellington slopes on top gear, with the wind like a friendly ghost pushing me in the middle of the back, I wondered if I should be on hand when the Anfield hold their 80th revel. I hope so, for this world is a very lovely place.

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BEFORE you buy a cycle lighting set, "spin" test the dynamo and compare it with the special 8-POLE Philidyne dynamo. You will feel at once that the Philidyne runs so much more smoothly, and will be amazed at its light weight — only 9¾ oz.

This means that the Philidyne dynamo not only makes night cycling easier, but also considerably reduces tyre-drag. What is more, it gives a good strong light even at walking pace, and at normal riding speed its wide far-reaching beam makes night cycling a pleasure. Philidyne headlamps are all of streamlined appearance and beautifully finished. Some have space for a stand-by battery to use at traffic halts, etc.

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TRY THIS SIMPLE "SPIN" TEST

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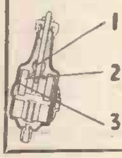

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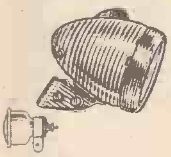

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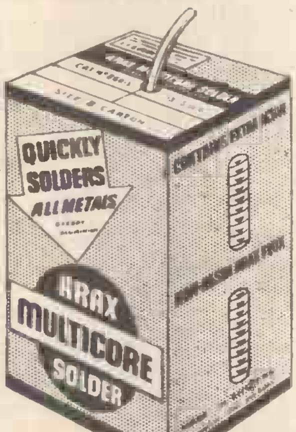

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CYCLORAMA

By H. W. ELEY

A Bath Road Pump. near Colnbrook.

Relics of the coaching days, these pumps were placed by the roadside to keep it well watered. They were of uniform pattern and placed at close intervals on the left hand side of the road travelling from London. Very few now remain. The sketch shows one near Colnbrook close to the 16th milestone. . . .

The Anti-cyclist Complex

IT is curious how it persists! I was motoring with a friend recently, and as we passed a cyclist he turned to me and said, " Those are the menaces on the road . . . cyclists." Now, that particular cyclist was riding very carefully, he caused my friend at the wheel no embarrassment, so I naturally asked on what grounds he based his conviction that cyclists were " menaces." There were no solid grounds at all! It was a generalisation, so common among motorists, who seem to think it the correct thing to blame cyclists for every kind of road misdemeanour and every type of mishap. Of course, in the long conversation which followed I did my best to alter the views of my anti-cyclist friend, and I think I succeeded. There are careless riders on the roads; there are selfish riders, with little thought for " the other fellow," but, there are careless motorists, too! I wish that the doctrines preached so fervently at the Roadfarers' Club could be more widely known: there, it is recognised that *all* road-users have rights; there, it is realised that, at different times, we are pedestrians, cyclists, and motorists. Actually the Roadfarers' Club was founded with the very idea of promoting this thought, and advocating co-operation and sympathetic understanding among all classes of road users, but prejudices die hard!

Names of Long-ago

AFTER writing about the " Campion " bicycle, I came across another good old name which seems to have disappeared —" Swift of Cheylesmore." What a famous bike was the " Swift " in the old days! It certainly rivalled the Rover, the Premier, and the old Rudge-Whitworth in popularity . . . but I have not seen a " Swift " cycle for ages. To riders of a past generation these old names mean a lot . . . and recall good memories. I saw the name " Swift " on a very old catalogue, unearthed whilst I was doing a bit of " clearing out." Of course, names do not matter much, so long as cycles are still popular . . . and how popular they are is demonstrated to the full when one lives in the country, and realises how many folk rely on the bike for transport to and from work, and for shopping.

Christmas in the Country

I'M glad that I shall be in the country for Christmas, for that is where Yuletide has real meaning. Weeks ago, I marked down the holly trees from which to cut my Christmas decorations . . . and in a little plantation I know the berries are profuse and scarlet. I must wander round old orchards and try to find some mistletoe clinging to the gnarled branches of some ancient oak. Christmas ivy is plentiful . . . so I hope that my " den " will be duly bedecked for the festival, and that I shall, in this quiet countryside, capture the authentic spirit of Christmas. For my reading, when the curtains are drawn, the log fire ablaze, I shall, as ever, dip again into Dickens, and dwell for a time with old Scrooge, and Marley's ghost. No novelist ever interpreted Christmas as faithfully as Dickens; no man ever realised more clearly the call to goodwill and charity, as the bells peal out over the rime-covered meadows, and the robin sings a cheery song from the top of a gate-post down Bramble Lane. And, in the country, there is the village inn: its lighted windows twinkling with welcome, its cosy bar inviting one to raise a tankard, and wish the whole wide world " A Merry Christmas."

