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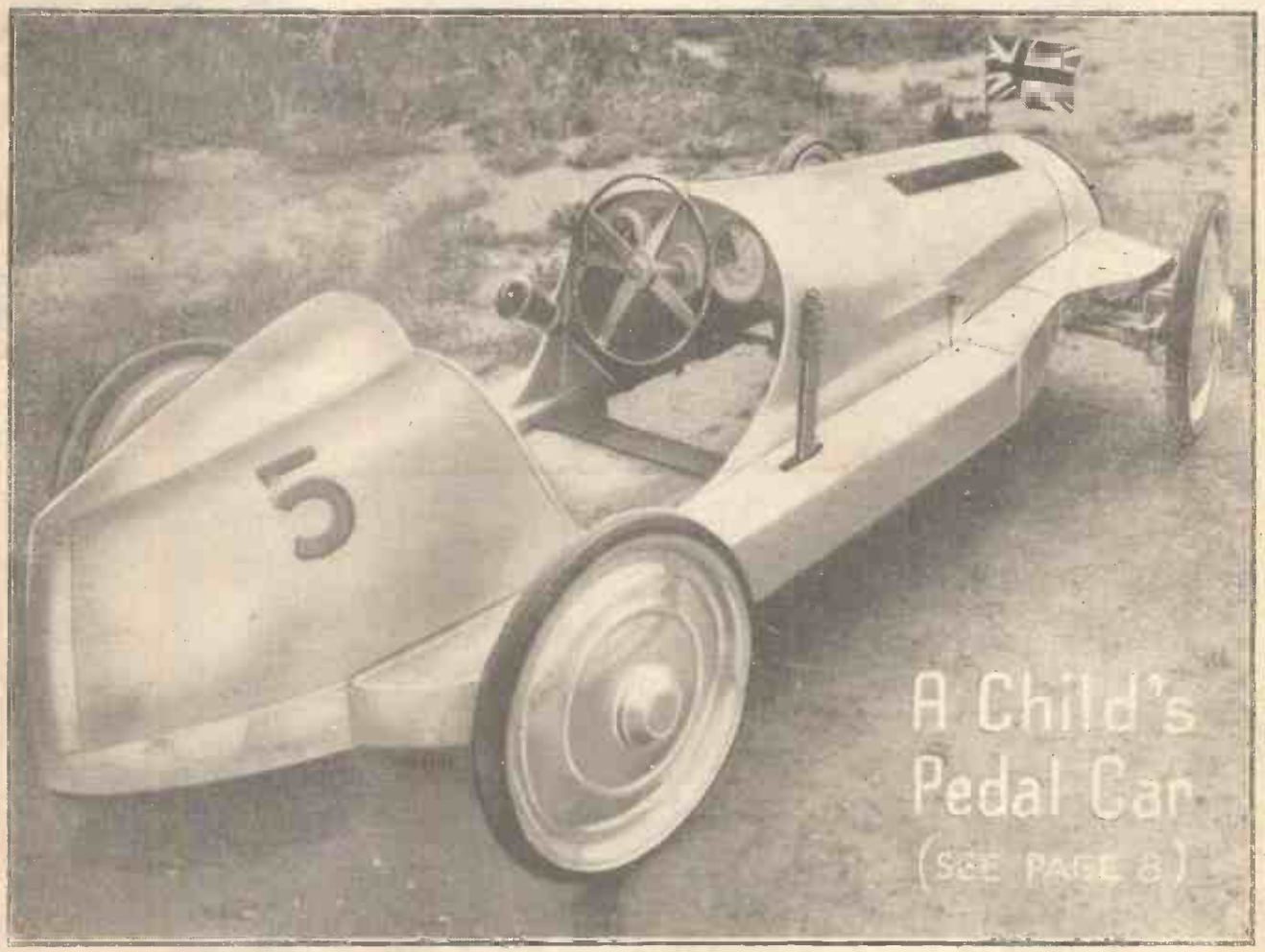
NEWNES

# PRACTICAL MECHANICS

9D.

EDITOR : F. J. CAMM

OCTOBER 1949

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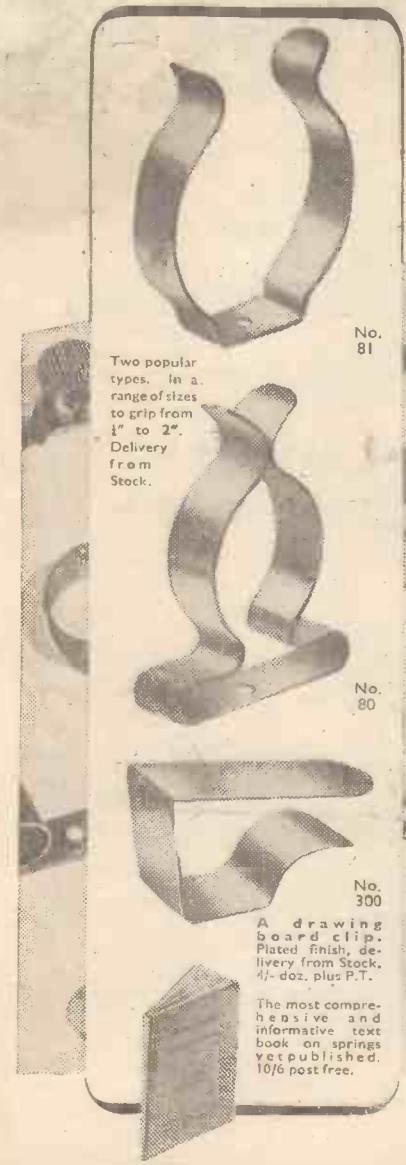

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# PRACTICAL MECHANICS

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

Editor: F. J. CAMM

VOL. XVII OCTOBER, 1949 No. 192


# FAIR COMMENT

## By THE EDITOR

### The Model Engineering Exhibition

THE Model Engineering Exhibition, reviewed elsewhere in this issue, was a marked improvement even on its predecessors. The exhibits were more spaciously arranged and there was more gangway room. Moreover, there was a larger number of new models to attract and interest those who have visited so many previous model engineering exhibitions and were growing a little weary of the same models being exhibited year after year. If we may make a suggestion it is that no model should be exhibited two years in succession. Each year the exhibition should reveal a freshness of effort on the part of model engineers, so that it does not become just a museum of time-honoured models.

The control-line flying, the model racing cars and the radio controlled models attracted a great deal of interest, far too much according to the exhibitors, and we wonder whether it is wise in a space so small as the Horticultural Hall to include such attractions. Demonstrations of this sort can be witnessed in various parts of the country almost every week-end. In a small hall, or in a large one for that matter, they tend to attract attention away from the models which are the *raison d'être* of the exhibition. Apart from the noise the enclosure was not readily visible by those unfortunate enough to be at the back of the throng.

Has not the time arrived when the exhibition should be staged on a much larger scale? On a scale in fact which reflects the vast growth of model engineering in all its branches and in home mechanics and science generally? At present the exhibition is a model of an exhibition. This may be in keeping with its theme, of course, but it does not give exhibitors a fair chance to display their goods, nor visitors during the crowded sessions to examine the exhibits. The time has come when a fresh outlook is needed. Model engineering to-day is not only a fascinating hobby but it is a career for many. Almost everything which is manufactured starts off as a model. Every great invention first took practical shape in the form of a model, and, as Sir Frederick Handley Page pointed out when he opened the show, all aircraft in use to-day owe their existence to the valuable work performed on models by early experimenters such as Stringfellow, the Wrights, Phillips, da Vinci and many others.

We think, also, that a selection committee should examine the exhibits before the show to see if they are worthy of public inspection. A few of the models bore evidence of hasty work and others of lack of skill. Only the best should be shown, and, whilst the unskilled amateur should not be discouraged, it would be a greater incentive to him to attain skill if the acceptance of his work for exhibition became a cachet, a sort of hallmark on a certain standard of skill.

Models which are neither ornamental nor useful, and which merely evoke admiration because of the painstaking skill of the builders, should be rigidly excluded. They tend to lower the general standard, in some cases evoke smirks from the public, and do not enhance interest in the exhibition. Ships in bottles, for example. We all know how they are made. At one time it was a mystery, and was interesting because it provided a sort of guessing competition as to how the ship got through the neck of the bottle. Almost every journal dealing with models has at some time or other explained how to make ships in bottles. I noticed that the *Daily Telegraph* commented on this point. It said, in dealing with the exhibition, "More puzzling is the fascination of the useless." It went on to say that the exhibition gives public sanction to the love of toys and of making them which is in nearly all of us, even the gravest and the oldest. Modelmakers will, of course, resent the reference to their work as toys. Models are not toys but scientific instruments of great educational value, and often they are more useful than lectures in demonstrating a method or a principle. The Science Museum has a special section devoted to scientific models of historic interest, and is well worth a visit.


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NOTICE TO INTENDING CONTRIBUTORS

THE EDITOR OF PRACTICAL MECHANICS is always pleased to consider manuscripts suitable for publication in the columns of this journal. As a general guide, articles should be about 1,200 words in length, although where the subject warrants it, the article may be extended to 2,000 words. Short articles of 500 to 750 words are also accepted.

**To avoid the possibility of overlapping, intending contributors are advised to write in the first instance to the Editor, giving a brief outline of the article they intend to write, and at the same time enclosing details of their qualifications.**

MSS. should be typewritten, using one side of the paper only, and double spacing. Preferential consideration will be given to those MSS. which are accompanied by sketches and/or photographs, and these should be properly captioned.

**The Editor does not hold himself responsible for the safe custody of manuscripts, but every effort will be made to return unaccepted contributions if a stamped and addressed envelope is enclosed. All correspondence intended for the Editor should be addressed: The Editor, PRACTICAL MECHANICS, Tower House, Southampton Street, Strand, W.C.2.**

### A New Volume

IT hardly seems sixteen years ago this month when over a year of planning culminated in the publication of the first issue of this journal. It has certainly made vast progress in those sixteen years. It circulates throughout the world and has become recognised as the leading British scientific journal. Now we commence volume 17, into which I shall introduce many new features and competitions. Recent competitions relating to fountain pen and lathe design have proved highly successful, appreciated both by readers and by manufacturers. Several excellent designs for lathes have been received and next month I shall announce the result and publish the winning design. Many other competitions of a similar nature will follow.

Indexes for volume 16, which comprises issues dated September, 1948, to October, 1949, are now in course of preparation. Indexes for previous volumes of this journal are still available. They cost 10d. each by post from the publisher, George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2.

### Engineering Data Sheets

OUR companion journal, *Practical Engineering*, which, of course, deals with professional engineering and is published at 4d. every Friday, is issuing each week a series of eight data sheets dealing with workshop and drawing office practice. A loose-leaf binder is available for a nominal sum so that the data sheets may be collected and collated week by week. The data sheets will be included for at least twenty weeks and, when complete, will comprise a ready reference on a large number of engineering subjects.

### Travel Scholarships

THE Institution of Production Engineers has announced the establishment of Schofield Travel Scholarships. These Scholarships, to be awarded for the first time in 1950, will entitle successful graduates to six months' study visits to the United States of America, the entire time being spent in industry, although in future years study visits to other countries are envisaged. The institution will make all administration arrangements, and will pay all travel and subsistence expenses in connection with the visits. The scheme was originally conceived by Mr. E. W. Hancock, M.B.E., M.I.P.E., Director and Works General Manager of Humber, Ltd., and a vice-president of the institution, and it is largely due to his untiring efforts that this major award is announced. F. J. C.

# Making a Pedal Car

## Constructional Details of a Miniature Car of the "Grand Prix" Type

By L. C. VERDON

*Fig. 1.— The youthful driver at the wheel of the completed pedal-car.*

I HAVE been for many years an enthusiastic follower of "The Sport," and when my daughter arrived at what might be called the "pedal-car age," previous model-building experience insisted that her car should be as correct as possible. This, of course, ruled out any commercially-made "chariot," and I set to work to make her a car which would be sound both in looks and performance.

I decided on a "Grand Prix" type, as the body, without lamps or wings, would weigh less than a sports model, and more robust construction could thus be allowed on the chassis. The 1500 c.c. car of 1939 vintage was taken as a prototype, the idea being not to slavishly follow a particular car, but to achieve that peculiar "atmosphere" possessed by a real Grand Prix job.

The illustration, Fig. 1, shows the general lines of the finished model. Rather than have a poor attempt at spoked wheels, and for greater strength (having kerbs in mind) I put on disc wheels which look quite presentable. The principal difficulty which at once presented itself was to get the drive past the seat which had to be at about the same level as the axles. The solution (after discarding several attempts at front wheel drive) was to take a chain drive in a tunnel along one side of the seat. This meant having a crankshaft somewhere in advance of the seat to convert the treadle action of the pedals into the rotary action of the chain drive, and this has proved thoroughly reliable and successful. The front axle was not sprung as there was to be comparatively little weight in front, and the rear axle was mounted on coil springs which comfortably iron out on local bad pavements. A small amount of whip in the chassis ensures that the front wheels are continuously in contact with the ground.

The diameter of the wheels is 13in. over the tyres; the front track is 25in., the rear track 23½in., and the wheelbase is 3ft. 5½in. The total length of the body is 5ft. 3in., and the height to the top of the scuttle is 18in.

### Chassis Construction

The chassis members are of 1in. x 2in. hardwood, the 2in. dimension vertical, and the sides parallel. For the front axle a 19in. length of ¼in. diameter mild steel tubing was cut, and a U-shaped bracket was welded to each end to take the stub axle mountings. These brackets are clearly shown at A in Fig. 2, and in the general assembly drawing, Fig. 3. Two drilled brackets for bolting to the chassis members B are shown at g, and were welded into position 7in. each side of the centre; the complete axle being thus rigidly bolted to the chassis members formed the front cross-member. A second cross-member was made of ½in. x ¼in. mild steel 19in. long. Each end was bent up at right angles from the end and bolted across the chassis 34in. from the front. This cross-member, which is shown at T in Fig. 3, also forms the front of two seat supports 3in. below the top of the chassis members.

### Steering Gear

Having thus obtained a fairly rigid chassis I set to work on the steering gear so that when the rear suspension was finished and fitted it could immediately be tested and adjusted. Two pieces of ¾in. tubing were cut to fit inside the U-pieces (A Fig. 2) at each end of the axle. These were drilled and tapped to take ⅜in. diameter stub axles and swivel links which were finally welded as indicated. Gun metal bushes were pushed into the tubes for improved wearing properties and a bolt right through the U-pieces held them in place. A track rod was made of 5/16 dia. steel with a U-socket screwed on each end which fitted over a tongue filed on the swivel links. The steering layout is shown fully in Fig. 3, F being the track rod.

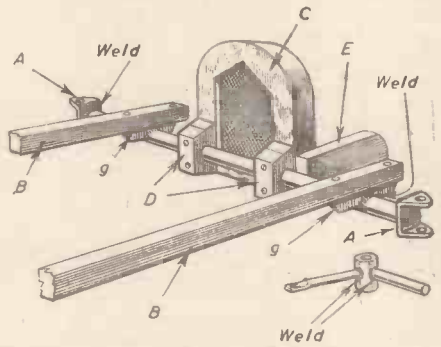



*Fig. 2.—Details of front axle and stub axle mountings.*

I removed the chuck and handles from an old handbrace and welded the body containing the gears on to a strip of ⅜in. x ¼in. steel (H Fig. 3). This was bolted across the chassis 7in. from the front so that the gears were centrally placed, and a drag link connected from the existing arm on the larger wheel to the offside swivel arm G. The steering column was made from ½in. dia. tubing 21in. long, into which was inserted and riveted the shoulder of the small gear. The dashboard was cut out of 5-ply wood, and three dials—rev. counter, oil gauge, and fuel gauge—were inserted into suitable holes with celluloid covers. The assembly was fixed to the chassis by means of a strip aluminium former screwed right round the outside of the dashboard and bolted at each end to the chassis members.

### Steering Wheel

The steering wheel was fabricated from a turned steel boss on which were riveted four spring steel spokes; the rim was made of ⅜in. dia. copper tubing bent into an 8in. dia. circle, the joint being brazed, and the ring riveted to the spokes. The top end of the steering column was tapped to a depth of ½in., and just below this a pin projecting ¼in. either side of the column was pushed into a tight-fitting hole. A slot in the boss of the steering wheel engaged in this pin when the wheel was positioned on the column, and a bolt screwed into the tapped bore of the column completed the assembly. The illustration, Fig. 10, shows the appearance of the cockpit and also the offside steering unit.

The front wheels had phosphor bronze bushes pushed into each end of the hub, and were secured on the stub axles by means of a washer and split pin.

### Rear Suspension

The rear suspension was next tackled and is described with the help of Figs. 3, 4 and 5. The cross-member I is bent from 1in. x ⅛in. mild steel and forms the rear seat support and the top anchor of the

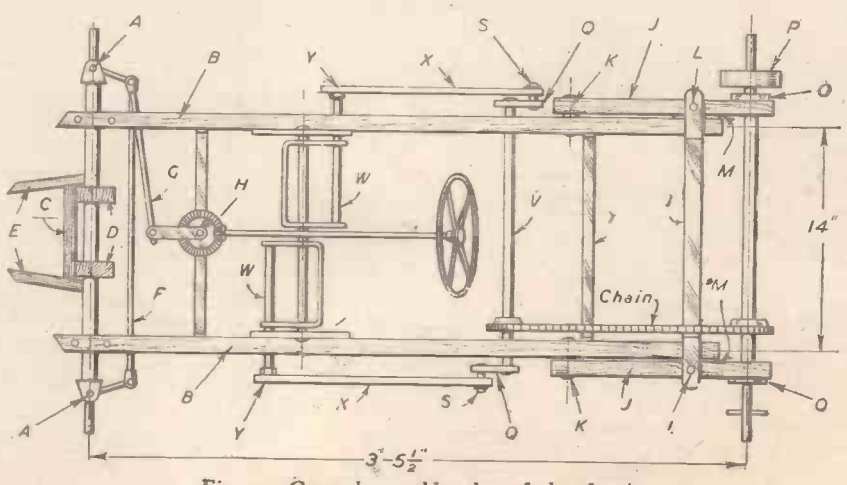



*Fig. 3.—General assembly plan of the chassis.*

springs. Two arms J were cut from the hardwood and shaped and drilled. A ¼in. hole was drilled through the chassis-member B and arm J at the point K. A piece of ½in. tubing slightly longer than the combined widths of B + J + ¼in. thick washer is inserted and leaves the arm J free to turn on the tube when a bolt is put through and tightened with a large washer on each end to keep the assembly in position. A coil spring L (I used a large valve spring) is placed between the top end of the cross-member I and the arm J, and a long bolt is put right through; this bolt, by being tightened or slackened, controls the tension of the springing and the horizontal properties of the chassis, and can be finally adjusted when all the wheels are on. A friction plate M is screwed between B and J, of the same thickness as the middle washer at K, and serves to keep the arm parallel with the chassis member. The slot N (Fig. 4) in the arm J is to allow the back axle assembly to drop into place, and the three ¼in. dia. holes correspond in position to similar holes in the axle ball race housings.

### Rear Axle

The rear axle was made from ⅝in. dia. steel rod turned down to ½in. dia. for 3½in. each end to take the ball races and wheels. An adaptor was made to take an 18-tooth cycle chain wheel and to be a push-on fit on the larger diameter of the axle. This was put on to the shaft, but was not positioned or fixed until the crankshaft was fitted, and then a ½in. ball race in a suitable steel housing was pushed on each end of the axle up to the shoulder between the ½in. and ⅝in diameters. Each housing face was drilled with three ¼in. diameter holes to correspond with those in the arm J. A ¼in. dia. pin projecting ¼in. each end was put through the nearside end of the axle to engage with a slot in the hub of the wheel to take the drive. The wheel, a hammer-fit on the shaft, was kept against the pin by a spring washer between the wheel and a split-pin in the end of the shaft. The offside wheel revolves freely on the axle for "differential necessities." A 4in. diameter wooden brake disc (P, Fig. 3), bolted to a steel adaptor, is secured to the axle between the bearing housing and the wheel. The whole axle assembly was then bolted on to the arms J by slipping it up into the slots N (Fig. 4) and bolting the arms J to the bearing housings O in Fig. 3. The chassis was then levelled up and springing adjusted equally.

### Driving Gear

Then came the drive, and with it a few headaches. I underestimated the strength necessary in the pedals to preserve rigidity, and modification became necessary after a few "pavement" tests. This was successfully accomplished and the second attempt is still running well. It is obvious that the treadle action is better for this type of car and, in the present case, with the pedals on the same horizontal level as the seat, a really powerful push can be obtained. As previously mentioned this treadle action had to be transmitted to the chain drive so the next item was the crankshaft. This was to be in front of the seat and, as there was no room for the normal crankshaft with inside webs, it was decided to take the connecting rods from the pedals to the crankshaft outside the chassis where they would be covered by the side body fairings, and the inside of the cockpit would be free of mechanism. This arrangement, although it simplified the crankshaft, complicated the pedal gear and caused the underestimated stresses because of the drive coming some inches away from the side of the pedals.

The crankshaft is of quite simple design and is shown in Fig 6. The webs (Q) were made from ⅞in × ⅛in. mild steel cut to a length of 2½in. and drilled with two ⅝in. dia. holes in each at 1½in. spacing equidistant of the centre. In one hole of each was riveted and brazed a 4in. length of ⅜in. rod (R) and in the other hole a 1in. length (S). On to the 4in. length was put a distance collar (T) made of ⅝in. × ½in. tubing ⅝in. long, and then a ⅝in. ball race (U). The rod R was then inserted and riveted into the end of a 14in. length of

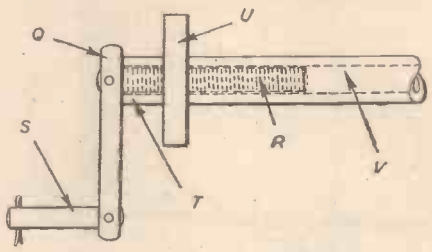



*Fig. 6.—Detail of the crankshaft.*

⅝in. × ½in. tubing (V, Figs. 3 and 6). An adaptor to take another 18-tooth chain wheel was slipped over the tube V, and another crank web made in a similar manner was riveted to the other end of U at 180 deg. to the first. The complete crankshaft was then placed in position in the chassis and with each web at an equal distance from the chassis members, the adaptor was positioned just inside the near side chassis member, where it was marked, drilled and riveted. Split bearing housings were cut out of oak and are detailed in Fig. 7. One half (a) was cut long enough to take four woodscrews and was screwed direct to the underneath of

*Fig. 10.—View of the cockpit and offside steering unit.*

the chassis member B. The other half (b) was held with two screws to (a) after the insertion and positioning of the crankshaft. The chain wheel on the rear axle was then lined up with that on the crankshaft and riveted through the axle. A cross-member of ½in. square oak was screwed across from the front of one bearing housing to the other, and the space from this to the front seat support (t) was covered with stout plywood, leaving a passage for the chain which may now be fitted. This plywood can clearly be seen in front of the seat in Fig. 10, and also the tunnel in which the chain runs.

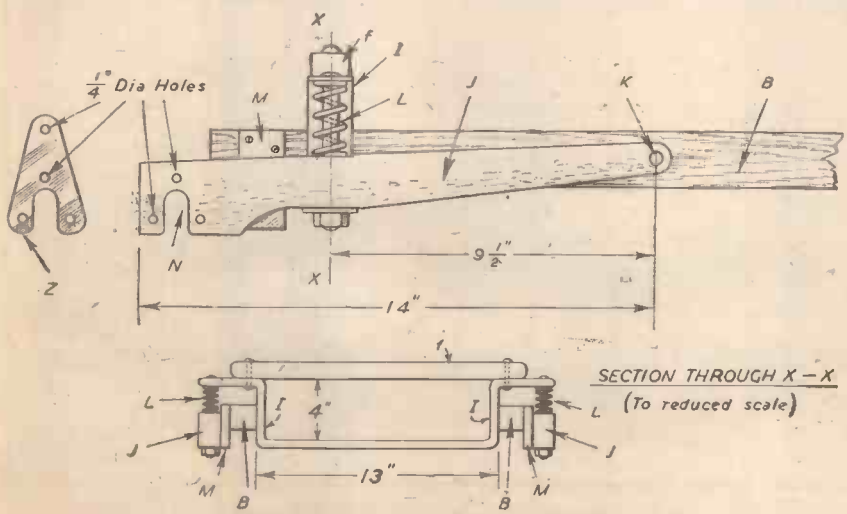
### Pedals

Two pedals were constructed of 1in. x ⅛in. mild steel strip, and are shown in Fig. 8. The tubing, brazed through holes drilled in the top of the frame, has an oil hole drilled at C. A shouldered stud, W, is bolted to the frame each end, and with enough thread projecting 2in. one end to pass underneath the chassis side and come into line with the rod S on the crankshaft. Two small plates (d) are bolted on the stud W to take the footboards to be described later. These two pedals were hung on a ⅛in. dia. bar, suspended on two inverted-U brackets, one on each chassis member. This accounts for the bulge and the nut on the side of the bonnet, which I could see no way of avoiding.

### Connecting Rods

Connecting rods were constructed by first making two housings to take phosphor bronze bushes to fit the crankweb pins S. These housings, shown at Fig. 9, were bolted one on each of two lengths of ½in. x 5/32in. steel (X) on to the other end of which were brazed ⅜in. nuts (Y). The nuts were screwed on to the ends of the pedal studs (W) and the bronze bushes were slipped on to the crankweb pins (S) and secured with washers and split pins. After three months of continuous wear there is no sign of any trouble developing in this assembly, and it is all easily replaceable if necessary.

Footboards for the pedals were cut from ½in. oak, shaped to the foot, and having a retaining wall of strip aluminium screwed round the heel part so that the foot could rest on the boards without conscious effort when the car is stationary. These boards were fixed to the brackets d in Figure 8.




*Figs. 4 and 5.—Side view and section of the rear suspension members.*

### Handbrake

The handbrake was mounted on a bracket projecting from the chassis member, care being taken to see that it did not foul the path of the connecting rod when the car was in motion. A brake shoe was cut from ¾in. thick oak and lined with a piece of canvas belt. Two stout aluminium plates (Z, Fig. 4) were bolted one each side of the off side suspension arm and bearing housing assembly, using the same bolts that join those two units. A 5/16in. bolt was put through the top holes with a spacing collar between them, the bolt projecting over the brake disc so that the shoe could be pivoted over the disc. The brake lever is not in line with the shoe, and connection between the two is made with a strip of ¾in. x ⅛in. steel which is slightly offset. No ratchet is fitted; a powerful return spring makes it just a plain fly-off handbrake, and it is a very effective anchor.

The chain was covered in with sheet aluminum screwed from the cross-members t and I to the chassis member B.