The Show

BEFORE these notes appear in print another Cycle show will be over . . . and tired advertising and exhibition men will have heaved sighs of relief that all the hectic business of " getting the stand ready " is over. I know what it means to have to prepare a cycle show stand: however carefully one plans, there are always last-minute snags and unexpected difficulties, but they are always overcome. And I like to look back to the days when, on the " opening morning " I used to conduct my directors round to show them the large range of Dunlop products, and meet old friends in the industry. May this year's show bring increased business to the British cycle manufacturers, and to the makers of tyres and accessories. No industry deserves better rewards than the cycle industry . . . it is alert, progressive, and hard-working. Britain can be proud of it!

Scenic Gems

THE English scene is beautiful, almost wherever you may ride or walk. Here, on the borders of Derbyshire and Staffordshire, there are scenes of unsurpassed loveliness . . . and one fine, mellow day in late September I journeyed into the Manifold Valley and admired again the beauties of that lovely stretch of country around Longnor. Rippling cascades; green dells; peaks of real grandeur; and a rich greenness really remarkable when one considers the dryness of this season. I journeyed on to Chapel-en-le-Frith, and lunched at Hayfield (and a good lunch it was, served in a pleasing room bedecked with a grand collection of horse " brasses "); back over the Snake Pass, a little bleak and forbidding; to friendly little Ashbourne, and so home to tea. Derbyshire and Staffordshire are not sufficiently appreciated, and I wonder that more tourists do not explore their delights.

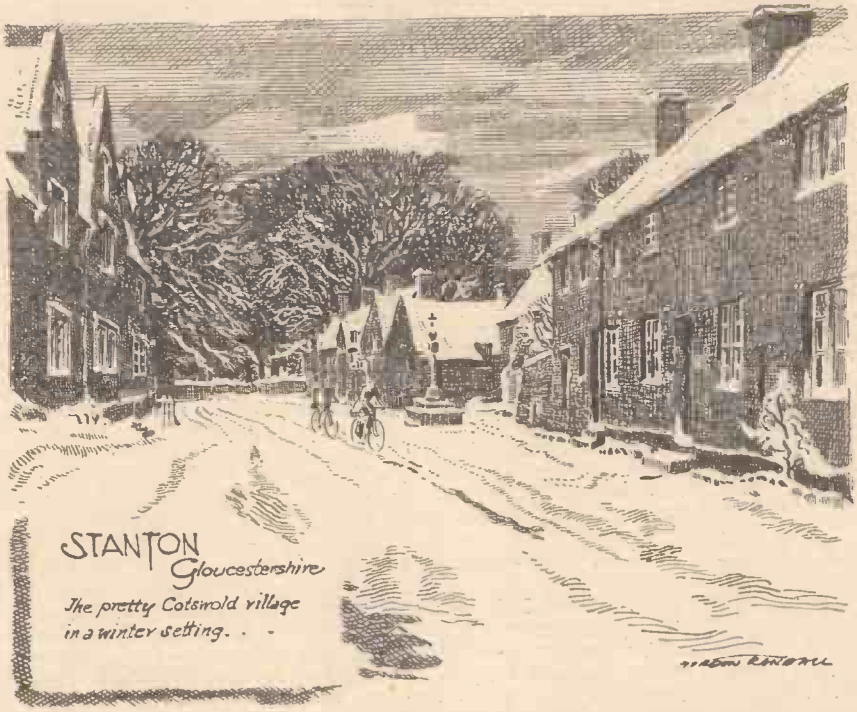
The Benevolent Fund

I WAS reminded the other day of the good work of this old fund when I received a notice of a meeting. My memory raced back to the days when a committee, of which I was proud to be chairman, inaugurated a " Propaganda Drive " for increased membership, and wider knowledge of the fine work of the fund. I recalled the happy meetings we had with the genial president of the fund, Claud Wallis, and those energetic advertising managers who served on the committee: " Jim " Phillips, of Joseph Lucas; Noel Brealey, of B.S.A.; Fred Keller, of Raleigh; MacLachlan, of Hercules . . . I do not mention them all, but I believe that we did a worthwhile job for the old fund which was founded so many years ago by A. J. Wilson, of immortal memory.

The lane to the village of BICKINGTON S. Devon. on the Ashburton—Newton Abbot road.

My Point of View

By "WAYFARER"



STANTON Gloucestershire

The pretty Cotswold village in a winter setting.

Excuses

GLANCING over a local newspaper the other day I came across quite a crop of interesting cases in which cyclists were concerned and which caused them to be "presented at court." One, who was charged for failing to comply with a "Halt" sign, explained that he usually followed another route, where there was no such sign. Moreover, he had a headache! No doubt the latter was as good an excuse as any, but the cure cost the defendant 10s. Another cyclist who "almost stopped but did not put his feet down" had to pay a fine of £1 for his failure. A third cyclist was fined a like amount for cycling on the footpath. He—poor fellow!—"did not realise he was doing it"! A fourth offender also paid £1 for cycling without lights after dark. The policeman's evidence was highly technical: "there was no lamp fitted to the front of the machine and, because of this, the supply of electricity to the rear lamp from the dynamo-set was cut off." It all sounds a bit comic to a Simple Simon such as myself. I would have thought the the absence of a front lamp, apart from its effect on the back lamp, was in itself an offence, while the cutting off of the supply of electricity sounds very serious!