### Radiator

A radiator was cut out of wood and shaped as at C in Fig. 2, and the open space filled in with wire gauze. It was fixed to the front axle with two brackets (D), and the edge is at a slight angle to coincide with the taper of the bodywork from the radiator to the scuttle. A wooden former cut to the shape of the side radiator fairings (E, Figs. 2 and 3) was screwed to each side before fixing finally to the axle.

### Seat

The seat was built on a plywood frame, strengthened where necessary with strip wood and upholstered with glued horse-hair cushions covered with brown Rexine. To complete the chassis a piece of light ½in. diameter tubing was bent to fit round the back of the seat to support it, and was bolted from one to the other of the two spring supports. This is shown at f, in Fig. 5, and may also be seen in Fig. 10, above the rear wheel; it also gives great strength and rigidity to the rear suspension.

The crankshaft stroke of 1½in., combined with the large roadwheels, provides a high enough gear for sprint bursts to be very effective. The steering gear gives 1¼ turns of the wheel from lock to lock, and this takes away any jerk from the cornering.

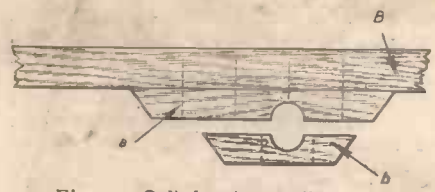



*Fig. 7.—Split bearing housings.*


*Fig. 9.—Side view of connecting rod.*

### Bodywork

The bodywork does not merit much description as it is quite a simple light construction of aluminum sheet, cut to shape from cardboard or thick brown paper templates. The scuttle was put on first, being screwed to the dashboard and direct to the chassis. The two fairings over the front axle were fixed next, using the same bolts that secure the axle to the chassis, and screwing to the formers E, Fig. 2. The radiator cowling was cut to shape and screwed round the radiator and inside the two E formers.

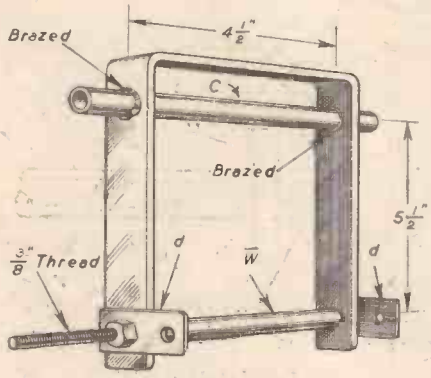



*Fig. 8.—Details of pedal construction showing the brazed joints, and brackets to take the footboards.*

The bottom was screwed to the underneath of the formers and then the grille was fixed. This is of quite simple construction, but care had to be taken to keep it square and horizontal. A length of 5/16in. dia. brass wire was drilled with ⅛in. holes along its length at ½in. intervals, and was bolted from the top to the bottom of the radiator opening; the illustration, Fig. 1, shows this quite clearly, and also how the horizontal bars were fixed through the ⅛in. holes and bent each side into the cowlings. They were soldered to the upright, and ⅛in. wire was bent round the cowling and soldered to the horiontal strips; as these could not move outwards by virtue of being bent inside the cowling, and could not move inwards because of the wire soldered on the outside, a very firm grille was formed. The bolt holding the top of the centre upright was disguised by being countersunk into the radiator badge, which was cut out of thick aluminium. The lower bonnet sides were made next, and then the side fairings which run in one piece from halfway along the bonnet to the back of the seat. The fairings (see cover picture) are temporary ones, the finished ones having a more rounded shape. The bonnet top was cut to shape, and strips of louvres which I found round an old electric motor were recessed into it. The top is fixed at the front, and at the back is recessed to fit under the scuttle, this giving it enough movement to allow for the chassis whip that has already been mentioned.

### The Tail

The tail was fixed round a strip of aluminium former fixed behind the seat; it was made in three parts, two sides and the top cowl. The rear end of the sides was screwed to a strip of wood between them, and the screws covered by a channel section cap which is fitted right over the end and screwed at the top and the bottom. The top cowl was bent right under inwards, each side being secured with nuts and bolts.

### Windscreen

The windscreen is a "fold flat" type made of perspex, and a bonnet strap has been fitted. The body is left in bright aluminium, the only splash of colour being a red radiator badge and the steering wheel, which is bound with red cord.

# New Jet-Propelled Air Liner

*Britain's newest jet-propelled air liner, the D.H. 106 Comet, was put on show recently by the makers, the de Havilland Aircraft Co., at Hatfield, Hertfordshire. The Comet, a monoplane with swept-back wings and powered by four Ghost jet engines, is expected to have a cruising speed of nearly 500 miles an hour. It will carry a crew of four and up to 36 passengers. An order for 16 of these aircraft has been placed and the first two will be delivered to the Ministry of Supply, the remainder going to British Overseas Airways Corporation. Our illustration, a three-quarter view of the new jet air liner, shows the two starboard jet engines.*

NOTE.—*In our next issue we shall publish a special article with photographs and particulars of the new Brabazon I.*

*A close-up view of the new D.H. 106 Comet.*

# The Story of Spectacles

## The Interesting and Little-known Narrative of Eyewear Through the Ages

IN the church of St. Maria Maggiore at Florence, Italy, there is fixed high up on a wall a small marble bust and, below it, a neat marble tablet bearing the inscription:

*Here lies Salvino D'Armato, of the Armati, of Florence, Inventor of Spectacles. God pardon him his sins.* A.D. 1317.

It does really seem that that inscription, brief and laconic though it may be, expresses the truth and that in actual fact the worthy Salvino was, indeed, the first individual to fit "windows" in front of human eyes in order to assist and clarify failing vision.

Not that Salvino D'Armato was in any sense the originator of lenses or magnifying glasses. Those were in evidence long before his time, for even the Roman Emperor, Nero, who suffered from weakness of vision, is known to have used some form of magnifying glass.

All that D'Armato did when he introduced the principle of eyeglasses or spectacles was to take two suitably-framed lenses of appropriate strengths and to fasten them together with an intervening "bridge" or nosepiece so that they could be held or secured in front of the eyes.

A simple enough invention, in all truth! Yet it was one which had to be made sometime, and it was one which must necessarily carry its orginator into the front rank among the known and unknown benefactors of mankind.

Naturally, D'Armato's claim to the invention or origination of eyewear has not remained undisputed. He has a few runners-up in the matter, including even our own Roger Bacon, the thirteenth century Franciscan friar, of Oxford, who died in that city in 1292. Bacon's claim to the origination of eyewear is put forward by some writers in view of the fact that in one of his works (*Opus Majus*, 1265) he mentions an *instrumentum* for the eye and, also, "glasses which caused small letters to appear large." But here it is plain that Bacon is merely speaking of magnifying glasses and not of any device which could be worn permanently in front of the eyes.

D'Armato's greatest rival in the matter of the origin of eyewear is a practically unknown Dominican lay-brother named Allessandro della Spina. Della Spina is rather a dark horse in this little-known story. He is described as a modest and a good man and as one versed in the "mechanical arts." He died in 1313, just four years before the decease of D'Armato. He lived at a Priory in Pisa, so that it is possible that he was acquainted with D'Armato, about whose career we know practically nothing with the exception that he was a "nobleman."

On the whole, however, if there is any evidence as to the priority of the invention in question it points in favour of D'Armato and to the year 1285 or thereabouts.

### "Invention of the Devil!"

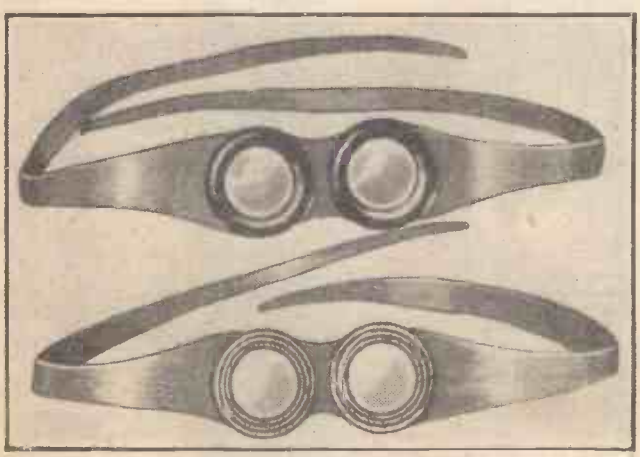
But for more than a century "nose-glasses," as they were called, were anything but popular articles. They were regarded

*An early illustration of a Chinese student, showing eyeglasses which are secured in position by means of weighted cords passing over the ears.*

as freakish and even (so it is recorded) as an "invention of the Devil." Their wearers were ridiculed and derided, a consequence, no doubt, of the very heavy, cumbrous and unsightly mountings of the lenses.

But the invention of printing which occurred during the period, say, 1430 to 1448, changed all this. Thousands of people who had never read before began to read the printed books as they slowly came forth from the early presses. They found that their eyesight was defective in one way or another and they flew to the once-ridiculed glasses as fairly effective aids to comfortable vision.

The first commercial makers of eyeglasses and spectacles seem to have been located at Frankfurt-à-Main in 1450. Other spectacle makers are reported at Strasburg in 1466 and Nurnberg in 1479, these makers obtaining their optical glass from the glass factories which were then situated in the Bavarian and Bohemian forests.



*The ancient counterpart of horn rims. Horn-framed spectacles sewn into leather bands.*

*The first known illustration of an individual wearing glasses. It is a portion of an Italian painting dating from* 1352.

The spectacles turned out by these early makers were big, heavy and disfiguring affairs. They were formed of two large circles of wood, leather, copper, iron and even of weighty lead which framed the lenses and which were provided with a straight "pin" bridging the nose. Such spectacles must have excelled in the discomfort and annoyance which they inflicted on their wearers. They constantly fell from the nose, so that, more often than not, it was necessary to hold them constantly on the nose by means of the hand.

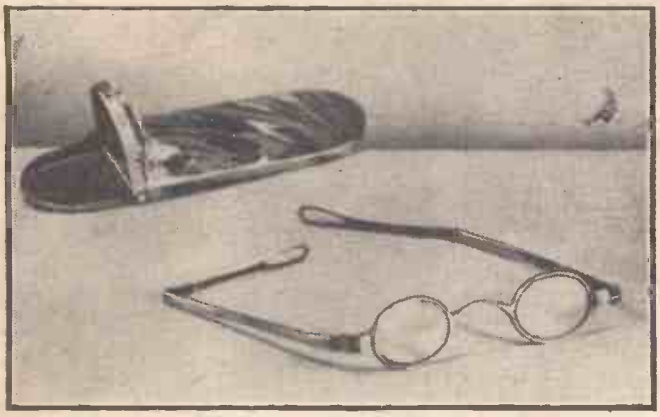
Spreading across Europe, downwards into Italy and upwards into Britain, the use of spectacles became commoner and commoner as time went on. In the sixteenth century, spectacle making was a recognised trade in England. The Worshipful Company of Spectacle Makers was founded in London in 1629 by King Charles I, who invested it with wide powers for controlling and regulating the making of glasses of all descriptions.

The main problem confronting the earlier spectacle makers seems to have been how to get the glasses to remain in position in front of the eyes without everlastingly becoming displaced, or worse still, without falling off the face and breaking. And it is surprising how long it took those early makers to solve the problem adequately.

All sorts of ideas and notions were tried out one by one. The lens frames were sewn into leather straps which buckled at the back of the head. Other types of glasses were provided with leather thongs or thin cords which looped over the ears. But perhaps the most ingenious of all such cumbrous and awkward methods was one said to have been of Chinese origin. It consisted of pro-

viding the glasses with strong side-cords having leaden weights attached to their ends. The side-cords passed over the ears and the heaviness of the weights kept the glasses drawn well up on the nose!

The system was not a popular one in Europe, but, as we would say nowadays, "it was an idea!"



*A pair of silver spectacles, dating from 1800.*

### Early "Horn Rims"

English spectacles were always characterised by good design and workmanship. The Worshipful Company of Spectacle Makers saw to that. As time progressed spectacle rims became finer and finer. In place of wrought iron and leather, gold and silver were used for the frames, and, lest anyone may imagine that our present-day "horn rims" are exclusively of American origin, let it be mentioned that even in the year 1700 British spectacle makers were turning out spectacle frames in horn and also in real tortoiseshell. Good examples of such frames are to be seen in the Science Museum collection at South Kensington.

An early "mechanical" method of keeping spectacles and eyeglasses on the face provided them with a vertical member rising up from the bridge and, being hinged or curved at its upper end, was capable of being pushed into the hair in much the same manner as a hairpin is (or was) manipulated by members of the feminine sex. If you happened to be "thin on top" you were just unlucky, for you couldn't use these glasses because your hair would not be dense enough to afford the vertical piece sufficient grip.

Eyeglasses with hard, firm springs which compressed the sides of the nose and so enabled the glasses to obtain a vice-like grip on that appendage were introduced. These, indeed—in their more merciful forms—survived well into our present century, being specially favoured by persons who did not find it necessary to wear glasses constantly.

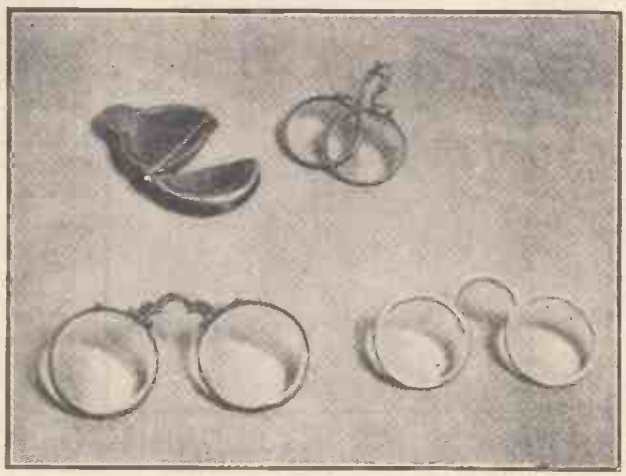
At last, however, some unknown and brilliant genius invented the rigid metal sidepieces for glasses. This invention, combined with the curved bridge to fit gently over the nose, at once introduced real comfort in spectacle wearing. It also ever afterwards served to distinguish "spectacles" proper from "eyeglasses" which were without such sidepieces and which merely clipped to the nose.

It is not known how, when and where these nowadays indispensable sidepieces were first brought out. The invention was certainly not an English one, but it quickly passed into Britain, and in the eighteenth century these "sidepiece" frames were practically the only ones made.

The sidepieces of the earlier spectacle frames terminated in large metal rings. Usually, the sidepieces were hinged on to the lens frames and then, at a later date, sliding sidepieces were introduced for the convenience of length-adjustment by their wearers.

### Lighter Frames

As time went on, frames and sidepieces became thinner and lighter until eventually by the middle of the nineteenth century they were composed merely of a steel wire. It is only within our present century, with the introduction of spectacle frames made from plastic materials, that glasses have increased in size and become bulkier in appearance. Nowadays, of course, spectacle lenses are worn without any frames at all, a design which would seem to represent the utmost limit of the spectacle maker's ingenuity.



*Early eyeglasses in the collection formed by the British Optical Association.*

The earliest communities of spectacle makers in Britain were centred in the Clerkenwell district of London, which is still famous for its association with clockmakers and dealers. Later, spectacle makers spread to Sheffield, Birmingham, Wolverhampton and other districts. Their products were, of course, entirely hand-made, even the lenses being hand ground. Some of these workers survived even the Victorian age until, at last, the modern machine-made plastic frames engulfed the survivors and drove them into other fields.

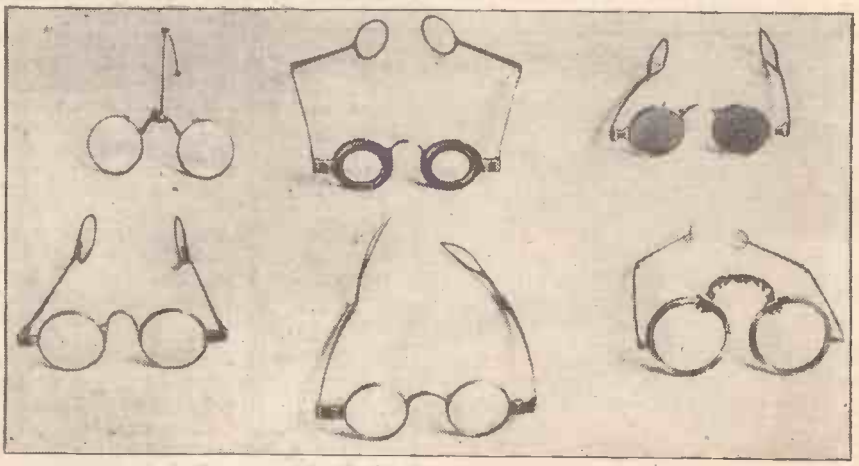
The first lenses used for spectacles were sections of quartz or "pebble," as such material came to be termed. Manufactured glass, however, was very quickly brought into the service of the spectacle maker, although at all times the real "pebble" lenses have been employed for the best glasses right up to fairly recent days.

Optical glass is a British invention, the first satisfactory glass of this nature being manufactured by the Chance brothers in 1833. Up till that time, and, indeed, long after it, glass of any variety was used for eyewear so long as it was clear and free from mechanical defects and flaws. Very few concave lenses were made from "pebble" because the quartz was very difficult to grind—mechanically and economically.

### Prescribing Glasses

The adjustment of glasses to suit individual eyes was, until less than a century ago, hopelessly chaotic. For a long time glasses were classified in "strengths" according to the age of the wearers for whom they were intended. Thus, spectacles were sold under the classification of "30 years," "40 year," "60 years" and so on, the "years" being scratched on the frames to indicate the approximate age of the wearer which the glasses would best suit. No provision was made for the individual variations from the standard "age" classification, nor was any allowance made for differences of visual power between a wearer's eyes. Indeed, cheap spectacles were turned out in merely two classifications—"young sight" and "old sight."

The better makers, of course, did endeavour to provide for the optical requirements of their clients in a more exacting manner. They had a system whereby they took a certain lens as a unit, and by placing a number of such units together they were able to develop a workable scale of arbitrary optical "powers" which certainly went far to accommodate individual differences between eyes.



*Our ancestors' eyewear. Note particularly the eyeglasses in the upper left-hand corner. These were held in position on the nose by means of a vertical rod which was hinged at the top, and which was passed through the hair in much the same way as a feminine hairpin.*

It was only in 1875 that the present system of optical assessment was introduced, this being based on the "diopter," which is an international standard of optical "power." Previously (in 1851) Helmholz, the German physicist, had invented the opthalmoscope, which enabled the visual power of an eye to be determined without reference to the person examined. It is from this period that the present-day scientific system of optical measurement, assessment and prescription in relation to spectacles and eyewear generally has arisen.

The medical profession, like it has often been to many another basic innovation, was at one time openly opposed to the use of spectacles, which it supposed would cause injury to the eye. Medicals were wont to prescribe eye-washes and massage in place of glasses for defective sight, and even when their opposition subsided they remained indifferent to the scientific side of ocular prescribing until the middle of the nineteenth century had passed. Such an attitude compares strangely with that of the present-day prescribing physician and surgeon, to whom the designation "optician" would be anathema.

**Cheap Glasses**

Large numbers of spectacles were manufactured on the Continent during the 1700's and early 1800's and imported into England. In London, at the beginning of the 1800's, you could buy a fairly decent pair of iron-framed glasses, complete with adjustable side-pieces and age-classified "sights" for one shilling. Naturally, you hadn't to be particular as to whether the glasses matched the individual differences of your eyes and, also, you hadn't to mind the lenses having a slightly bottle-green tinge. After all, a better-made English pair of spectacles could be had for 3s. 6d., whilst, of course, if you sought the best of articles and your pocket was sufficiently deep, you could purchase the best possible pair of glasses in 18ct. gold frames for 12 guineas.

Forty or fifty years earlier glasses could be obtained still cheaper. The rural "packman," or village peddler was then a person of considerable utilitarian importance, and even necessity. With his baskets and panniers crammed with miscellaneous household wares slung over the back of his slow-moving mule he travelled on his rounds through rural England, avoiding the growing industrial towns and circuiting only the rural areas.

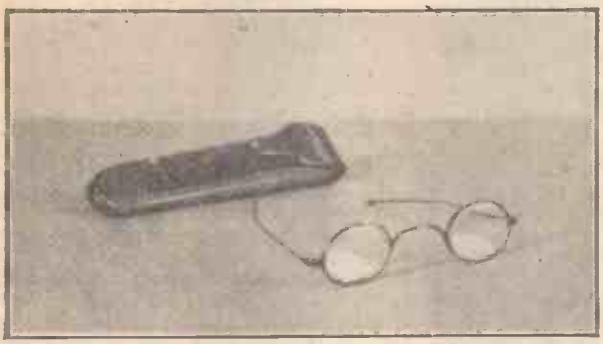
Among his laces and ribbons, his coloured cloths, his buttons, needles, pins, ornaments, pots, pans and his assortment of prevailing gee-gaws of every kind he usually included *spectacles*—German-made ones.

They were not bad-looking spectacles, being made of brass, lightly silvered, the glasses having the usual German greenish tinge; and the price of the articles (including, necessarily, the packman's reasonable profit)—*fourpence a pair*, "any strength you like!"

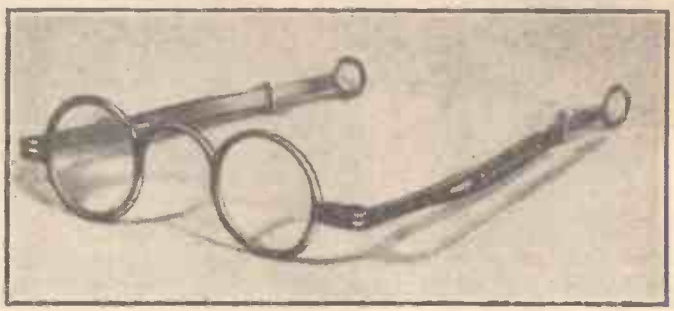
Such was the popularity of spectacles in an England which was rapidly becoming industrialised and in which the face of its civilisation was quickly changing.

Nowadays, of course, the tendency is to get away from spectacles and eyeglasses altogether and to substitute for them "contact glasses," which are delicate, shell-like, accurately-shaped pieces of thin, clear glass which fit under the eyelids in actual contact with the eyes and whose presence is practically undetectable. Whether such optical aids, in consequence of their high cost, their difficulty of making and the necessity of getting used to wearing them, will ultimately drive all spectacles and other similar types of eyewear to the limbo of obsolescence is difficult to prophesy.

Probably such will not be the case, but at all events "contact glasses" are of much interest in view of their beginning a new chapter of the story which was commenced so many centuries ago by the nowadays almost unknown yet none the less worthy *Salvino D'Armato, of the Armati, of Florence, Inventor of Spectacles.*



*These historic spectacles belonged to the famous John Dalton, originator of the modern Atomic Theory. They illustrate the almost wire-like steel frames of the first half of the 19th century.*



*Iron spectacles of the 18th century. These, which were provided with sliding side-pieces, were the common type, selling sometimes for as little as one shilling a pair, complete with lenses.*

# Notes and News

**Automobile Association's New Radio Mast**

A LATTICE-TYPE aluminium mast, 60ft. high, has been erected on the roof of Fanum House, New Coventry Street, London, the headquarters of the Automobile Association. The purpose of the new mast is to extend the radius of communication of the radiotelephone system by which the A.A. controls its night breakdown service in the London area. The top of the tower is 160ft. above pavement level, and carries a dipole aerial of a Marconi transmitting and receiving installation, which is housed on the roof of the building.

**The Jordaphone**

A NEW portable wire-recording instrument called the Jordaphone has recently been introduced in the United States by Mohawk Business Machines Corp., of New York. Having the appearance of a squat radio set, the instrument is placed in a convenient position on a desk or table, and the telephone is simply placed on it, each end of the receiver resting on rubber "mushrooms." When the bell rings these "mushrooms" rise just enough to lift the receiver off the buttons. This starts the acetate record which says you are out and will the caller record a thirty-second message. This message is taken down on wire which can be used over and over again. At the end of the thirty seconds, or more, if the instrument is set for more, the "mushrooms" let the receiver down again and the record pick-up returns to the beginning of the record, ready to start again.

Apart from this, the wire-recorder part of the instrument can be used with a hand microphone for recording dictation, music, or anything else.

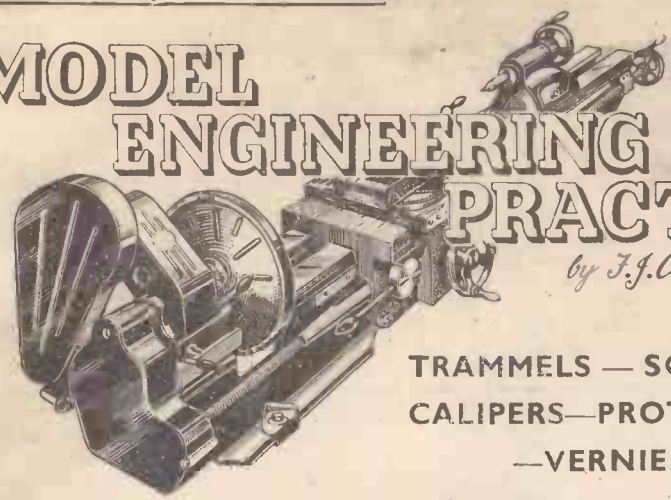
The Jordaphone will also record a two-way telephone conversation.

*An artist's impression of the Jordaphone, an instrument which automatically answers telephones with the owner's voice.*

*4th Article of a New Series*

# MODEL ENGINEERING PRACTICE

*by J. J. Camm*



## TRAMMELS — SQUARES — CALIPERS—PROTRACTORS —VERNIERS

THE general appearance of this simple scribing block will be clear from the sketch in Fig. 38, which also gives an indication of the method of using this tool.

When using the scribing block do not have the scriber point projecting any farther than is absolutely necessary; and as the lines are being drawn the point of the scriber should *follow* the pillar . . . it should neither be at right-angles to it, nor should it precede the pillar.

### The Trammel

Like the divider, this tool is also used for marking out circles and arcs, and consists of two scribers which are adjustable along the length of the connecting bar. This connecting bar (or beam) usually consists of a $\frac{5}{16}$ round steel bar with one side flattened to prevent the scribers rotating. Any size circle or arc can be provided by sliding the scriber sections until the required distance between them is obtained, and then the fine adjustment is made by means of the knurled nut and screw, as shown. (Fig. 37.)