Cotswold Occasion

I HAD spent a glorious July Sunday in the Cotswolds, enjoying to the full (as usual) the majestic colour scheme which those gracious hills constantly present to the observer, together with a staggering array of long-distance views; and, on the following evening, I paid a casual visit to an old cycling chum who lives in one of the suburbs of the Big City we jointly (with a million other people) inhabit. Externally, there was nothing to suggest anything unusual about the house, which was just a typical suburban residence surrounded by thousands of others—though I *did* notice that the window of the front sitting-room, with its leaded lights and its samples of bottle-glass, was different. "Come in!" said my friend, and I came in, stopped dead on being shown into the front sitting-room. For I was instantly transferred to the Cotswolds. As the harvest of a labour of love, spread over two years, my friend has converted a drab, common-place room into a Cotswold cottage (or inn) living-room. The floor is an old oak one, brought from a school some miles away. The door is in keeping. A "false" ceiling has been inserted 18 inches below the original one, and is ornamented with genuine beams. An inglenook, faced with Cotswold stone, occupies the whole of one side of the room, and here, in accordance with custom, the ceiling has been set even lower. The smoke from the wood fire, burning (at the proper season) in a basket-grate on the open hearth, ascends into a circular device, of small Cotswold stone, and thence to the concealed chimney proper.

The furnishings of this delightful room are of a piece with the surroundings as described, from the dresser to the refectory table and from the fiddle-back chairs to the settle. Out of sight behind the last-named is a central-heating unit which, with the graceful electric lights and the curtain "railway," constitutes the only modern feature of the room.

I must again go to my friend's house, next time on a winter night when the curtains are drawn and the logs blaze merrily in the ingle-nook, and the well-placed lighting sheds a soft radiance over everything. Then the illusion of this Cotswold occasion will be complete, and my comrade and I, with old pewter pots (containing something wet) near at hand, will yarn about our adventures along the road, in the Cotswold Hills and elsewhere. It may just be added, as a hard fact, that this room would probably never have "happened" but for my friend's cycling experience. It was the bicycle which introduced him—and me, and thousands of others—to the charm and fascination of the Cotswolds.

Registering Surprise

THE Mayor of Royal Leamington Spa told a recent meeting that he was "most surprised" to "discover" that cyclists were not compelled to have brakes, and he expressed the hope that the national cycling organisations would agitate to remove "such an extraordinary menace." How true it is that a little knowledge is a dangerous thing! Fortunately, Major Watling, the Director of Cycle Manufacturers' and Traders' Union, was present at the meeting when this "most surprising discovery" was announced, and he (momentarily forgetting the tiny minority of fixed-wheel bicycles with one brake) put the Mayor right by saying that "there had never been a British cycle built during the last 30 or 40 years which did not have two independent brakes." The Major very fittingly added that what uninstructed users did after taking possession of these machines was quite outside their control.

It is all to the good that there was somebody on the spot able and willing to nail down a preposterous statement without delay. The trouble is that in every walk of life a lie gets a long start of the truth, but here, fortunately, the false impression and the facts appeared simultaneously on the platform and, later, in the press. Incidentally, Leamington is 23 miles from Birmingham and eight from Coventry, in both of which cities, I understand, thousands of bicycles are made every year. It is thus difficult to understand the ignorance of Leamington's chief magistrate, except on the theory (which I know from personal experience to be untrue) that his worship lives in a cave!

On the general question of cyclists having to "agitate" for two brakes to be compulsory on all bicycles, it is surely anomalous for any section of the community to go cap in hand to authority and invite restrictions. In any case, there are enough people in this world who are keen on watching over what they conceive to be our interests, and we must not cramp their style by crowding in on them! I agree, of course, that every free-wheel bicycle should be maintained in a state of efficiency, but I hope that this is a matter which can be left to the common sense of the folks who are primarily concerned. Further, it is not the "extraordinary menace" of the brakeless cyclist which is responsible for more than a mere fraction of our road casualties.

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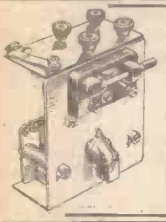

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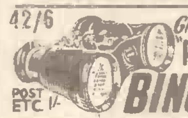

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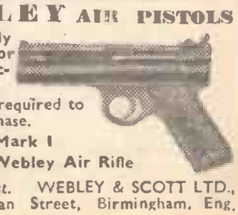

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