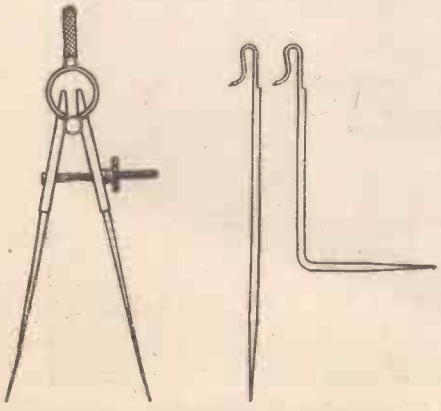
### The Box-square

When it is necessary to mark out a mortise or key-seat on the surface of a round shaft, then the work is easily done by means of a box-square (or key-seat rule). These tools are used when it is inconvenient or impracticable to mount the work on vee-blocks and use the scribing block. There is also a key-seat attachment for use with the ordinary rule or straight edge and is used for the same purpose. (Figs. 39 and 40.)

### Calipers

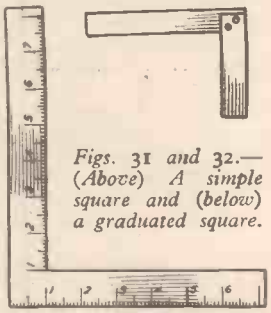
While it is true that calipers of all types are superseded by the more accurate limit gauge and micrometer, yet where only approximate measurements are necessary, calipers are still very useful tools, and the trainee must know how to use them. Really fine measurements by means of calipers are impracticable for the reason that, once adjusted to the work being measured, they have to be removed from the work, set against a ruler and the measurements read off from that, and it is not easy to read off less than hundredths of an inch on a ruler. Calipers do not give an automatic reading while still adjusted to the job, as the micrometer and vernier do. Moreover, accurate calipering depends so much on the personal skill of the mechanic; he has to know and to judge the hardness of the caliper points and how much "spring" there is in the tool itself.

The legs are adjusted by means of a knurled nut. In some types, this nut is provided with a spring chuck, which is of great advantage in that the thread of the nut engages the screw at the slightest pressure, and when the pressure is released it slides quite freely across the outside of the screw.

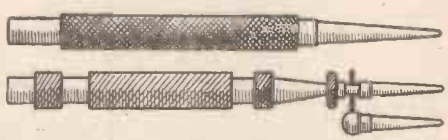


*Figs.* 35 *and* 36.—(*Left*) *Dividers.* (*Right*) *Two types of scribers.*

*Fig.* 30.—*The large straight edge.*



*Figs.* 31 *and* 32.—(*Above*) *A simple square and* (*below*) *a graduated square.*



*Figs.* 33 *and* 34.—(*Above*) *A centre punch.* (*Below*) *An automatic spacing punch.*

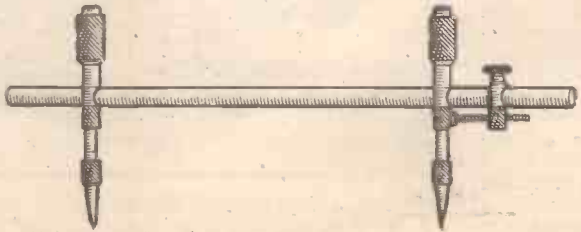


*Fig.* 37.—*The trammel.*

### The Inside Caliper

This is much the same as the outside caliper, except that the legs are shaped differently so that the tool can be used for measuring internal surfaces, such as the diameter of the bore in a cylinder block.

To caliper the diameter of a bore, keep one of the legs still and, with the point of the other leg, make one small arc in line with the bore and another at right-angles to it. You will thus be able to adjust the caliper to the maximum size, and the finer adjustments can be made by moving the tool up and down the bore. (Figs. 41 to 44).

### Transfer Calipers

This type of caliper is used for taking dimensions of diameters or thicknesses over projections, or inside cavities. There are types for both "inside" and "outside" measurements, as shown in the same two diagrams.

As the diagrams show, there is a third short leg on the same pivot as the two normal legs and there is also a stop provided whereby this short extra leg can be fixed in any desired position to the long leg which does *not* bear the stop, in such a way that when the long leg is moved, the short extra leg moves with it.

In using the transfer caliper, you first loosen this nut, insert the caliper legs and adjust them to the inside or outside dimension which is being read, and while holding them in this position, the third leg is brought over against the stop and the securing nut tightened down. Having done this carefully, the caliper can be swung in or out to clear the obstruction, removed from the job and, by moving the two legs together until the extra leg comes against the stop, the required dimension can be read off against a ruler in the ordinary way. The dotted lines in the diagrams will show the operation of this caliper quite clearly.

### Thread Calipers

Sometimes called the "jenny," this type of caliper is very useful for marking out work where strict accuracy is unnecessary. For measuring the outside diameter of a screw thread or the core diameter of a screw, calipers with specially shaped ends are used which may be quite broad to ride over the threads, or very thin in order to go right down between the threads to the core. There are many other types of calipers in use, but all are on the same principle, being mere adaptations devised for special purposes.

The bevel gauge consists of two thin blades, both of them being slotted and one of them being bevelled off at an angle as shown in

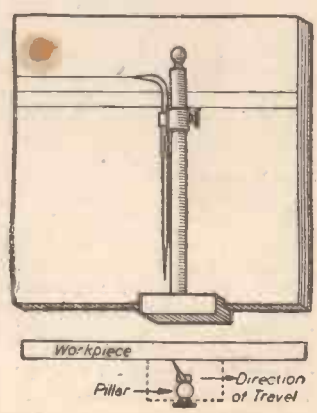



*Fig.* 38.—*The scribing block; and below is shown how the point of the scriber should follow the pillar of the scribing block.*

*Fig. 39.—Box-square or key-seat rule.*

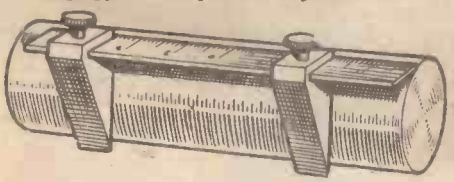


*Fig. 40.—Key-seat attachment.*

Fig. 46. The straight edge (or stock) has a stud riveted in it on which the other blade is hinged in such a way that the latter can be clamped at any desired angle. The bevel gauge is used for transferring angles from one piece of work to another, or it can be set to give any desired angle by means of a *sine-bar* or *bevel-protractor* (both of which tools will be dealt with in due course).

Fig. 47 shows a combination bevel gauge, and from the illustration it will be seen that this differs from the simple type in that it has a third blade; also the intermediate blade is slotted right to the end. The third (auxiliary) blade also has a clamp bolt by means of which it can be slipped along the slotted blade and clamped to any desired angle. It can therefore be used in combination with the two blades of the simple type of bevel gauge, and when so used it will lie quite flat on the work. Some of the methods of using this tool are shown in Fig. 48.

**The Bevel Protractor**

The protractor is a device for accurately measuring angles, and a very wide variety of types is available, the different types depending largely on the degree of accuracy required and the class of work being processed. A very common type is shown in Fig. 49. It consists of a graduated disc fitted with two blades, one being fixed in relation to the disc, the other being adjustable to the angle being measured. For any class of work where angles are to be measured or set out to within a limit of five minutes, this type of protractor is perfectly satisfactory.

The disc is graduated in degrees over a complete half of a circle (which is an "arc" of 180 deg.) and reads from 0 deg. to 90 deg. in each direction. As the illustration shows, *verniers* are provided in such a way that the protractor becomes readable by vernier in any position, making the measurements accurate to one-twelfth of a degree.

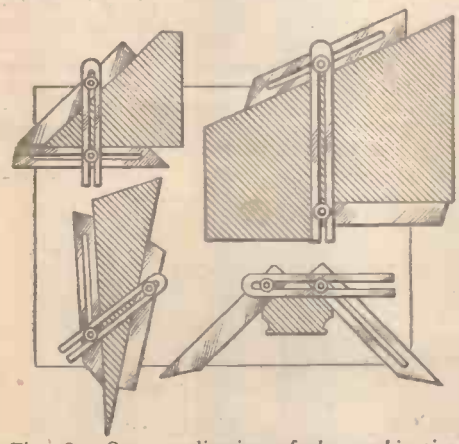


*Fig. 48.—Some applications of the combination bevel gauge.*

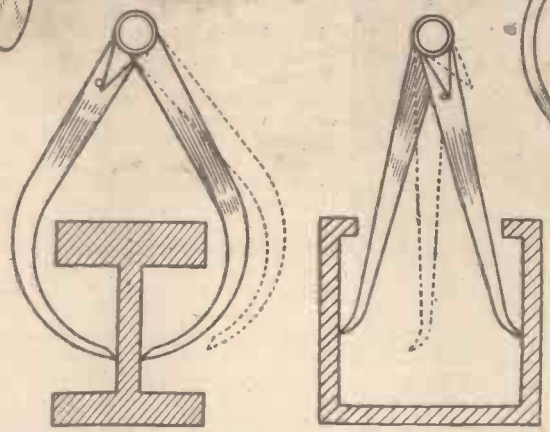
**The Vernier**

Any vernier (and there are many adaptations to various tools and jobs), consists in principle of an *auxiliary* scale attached to the main scale of any measuring instrument in such a manner that the tool to which it is affixed becomes suitable for taking much finer measurements than would otherwise be possible.

The principle on which the vernier works is simple, and is as follows:

If we take a scale of one inch in length and divide it into 10 equal parts, and if we then take a length equal to nine of these divisions and divide that into 10 equal parts again, then each of these latter divisions will be one-tenth shorter than each of the original divisions.

If we then put one scale (the larger) at the top and the other against it at the bottom, as shown in Fig. 50 (calling the former "the beam" and the latter "the vernier"), then the second line of the vernier will differ from the second line of the beam by one-tenth; the third line will differ by two-tenths, the fourth by three-tenths and so on until the last line on the vernier coincides exactly with the tenth line on the beam, which will be a gain of one space over the whole length of the vernier.



*Figs. 43 and 44.—(Left) Outside transfer calipers. (Right) Inside transfer calipers.*

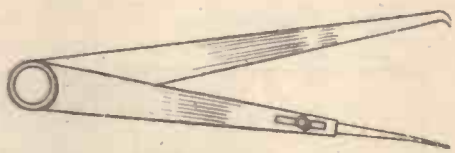


*Fig. 45.—The "jenny" caliper.*

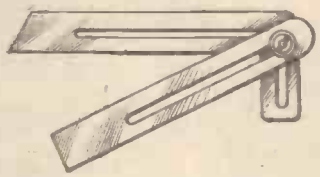


*Fig. 46.—The bevel gauge.*

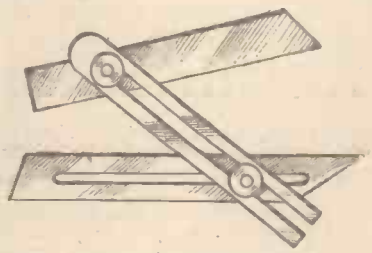
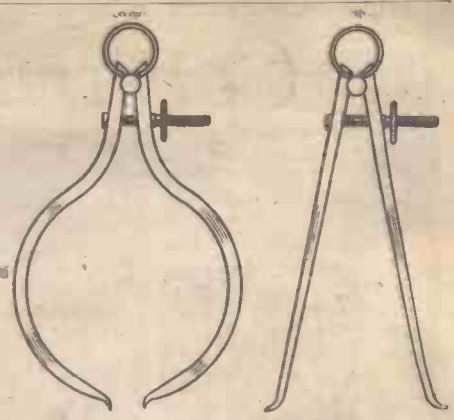


*Fig. 47.—Combination bevel gauge.*



*Figs. 41 and 42.—(Left) Outside and (right) inside calipers.*

**Reading the Vernier**

In the enlarged drawing of a beam and vernier shown in Fig. 51, the beam is graduated in inches, tenths of an inch and fortieths of an inch. In other words, without the vernier attached, you could read only to an accuracy of one-fortieth, and the reading on the vernier in Fig. 51 would be:

| | | |
|---|---|---|
| 2 inches | = | 2.0 |
| 2 tenths | = | .2 |
| 0 fortieths | | |
| | | 2.2 |

But the vernier enables us to read to another decimal place; run your eye along the vernier until you come to a division which coincides with one of the divisions on the beam (marked with an arrow in the illustration). The number of this division on the vernier from zero gives you (in the case shown) a measurement of .006, making your total reading 2.206, i.e., an accuracy to the nearest thousandth of an inch.

*(To be continued)*

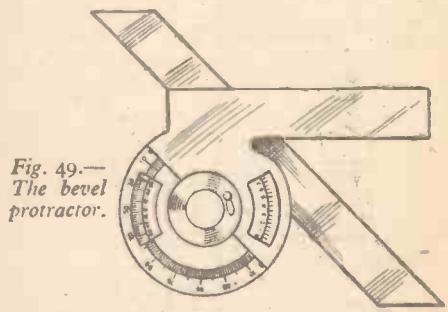


*Fig. 49.—The bevel protractor.*

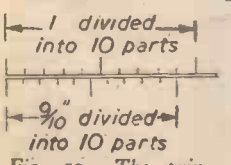
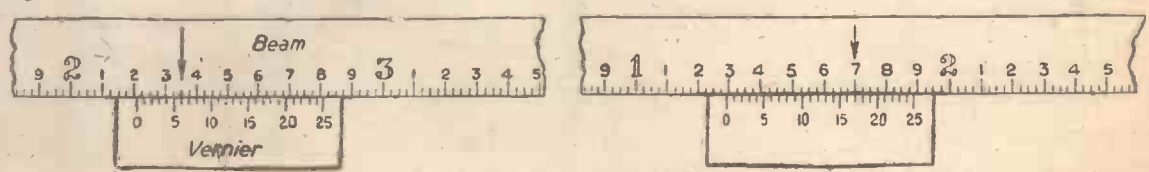



*Fig. 50.—The principle of the vernier.*



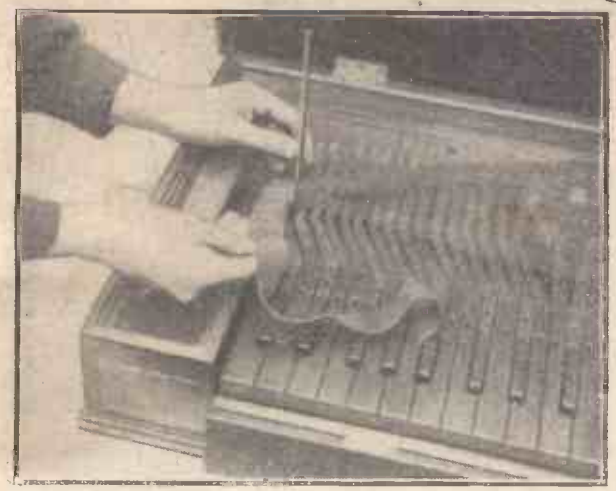

*Figs. 51 and 52.—Vernier readings.*

# Constructing a Clavichord

## The Modern Revival of an Old-time Keyboard Instrument

By J. F. STIRLING

(*Continued from page 372, September issue*)



*Threading the strip of damping felt through the clavichord strings. The cloth is merely loosely woven under and above alternate wires.*

USUALLY the spacing of the bridge pins will be closer on the two curves of the bridge and wider at its middle. It is best, therefore, to mark out and insert the pins after the bridge has been secured to the soundboard and the tuning pegs inserted in the wrest plank.

Gramophone needles gently tapped into fine pre-drilled holes make excellent pins for the bridge.

The bridge must be secured to the upper side of the soundboard by means of firm glueing. There is no other method of attachment. Thus attached it will be safe enough, since the combined pressure of the strings will continually serve to keep it free from strain.

Having now secured the bridge to the soundboard and the soundboard to the instrument itself, it now remains to drill holes for the tuning pegs. If necessary, it will not be difficult to make the tuning pegs out of steel rod, tapering at the lower ends and filed flat at the upper ends to fit a suitable tuning key. In this case the pegs should go three-quarters down into the wood of the wrest plank and they should project about 1¼in. above the surface of the wood. At a point just above the wood surface each peg should have a hole drilled through it for the insertion of the wire.

To save oneself the trouble of making 50 or more of these pegs, similar and well-finished ones, such as are used in banjos, guitars and other fretted instruments, can be obtained from most dealers in musical instruments.

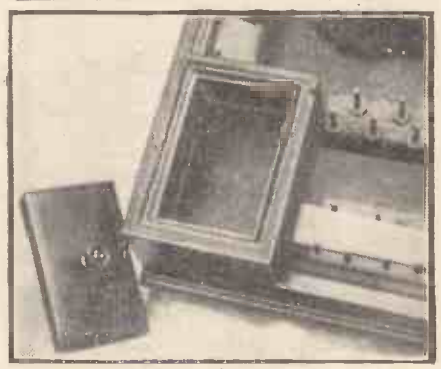
It is advisable, after marking out the holes in the wrest plank for the tuning pegs, to pre-drill them, using a drill which is slightly smaller in diameter than the tuning peg itself. Each peg is then gently tapped into its hole with a light hammer. Note particularly that the holes should be given a slight "rake" or slant, so that the tuning pegs do not stand perfectly upright, but slant slightly outwards to the *right*.

Since the soundboard will have been glued over the wrest plank it follows that the holes for the tuning pegs must be drilled through this portion of the soundboard. This will not make any difference to the sound of the instrument, for this glued-down portion of the soundboard is permanently "dead."

### Attachment Pins

On the opposite (left-hand) side of the clavichord is a similar but narrower "plank" for the metal attachment pins of the strings, this "plank" being continued at the rear side of the instrument. Here steel gramophone needles firmly driven into pre-drilled holes will suffice, but again the precaution must be taken of drilling the holes on the slant, so that the attachment pins are not vertical, but slant slightly *leftwards*. Tiny screws can be used in place of the steel pins provided that they reach sufficiently down into the wood to be absolutely rigid, but owing to the dimensions of the screw heads there may be some difficulty in spacing them all in a double row.

We must again return to the keys of the instrument. Each key at its farthest end should be weighted by means of a lead insertion. Molten lead cannot be cast directly



*The "tool-box" of the instrument, with its ornamental lid.*

in the woodwork. It is best to drill a ¼in. hole right through the wood of each key, and then to insert pre-cast "pellets" of lead into the holes, flattening them down by means of a hammer. The lead can be cast in any rough manner but the diameter of the diminutive lead castings must coincide with that of the hole drilled in the end of the key, for any attempt to make a slightly larger casting fit into a slightly smaller hole will almost inevitably end with a splitting of the wood.

As an alternative measure, the key ends may be weighted by means of little lead plates screwed on to the upper sides of the key shanks at their farthest extremities. Although these lead weightings may each weigh less than ¼ ounce, their presence considerably facilitates the quick response of the keys. The lead inserts or plates must, naturally, be all of the same weight.

### Key-pins

The keys themselves are secured in position on two sets of upright steel pins, these pins being inserted into hardwood rails which are themselves glued and screwed into the base of the instrument.

The main key-pin has its centre about 5in. from the front edge of the "white" keys, the "black" keys having pins situated a little farther back. The function of these pins is merely to provide a fulcrum point for each key lever.

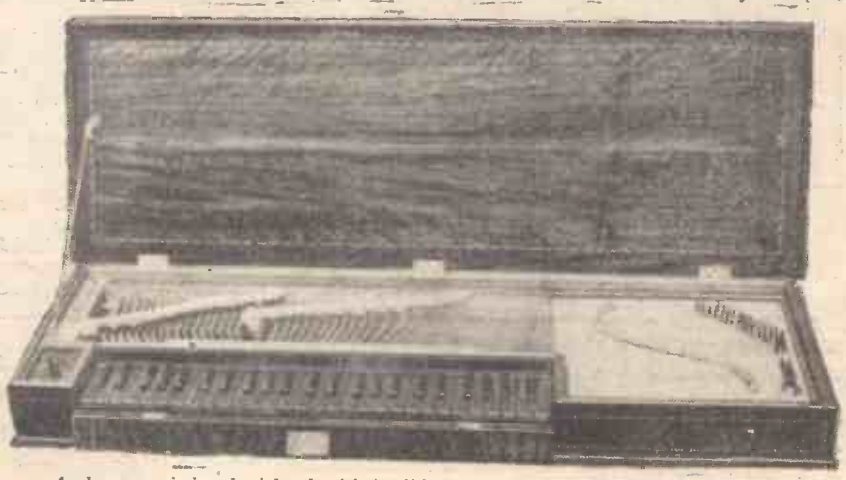
The subsidiary set of key-pins are situated directly underneath the keyboard. Here, the pins merely serve to guide the keys accurately downwards in correct alignment and to prevent a very objectionable side-to-side movement or rattling of the keys which would otherwise occur.

Both key-pin rails must have a strip of felt glued on to them, and the key-rest rail which is provided at the rear side of the instrument and with which the extremities of the keys make contact when in their normal non-depressed condition also requires adequate felting in order to eliminate any objectionable "key knock" and similar thudding sounds.

Usually, too, a number of thin felt washers will be required for some of the fulcrum key-pins in order to even up the keyboard level of the keys.

### The Clavichord "Jacks"

Each key is provided with a brass (or copper) "jack" or "tangent," as it was originally termed. This is merely an upright piece of brass or copper cut from 1/16in. metal sheet and given a triangular form with its broad edge upwards. These "jacks" are merely metal tongues which are driven down securely into the wood of the key shank so that when the key is depressed



*A close-up of the clavichord with its lid open, and the music-desk removed*

the jack rises and strikes the stretched and tuned wire or string above it, thus creating the sound.

The jacks must, of course, be all of one height, which should be about $\frac{5}{8}$in. projecting upwards above the key shank. Under these circumstances the jacks will only have to travel less than half an inch before they strike their respective wires.

Each key should be numbered on its side, beginning with "1" for the lowermost key and carrying the numbering consecutively until the uppermost key is reached. This precaution will save much time when taking out keys to make adjustments.

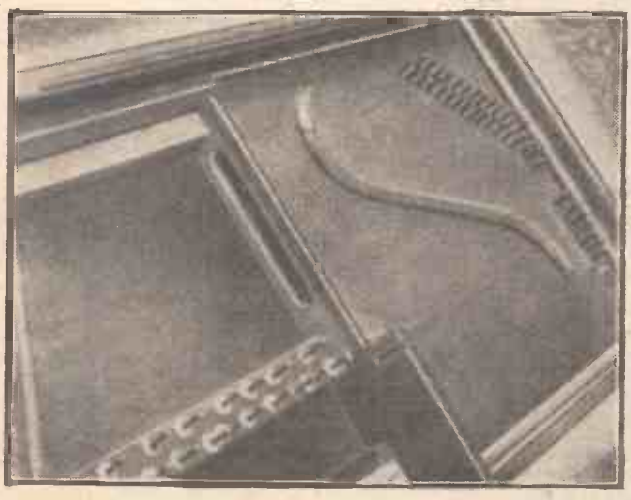
Although the holes in the keys for the pins may be made "plain" it is a great refinement to line them with felt, since this reduces wear and cuts down noise. Unfortunately, however, this felt-lining is not an easy operation, and it calls for a great deal of patience to treat fifty or more keys in this manner.

It should be noted that the main fulcrum pin hole in the key must be cut in a rectangular shape (about $\frac{3}{8}$in. x $\frac{1}{8}$in.) on the upper surface of the key. It need only be a plain circular hole on the underside. If the slotted upper portion of the hole is not provided the key will not have the requisite up-and-down play.

Regarding the guide-pin hole on the underside of the key at its front end, this hole should also be rectangular so as to allow for a very slight amount of play necessary for the free and rapid movement of the key.

The metal pins themselves may be of 3/16in. steel rod, and they should project upwards equally about $\frac{1}{2}$in. Brass rod may be used in place of steel for these pins, if desired. Indeed, if there is any risk of dampness in a room, brass pins are the better of the two, since, under conditions of atmospheric humidity the steel pins will rust and will cause an unsuspected sticking of the keys.

Apart from the actual stringing of the clavichord, the remaining constructional details of the instrument will be made clear by a study of the illustrations accompanying this article. Particular note should be taken of the little rectangular "toolbox" which is provided at the left-hand side of the keyboard. This is characteristic of all clavichords, and it serves a useful purpose in providing a corner for the necessary tuning key, spare strings, and so on.



*A side view of the soundboard, showing the slotted wooden support through which sound escapes.*

### A Plain or Ornamental Lid

The upward-rising front of the keyboard is characteristic of the instrument. It should be provided with a neat inset lock engaging with the upper lid when it is in the closed position. Thus locked, the clavichord is secured against unauthorised playing.

The upper lid of the instrument can be made quite plain, or it can be given a carved or inlaid design, or decorated by painting, or in any other way. Note that in the traditional clavichord the hinged lid is secured to the body of the instrument merely by means of a piece of cord fastened to a metal ring or hook at one side of the clavichord so that the complete falling backwards of the lid is only prevented by this cord. The arrangement is crude, no doubt, but it is quite effective, and, in the writer's view, the provision of any other lid arrangement would be quite out of keeping with the old-world character of the instrument.

The under-support of the clavichord is entirely a matter for the constructor himself. He may decide not to have any special support at all and merely to rest the instrument on a convenient box, chest or table. On the other hand, he may elect to make legs for the instrument and to screw these permanently in to its underside. Thirdly, he may prefer to make for himself a completely separate supporting underframe on traditional lines and in woodwork matching that of the clavichord itself.

A good clavichord is worthy of such attention. The proper underframe gives stability and appearance to the instrument and converts it from a mere "box of tricks" into an attractive piece of furniture.

The photograph of the separate underframe accompanying this article depicts the authentic old-time clavichord support. It is a copy of the clavichord underframes which were used in Queen Elizabeth's days. Such an under-support is easily made, provided that one can do a good job of woodturning. Alternatively, any cabinetmaker should be able to turn out a replica of it from the example shown.

It is a good plan to give a light coating of shellac varnish to the entire interior of the clavichord before it is finally strung. The keys, except for their front upper surfaces, should be thus treated and, also, the upper surface of the soundboard. The soundboard will, of course, take a violin varnish and be better for it, but no attempt should be made to cover it over with any ordinary varnish, synthetic or otherwise.

The back rail of the keyboard is made detachable in order that keys may be removed if required. Only the best workmanship should go into this keyboard rail. On it the clavichord constructor should carve his name—and also the year of construction, remembering, with an eye on posterity, that a "dated" instrument may be a valuable (and even a serviceable) antique in a hundred years from now!

A light music desk may be constructed from strips of furniture wood and provided at its base with two slotted brass strips, the slots of which engage with two projecting studs secured to the rear side of the keyboard "name plate" rail. Such a music desk will look well and will amply bear the weight of any ordinary music book.

### Stringing the Clavichord

We come finally to what is, perhaps, the most interesting part of clavichord construction, namely, the stringing of the instrument.

The instrument is strung from left to right; that is to say, more or less at right angles to the direction of the keys.

*A view of the music desk removed from the clavichord. It is secured to the rear of the front "name-plate" rail of the instrument, its slotted extremities (made of brass strip) engaging on two metal studs projecting from the back of the rail.*

It is here important to observe that the brass "tangents" or "jacks" are not all given the same positions in their respective keys. The row of "jacks" forms a diagonal line across the upper surfaces of the key shanks, beginning at a distance of about $\frac{1}{2}$in. from the far end of the uppermost key to about 6in. from the rear end of the lowest key in the bass of the instrument. Likewise, the lengths of the strings vary from the bass strings to the shorter ones of the upper notes.

The strings may be of either hard-drawn brass or of steel music wire. Brass strings give a mellower tone, but steel strings are more enduring. Brass strings in the upper register of the instrument are necessarily unduly tensioned and they tend to break. It is best, therefore, in actual practice, to make a compromise and to have brass strings three-quarters of the way up the instrument from its lowest note and then to finish off the highest notes with steel strings.

Note particularly that the actual diameters of the strings must vary as one ascends from the lower to the higher notes. It is best to divide the keyboard into four or five portions and to use thicker strings for the lower notes, somewhat thinner ones for the next division of notes, and so on until the upper notes, which require only fine strings, are reached.

For the lowest notes brass or steel strings of No. 7 gauge are the most suitable. Then come 6, 5, and 4 gauges, ending up with No. 3 gauge for the finest strings. It is this gauge which is best obtained in instrument steel, since brass wire of this thinness is so liable to break.

Instrument wire, both brass and steel, is procurable from any large firm of pianoforte dealers or of dealers in pianoforte fittings and supplies, as, for example, Messrs. J. & J. Goddard, 68, Tottenham Court Road, London, W.

**Attaching the Strings**

The clavichord should be strung from its lowest note upwards, each string or wire being conveniently tensioned before the next string is put on. A neat loop should be made at the free end of the wire, the loop being secured by pressure from hand pliers. The loop is placed over the attachment pin on the left-hand side of the clavichord and the wire is taken past the corresponding guide pin in the soundboard bridge and threaded through the tuning peg, being wound three times clockwise around the peg (at its lower part) before being cut off. The tuning peg is then given a slight clockwise turn to tighten up the wire. After this the next wire is similarly fixed, and so on until the last wire is dealt with.

Care must be taken to see that the brass jacks underneath the wires make accurate contact with their respective wires and that no jack strikes more than its own wire. If any jack appears to have an unduly sharp upper edge it should be filed down a little, otherwise the wire which it strikes may become worn and eventually fracture.

The wires must be free from kinks. It is not advisable to bend them abruptly, since they develop permanent strains at the bent areas and tend afterwards to fracture at these parts.

**Tuning the Instrument**

When tuning the clavichord, begin at "Middle C," the white key in the middle of the keyboard. Tune this in unison with the same note on the pianoforte keyboard. Then tune all the "white" notes downwards and similar notes upwards. After this, repeat the process for the "black" notes. Admittedly, this is not the scientific or "professional" method of tuning a keyboard instrument, but, given a reasonably well-tuned piano to go by, any individual with even a semblance of a musical ear can keep a clavichord in tune by this method without learning the technicalities of professional tuning.

It should be stressed that a clavichord will not stay in tune after it has first been strung. This is owing to the fact that there may be a little yielding of the attachment pins and the tuning pegs, a slight shrinkage (or expansion) of the woodwork due to atmospheric conditions, but, most of all, to a natural yield or "give" of the wires when first placed under tension. Gradually, the wires will cease to "give" under tension, and, after that stage, the instrument will remain "rock steady" in tune. The process may be expected to take anything up to a couple of months, or even longer. Hence, no instrument of this class should be condemned on the score of its not remaining in tune during the initial stages of its life.

**"Monochords" and "Bichords"**

The clavichord described in this article is technically a "monochord" instrument. That is to say, the jacks strike one wire each. But some of the more advanced instruments of this nature were made on the "bichord" principle. These had two wires for each jack to strike, each pair of wires being accurately tuned in unison. The tone of such a bichord instrument was fuller but not particularly louder than that of the plain "monochord" instrument. It is, therefore, quite open to the enthusiast to construct a bichord instrument for himself if he so desires, but it should be remembered that a double set of tuning pegs and wire-attachment pins will be necessary. Furthermore, with this variety of clavichord, tuning difficulties are increased considerably, since each pair of wires must be kept tuned to a strict unison.

**"Damping" the Strings**

After stringing and initial tuning the clavichord must be "damped," otherwise its music will be nothing more than a mere jangle. Damping is effected very simply. We require two yard-long strips of 1in. wide felt. Shorter lengths of felt may be sewn together to make the longer strip, if necessary. Beginning at the lower end of the instrument, one of the felt strips is threaded upwards and downwards between the strings on the left-hand side of the row of jacks. The first yard of felt strip will go about halfway up the instrument. It is then continued with the second felt strip which is allowed to overlap the first line of felt for an inch or two, so that, for the range of a few notes, a double line of damping felt is produced.

The instrument, after a final touching-up of the tuning, will now have been completed. Its tone, although soft and delicate, will be firm, decisive and clear. After the jack has moved downwards out of contact with the wire, the felt will immediately come into operation and the sound of the vibrating wire will at once be extinguished. The action is, of course, precisely the same, in effect, as that of the row of dampers in the orthodox pianoforte.

For the amateur who has a taste for woodwork and craftsmanlike decoration, and particularly if he has, at the same time, an ear for the finer kinds of instrumental music, the construction and subsequent enjoyment of a clavichord will provide for him a continual source of charm and interest. If it is well made in the first place the instrument will never wear out or lose its tone. On the contrary, its tone will tend to increase in sweetness and delicacy with the passage of time.

There are few musical people who have not been entirely charmed by the performance of a good clavichord. It is the most delicate and the most expressive of all keyboard instruments. It is an instrument whose construction is relatively simple and which is well within the financial resources of the average interested amateur.

# Motor-controlled Model Stage Curtains

## A Useful Addition to a Home Cine Outfit

By D. STEWARDSON

BEING in possession of a miniature cinema, complete with stage, screen, projectors, etc., I decided to fit motor-operated curtains. Having purchased a dark red velvet pair, I proceeded in the following manner.

After hanging the curtains to the track runners, which are situated on the underside of the stage top, I attached the pull-cords to each curtain in turn, as will be seen in Fig. 1. Completing this, I found that I had two pull-cords reaching from end of the stage top to the stage bottom and a short length to act as spare. By pulling one of these cords the curtains opened and pulling the other cord they closed.

Looking round for a suitable motor for the job I finally bought one of those ex-Government hand generators often seen advertised. These have an output of 7v. 4a. at 100 r.p.m. of the handle. Finding it ran exceedingly well as a motor, I applied 12v. D.C. to it. Then, by changing the field coil, it would reverse. The wiring diagram (Fig. 2) shows the wiring of the reversing switch, which is of the type that is often used for disconnecting the earth and aerial from a radio set.

The next step was to make a winding drum to fix to the motor in place of the handle. I obtained a round piece of hardwood, 5in. long by 2in. diameter, and drilled a ⅜in. hole right down its length. To each end is screwed a circular disc of ebonite,

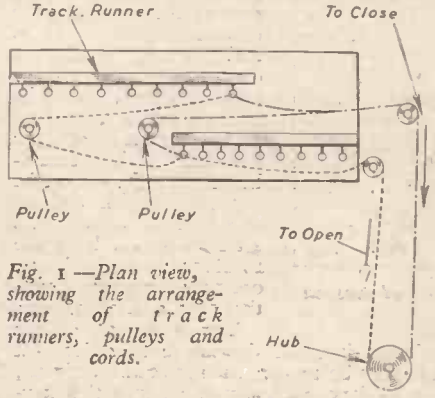



*Fig. 1—Plan view, showing the arrangement of track runners, pulleys and cords.*

6in. diameter by ¼in. thick, one disc having a centre hole of ⅜in. diameter and the other ¼in. diameter. After screwing, a 3/16in. hole is drilled in each disc just above the outer diameter of the wooden hub.

**Fixing the Pull-cords**

I removed the handle from the motor and bolted the drum in its place, then screwed the motor to a baseboard and fitted the whole to the bottom of the stage. All that remained now was to attach the two pull-cords to the drum (Fig. 3). I wound the cords on to the drum by hand in opposite directions, and then switched the motor on and ran the curtains about 15 times, making adjustments where necessary. Now they work quite smoothly. One more item worth noting is that if one of the cords has a tendency to work slack it is an easy matter to insert a spring strainer in it to keep it fairly tight.

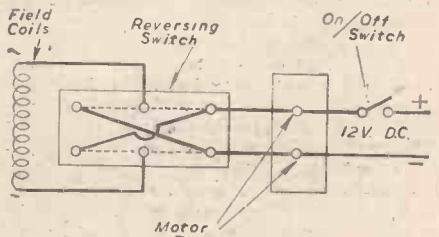



*Fig. 2 (above)—Wiring connections of the reversing switch.*

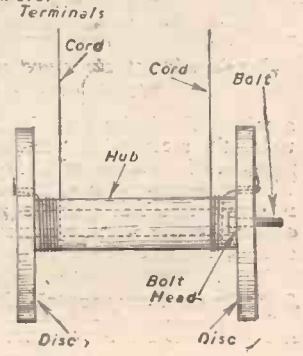



*Fig. 3.—The winding drum, showing how the cords are attached to the hub.*

# The Elements of Mechanics and Mechanisms—24

## The Principle of the Gear



### Rolling Cylinders

THE simplest type of gear is that which connects two parallel shafts and the gears themselves correspond to two cylinders rolling together. It is possible to take the drive from one shaft to another by mounting a smooth cylinder on each of them and pressing the cylinders together, so that they touch on a line parallel to the shafts, when one will drive the other by means of friction at the line of contact.

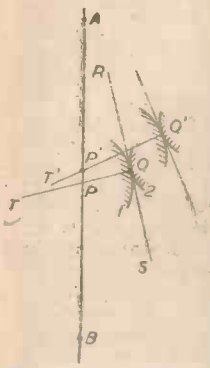



*Fig. 21.—Condition for uniform velocity transmission.*

If there is no slipping at the line of contact the cylinders give a smooth and accurate transmission of velocity. In any length of time, the angles through which the shafts are turned are inversely proportional to the diameters of the cylinders. For example, if the two cylinders are called A and B, and the diameter of B is twice that of A, the angle through which B turns during any length of time is half the angle through which A turns during the same length of time.

If the cylinders are perfectly accurate, this relation applies, however short the length of time, or however long it is. The cylinders are said to give "uniform velocity transmission."

The objection to friction cylinders in practice is that they do not give a positive drive owing to the natural tendency for slipping to occur at the line of contact. To overcome this difficulty the smooth cylinders are replaced by toothed cylinders, the teeth on one cylinder engaging in spaces between the teeth of the other cylinder so that a positive drive is obtained. If, in such a case, the toothed cylinder or "gear" B has a number of teeth which is equal to twice that of gear A, then gear A will make two revolutions whilst gear B is making one revolution. If we do not consider anything but a whole number of revolutions of B, then the number of revolutions made by A will always be twice that made by B and there will apparently be uniform velocity transmission.

If, however, we wish to consider smaller angular movements than this, the rotation of A is not necessarily exactly twice that of B. For example, the teeth may not be equally spaced, and furthermore, even if they are equally spaced but are not of suitable form, the tooth action may be irregular so that the rotation of B through, say, half a degree, does not in every case produce a rotation of A through one degree.

The condition of uniform velocity transmission is extremely important in most gearing applications, and consequently gear teeth must be equally spaced to a high degree of accuracy and must be of suitable geometrical form.

### Form of Gear Teeth

There are many geometrical tooth forms which will theoretically give the condition of velocity transmission, and in practice the selection is made from them on the basis of ease of manufacture and measurement. There is one simple geometrical condition which applies to all gear tooth forms which gives uniform velocity transmission, and this may be described by reference to Fig. 21.

The gears are assumed to be spur gears, i.e., working on parallel shafts and having teeth of the same shape on all sections perpendicular to the centre line of the gear, with the length of tooth lying parallel to the centre line of the gear. Fig. 21 shows an end view, A and B representing the centre of the gears, P being a fixed point on AB and Q a point at which two teeth touch each other in a particular angular position.

Since the teeth touch each other at Q, the tooth profiles have a common tangent RS passing through the point Q. The line QT is drawn through Q perpendicular to RS.

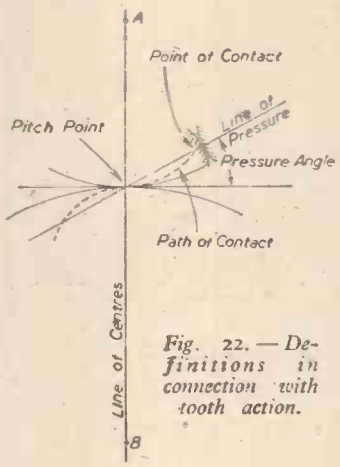



*Fig. 22.—Definitions in connection with tooth action.*

Since RS is a tangent to tooth profile No. 1, the line QT is perpendicular to the profile No. 1 at the point Q and is said to be the "normal" to the profile at Q. The normal QT intersects the line of centres AB at P.

Since RS is also a tangent to profile No. 2 at the point Q, the line QT is the normal to profile No. 2 at point Q. The line QT is therefore the common normal to the two profiles at Q.

Fig. 21 shows at Q′ another point of contact between the tooth profiles when the gears have rotated into a different angular position. The common normal at Q′ is Q′T′, and this intersects AB at the point P′.

If the tooth forms are to give uniform velocity transmission, P′ must coincide with P. In other words, the common normal to the tooth profiles at any point of contact must pass through a fixed point on the line of centres. If, as in the case shown in Fig. 21, the common normals do not all intersect the line of centres at the same point, the tooth forms do not give uniform velocity transmission.

When uniform velocity transmission is obtained, the fixed point on the line of centres through which all the common normals do pass is called the "pitch point." The distances of the pitch point from the centres of the gears are proportional to the numbers of teeth in the gears, and this means that the pitch point is the point of contact of the two rolling circles to which the gears correspond. These circles are called the "pitch circles." Their characteristics are:

(a) Their centres are the centres of the gears;
(b) They touch each other on the line of centres;
(c) The speed of one circle at its circumference is equal to the circumferential speed of the other circle;
(d) The diameters of the pitch circles are proportional to the numbers of teeth in the gears.

### Path of Contact

As the gears rotate, the point of contact between any pair of teeth must move, and the line traced out by the moving point of contact is called the "path of contact." For gears which give uniform velocity transmission, the path of contact must pass through the pitch point. Generally speaking, the path of contact is a curved line, but in the special case of involute gearing it happens to be a straight line.

### Line of Pressure

The force exerted by one gear tooth on another with which it makes contact lines along the common normal to the tooth surfaces at the point of contact. (This statement assumes that friction at the point of contact is negligible.) The common normal is thus the line of pressure exerted by one tooth on the other, and it follows therefore that for uniform velocity transmission the line of pressure always passes through the pitch point.

It will be seen that the line of pressure is not necessarily a fixed line; it may change its direction as the position of the point of contact changes, but it must always pass through the pitch point if the gears are to transmit uniform velocity (Fig. 22).

In the case of involute gearing the path of contact is a straight line passing through the pitch point, and the path of contact is the same line as the line of pressure.

### Pressure Angle

A line drawn through the pitch point perpendicular to the line of centres is a tangent to both pitch circles. The angle between the line of pressure and this common tangent is called "the angle of pressure," or, more usually, "pressure angle." The pressure angle is not necessarily constant; if the line of pressure changes its position as the

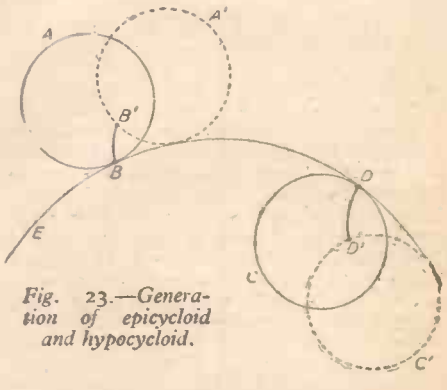



*Fig. 23.—Generation of epicycloid and hypocycloid.*

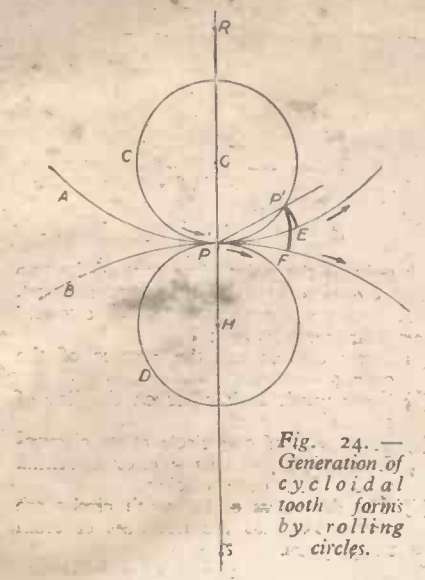



*Fig. 24.—Generation of cycloidal tooth forms by rolling circles.*

point of contact moves, then the pressure angle changes its value.

In the case of involute gearing, the pressure angle is constant because the line of pressure is also the path of contact.

### Continuity of Tooth Action

The path of contact is always of limited length, and therefore tooth action will cease when the point of contact between two teeth reaches the end of the path of contact, unless two other teeth have in the meantime made contact. Any such contact must begin at the other end of the path of contact. The condition for continuous tooth action is therefore that the point of contact between two teeth shall not reach one end of the path of contact before two other teeth have made contact at the other end.

Generally speaking, this condition fixes a minimum depth of tooth in relation to the distance between adjacent teeth.

### Pitch of Teeth

The pitch of gear teeth is the distance between the points of intersection of corresponding flanks of adjacent teeth and the pitch circle, measured round the arc of the pitch circle. If a pair of gears are to work correctly together the pitch must be the same for both of them.

It is necessary to point out that the pitch circle of a gear is not necessarily one particular circle. The pitch circles of a pair of gears are defined by the centre distance of the gears and the ratio of the numbers of teeth. Certain types of gears will operate correctly with any centre distance within a certain range, and consequently the pitch circle of each gear will vary as the centre distance varies. It will be seen, therefore, that the pitch of the teeth of a particular gear as defined in this way is not a fixed quantity. It will be obvious that the spacing of the teeth on one circle will be greater than the spacing of the teeth on a smaller circle. Consequently if the pitch circle is variable (as it is in the case of involute gears) the pitch also is variable. If the pitch of the teeth of a gear is specified, it may be taken to be the spacing of the teeth measured on the pitch circle of generation. If, on the other hand, a pair of gears working at a specified centre distance are under consideration, the term "pitch," unless otherwise qualified, must be taken to refer to the spacing on the pitch circles determined from the centre distance and gear ratio. It happens that in the vast majority of cases these pitch circles (called the pitch circles of engagement) are the same as the pitch circles of generation of the two gears, but in the case of involute gears there is no necessity for this.

In other types of gears, e.g., cycloidal, the pitch circle of engagement must be the pitch circle of generation (so that the centre distance of a given pair of gears is fixed for correct action) and the distinction does not arise. If, however, it is assumed that the same restriction applies to involute gears, the full possibilities of involute gearing will not be realised and, in a case in which the pitch circles of generation do not coincide with the pitch circles of engagement, much confusion can arise.

To summarise : the pitch of a pair of involute gears is usually, but not always, the same as the pitch of generation of the gears.

### Cycloidal Teeth

The tooth form based on the cycloid has been widely used in the past and is still employed for certain purposes, although the involute tooth has almost entirely superseded it. It is desirable to give some description of the cycloidal tooth, however, if only to bring out more strongly the special virtues of the involute tooth.

In Fig. 23 the circle A is imagined to roll without slipping around circle E to the position A′. Circle A has a point B which, in the original position of A, lies at the point of contact of A and E. Whilst A moves to its new position A′, B moves to B′ and its curved path BB′ is part of an "epicycloid" to circle E.

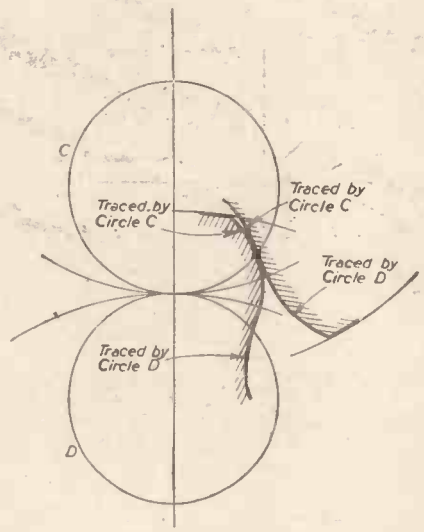



*Fig. 25.—Generation of different parts of cycloidal profiles.*

Similarly circle C, lying inside circle E and originally touching it at D, rolls to position C′ and during the same interval, point D moves to D′, the curved path DD′ being part of a "hypocycloid" to circle E.

In Fig. 24, A and B are the pitch circles of two gears whose centres are R and S. The circles C and D have their centres G and H on the straight line RS. All four circles touch each other at the pitch point P. Now all four circles are imagined to rotate so as to roll without slipping at P in the directions indicated by arrows. (This means that their circumferential speeds are all the same.) When this happens, circle C is rolling *inside* circle A and outside circle B. Therefore a point on C describes part of a hypocycloid on the plane of A and part of an epicycloid on the plane of B. These curves are shown by EP′ and FP′ respectively. It can be proved that they touch each other at P′ and also at every other position of P′ as the circles rotate. Since they touch at P′ they have a common normal at P′ and it can be proved that this passes through P, the pitch point.

Therefore, if EP′ represents part of the profile of a tooth of a gear whose pitch circle is A and FP′, part of the profile of a tooth of a gear whose pitch circle is B, such profiles will give uniform velocity transmission.

It will be noticed that the point on the circle C has traced the part of the tooth profile of the upper gear that lies *inside* the pitch circle A and the part of the tooth profile of the lower gear that lies *outside* the pitch circle B. If the circles had been imagined rotated in the opposite directions, then a point on circle D would have traced out the part of the tooth profile of the upper gear that lies *outside* the pitch circle A and the part of the tooth profile of the lower that lies *inside* the pitch circle B. Fig. 25 shows the general forms of tooth profiles in both gears.

Tooth forms produced in this way are said to be of the cycloidal type. It will be seen that each profile is composed of two distinct curves which join together at the pitch circle. It follows from this that a cycloidal gear has a definite pitch circle and that two cycloidal gears cannot work accurately together unless they are set so that their pitch circles touch.

Referring to Fig. 26, it will be seen that the point of contact of two teeth must lie on circle C or on circle D. If the right-hand flank of the lower tooth is touching the left-hand flank of the upper tooth (as shown in Fig. 25) the point of contact is either on arc KP of circle C or arc PL of circle D. The point K is fixed by the intersection of the tip circle of the lower gear with circle C, because contact is clearly impossible beyond the tip of a tooth. Similarly, the limiting point L is defined by the intersection of the tip circle of the upper gear with circle D.

The path of contact is the combination of the arcs KP and PL. The line of pressure is the straight line joining P to the point of contact, wherever it happens to be. For example, it may be PP′, in which case the pressure angle is the angle P′PX. It will be seen that the pressure angle changes as the point of contact moves ; it is zero when the point of contact is at the pitch point.

### Gears of Different Numbers of Teeth.

The geometrical principles involved in Figs. 24, 25 and 26 apply whatever the sizes of the pitch circles, and the condition of correct tooth action between cycloidal gears of any numbers of teeth is that mating parts of profiles must have been produced by equal rolling circles (C or D). In practice, C and D are of the same diameter, which is half the pitch diameter of the smaller gear required in the series. It is found that the tooth-profile of this gear is a radial straight line inside the pitch circle, this being the particular form assumed by the hypocycloid when the rolling circle is half as big as the pitch circle.

(*To be continued*)

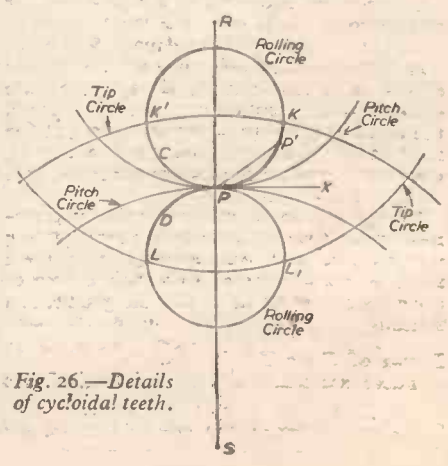



*Fig. 26.—Details of cycloidal teeth.*

NEW SERIES

# Wood Turning—3

## The Use of Wood-turning Tools

By FREDERICK JACE

WOOD-TURNING tools must be kept sharp; this not only reduces the effort required for paring off but also produces a better finish. The usual wood-turning tools were illustrated in figures 9, 10, 11 and 12 of last month's issue, but in practice it will be found that nearly all work can be performed by means of the gouge and the side chisel. Two sizes of these should be obtained, a large one for

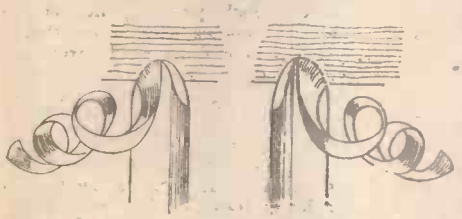


*Fig. 13.—Left- and right-hand cuts with the gouge.*

large work, and a small one for more slender pieces. A ½in. gouge and side chisel are suitable for the usual run of work, although they may be obtained from quarter inch to two inches in width.

### The Gouge and Chisel

The gouge is, of course, ground on the outside and it is ground back so that it appears as in Fig. 10 given last month. The side chisel is ground as shown in Fig. 11. The firmer chisel is similar to the ordinary bench chisel with the difference that the cutting angle is more obtuse. The round-most tool is used for concavities and somewhat resembles the coachmaker's chisel, having its end ground to semi-circular form. The diamond point tool is employed for scraping where an ordinary chisel could not be held at a convenient angle in relation to the work. Sometimes right- and left-hand tools are used for this.

All wood-turning tools need long handles, so that good leverage can be exerted. The gouge is probably the most used of all the tools. The side chisel and the other chisels are used for scraping, which means that they are advanced to the work in a horizontal plane. The angle at which the gouge is held will naturally depend upon the height above centre at which it is held, the diameter of the work, and the form of the cut. Its best position is soon found by experiment. The cut is made by a sliding movement either to the right or to the left as shown in Fig. 13. It will be seen from Fig. 14 that the side chisel is used in a similar manner. The main purpose of the chisel, however, is, as previously mentioned, for parting or cutting off and for making V incisions. It will be seen from Fig. 15 that a number of cuts are made with a chisel before the final groove is formed; the cuts are made side by side. A large number of light cuts are better than a smaller number of heavy cuts, and the tool edge will last much longer.

The gouge is advanced at an angle to the work as shown in Fig. 16. The right hand grasps the end of the tool handle as indicated in the diagram.

### Sharpening

It is of the utmost importance to resharpen the tool directly it is felt that it is not cutting properly. Do not rely upon sandpaper to remedy the effects of bad cutting. Indeed, it is impossible to remove the effects of bad work by means of sandpaper.

An oil stone must be kept especially for sharpening the gouge, because it soon wears a groove in the stone which would render the latter unsuitable for the other chisels. The groove in the stone is an advantage when sharpening the gouge, for it acts as a guide. The usual width of stone is about 2in. The diagram Figs. 18 and 19 show the correct angle to hold the chisel on the stone

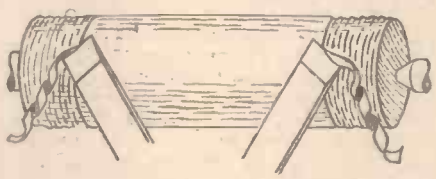


*Fig. 14.—Left- and right-hand cuts with the side chisel.*

*Fig. 16.—The gouge is held at this angle in relation to the work.*

*Fig. 17.—How the flat tool is used.*

*Fig. 18.—Sharpening the gouge on an oil stone. It is, of course, given a twisting movement.*

*Fig. 19.—The burr inside the gouge is removed by means of an oil stone slip with a rounded edge.*

and the method of removing the burr raised by sharpening with an oil stone slip with rounded edge. It is necessary to give a rolling or twisting motion to the gouge as it passes from end to end on the stone. It must not be sharpened only at the point but all round its curves. The oil stone slip used for removing the burr must, of course, be held flat against the hollow groove of the gouge; it must not be tilted in any way.

The side chisel must be ground and sharpened to equal angles on each side. The rounded nose, of course, requires a rolling motion as when sharpening the gouge, and it may be sharpened on the same stone as the gouge. To remove the burr, lay it flat on the stone and lightly rub it up and down. The grindstone used when the chisels and gouges need sharpening, after frequent application of the oilstone, is a fine-cutting, wet sandstone with copious supply of water running from a container on to the edge of the tool or picked up from a trough in which the wheel is partially immersed. Do not use one spot on the edge of the grindstone or grooves will be formed.

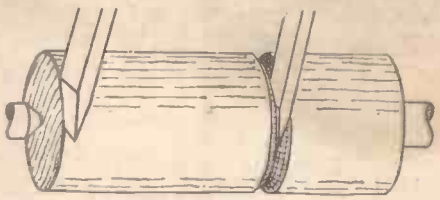


*Fig. 15.—Making V-grooves and parting off with the chisel.*

### Chucking

It is easy to have a nasty accident due to faulty chucking, and the first thing to learn when mounting is to make quite sure that the work is securely chucked and cannot work loose. In the early stages, therefore, until confidence is gained, cuts should be light in character. A dig in can have disastrous results to the hands as well as to the work. Much greater care is necessary with wood-turning tools because they are held in the hands and not in a slide rest or tool post.

### Centering

It is necessary, accurately to centre the work so that it revolves truly between the centres. Eccentricity to any considerable extent will cause a juddering cut and may result in a dig in, broken gouge, or the work flying out of the chucks. To receive a fork centre a saw cut should be made across the end of the work, although in soft wood this should not be necessary. The blank piece of wood which is to be turned is cut square in the first place and then has the four corners planed away to lessen the amount of turning work.

The forked centre is, of course, driven in at the left-hand end and the work is supported at the other end by the dead centre in the tailstock. This centre is driven into the work sufficiently deeply to take the pressure of the cut, and to support the work whilst turning. This dead centre should be oiled. It helps if a small hole is first made with a bradawl for the centre to run in. In fact a hole should also be made for the forked end.

It is important in order to save work to spend some time ensuring that the centres are accurately located so that the work revolves concentrically. The piece of wood should only be just large enough to turn up to the required size. This avoids an unnecessary amount of turning removing waste timber.

The square piece of wood should have diagonal lines drawn from corner to corner and the point of intersection is the centre.

*(To be continued.)*

# A Power-driven Model Biplane

## Constructional Details of a Deisel-engined Flying Model

By FRANK HUGHES

ON many occasions I have seen beautifully finished flying models become total wrecks, often only a very few minutes after being taken out of their transport boxes on the flying field. It has made me feel sorry when I have seen their owners sadly picking up the pieces and throwing them back into the box, all too quickly, without having had the pleasure of even one decent flight out of their machines.

Now good models demand many hours of interesting but quite painstaking labour to build, and often the burning of quite a drop of "midnight oil" as well, to say nothing of the expenditure of a certain amount of cash. Is it to be wondered at, that after a few "write-offs" like that just mentioned, many fellows are apt to become discouraged, even to the point of giving up in despair?

Actually, there is no need for this, as the remedy more often than not rests with yourself. Think carefully—did you really allow for that sudden dive in, or that bumpy landing, etc? or did you cut down the weight to such an extent that you left your model too frail to stand it?

I have examined many of these "lightning crack-ups"—lightning in both senses of the word—at various times and places, and I have invariably noticed the same errors being made by many—"faulty construction," "bad joints," "unsuitably small section materials," and often the trouble has been a combination of all three.

When building a power model it is best to bear in mind the fact that your machine will be carrying the weight of an engine, and that the weight will be concentrated in one spot—a totally different state of affairs to the rubber-driven model, where the power weight is usually distributed over best part of the length of the fuselage. This is a fact that apparently is often lost sight of, as quite a number of crashed machines that I have closely examined were of such flimsy construction as to be quite unsuitable for the job they had to do, particularly where the fuselage framework and often the undercarriage were concerned.

Having built my first flying model in 1910, a Henri Farman biplane, and being something of an "old-timer" on the subject, having designed and built model aircraft of all possible types, this long experience has taught me not to hurry construction, and also never to sacrifice strength for the sake of being afraid to add a little more weight.

### Sturdy Construction

To proceed with details of this model, I put all I knew into it, combining sound construction with good shock absorption. The machine thus has a fair chance of many interesting flying minutes—even hours—bringing it safely back day after day, and what's more "in one piece." In the past I have built many of the "frail kind" of model, but a really strong machine, such as the one about to be described, is a much better proposition from all points of view.

I have no doubt that many model-flying enthusiasts have seen this model flying high over Hounslow Heath at some time or other during the last season.

*Mr. Hughes launching the model biplane.*

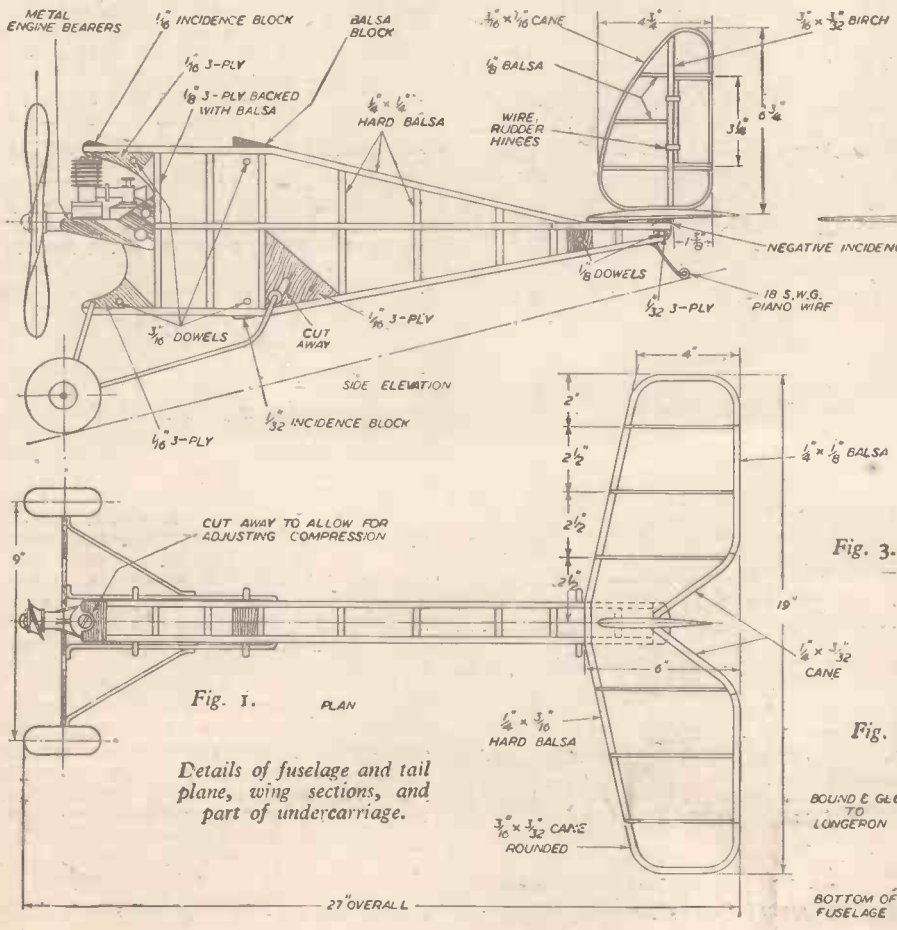
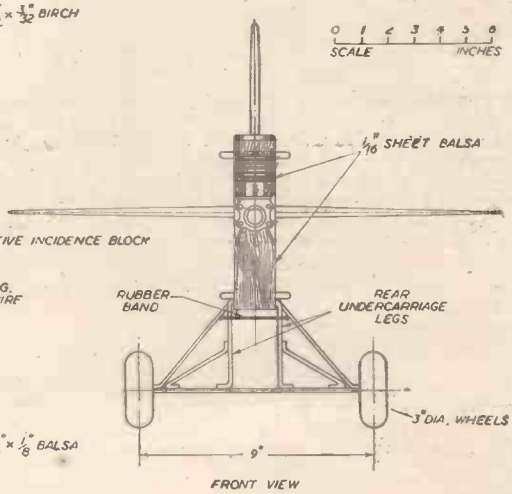



Fig. 1. PLAN

*Details of fuselage and tail plane, wing sections, and part of undercarriage.*




FRONT VIEW

Fig. 3.

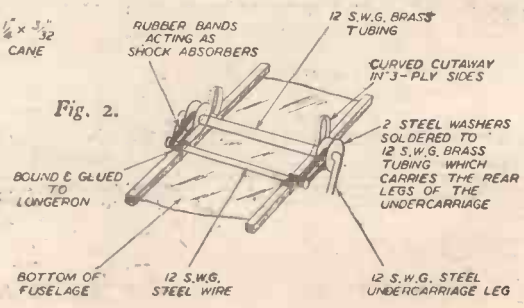




Fig. 2.

On one occasion the machine flew right away and was lost for five days, when the finder was kind enough to deliver it back to me, quite unharmed. (Another proof of the common sense of putting one's name and address clearly on your model.) It had landed very near to Kew Bridge, quite a tidy step away from its take off. It now has over six hundred flights to its credit, with a total damage of a bit of paint knocked off and two broken airscrews.

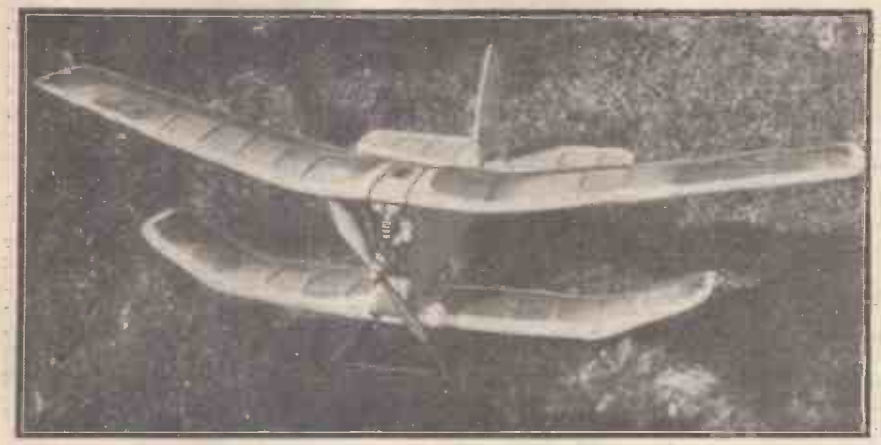
The machine is the result of much thought and care in designing and building, and I think the reader will agree that it is not exactly easy to build an engine-driven model biplane that performs well in the air and arrived at after many experiments with biplanes of all types and of various sizes.

### Constructional Details

The machine is quite a straightforward one to build and should present no particular difficulty, even to an enthusiast who only has a good general knowledge and not a lot of experience behind him in biplane building.

You will notice I have entirely done away with interplane struts—these are a common source of annoyance in a crash.

The upper and lower mainplanes are both rubber sprung to the fuselage with strong strip rubber bands, the tailplane being fixed likewise.



*The biplane lands safely over a mile away from its starting point.*

yet is capable of taking hard knocks repeatedly. That is the problem I set myself, and the result is more than satisfactory in in the "Heath Explorer," which has been

The 12g. steel wire undercarriage is rubber sprung front, rear and sides, and does its work very satisfactorily. The detail drawing, Fig. 1, shows clearly the method of springing the two rear legs of the undercarriage. Upon impact with the ground the brass tubing containing the rear legs is forced back and upwards in a curved direction, the rubber bands expanding at the same time and taking all the shock. Sorbo airwheels are used, as I find them not too heavy and very suitable for this type of undercarriage and for general hard wear.

### Fuselage

I suggest building the fuselage first, in the usual manner, both sides being built upon each other and the horizontal connecting formers then added, taking great care to get everything quite true.

Then attach the metal engine bearers by gluing and bolting to the ¼in. three-ply upright, which is made lighter by cutting away a central portion with a fretsaw, then backing it with balsa. Now cut all the three-ply strengthening pieces to exact size and shape, being careful to follow the curve necessary for the rear undercarriage legs carrier to work into. Then very strongly glue and bind into position the brass tubing which is to take the front legs. Details are clearly shown in the fuselage drawings, Fig. 1. Be quite sure you cut all struts and cross-pieces *quite squarely* at their ends before gluing, and, most important of all, *double glue every joint you make*, allowing the first coat to become thoroughly dry before you apply the second one.

The latter hint, of course, applies to the whole machine and not only to the fuselage.

### The Undercarriage

This is made from 12g. steel wire. Bind all joints with fine florist's wire before soldering them. When making the rear legs carrier you will find it much simpler than it at first appears. The unit is very strong and will stand up to practically anything. The rear

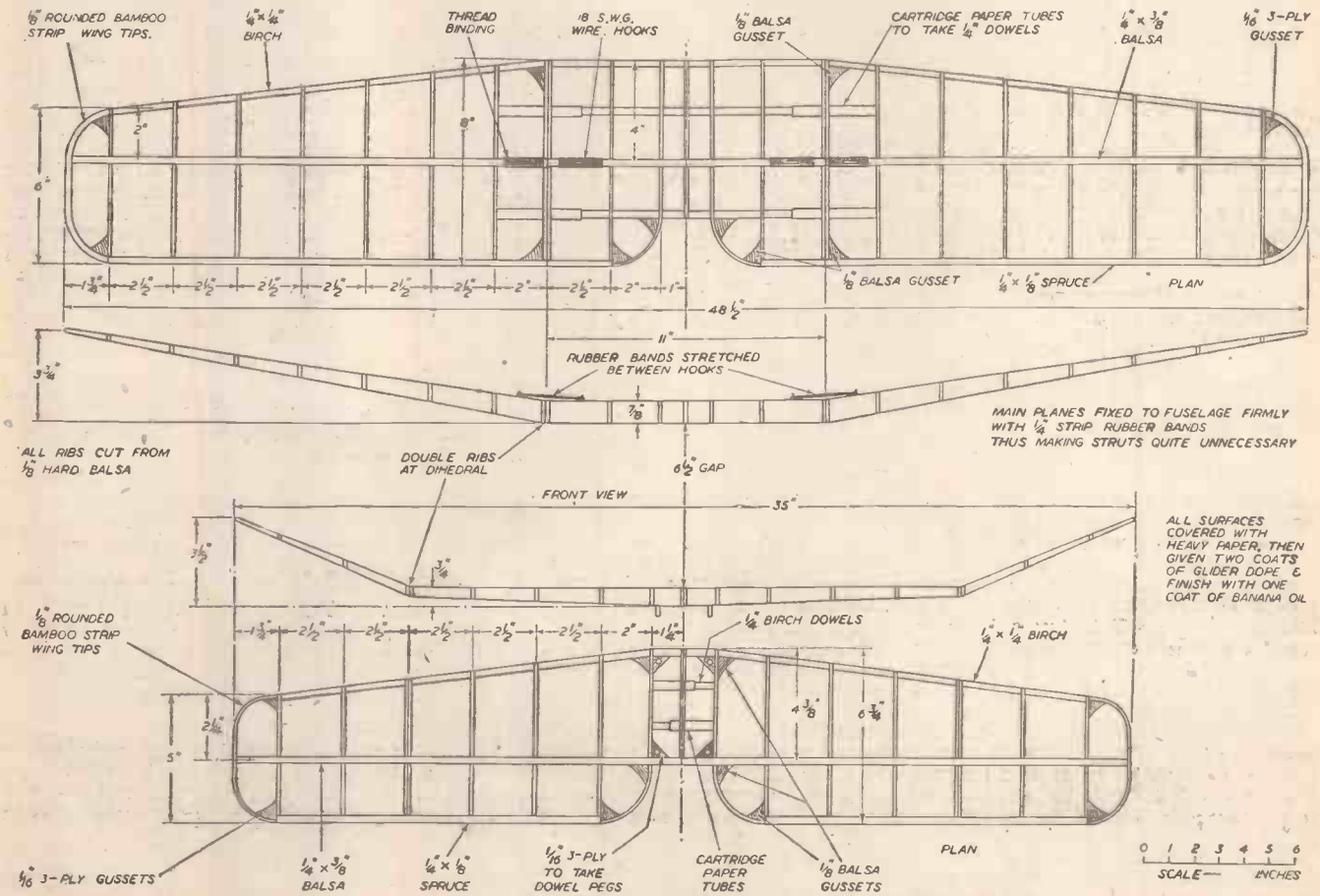



*Fig. 4.—Details of upper and lower main planes.*

skid is made made from 18 s.w.g. piano wire, bound firmly at its top to a bamboo peg, which in turn is glued to the hard balsa block at rear of fuselage on the underside.

**The Empennage**

This is next built as shown in Fig. 1. It is of sturdy construction and the drawings are self explanatory.

The tailplane section is shown in Fig. 3.

**Mainplanes**

The upper mainplane is built up on the plan of same (Fig. 4) and is in three pieces: a centre section, port, and starboard wings. The correct dihedral angle is shown in the front view and the wing section used is seen in the detail drawing (Fig. 3).

The lower mainplane is built up in exactly the same way, only it is in two sections, as shown, the join at its centre, allowing of very easy fixing between the front and rear undercarriage legs.

Note that the dowels are quite free in the tubes and are not glued to one side as is the usual practice. I find that in a bad crash these dowels may be broken without breaking the plane, and the fixing of a new one is simplicity itself if you carry to the airfield one or two spare ones already cut to the required length. All that is necessary is to shake out the broken piece and insert a new one in its place.

**Covering**

The covering of the whole machine is strong rag tissue, water doped, then given two coats of glider dope, allowing each one to dry well before applying the next. Then finish with one coat of banana oil. After this the mainplanes, tailplane fin and rudder can be edged with "joy" cream enamel, which gives it a very pleasing appearance. Of course, the builder can please himself about this latter refinement.

Another practice I adhere to as much as possible is to let my machines take off unaided. Of course, it's not always possible to find the necessary "strip of straight and even," but on the whole my machines do much more R.O.G. than hand-launched flights. After all we do fit undercarriages to our machines, so why not use them more often. Besides it is more realistic to see your model commence its flight R.O.G.

This machine is not intended for competition work, although I have no doubt it could well hold its own in that field; but the model aeroplane enthusiast who likes a fairly good sized machine that will fly steadily and consistently, doing its two to three minutes, with an absolute minimum of damage, will not be disappointed with this biplane.

The engine, a 2 c.c. E. D. Mark II, is such a reliable one that it needs no comment here. Installed in this model, the whole forms an excellent combination, giving many pleasant days of "good sport" in return for the care and effort expended during construction.

# Twenty Years From Now

## How Shall We Spend Our Leisure?

By Prof. A. M. LOW

TWENTY years ago we were talking about a 48-hour week as something of a dream to be realised. To-day it is a 40-hour, five-day week. Twenty years hence shall we be talking about a 30-hour week? It may not have come to that, for there are obvious limitations on the indefinite reduction of working hours. But we may be certain that unless there is a major catastrophe we shall be enjoying shorter working hours in better conditions, and that will give everyone more leisure. If we achieve the 30-hour working week, that will leave nearly 140 hours for eating, sleeping and "amusing" ourselves. A much greater proportion of this will be genuine leisure, for there are signs of revolt against the present great expenditure of time and energy on travelling to and from work.

**"Organised Leisure"**

For several decades these new long hours of leisure are likely to present many people with difficult problems to face. In the past it has only been a very small, select class in any civilisation which has enjoyed real leisure. The world has never before known a society in which the majority of people were free to use the greater part of their lives as they liked. Many will undoubtedly find difficulty in employing their leisure profitably or even happily, and I foresee that well-meaning attempts will be made to "organise" their free hours for them, especially in the case of young people. These attempts will lead sooner or later to revolt and the realisation that just as people must have the vote before they can learn to use it, so people can only learn how to use their leisure by being given it to play with as they wish. "Organised" leisure is a contradiction in terms.

The new leisure will lead to a boom in "sport" which is already beginning to be apparent. We may anticipate some interesting developments before twenty years have passed. For fifty years sport has become more and more "scientific," and we have attempted steadily to reduce the element of chance. We are no longer content that the movement of a ball should be influenced by a worm cast or a flaw in the material of which it is made, so we poison the worms, select the material scientifically, and carry out tests on the ball before using it, as exact as those on an aeroplane part. Our ancestors thought "spots" on a cricket pitch were part of the game, but we invoke the whole science of horticulture to eliminate them.

We are no longer content to accept the verdict of judges dependent upon the comparatively easily deceived human eye, so we install special cameras at the finishing post to record what actually happened. I could give a hundred examples of how science has influenced our games recently from the "new" golf ball—ballistically designed and X-rayed—to the studying of the laws of heredity to get better racehorses and greyhounds. Mathematicians are even engaged to take some of the gamble out of football pools with permutations and combinations.

We must expect this trend to continue. There has been argument in Australia about the verdicts of cricket umpires. We may see the invention and adoption of an "automatic umpire," based on radar principles, which would infallibly record the course of the ball! Fantastic as it may seem to-day, in fifty years we may have "robot" jockeys for horse racing. Since they would eliminate the "human element" they would make horse races a real test of the ability of the horses. Such a robot, based on electronic devices, has already been experimentally used.

**New Sports**

In the last twenty years we have seen the introduction of several new sports, and we must expect yet more during the next twenty years. The new sports are likely to appeal, like dirt-track racing, through a combination of scientific skill and personal courage. Dirt-track racers have to be concerned with such things as fuel values and sparking-plug design as well as the physical task of controlling a machine. One of the new sports that might develop as a spectacle is model car racing. During the last few years model cars less than 18in. long and running literally on a thimbleful of fuel have achieved speeds of over 70 m.p.h. I can foresee that this sport, developed by a promoter, might become a popular spectacle and, incidentally, be of considerable value to motoring generally. The same applies to model aeroplane racing. Because of the great distances that have to be covered by a modern plane aeroplane racing has restricted possibilities as a spectacle. But model aircraft, radio controlled, could be flown in a comparatively small arena and provide the test of scientific skill as well as the competition which modern spectators demand.

Sport and organised amusement are already major industries, and we must expect them to develop. In the cinema and in television we shall get not only "three-dimensional" full colour, but also, perhaps, appeals to other senses as well. Experiments have been conducted with "scenties," and we may yet use perfume as a "background" to the pictures on the screen in much the same way as music is now used. It will even be possible to have "feelies." The spectator simply plugs into a socket on his seat and is electrically stimulated so that he not only sees, for instance, a silk dress, but actually gets the feel of it.

**Hobbies**

But leisure cannot be devoted wholly to being amused. Obviously, men and women will have to spend a good deal of their "spare time" amusing themselves. Here I anticipate the majority of people devoting themselves to what we now call "hobbies" with such enthusiasm that they virtually become secondary occupations. They will have the time to give really serious attention to their gardening, rabbit breeding, book collecting or whatever it may be. I believe that we shall have to revise our ideas of education so that a child leaves school equipped with the basic knowledge not only to learn how to earn his living, but also how to use his spare time. The country should become very much richer for this. In twenty years we may expect a very great increase in the number of amateur theatrical, musical, literary and similar societies doing really serious work.

Those whose tastes do not lie in the direction of the arts will find equal opportunities in the sciences. Most sciences have become extremely complicated and specialised, so that the "amateur" would appear to have little opportunity. But, in fact, there are great fields which offer better opportunities to the amateur than the professional, especially in the so-called "social sciences." In many cases progress can only be made by the collection of material over a wide field, and it is here that I shall expect the amateurs to play an important part.

**Inventive Talent**

Increased leisure should offer the opportunity for the great native inventive talent of the British people to flower. Perhaps in twenty years time the Government, realising the importance of invention, will offer "spare-time" inventors facilities for carrying on their work, which ultimately may benefit the whole community and provide even more leisure.

# THE WORLD OF MODELS

## The Model Engineering Exhibition

By "MOTILUS"

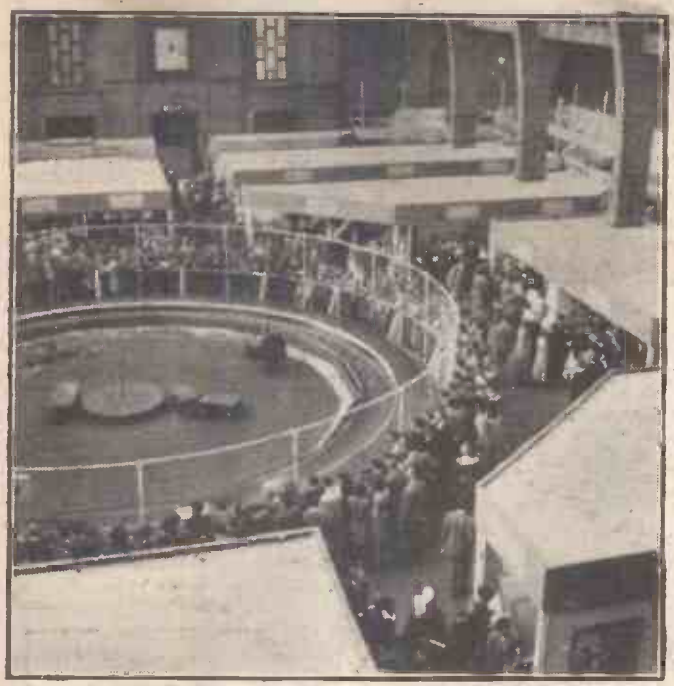


*Fig. 1.—A general view of the 1949 "Model Engineering" Exhibition, showing position of the grand circular track. Traction engine models were used for the first time on this track this year and one is seen in use with driver and passenger.*

THIS year's visitors to the annual Model Engineering Exhibition in London were surprised by the general re-arrangement of the whole exhibition layout (Fig. 1). The railway running track was once again along one side of the hall, but the grand circular track had been placed almost centrally instead of at the far end, as it has been previously. The most noticeable innovation, however, was the removal of the Competition Section to one side of the hall, instead of being right down the centre. This arrangement has the advantage of allowing more uniform placing of the commercial stands, to ease access round the hall. Many visitors, however, consider the amateur work should continue to be the central feature of this long-established exhibition, the original purpose of which was to display annually the work of various model groups and other enthusiastic amateurs. The display of models along a side wall is never quite satisfactory for visitors, as the models can then only be viewed from one or two angles. No doubt before the next exhibition the organisers will obtain various opinions on the pros and cons of this new arrangement.

### Passenger-hauling Model Steam Locomotives

The Society of Model and Experimental Engineers this year ran a double running track: one 7¼in. gauge and one multi-gauge track. Many interesting locomotives did excellent work hauling loads of fascinated passengers, and a noticeboard informed bystanders which locomotive was in use, as well as giving the name of the locomotive that would be next on the track. Among these the society had the pleasure of including, by courtesy of Mr. J. I. Austen-Walton, his 5in. gauge 4-6-0 "Centaur," a Championship Cup winner of 1947. The Society and members of the Affiliation Societies provided also a good display stand of some most attractive and varied models, as well as operating the locomotive test stand, which was such a successful experiment at last year's exhibition. Centre-piece of their stand was their steam-driven model of an old-type vertical table engine, constructed as long ago as 1830 by Mr. R. S. Charsley, a pioneer railway engineer, and presented to the society last year by his grandson, Mr. K. Charsley. (Visitors to the society's Jubilee Exhibition in 1948 will remember this interesting old model being featured there for the first time.) There were several other excellent engineering exhibits, many of them working by compressed air.

The Tramway and Light Railway Society once again provided a colourful contribution from the work of their members (Fig. 3). Also an evergreen attraction was the 00 gauge model railway displayed and operated by members of the Ilford and West Essex Model Railway Club, a most realistic layout with all locomotives, rolling stock and lineside buildings and scenery constructed by members themselves.

Stand No. 54 was shared by the Road Locomotive Society and the British Fairground Society. The latter included a most attractive, large model roundabout in their display. This is to a scale of 1½in. to 1ft., being some four feet in diameter and is steam-driven, with a horizontal model of a Savage's engine and boiler, which also drives the organ. Round the canopy is emblazoned the announcement: "Bill Stables' Grand Model Old-time Steam Galloping Horses and Golden Cockerels—On Tour"! The "galloping horses and cockerels" are in three tiers, and the model is a fine sight when working with the organ playing and the model mounts moving up and down as they circulate.

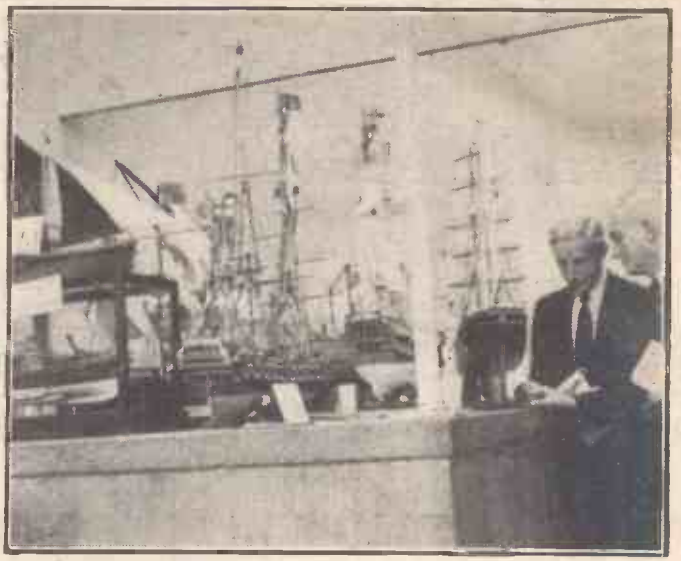


*Fig. 2.—Just a few of the numerous ship models displayed in the Competition Section, with two of the Marine Model Judges, Lt.-Cdr. J. H. Craine, R.N.R. (Ret.) and Mr. Edward Bowness.*

### Loan Section

The Loan Section provided a varied selection for study. Mr. Charles Hampshire, well-known builder of waterline ship models in naturalistic settings, had sent a waterline model of the new Cunard White Star liner R.M.S. *Caronia*, to a scale of 1/64in. to 1ft: a really fine example of this artist's modelling. Unusual exhibits included two coach models loaned by Mr. P. Winton: one was a model of a Lord Mayor's Coach of 1887, particulars for which were taken from "Cooper's Art Journal" of that period, and the other of the Old Times Stage Coach. In 1888 this latter coach was driven on a record run from London to Brighton and back in less than eight hours for a wager, the driver being the famous whip, James Selby. Greatest novelty in this section was probably the world's smallest electric motor, made by Mr. Walter Anderson, of Birmingham, who specialises

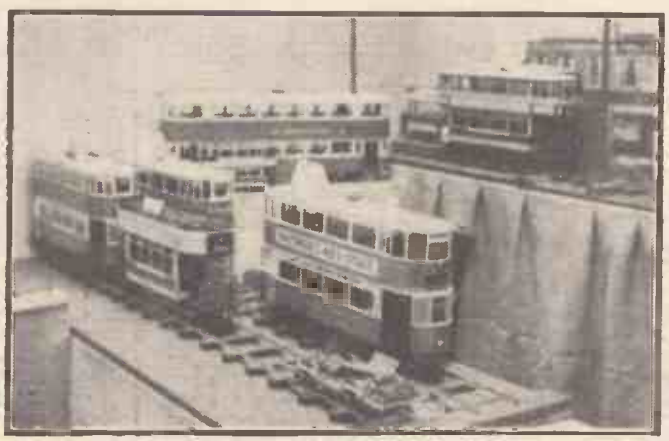


*Fig. 3.—A group of excellent tramway models on the stand layout of the Tramway and Light Railway Society.*

*Fig. 4.—The Championship Cup for the best model sailing ship was awarded to Mr. A. E. Field for this representative model of an early sixteenth century Spanish carrack.*

in these tiny motors. These have many practical uses, such as installation in dental drills, and Mr. Anderson has already produced some one-and-a-half thousand motors, each of them weighing only three grains (160 weigh 1oz.).

Two new features of great appeal for modelmakers appeared at the exhibition this year. One was a stand where visitors could watch Mr. I. W. Marsh, of Barry, at work on his model of the ship *Thermopylae*, giving them the opportunity of seeing the application of fine detail and tiny fittings on a model ship, points at which Mr. Marsh excels. Many visitors will have called to mind the beautiful model tea-clipper *Sir Lancelot*, exhibited by Mr. Marsh in the 1947 Exhibition. Model locomotive enthusiasts were provided with a similar opportunity by the workshop stand of the Malden and District Society of Model Engineers. Here visitors could see the building of a passenger-carrying locomotive of 5in. gauge. It was a 4-4-0 express-type of locomotive, based on the "Maid of Kent" design of L.B.S.C. At the opening of the exhibition only rough casting, bar and sheet metal and other materials were to be seen on the stand, but work progressed day by day; castings, e.c., were turned and finished, sheet metal was cut out and fittings made and assembled. Expert modelmakers were on the work to avoid unnecessary delays, so that the work could be as nearly complete as possible during the ten days of the exhibition.

The grand circular track was this year used for working displays of model traction engines as well as for speed cars, power boats and aircraft; perennial attractions, if noisy ones. Operations were carried out by four different representative model organisations, and demonstrations were also given of radio control by the Radio Controlled Models Society.

### High Standard of Workmanship

This year's visitors were surprised and pleased at the large amount of amateur work in all sections and, what is perhaps important, at the extremely high standards in general workmanship in painting and finishing of the models. In the competition section the judges were hard put to it to reach decisions, owing to the excellency of so many entries. Once awards are made and announced, however, great interest is taken in the prize-winning models, and especially in the Championship Cup winners.

A model locomotive built to his own design won a championship cup this year for Mr. E. G. Rix, of Maidstone. This free-lance, 4-6-2 locomotive, "Liberty," is for 5in. gauge and its building occupied some 4,200 spare-time hours over a period of seven years. It has 2 cylinders of 1¾in. bore and 2½in. stroke, Walshaerts valve gear, water-feed pump on the smokebox and is coal-fired. Weighing over 3 cwt. and measuring some 7ft., the locomotive has a working pressure of 150 to 175lb. per sq. in. Excellently finished, the model was painted in green, with yellow lining, and made an imposing exhibit. (Fig. 7.) Mr. Rix is a versatile modelmaker and had other engineering models displayed in the exhibition.

Among many fine locomotive models, special mention must be made of silver and bronze medal winners. Mr. R. D. Rowell, a member of the Brighton and District Society of Model Engineers, was awarded a silver medal for his gauge O (¼in. scale), 4-8-2 mountain-type locomotive "Ursamaximus." This unpainted model already represents ten years of spare-time work, and Mr. Rowells is a worthy recipient of his medal,

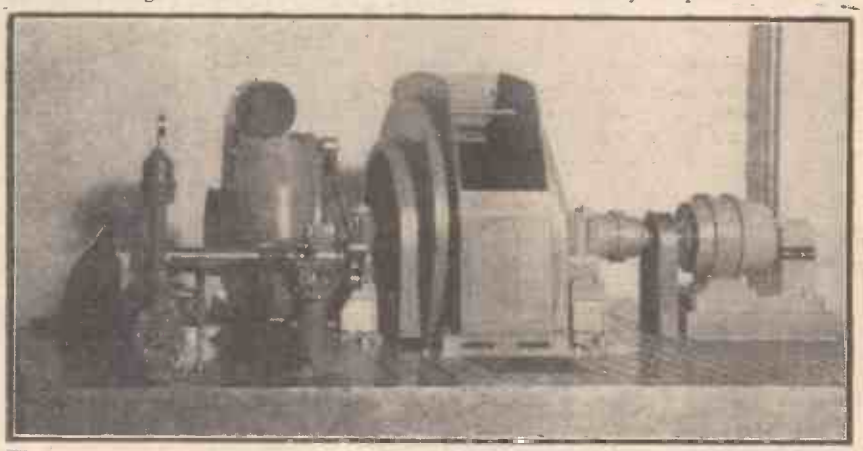


*Fig. 5.—This fine engineering model of a North Scotland Hydro Electric Board water-driven turbine was made by Mr. E. H. Evans, of Sevenoaks, who won the Championship Cup in the General Section for this outstanding piece of work.*

for his model is certainly outstanding in fine detail. The same may be said of Mr. W. H. Brittain's coal-fired, 3½in. gauge "Royal Fusilier" locomotive of the "Royal Scot" class, for which a bronze medal was awarded. The only painting on this model is on the wheels, the rest being highly polished steel and brasswork. Mr. Brittain is to be congratulated on this first attempt at building a locomotive model, which took him nine years to complete, although not all fellow modellers would agree with the polished finish, as many prefer the more realistic painted finish.

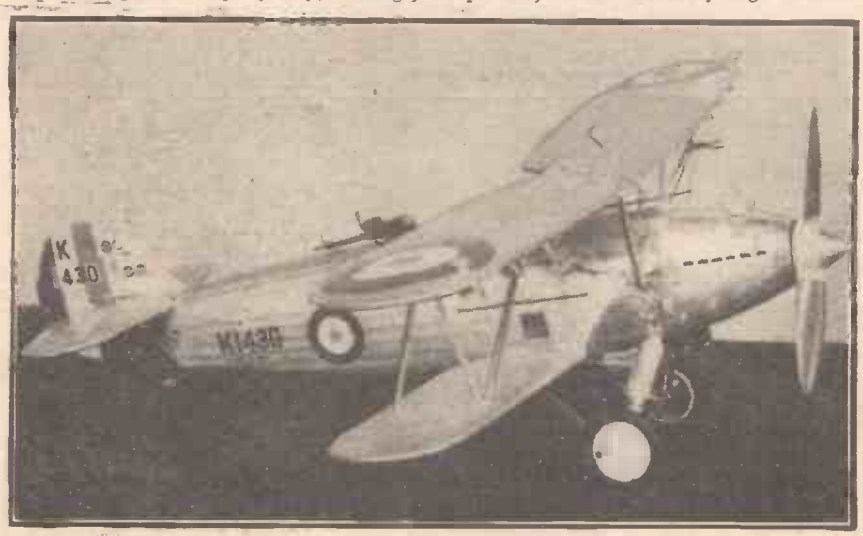


*Fig. 6.—The non-flying model of a Hawker "Hart" day bomber (1933), for which Mr. I. O. Newton won the Championship Cup in the Aircraft Section.*

### Ship Model Section

The ship model section at the exhibition had, as so often happens, the largest number of entries for competition. As before, two championship cups were offered: one for the steam and motorship section and the other for the sailing ship section. Mr. T. Fletcher, of Colne, who won the former award in 1948, gained it again this year for his working model of a river-coastal tugboat (Fig. 8). Not only was this a fine scale model externally, but removal of the deck revealed some very good workmanship on the engine and boiler. The second marine cup went to Mr.

A. E. Field, of Walsall, for his representative model of an early 16th century Spanish carrack (Fig. 4). As well as taking pains with his modelmaking, Mr. Field went to great trouble to make his model as accurate as possible. He based it on a model of Columbus's *Santa Maria*—built in 1892 under the supervision of the director of the Naval Museum, Madrid, a copy of which is in our own Science Museum in London. Various alterations were made, based on later information, to make the model more nearly representative of the carracks of that century.

An unusually large number of medals and diplomas were awarded in the marine model classes, probably due to the high standard of work throughout. A silver medal went to Mr. W. C. Beaman for an interesting full-hull model in an unusual scale of 3/64in. to 1ft. Although an uncommon scale, this was a most attractive glass-case model and much attention had been paid to realism, especially in deck fittings, derricks, rigging and lining of the wooden decks. The hull had been "bread and butter" built in wood, which makes a more stable job than the carving of the hull from a single block. There were two further silver medals given in this class for excellent waterline models. Also a bronze medal for Mr. H. G. Swarts' model of the new Mumbles lifeboat, the prototype of which has been named after her coxswain.

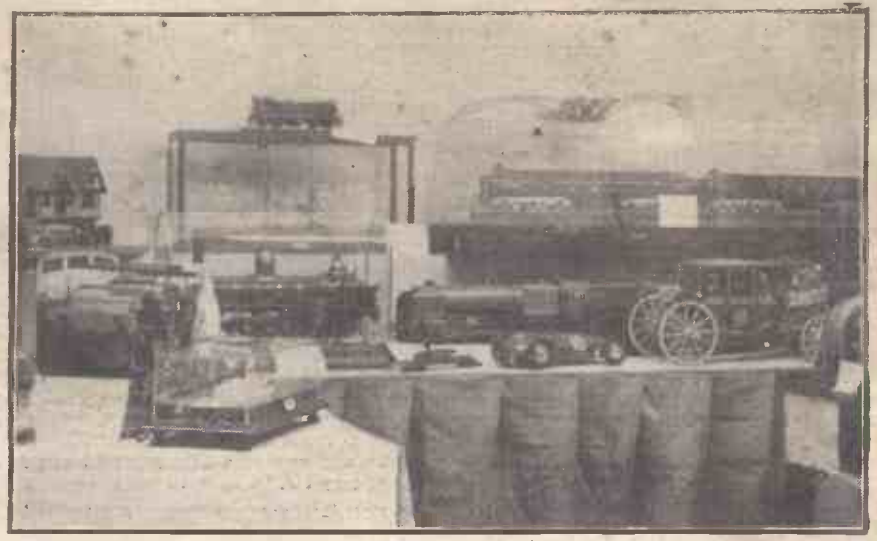


*Fig. 9.—A general view of some of the models in the Loan Section, a collection of both varied and curious models.*

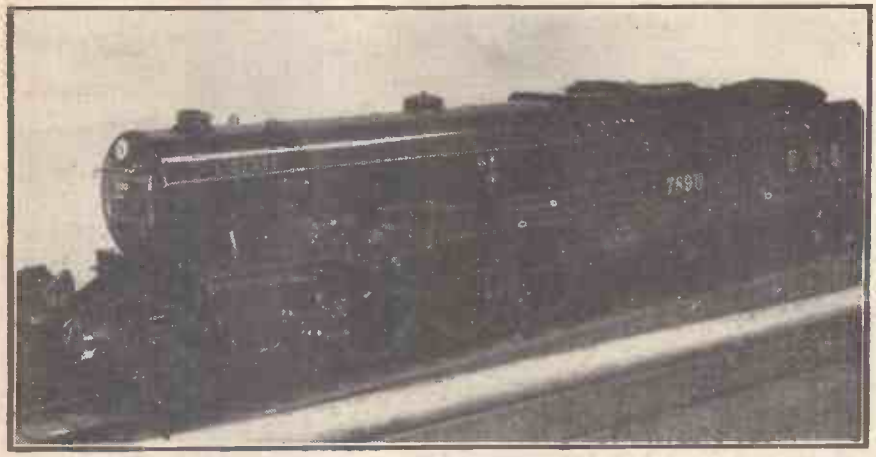


*Fig. 7.—Championship Cup in the Locomotive Section went to Mr. E. G. Rix, of Maidstone, for this excellent 5in. gauge 4-6-2 Pacific-type passenger locomotive model, "Liberty."*

**Model Aircraft**

Model aircraft, too, were plentiful, the championship cup this year going to the builder of a non-flying model of a Hawker "Hart" day bomber of 1933. Congratulations to Mr. I. O. Newton for some excellent work on this delicate model, finished in R.A.F. colours (Fig. 6). Also to the silver medal winners for some impressive, working, power-driven models.

A most unusual model gained a championship cup for Mr. E. H. Evans, in the general section. This was a model North Scotland Hydro Electric Board water-driven turbine, to a scale of 1in. to 1ft. Our illustration, Fig. 5, gives some idea of the scope of this engineering model, which was so admirably executed. Fine workmanship was also evident in the model by Mr. R. A. Barker of a beam engine (period 1840) as used in Cornwall and Derbyshire in the mining industry. This type of engine is still in use in Derbyshire. The general section displayed an enormous variety of good models.

The junior section of the exhibition boasted some 20 models, many of which showed great promise, two diplomas and a bronze medal being awarded to three of the exhibitors.

As well as viewing the fine array of amateur models, many visitors also visit the exhibition to discover what leading model manufacturers have to offer them in the way of finished models or materials and parts for home construction. Although one or two well-known names were missing this year there were still plenty of productions on the trade stands to attract all model enthusiasts.

It is impossible to be comprehensive when reporting on this attractive and popular annual exhibition. I would like to pay tribute to the enthusiasm of all those connected with the organisation: the zealousness of all the stewards throughout the 10 days; the thorough way in which the judges study the competition models in order to reach difficult decisions, and the ready and cheerful assistance afforded to all by the exhibition staff. Nor can I close without mention of the exhibition manager, Mr. E. D. Stogdon; apart from the enormous amount of preliminary work that is so essential, Mr. Stogdon is always available during the period of the exhibition, from the opening of the doors until they are closed at night, and he is never too busy to attend to the needs of inquirers and those seeking information.



*Fig. 8.—Mr. T. Fletcher, of Colne, won the Championship Cup in the Working Model Steamer Section for the second year in succession; his winning model this year was this river and coastal tugboat, which shows excellent finish and detail.*


### A Radio Awakener

SIR,—I was extremely interested in the radio awakener which Mr. T. Lonsdale, of Burnley, described in the April issue of PRACTICAL MECHANICS, and enclose sketches of an alarm apparatus I have constructed which may interest other readers.

This has been in constant use for several months and has not yet failed to awaken me, the reason being that I have connected to the lampholder, by means of a length of electric flex, a portable record player, and by selecting a record before retiring and placing the pick-up arm in position on the record, morning rising is considerably more pleasant. The records used are 12in., the reason being that the record player requires just over one minute to "warm up," and since the 10in. size rarely lasts more than two minutes, awakening would not be quite so unequivocal.

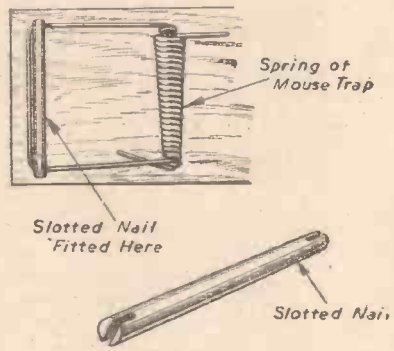
The original idea, as can be seen, was merely to switch on the light which is situated on the top of the box, but since a light is unnecessary during the summer months I utilised the lampholder as previously described.

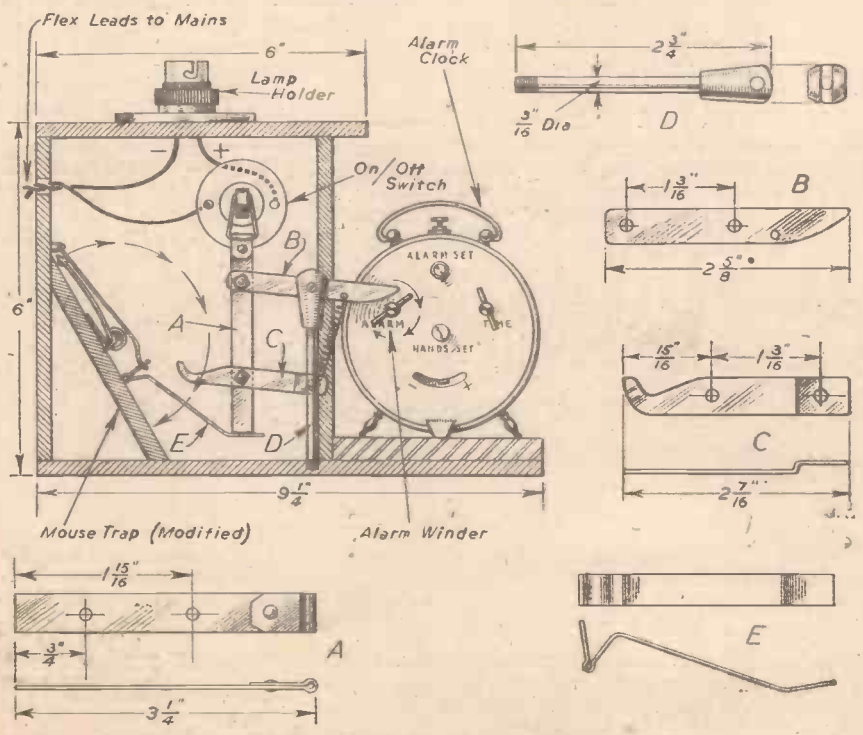
I found that after a few weeks of use the spring bracket of the mouse-trap became severely twisted, due to the impact directed upon part "C" after release, and in view of this I reinforced this as shown in the sketch.

No further securing was required beyond pressing the slotted nail into position, as the tension was directed against the end of the bracket on impact. Part "A" is attached to the switch by means of a small loop of wire, in order to ensure that sufficient "play" is available when lever "B" is moved by the revolving alarm key to allow for the release "E."

The resetting becomes extremely easy with practice, and I am able to reset the apparatus in darkness. Switching off, too, is quite simple and may be accomplished whilst lying in bed (provided, of course, the box is within reach), simply by passing the fingers inside the box above the alarm clock.

As a matter of interest, column "D" was constructed from an old bicycle brake, and the existing thread served to screw into the wooden base of the box, holding the whole assembly quite rigid.—B. R. COATES (Bideford).




*General view and details of a "radio awakener."*

### A Slide-rule Magnifier

SIR,—In the September, 1948, issue of PRACTICAL MECHANICS there appeared an article on a Slide-rule Magnifier, by H. D. Smith. May I suggest an improvement of this attachment. As a user of a slide-rule this arrangement was a very welcome one, but on making one as shown the following snag appeared. If the Perspex glass was bolted directly on to the clips by bolt A (Fig. 1), hardly any magnification was obtained at all. The reason being that the glass was not at its focal length from the cursor. In these small lenses this distance is of the order of 1-1½in.

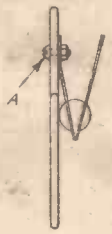



*Fig. 1.*

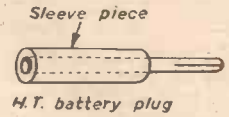



*Fig. 3.*

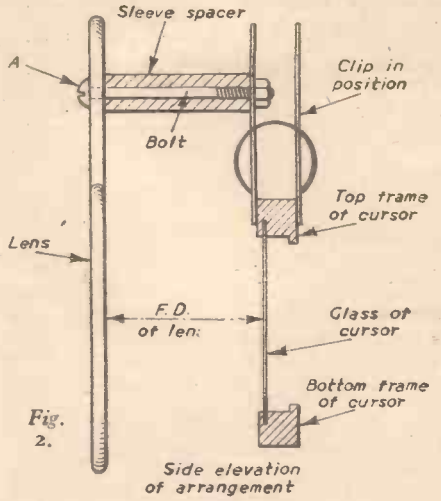



*Fig. 2.*

*An improved slide-rule magnifier.*

If a longer bolt than A is obtained and a length of small brass tubing slipped over it, this will form a sleeve between glass and clip, as shown in Fig. 2. This will fix the glass at its correct focus from the cursor line. The length of the sleeve, and consequently the F.D. of the lens, can be found by trial and error to suit the individual user. If brass tubing is hard to get of the right size, a plastic sleeve from a wireless H.T. plug can be used equally well (Fig. 3).

Although this device is a little cumbersome, it can easily be detached when not in use, and is much cheaper than the usual magnifying cursor sold to-day. For a 6in. S.R. it is ideal, especially if the rule is used a great deal.—G. ELLIS (Sheerness).

### Static Electricity

SIR,—In the July issue of PRACTICAL MECHANICS a reader, Mr. R. Douglas, of Manchester, expresses some doubts concerning the theory on the collection of electro-static charges on moving machinery. I hope that the theory which I give here will clear up the matter; if not, I would be pleased to hear from Mr. Douglas or any other reader on the subject. The electrical stability of the atom has its influence on the electrical behaviour of the molecule, and the molecules of a conductor have atoms in which the force of attraction between the nuclear protons and the extranuclear electrons is much weaker in some cases than in others, so that the application of a small counter electric force releases the more loosely held elec-

trons from atomic control and gives them direction from molecule to molecule through the conductor. It would be sufficient, then, to call these weakly held electrons "free electrons."

Stimulation by friction, however, will result in the loss of such electrons to be gained or picked up by another material, as is the case in moving machinery, such as, for example, a shaft and its bearing. The negative charge is therefore separated from the positive charge and passed on to the other material. We can then assume that the materials have become charged, and I might add that this charge can be quite dangerous, as probably many a reader has experienced when trying to jump on a moving bus. He has, in fact, shorted out the static charge set up by the bus engine and moving parts.

In the case of wireless receiver aerials in a storm, many people believe that they earth the aerial in case of lightning discharges. This belief, however, is not true; the reason one earths an aerial is to provide an easy path for the charges which accumulate on the aerial to earth, otherwise they might damage the receiver when the aerial is replaced.

Hoping that the information will prove useful to Mr. Douglas and other readers.—B. A. BAKER (Chelsfield).

### Simple Blowlamp Conversion

SIR,—I read with interest the article by J. F. Stirling in the June issue of PRACTICAL MECHANICS referring to a "Simple Blowlamp Conversion."

Whilst the published designs and comments of the writer are greatly appreciated I would respectfully suggest a modification in design when fixing the plunger pump to the lamp.

It is stated by him that "with the hand-pump in position the reservoir will not hold as much fuel as it did without the pump and, in consequence, the lamp will not burn as long with one charge as it did under petrol running;" it is in this respect that I suggest the following modification.

The construction of the plunger pump will be as outlined by Mr. Stirling, but instead of fixing the pump inside the body of the lamp it should be fixed in a vertical position on the outside and at the rear of the lamp container.

A small hole, the diameter of the copper tube, is drilled in the head of the lamp chamber and the end of the copper tube inserted and fixed in this position.

This method will in no way cause the capacity of the lamp to be reduced and the cutting of the ⅛in. diameter hole in the head of the lamp chamber through which to insert the pump is no longer necessary.—R. BENBOW (Stourbridge).

### "Electrified Fence Construction"

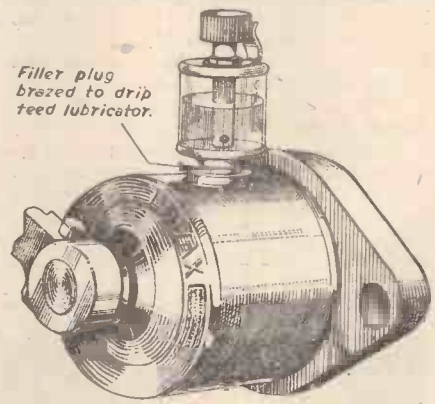
SIR,—My attention has been drawn to the article on the above subject appearing in the August issue of PRACTICAL MECHANICS, in which your contributor advises the use of the A.C. mains as a source of energy for the home-made electrified fence he describes. I must hasten to warn all your readers not to attempt to follow this suggestion under any circumstances whatsoever.

Apart from the difficulties of running supplies from some distance from the A.C. mains to the apparatus, British makers of electrified fence equipment who have carried out considerable research into the subject have reached the unanimous conclusion that there is considerable risk in using the public electricity supply as a source of energy for electrified fences even when a properly designed transformer is used. It is not necessary for me to emphasise the danger, both to human and animal life, of an electrified fence becoming alive at mains voltage due to a fault in the apparatus. The "low value fuse" he suggests is definitely no protection against this eventuality.

It is for this reason that the British Standard Specification on the subject bases its recommendations entirely on the use of battery power and, in fact, goes so far as to discourage very strongly the use of mains electricity. There are a considerable number of electrified fences in Great Britain which have been in use since before the war and, due to the care taken in their design and installation, no unfortunate results, fatal or otherwise, have so far occurred—a record which we would not like broken.—JOHN M. FRASER (Electrical Development Association, London, W.C.2.).

### Topping up Shock Absorbers

SIR,—One of the most awkward and trying maintenance jobs it has been my pleasure to overcome is the topping up of the round type of "Luvox" shock absorbers. I have found in the past that great difficulty was experienced in getting the fluid in, owing to the air not being able to escape properly. To remove the shock absorber from the vehicle so that it can be operated to pump the air out, often results in much bad language and damaged knuckles, owing to inaccessibility and corrosion of the fastening nuts and bolts.




*Fitting a lubricator for topping up a shock absorber.*

My solution to this problem was the use of a suitably sized drip feed lubricating bottle which I brazed to a filling plug from a damaged shock absorber, the plug having a 7/32in. hole drilled through it.

All I now do is remove the filler plug from the vehicle shock absorber, screw in the lubricator filled with fluid, screw open adjuster at top and, after a short "pleasure" run, I find the absorber full, and the same operation can now be applied to the remaining units on the vehicle.—E. E. RICHARDSON (Worksop).

### Cycle Rear Lights

SIR,—Having described a convenient method of wiring a battery-operated cycle lighting set to overcome the difficulty of knowing whether the rear lamp is lit or not (namely by connecting it in series with the front lamp), Mr. Verlander, in the August issue of PRACTICAL MECHANICS, advises users of dynamo sets who may wish to adopt his method, that in the case of a 6-v. dynamo, two 3-v. lamps should be used.

This method of matching lamps to the output of the power supply is correct to a point, and where batteries are used presents no difficulties, but where dynamos are concerned it provides a trap for the unwary.

The lamps which he probably has in mind are those rated at 3.5 v. 0.3 amp. and normally used in flashlamps; this being so two wired in series would consume 0.3 amp. at 7 v., giving a power consumption of 2.1 watt.

The majority of cycle dynamos are of 3-watt rating and, correctly loaded, deliver this output at 6 v. 0.5 amp.

To connect such low-powered lamps to the 3-watt output would result in their burning out; since, unlike a battery whose voltage is more or less constant, a dynamo's voltage increases when lightly loaded, due to the fact that it attempts to force its total output through any circuit connected to it, and the state of affairs that arises can be roughly shown by using Ohm's law thus:

Resistance of two 3.5 v. 0.3 amp. lamps in series $= \frac{3.5}{0.3} \times 2 = 23.33\ \Omega$

Output of dynamo = 3 watts which, through a resistance of 23.33 $\Omega$, divides itself as follows:

$$W = I^2R \text{ or } I = \sqrt{\frac{W}{R}} \sqrt{\frac{3}{23.33}} = 0.3586 \text{ amp.}$$

IR (voltage) = 0.3586 x 23.33 = 8.366 v.

Thus the lamps would receive 0.3586 amp. at 8.366 v. instead of 0.3 amp. at 7 v.

Attempts to compensate this by the use of resistances only leads to snags when travelling at low speeds, and my own experience of dynamo sets is that correctly fitted they give little trouble and do not justify alteration.

With battery lamps things are different. Front lamps are reasonable, rear lamps in general are a downright disgrace, and unless users are able to avail themselves of the product of a well-known manufacturer, the only alternative, if a reliable rear lamp is required, is to improvise one's own.—V. BUTLER (Bethesda).

### Making Briquettes of Coal Dust

SIR,—In the March issue of PRACTICAL MECHANICS (mail to Mexico is slow), A. B. Durston was told in the "Queries and Enquiries" column, that Portland cement was unsatisfactory for making briquettes of coal dust.

I have used such cement very satisfactorily with petroleum coke dust, however. This was a highly volatile coke, with an extremely low ash content—about one or two per cent. The proportion of cement was one part to three or four of coke. The lower proportion of cement made briquettes which were likely to break while handling. The drawback to the process was the fact that mixing the dust and cement before adding water was a hard and tedious process, and the hand moulding of briquettes was a dirty one.

In using these briquettes, I made a curious discovery; the cement sifted through the grate bars, mixed with a small amount of ash, and was usable again. Apparently the heat of the fire restored its character as cement.

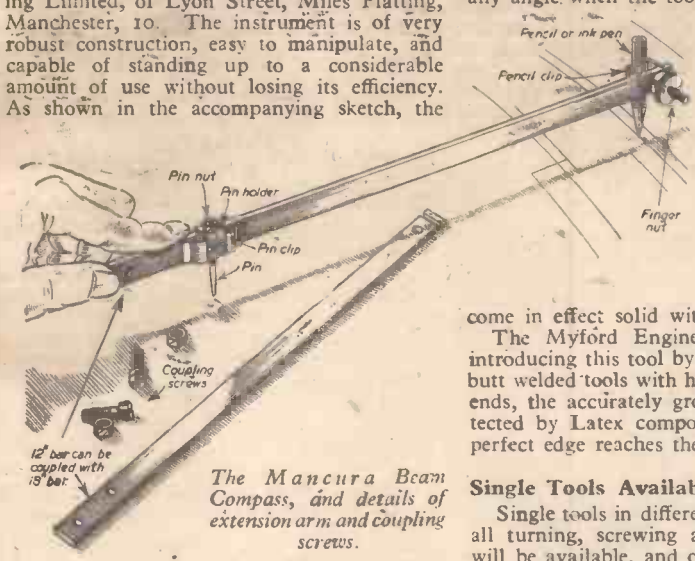
May I also say how helpful I find PRACTICAL MECHANICS in keeping up with what is going on in the technological world. I am particularly interested in the history of model-building, such as E. W. Twining's article in the March issue.

Unfortunately, no British technical publications are available on news-stands here in Mexico.—L. F. STUNTZ (Mexico City).

# Trade Notes

### Mancura Beam Compass

A NEW type of beam compass has just been introduced by Mancura Engineering Limited, of Lyon Street, Miles Platting, Manchester, 10. The instrument is of very robust construction, easy to manipulate, and capable of standing up to a considerable amount of use without losing its efficiency. As shown in the accompanying sketch, the beam consists of two bars, 18in. and 12in. long respectively, which can be coupled together when a large radius (up to 27½) is required. Either a pencil or ink pen may be used, and spare parts or any required lengths of bar are available. The price of the compass, which is supplied in a neat case, is 18/-.




*The Mancura Beam Compass, and details of extension arm and coupling screws.*

### Myford Quick-setting Lathe Tool

THIS new quick-setting tool has been designed and developed to meet the need for an improvement on the old method of obtaining the correct tool height with the aid of various packing pieces.

With the Myford tool, such weaknesses as overhang, insufficient support, poor and ineffective packing, are obviated. The quick-setting tool is clamped directly in the boat-shaped holder to the base support and therefore none of these complications are in evidence. The annular grooves machined in tool and boat, form the radiial movement to obtain exact tool centre height. The Myford tool clamp with its spherical washer forms an ideal medium for tool locking, the spherical washer enabling the clamp plate to position itself to any angle when the tool is raised or lowered. The loose heel adjusting screw now fitted to the clamp plate adds to the efficiency of the clamping, and prevents damage to the top slide surface.

The accompanying illustrations show that the new lathe tool is so well supported as to become in effect solid with the top slide.

The Myford Engineering Co., Ltd., are introducing this tool by providing ½in. square butt welded tools with high-speed steel cutting ends, the accurately ground faces being protected by Latex compound to ensure that a perfect edge reaches the user.

### Single Tools Available

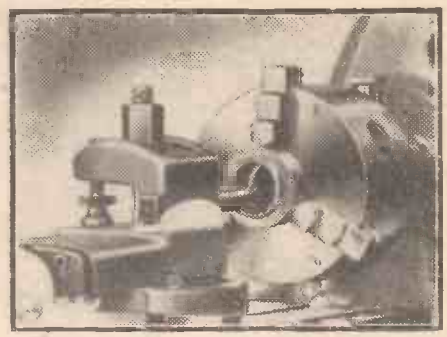
Single tools in different shapes which cover all turning, screwing and boring operations will be available, and one "boat" is all that is required for a complete set. A trial can therefore be made by obtaining a single tool and "boat," and afterwards completing to a set as required.

Further particulars are available from the Myford Engineering Co., Ltd., Neville Works, Beeston, Notts.

### The Hydrofin Craft

A NEW type of Hydrofin, a single-seater, was recently demonstrated off the Isle of Wight, by the Hydrofin Co. Apart from its high speed the chief characteristics of this craft are claimed to be stability, seaworthiness, and comfortable travel on waves. This mode of travel is something quite new in maritime history. There is, apparently, a complete absence of pounding on the hull, even when the craft is travelling at speed. In the accompanying illustration of the one-man Hydrofin it will be seen how the craft "rides" on the water. Further particulars can be obtained from the Hydrofin Co., Ltd., Cowes, Isle of Wight.

*A one-man Hydrofin.*



*The Myford Quick-setting Lathe Tool, and (right) in operation on a lathe.*

## The Motor Trawler "Jorundur"

THE 167ft. Icelandic motor trawler "Jorundur" has been designed and built by Messrs. Brooke Marine Limited, of Harbour Road, Oulton Broad, Lowestoft, and of Port Dinorwic, Caernarvonshire, and is a fine example of British workmanship throughout. The vessel represents the largest craft of her type to be built on the East Coast. She is to the order of Mr. G. Jorundsson, of Iceland, for his Icelandic fleet.

Acceptance trials were held last July and the trawler has since been delivered to its owner for fishing duties.

The principal dimensions of "Jorundur" are: Length 167ft., breadth moulded 28ft., depth moulded 15ft., fish-hold capacity 12,000 cu. ft. or 4,500 kits of fish, fuel-oil capacity 100 tons.

The vessel is built in steel to comply with Lloyd's Class 100 A1 Motor Trawler, incorporating extra strengthening in accordance with the builder's practice. The double-bottom tank structure, oil-tight and water-tight bulkheads, engine seatings and deck casings are of welded construction.

The equipment is full and modern and includes electric log, two sets of echo sounders, Kent Clear View Windscreens, one standard and one steering compass, complete radio equipment, loud hailer, inter-cabin telephones, electric engine room telegraphs, directional finding apparatus, and provision is made for the installation of radar apparatus at an early date.

### Propelling Machinery

The main propelling machinery is an 8-cylinder Mirrlees type HFRBT 8 direct reversing turbo-charged engine capable of developing 950 b.h.p. continuously at 300 r.p.m. operating through a Bibby detuning coupling and a 2-1 reduction gear box, the latter being fitted with an oil-operated isolating clutch.

The propeller is of Heliston design, made in manganese bronze by Messrs. Stone Ltd. With these units a service speed of 12 knots will be obtained.

The winch auxiliary is a Mirrlees type TLA 5, 5-cylinder, 4-stroke, heavy-oil engine with fresh-water cooling, developing 225 b.h.p. at 500 r.p.m., clutch-coupled at the forward end to a Vickers VSG hydraulic pump for driving the trawl winch motor unit and at the aft end direct-coupled to a 50 k.w. generator.

A further auxiliary set, comprising one 2-cylinder McLaren type MR 2 heavy-oil engine, developing 44 b.h.p. at 1,000 r.p.m., is installed and coupled to a 5 k.w. dynamo clutch-coupled to each air compressor and general service pump, delivering 48 tons of sea water per hour against a head of 40ft.

A second generator is installed, comprising a 4-cylinder MR 4 McLaren heavy-oil engine with independent fresh-water cooling developing 88 b.h.p. at 1,000 r.p.m., and is direct-coupled to a 50 k.w. dynamo.

A composite waste-heat and oil-fired thimble-tube boiler by Messrs. Clarkson's operating at 75lbs. per sq. inch is fitted in the funnel casing. It can be fired either by the main engine exhaust gases or by an independent oil burner. On exhaust gas it will evaporate approximately 625lbs. of water per hour and on oil firing approximately 1,000lbs. of water per hour. The combined output with simultaneous firing is approximately 1,600lbs. per hour.

# QUERIES and ENQUIRIES

A stamped addressed envelope, three penny stamps, and the query coupon from the current issue, which appears on page 8 (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.

## *Paint for Cine Screens*

**WILL you please give me the formula for a flexible white paint for cine screens which have to be rolled up.—R. G. Avent (Harpenden).**

BY taking an ordinary white cellulose paint and by stirring a few drops of castor oil into it, the paint may be made remarkably flexible for screen use. It will, however, dry glossy.

What you require, however, is a rubber paint which will dry non-glossy or "flat." Such a one is given by the following formula:

| | |
|---|---|
| Rubber solution .. .. .. .. | 25 parts |
| Boiled linseed oil (pale) .. .. .. | 62 ,, |
| Turpentine .. .. .. .. | 2 ,, |
| Zinc oxide or Titanium oxide or Lithopone .. .. .. .. .. | 100 ,, |
| White spirit .. .. .. .. | 10 ,, |

Mix the liquid ingredients first, then gradually work in the zinc oxide or other white pigment. The thinner you can make the paint (consistent with adequate covering power) the better it will be for your purpose. Remember, also, that two coats very thinly applied will be better than one thick coat.

## *Growing Crystals on Twigs*

**I WISH to form some large crystals on twigs of wood by dipping them in a chemical solution. Can you inform me as to the type of chemical to use?—E. W. Allen (London, N.W.).**

IT is very difficult to grow really large crystals from solutions, and for this type of work very special measures have to be taken. Perhaps, however, you do not refer to the "giant" crystals, but merely want to get a sort of crystal incrustation on dried twigs. This is comparatively easy. You can use for your experiments common salt, Epsom salt, Glauber's salt, Rochelle salt or common alum. The latter would be about the best to begin with, since it tends to give large crystals.

Take a quantity of hot water and dissolve in it as much powdered alum as it will take up, using as a stirring-rod the twig on which you wish the crystals to form. Then find some means of keeping the twig immersed vertically in the solution, and put the whole away for a few days, covering the vessel over with a light cloth to prevent dust falling into it. Some crystals will form at the bottom of the vessel, others on the sides, but a number will collect on the twig, and these will provide the incrustations which you desire.

You can use copper sulphate for the same purpose, and this salt will give you blue crystals. Potassium dichromate will give orange crystals, and chrome alum purplish crystals. Iron sulphate will give green crystals, but these will tend to go brown after a time, owing to oxidation.

## *Removing Distemper*

**COULD you please advise me if there is any chemical on the market that I could purchase for the purpose of removing distemper from the walls of my living-room? The reason I want to remove this is that the last coat that was applied last year is flaking off.—R. G. Symonds (Diss).**

OWING to the casein which it contains, good distemper is often very difficult to get off a wall, particularly if the plaster underneath it is soft, crumbly and porous. However, the distemper is softened by alkalies such as ammonia or caustic soda.

First of all, try wetting the distemper with a mixture of about equal parts of strong ammonia and water. Leave this on for at least five minutes. After this time, you should be able to scrape the distemper away. Strong ammonia will work more quickly, but the snag here is the suffocating smell and the expense of the liquid.

If ammonia fails, you will have to fall back on caustic soda, which is relatively cheaper. Dissolve 1 part of caustic soda (obtainable from any drug stores) in about 6 parts of warm water, and apply the solution to the distemper. Use an old brush for the purpose, or a rag tied on the end of a stick. If you get the stuff on your hands, wash it off at once, for it softens the skin quickly. Distemper which has been softened in this manner can be peeled away with a scraper. The process is tedious, but it is the only way. Keep the caustic or ammonia well away from any paintwork which you wish to preserve. After you have removed the distemper, give the wall a good scrubbing down with hot water in order to get rid of all traces of the caustic. Let the wall dry out. After this, it would be an advantage to give it a coating of size before you apply any more distemper or paper to it, the size rendering the wall less absorbent.

## *Staining Snooker Balls*

**WILL you please inform me of the method and dyes used in the colouring of snooker balls.—A. Smith (Croydon).**

THE method of staining snooker balls depends on the material used for the making of the balls. If the material is celluloid or some other type of plastic, the material is stained during its process of manufacture and it cannot very well be stained afterwards. On the other hand, balls of these plastic materials may be sprayed thinly with a coloured cellulose lacquer, two or three coats being applied.

If the balls are of ivory, they should first of all be immersed in a solution of one part hydrochloric acid (or nitric acid) in 20 parts of water for several days. After this they are rinsed and then carefully dried with a soft cloth. They are then immersed in a solution of a spirit-soluble dye in methylated spirit, or, better still, in industrial spirit, if the latter is obtainable. They must be immersed therein, with frequent turning over until the ivory has been evenly impregnated with the dye.

On the large scale, ivory is often dyed under pressure, a process which gives by far the best, the most even and the most durable results. Previously the vegetable dyes solely were used for staining ivory, but nowadays the aniline dyes are employed.

**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.**

The staining of ivory in a satisfactory manner is not an easy task, and we would advise you to make trials with a small piece of scrap ivory before commencing on the snooker balls themselves.

## *Ink for Writing on Metal*

**CAN you please give me a formula for an ink or varnish suitable for writing on metal, but which does not leave any shadow or chemical action?—E. L. Humbert (Birmingham).**

YOU do not say what type of metal you wish to write on. Some inks are specially designed for certain metals and not for others. Thus, for instance, a solution of 1 part of copper acetate in 10 parts of water with sufficient ammonia added to redissolve the copious precipitate which is first formed makes a good writing ink for brass, but not for other metals. To some extent, however, all these inks attack the metal at least superficially. If, therefore, you require an ink which has no effect on the metal itself, you will have to use an ink based on shellac.

The following formula will probably suit your general needs:

Boil (under cover) 1oz. borax and 2oz. shellac with 18oz. water. Colour with lampblack to sufficient density, squeeze through fine cloth and then store in bottles for use. If the ink is not black enough, add a little indigo or ultramarine blue to it.

The advantage of this ink is that it can be removed completely from any metal surface by means of a cloth charged with ordinary methylated spirit.

## *Making Printers' Rollers*

**COULD you please give me some information as to the composition of inking rollers in a letterpress printing machine?**

**I understand they consist of a mixture of glue, glycerine, sugar and water. Could you give me the correct proportions, together with any information as to mixing and casting; or perhaps you could recommend a book on the subject?—K. T. Ellis (Newent).**

PRINTERS' rollers are not very difficult to make in the smaller sizes, and it is often possible to purchase from printers' stores the roller material ready to be moulded. The composition varies a good deal in nature. Most of them are made up on a glue-sugar basis. An average roller composition can be made up as follows:

Take 2lb. of ordinary glue, 6lb. treacle and ½lb. Paris white or ordinary whiting. To produce softer rollers in cold weather, use more treacle. To produce harder rollers in warm weather, use more glue.

Soak the glue in water until it begins to swell. Then pour away the water and heat the glue in a vessel surrounded by hot water. When it has attained a consistency of syrup, add slowly the treacle and then the Paris white. Keep the mixture hot for half an hour, taking care that it does not become too thick by evaporation of water.

Test the composition by placing a little of it on a piece of paper. When cool, it should be firm to the touch—rubbery rather than doughy.

The necessary mould should be one of metal, and it should have been well oiled. Place the wooden core of the roller centrally within the mould. This core must be perfectly dry, otherwise the composition will not stick to it. The composition is then poured into the mould around the central wooden core. The whole thing is then allowed to remain undisturbed for 24 hours, after which it may be withdrawn from the mould.

If treacle cannot be obtained, ordinary sugar may be used in place of it.

A roller composition not requiring sugar or treacle is the following, but it is not as reliable as the above:

| | |
|---|---|
| Glue .. | 70 parts (by weight). |
| Whiting .. | 50 ,, ,, ,, |
| Beeswax .. | 12 ,, ,, ,, |
| Glycerine | 70 ,, ,, ,, |
| Water .. | Sufficient to bring to syrup consistency when hot. |

## *Dyeing Linoleum*

**CAN you please inform me how to dye light linoleum brown?—L. A. Jones (Cardiff).**

IT is very difficult actually to dye existing linoleum and to obtain pleasing, level shades thereon. Most of the lino "staining" which is done is really a process of painting, a layer of tough, durable paint being brushed on to the surface.

But if you actually want to dye the lino, you should first of all scrub it with hot water, soap and soda so as to remove all surface oil and grease. Then, after drying, brush over it a hot solution of any oil-soluble dye in a mixture of equal volumes of paraffin oil and white spirit. Fifteen parts of dye should be dissolved in every 100 parts of the mixture.

Before commencing on large areas of lino, make trials on small pieces. Use the strongest dye solutions possible, but always remember that if you use excess dye, it will remain on the lino surface and readily come off.

After dyeing, give the lino a few days to dry out. Then rub it over as usual with a wax polish. During this latter process some of the surface dye will be rubbed off, but the majority of the stain will stay put.

Oil-soluble dyes can be obtained from most chemical wholesalers. If not available locally, try Vicsons, Ltd., 148, Pinner Road, Harrow, Middlesex, or Griffin & Tatlock, Ltd., Kemble Street, London, W.C.2.

## *"Coated" Lenses: Stereopsis*

**I PROPOSE buying a good binocular, but before outlaying a considerable sum I should be glad if you would give me some information which up to the present I have been unable to obtain.**

**I understand that the best binoculars have their lenses and prisms "coated," which is said to increase the relative light efficiency by about 50 per cent. Would you please explain what is meant by "coated" and how it is possible to check if the lenses have been so treated?**

**Stereopsis e.g., a binocular by Kershaw (10½ x 40) is said to have a stereopsis of 10,000yds. Does this indicate the maximum range of the glass, or the limit of the stereoscopic effect?**

**Finally, would you please explain the advan-**

tages and disadvantages of a 10 x 40 glass over one of, say, 8 x 30 for general purposes.—W. H. Wilkinson (Crewe).

"COATED" lenses are those which have received a thin and invisible deposit on their surfaces of a micro-crystalline compound, usually magnesium fluoride, which has the effect of enabling light rays to penetrate the surface of the glass without being scattered and thereby undergoing loss. A coated lens gives a rather more brilliant image than an uncoated one, particularly when viewing against the light.

By holding the lens surface at a certain angle and examining it with a strong hand lens, it is sometimes possible to discern a very fine film or "bloom" on the glass. This is the only non-destructive test for the presence of a fluoride or other type of lens deposit.

"Stereopsis" is more of a medical than a purely scientific term. It means merely the condition or state of stereoscopic vision, and in the sense which you indicate, it implies an approximate limit of stereoscopic seeing. It certainly does not imply a maximum range for the glasses.

In the nomenclature usually adopted by binocular makers the first and smaller figure refers to the degree of magnification of the glass, and the second figure is the diameter of the object glass in millimetres. The larger the object glass the more light it passes, and, therefore, the brighter the image. But, on the other hand, the greater the magnification the narrower the field of view and the less brilliant the image. Manufacturers endeavour to strike a happy and a useful medium between these two factors. Generally, an 8x glass has a more useful field of view for general purposes than a 10x or a 12x. The larger the object glass the heavier the instrument. In our opinion, you would do best to make a choice of an 8 x 30 instrument for general purpose viewing. Not only is such an instrument cheaper and lighter than a more powerful glass, but you will find it less critical in focussing, of wider field of view and generally more adaptable.

## "Fine" Copper Plating

**I WISH to make a number of fixtures for model ships.**

**The method to be used is copper plating, the fixtures made from some soft material, and then melting out the soft material and leaving the copper shell to be polished and fixed.**

**Could you please tell me the solution needed for the copper plating and the voltages needed for the process?—S. Best (Sheffield).**

THE best "fine" copper plating is done from a cyanide bath, i.e., a solution of copper cyanide in potassium cyanide solution, this giving a very smooth, fine copper deposit. You will not be able to procure such materials, however, on account of their exceedingly poisonous nature. Hence, you will have to be satisfied with an "acid" copper bath, which may be made up according to the following formula:

| | | |
|---|---|---|
| Copper sulphate | .. .. | ¾lb. |
| Water | .. .. .. | ½ gallon. |
| Sulphuric acid | .. .. | 2 fluid oz. |

(Dissolve the copper sulphate in the water. Then add the acid.) This solution should be worked in glass, porcelain or stoneware containers—not in any metallic vessel.

Half a teaspoonful of sugar added to the above bath will improve its working. A sheet of copper is made the positive electrode of the bath, and the article to be plated is made the negative electrode. Use an E.M.F. of about 2-3 volts D.C.—from an accumulator, if possible. The surface to be plated must be scrupulously clean, and it must be electrically conductible. If it is not, dust it over with very fine plumbago (graphite).

By the above method you should be able to build up a thin copper shell on your objects in about 30-40 minutes.

In your town you may be able to get supplies of the necessary materials from Messrs. Wm. Canning & Co., Ltd., 7-9, Sycamore Street, Sheffield, 1, but we do not think that they would be willing to supply cyanide materials to you.

## Black Nickelling

**CAN you please inform me if there is any process for black finishing brass so that it will withstand the action of lactic acid in milk? The maximum temperature to be contended with will be boiling point. I do not mind if this is a plating or chemical process.—F. A. Cam (Pontllanfraith).**

ALL things considered, we are of the opinion that the process of black nickelling will best give you the resistant black finish on brass which you require. Black nickelling is essentially a plating process in which nickel mixed with a certain amount of oxide is deposited. Provided that the lactic acid concentration is not excessively high, this deposit should withstand prolonged temperatures up to 100 deg. C.

You can obtain materials and equipment for black nickelling from Messrs. Wm. Canning & Co., Ltd., Great Hampton Street, Birmingham, or, no doubt, they would be able to undertake the job for you. On the other hand, you may be desirous of effecting the job yourself. If so, here are the necessary particulars:

Electrolyte

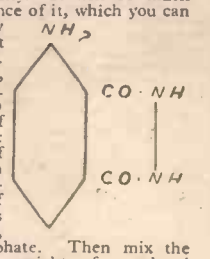
| | |
|---|---|
| Nickel ammonium sulphate .. | 10 oz. |
| Zinc sulphate .. .. .. | 1½ oz. |
| Sodium thiocyanate .. .. | 2½ oz. |
| Water .. .. .. .. | 1 gallon. |

Use a nickel anode. The component to be plated is made the cathode. The electrolyte should be worked cold. Use a voltage of from 0.5 to 0.7 E.M.F. Current density should not exceed 1 ampere per sq. ft. of surface to be plated. If the voltage, current density or temperature is increased the deposit will be grey, not black. Good thick black deposits can be built up by this method, but the process is rather slow.

## Luminous Calcium Sulphide: Ortho-aminophthalic Cyclic Hydrazide

**WHAT is the best way to make luminous calcium sulphide? Also, what is ortho-aminophthalic cyclic hydrazide, and how can it be used to make luminous compounds? How can these compounds be made into paints?—C. Gisborn (Rossendale).**

YOU will find it very difficult to make luminous calcium sulphide successfully. It will be much more satisfactory to buy an ounce of it, which you can do from any firm of laboratory chemical dealers, your nearest dealer being Messrs. J. W. Towers, Ltd., Chapel Street, Salford (near Victoria Bridge). However, if you wish to experiment with the making of this material proceed as under:




Take one part of plaster of Paris. Add to it one drop of a dilute solution of copper sulphate, and one drop each of similar solutions of ferrous sulphate, manganese sulphate, cobalt chloride and zinc sulphate. Then mix the plaster with three times its weight of powdered charcoal. Place the mixture in an old tin (a cocoa tin will do) and place the tin in the middle of a hot fire in which it should remain for two hours. The tin lid should be placed in position. After this time, continue the heating until the charcoal disappears, but for no longer. Then allow the creamy mass of impure calcium sulphide to cool down. Powder it well, spread it on a shallow dish and expose it to strong sunshine. It should now shine in the dark. There are, however, quite a lot of factors which may operate to prevent this, so that we cannot guarantee good results for you.

Ortho-aminophthalic cyclic hydrazide is a synthetic organic chemical having the structural formula as shown in the diagram. It is a yellow crystalline powder which is sparingly soluble in water or dilute acids, forming fluorescent solutions. The material is not self-luminous, and it will not make permanently luminous compounds. Its main interest lies in the fact that when dissolved in weak (5 per cent.) caustic soda solution containing a few drops of hydrogen peroxide it forms a solution which, when dropped into a strong solution of potassium ferricyanide made alkaline with a little caustic soda, it gives rise to the phenomenon of "chemi-luminescence." This means that when the above hydrazide solution is dropped into the ferricyanide solution a brilliant bluish-white pearl of light is produced. This, however, is not self-luminescence in the sense which you mean, and the effect is only transient. Nevertheless, ortho-aminophthalic cyclic hydrazide (sometimes called "luminol") is a very interesting substance.

Ortho-aminophthalic cyclic hydrazide cannot be used to make luminous paints and enamels. The luminous calcium sulphide can be so used merely by grinding it up in a suitable clear varnish until a paint of proper consistency is obtained.

A suitable varnish can be made by dissolving scrap celluloid (film scrap) in a mixture of approximately equal quantities of acetone and amyl acetate.

Luminous zinc sulphide (which is better than calcium sulphide) can be ground up to paint consistency in the same way.

## Metering Problems

**CAN you help me with the following metering problems? In the accompanying circuit diagrams (Figs. 1 and 2) meters A run backwards.**

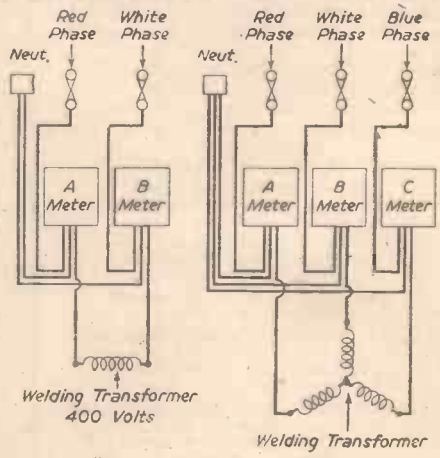



Fig. 1.




Fig. 2.

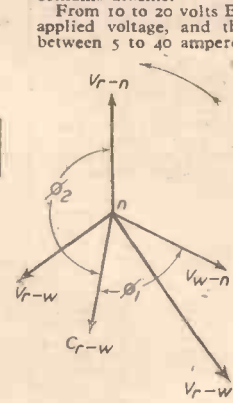



Fig. 3.

*Diagrams of electricity meter installations and vector diagram.*

**Will you please explain the total power consumed; the reason for A running backwards; and the vector diagrams. The meters and connections are in good order. Is there a good book explaining these points?—N. Cable (Wakefield).**

IT would appear that the vector conditions in the single phase transformer fed through two meters are somewhat as indicated in Fig. 3. Meter B gives a reading which is proportional to the product of $V_{r-n}$; $C_{r-w}$; Cos $\Phi_1$. In the transformer the current $C_{r-w}$ lags appreciably behind the voltage $V_{r-w}$, but $\Phi_1$ is less than 90 deg., hence Cos $\Phi_1$ is positive, and the meter gives a forward reading. The reading of A is proportional to the product $V_{r-n}$; $C_{r-w}$; Cos $\Phi_2$. $\Phi_2$ is more than 90 deg., hence Cos $\Phi_2$ is negative and the meter gives a backward reading. It may be noted, however, that if the angle of lag of the current in the transformer is more than 60 deg., as may occur when unloaded, both $\Phi_1$ and $\Phi_2$ will be negative, although the transformer is taking power from the mains, thus it would appear that these meters are not correctly connected. A single meter with its current coil connected in series with the transformer, and its voltage coil connected across the mains to which the transformer is fed, is all that is required.

In order to deal adequately with the question of the three-phase transformer fed through three meters it is necessary to know the exact internal primary and secondary connections. It may be that the transformer is used to supply three single phase loads, or to supply a single phase load. In the latter case it seems doubtful if the primary is connected in simple star.

The book "Electrical Testing for Practical Engineers," by G. W. Stubbings (E. & F. N. Spon, Ltd.), gives a certain amount of information on this subject, but more detailed vector diagrams are given in "The J. & P. Transformer Book" (Johnson & Phillips, Ltd., Charlton, London.)

## Neutralising De-rusting Liquors

**I AM using a 2 to 5 per cent. solution of hydrochloric acid on iron and mild steel components for de-rusting purposes.**

**Will you please inform me if there is a cheap and easily-applied method of neutralising the acid residue when rust removal is complete?—R. A. Calton (Bradford).**

THE spent acid from your de-rusting process could best be neutralised by pouring it in a slow steady stream on to a bed of limestone or of lime. These materials are plentiful in your district and they should be readily available.

The materials may, of course, be added to the spent acid in their vats or containers, but, in the case of limestone, considerable effervescence will be created, with the result that the liquor may "come over the top." It is always, therefore, better to pour the liquor on to the neutraliser than to add the latter to the former.

Are you, however, sure that you are acting to best advantage in neutralising such liquors? Spent acids from de-rusting and de-scaling tanks contain soluble iron compounds. If the acid is used up to the utmost extent and the liquid evaporated to dryness, the product then being roasted, you obtain a brick-red pigment which has considerable market value. Of course, this processing is rather a speciality, but, in an industrial district such as yours, you might be able to find a manufacturer of pigments who could relieve you of your spent acid liquors at periodic intervals.

## Anodic Oxidation of Aluminium

**I HAVE a number of small aluminium parts 3in. long by ½in. diameter which I desire to anodise by the sulphuric acid process, and then to colour same in a cold dye bath. Can this process be carried out by using a heavy duty battery to supply the current, and if so, what is the procedure?**

**What should be the specific gravity of the electrolytic, and, finally, is there a book dealing with this subject?—W. E. Gilson (Burton-on-Trent).**

FOR the sulphuric acid anodisation process, a very great variation in the acid strength can be used. In fact, any acid strength from 5 to 80 per cent. is admissible, but the acid employed must be pure, and not of the "Technical" variety, since the latter often contains arsenic.

From 10 to 20 volts E.M.F. constitutes the range of applied voltage, and the current density may vary between 5 to 40 amperes per sq. ft. of surface to be anodised, an average being about 20 amps. per sq. ft. If your heavy-duty battery is capable of the above output for a continuous period it will do the job which you require of it.

You should note that there is an initial "surge" of current, but immediately an oxide film forms on the aluminium this sets up a resistance, and thereafter the current remains more or less steady. If the process is prolonged (to develop thick oxide coatings) the resistance of the circuit slowly increases at the oxide layer. This generates heat; consequently, the bath warms up, and means must be taken to cool it.

The anodised material should be rinsed well and then transferred immediately to the cold dye bath (containing about 5 per cent. of dissolved dye). The bath should be raised gradually in temperature to about 80 deg. C., kept thereat for 15 minutes, and then allowed to cool down to normal. Almost any water-soluble aniline dye can be used for this dye-bath.

A standard work on anodisation is: "The Anodic Oxidation of Aluminium and its Alloys," by A. Jenny.

THE Cyclist
Editor: F. J. CAMM

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# Comments of the Month

By F. J. C.

**The Cycle Exhibition**

THE twenty-fifth Cycle Show to be organised by the Bicycle Manufacturers' Union will take place at Earl's Court from Friday, October 21st, to Saturday, October 29th. It is thus a Silver Jubilee Show, and plans have been laid to make it worthy of the attainment. The exhibition will occupy 121,500 square feet, as against 117,500 square feet last year. There will be 186 exhibitors, and 66 of them exhibiting complete machines will occupy 66,500 square feet, whilst 111 exhibitors of components and accessories will occupy 146,000 square feet. The nine tyre exhibitors occupy 9,000 square feet.

Once again the entire industry accommodates itself under one roof for the delectation of the devotees of our great pastime, providing an occasion for provincial cyclists for an afternoon ride and to all cyclists to survey the wares and the latest models of the manufacturers.

This year, perhaps more than any other, a visit will be well worth while, for there will be some strikingly new designs and many new accessories.

**Coruscating Coroners**

WE have on many occasions commented upon the vacuous remarks of coroners when investigating the cause of death of a cyclist killed in a road accident. Quite often the coroner sympathises with the motorist who has caused the death and lambastes cyclists generally for becoming involved in accidents. Indeed, one might gather from some of these coroners that cyclists go out at night and lay down under the wheels of passing motor-cars. A coroner has no other function than to ascertain the cause of death and he has no right to make any comments beyond that subject. He can, in fact, be invited to shut up when he proceeds to ventilate ignorant views from his apparently inexhaustible fount.

For example, at a recent inquest on a 14-year-old lad who was killed when he rode into the back of a stationary motor-car, the coroner proceeded to criticise dropped handlebars, which, he said, were used by youthful cyclists purely for "swank." In spite of letters of protest to the coroner replies were not received. Indeed, the coroner did not acknowledge an offer to demonstrate that dropped handlebars were quite safe. It is high time that the Lord Chancellor investigated this archaic office of coroner, usually occupied by some filibustering, pettifogging and choleric local big-wig, anxious to achieve some fleeting publicity out of a verdict on a corpse.

Some magistrates may be included in this general castigation. There was one who recently said that cyclists were a perfect nuisance and used objectionable expressions. We thought that view came from motorists who think that cyclists use bad language when the motorist misses them!

We have on many occasions taken up such remarks with the coroners or magistrates concerned.

**Sign-post Maze**

VISITORS to England this summer bitterly complained in the Press that our road signposting is inadequate and misleading. Their criticisms are receiving justifiable support from disgruntled British travellers.

A recent case, brought to the attention of the British Road Federation, concerned an overseas driver who set off from London's West End to visit Cambridge (52 miles away). After an hour and 40 minutes of groping he reached the first signpost bearing the word *Cambridge*. During that time he covered 20 miles.

A peculiar characteristic of many local authorities is that they appear unable to visualise the needs of the stranger unversed in the geography of the district. Sufficient care is seldom taken to see that fresh instructions are given to the roadfarer at every doubtful point. Indeed, as a nation, our attitude towards signposts has always been a little casual.

The Roman soldiers who built Britain's first roads established the foundations of what might have become a fine tradition. Along Stane Street, running 58 miles from London to Chichester, 69 good stone signs were erected showing the mileage and eventual destination.

The Romans sailed away. Many of the signposts were destroyed or overgrown. For nearly 12 hundred years no appreciable effort seems to have been made to help the traveller. Writing in 1635, one says: "It is a usuall manner in many parts where wayes be doubtfull for a travailler to find a standing post with a hand to direct men the ready way, but those hands tell thee not how many miles, nor the distance from place to place."

There is a familiar note of regret in these words, says the British Road Federation.

**Inaccurate Milestones**

THE coming of toll roads in 1663 brought about an improvement. Travellers insisted on signposts showing mileage as a means of checking the distance they were entitled to cover in return for the sums they paid. Distances, however, remained merely a matter for interested parties. Until the passing of the Standards Act in 1864, the Post Office, which paid for the carriage of mails on a basis of distance carried, insisted that the distance from London to Birmingham was a mere 89 miles. Exact measurement then revealed that the distance was 109 miles.

Apart from lack of correlation in showing destination, many existing signposts were originally designed to be read by the high-perched drivers of coaches. In the early days of motoring these signposts, with arms 7ft or 8ft. above the ground, could still be deciphered by the drivers of old-fashioned cars. But modern opinion is that the optimum height for signs is 3ft. 6in. above the level of the crown of the road. The old direction posts, although picturesque in their gaunt antiquity, cannot adequately serve modern fast-moving traffic.

Signposts were uprooted in 1914 and again in 1939 as a precaution against roaming enemy agents. By the time those not lost had been replaced, roads had altered, diversions had been created, corners eased or new roads built. The restored signposts led to much confusion.

A Government Committee on Traffic Signs was formed in 1933. Its conscientiously thorough report was issued in 1934. Four main principles were laid down.

1. Traffic signs must be so designed and sited as to attract, both by day and by night, the attention of the person for whom they are intended.
2. Their significance must be clear at a glance.
3. They must be so sited that sufficient time is allowed for road users to adapt their course of action to the indication given.
4. They must, so far as is possible, be erected on a uniform system, and the use of unnecessary signs should be avoided.

These recommendations have never been fully implemented, yet a Departmental Committee of the Ministry of War Transport, set up 10 years later, affirmed that it was impossible to improve them. Only certain modification could be made.

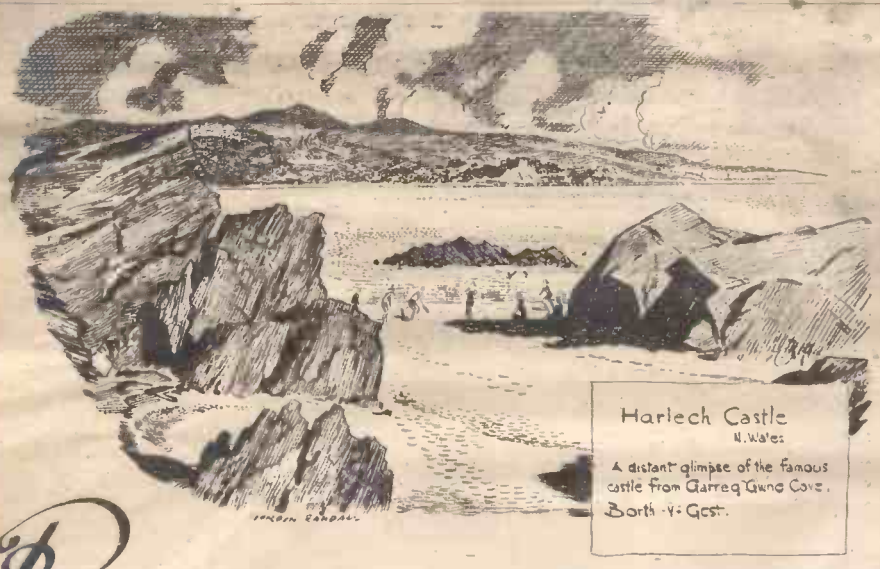
The Ministry of Transport is now considering the adoption of certain international road signs in order to make directions more easily understood by overseas visitors. Experts generally agree, however, that the presentation of the more modern British road signs is better than those of the Continent.

Whatever improvements the Ministry may effect, there is bound to be a delay before they come into force. Meanwhile, local authorities should remember that the majority of drivers are not so interested in a village "down the road" as they are in discovering the way to a town 100 miles away.

The international presentation of the warning X for cross roads is carried on an iron triangle with a 2ft. or 3ft. sharp-ended base. These protruding points are a potential danger to all road users.

The British equivalent is a rectangular iron plate, bearing a larger X, mounted below—and thus partially protecting—a triangle with 1ft. or 1ft. 6in. base.

The British Road Federation, which is responsible for collating these facts and figures, is performing most valuable work in co-ordinating the often conflicting interests of motorists, cyclists, pedestrians, The Ministry of Transport, the police and county surveyors. It does not hesitate to communicate to the Press when it feels that the interests of any particular section of road user is being unfairly attacked. Like the Roadfarers' Club it is non-partisan and holds the scales impartially.




# Pegagrams.

*Leicester Rider for Brighton-Glasgow*

KEN SATCHWELL, of the Leicester Pegasus Club, has been chosen to ride in this year's 6-day 600-mile marathon from Brighton to Glasgow. He is club secretary, and a keen rider for the club.

*Those Cycle Thefts*

A REPORT issued at Scunthorpe, covering 1948, reveals that reports of missing cycles kept the police busy during the year. There were 435 reports of missing machines, but of these 268 were later recovered in circumstances indicating no theft, but 141 of the remaining 167 were never recovered. At present there is an accumulation of 43 cycles at the police station which have never been claimed. The report states that Scunthorpe's scheme for the registration of bicycles has greatly helped in the work of tracing stolen and missing machines, and some 17,000 cyclists have registered their machines.

*Free Dinners!*

CYCLISTS riding along a trunk road who happen to come across a rabbit that has met a sudden death can, with a clear conscience, pick it up for the pot. This was pointed out to Scunthorpe Bench when a man who had picked up a rabbit from the roadside was charged with poaching, and his solicitor told the magistrates that as a trunk road and the grass verges belong to the Ministry of Transport there can be no question of poaching should anyone using the road pick up a rabbit on the roadside.

*Chesterfield Club Reorganises*

PLANS are in hand for the reorganisation of Chesterfield Spire Road Cycling Club, particularly for the benefit of younger riders in the town. At present the membership of the club is 40, and the emphasis is to be on racing; the intention being to build up a top-ranking club with the present fast riders as a nucleus. Mr. Roy Stubbs, of 4, Chapel Road, Grassmoor, Chesterfield, is the new racing secretary, and the general secretary is Mr. W. A. Taylor, of 25, New Bolsover, Chesterfield.

*Hard Luck!*

CECIL PAGET, who worked hard as organising secretary in connection with the Road Time Trials Council's 50 miles National Championship promoted by St. Neots and District Cycling Club, at St. Neots, Hunts, felt like one of the untouchables on the day of the event. There was chicken pox in his family and so he had to watch the riders as they went by near his home at Eaton Socon, and he just had to be content with that brief glimpse of the event while his duties for the day were taken over by Mr. E. D. Catmur. The winner was J. Simpson (Midland C. and A.C.) with a new course record and a time of 2hrs. 2mins. 14secs. Next came Ken Joy (Medway Wheelers) who was expected to win, with a time of 2hrs. 3mins. 22secs., with K. Whitmash (Southampton Wheelers) third, who took 2hrs. 4mins. 48secs. The three riders from the St. Neots Club put up good times but were not placed.

*Former Cycle Manufacturer*

THE death has taken place at the age of 71, at his home in High Street, Epworth, Lincs, of Mr. James Walster, a former cycle manufacturer. For many years he and his brother, the late Mr. Edward Walster, carried on a cycle manufacturing business at Epworth in partnership.

*Record that Wasn't*

WHEN he set out to beat the record for the 27-mile ride from Wisbech to King's Lynn and back, P. D. South, of Wisbech Wheelers Cycling Club, was determined to put up a better time. He completed the trip, having clipped 1min. 15secs. from the previous time, but unfortunately his time cannot be accepted as official, as the checker who would have checked his time at King's Lynn post office before he started the homeward run was away on holiday.

*Made Cycles and Furniture*

MR. W. L. FORINTON, of 54, Sleaford Road, Boston, who has disposed of his furniture business in West Street, Boston, and is retiring, combined at one time the business of furniture making and selling with the manufacture of bicycles. His father, the late Mr. A. W. Forinton, founded the business 64 years ago, and for a number of years the firm produced their "New Victor" bicycles, which became very well known in the town and district. During this period ten men were employed entirely in the production of bicycles and occasionally they also produced a motor cycle to a special order.

*Another Toll Disappears*

FOR over 300 years travellers using the road between Chatteris and Somersham, in Cambridgeshire, have had to pay a toll, but at long last traffic can now cross Chatteris Ferry without hindrance, for the Isle of Ely and Huntingdonshire County Councils have bought the rights for £6,500. Some 20 years ago the toll owners wanted £14,000 for the rights. Over 300 years ago a stream known as the Old West Water cut through the road at the spot and so a ferryman set himself up in business to ferry travellers and goods to the other side. Eventually the stream dried up or was diverted, and a roadway was built in place of the ferry, but the "ferry toll" remained and it continued in private hands until about 50 years ago when a limited company took over the toll rights.

*Action After a Century!*

A CYCLIST who appeared before Peterborough magistrates and was fined £1, with 8s. costs, for not keeping to the nearside of the road while cycling in Peterborough, had the doubtful honour of being the first person in Peterborough to be prosecuted for this offence, although such an act has been an offence for a hundred years. The cyclist, it was stated, collided with a car, after going on to his wrong side to pass some other cyclists riding five or six abreast. The chairman told him: "This has been an offence for over a hundred years. It is the first case the police have brought in Peterborough, but it is an offence that is all too frequently committed by cyclists coming out from works. They must realise that by not keeping to the nearside of the road when meeting other traffic they are committing an offence, the penalty being up to £10."

*Grim Warning*

THE bicycle of a lucky man was on show at the Road Safety Week Exhibition arranged at Brigg, Lincs. It was in the most prominent place, with framework twisted into scrap, wheels smashed and bent and hardly a fragment worth taking away. The rider of this cycle tried conclusions with a bus in a Brigg street. The front wheels of the bus went over the cycle, and the rider went right under the bus. Then out he crawled again bruised and shaken, but with no bones broken and no serious injuries.

*Penny-Farthing Racing Man*

MR. THOMAS S. DUNCOMB, who for many years carried on a hardware business in High Street, Stamford, Lincs, and has just died at the age of 89, was in his younger days a keen cyclist. For several years he lived at Dorchester and there he particularly distinguished himself. For a considerable time he was captain of the Dorchester Rovers Cycling Club and he won several silver trophies and medals, and also the Dorset challenge cup for cyclists, and the National Cycling Club's bronze medal. All these awards were won by Mr. Duncomb on a "penny-farthing" cycle.

*Gadgets Gave Him Away*

MAKING inquiries at a house in Grimsby, following the many reports of missing cycles, a police officer was about to leave when he noticed a cycle to which was attached a large number of gadgets, many of which struck him as being out of place. He interviewed the 16-year-old owner of the bicycle who was eventually, with two other boys, charged with stealing a bicycle, and they asked for many other cases to be taken into consideration. The boys had apparently been going into the cycle-stealing business on a wholesale scale. Some of the parts from the stolen machines were sold and others were buried, and the chairman of Grimsby Borough Magistrates commented at the hearing of the charges: "It is a puzzle to me how the parents of these boys could have had all this property on their premises without thinking something strange was happening."

# Around the Wheelworld

By ICARUS

### Harris—Professional Sprint Champion

REG. HARRIS defeated Van Vliet in the semi-final and Derksen in the final of the World's Professional Sprint Championship, and thus Harris now is the professional sprint champion of the world. There are many who think that this is the highest achievement in cycling, but, personally, I do not think so. All honour to Harris, however, for demonstrating that the Englishman can win at some sport. He is the first British professional sprinter to win this coveted honour, and his success is all the more meritorious when we remember that this is his first year as a professional. Even in this he makes history, for he is the first professional irrespective of nationality to become world champion in his first year. This is a pleasant culmination to all of the speculation regarding Harris and an answer to the critics who thought that he would not make the grade.

### More Controls Off

THE President of the Board of Trade recently announced in the House of Commons that amongst a wide range of manufactured articles controls were to be removed from bicycles and cycle tyres. This applies only to such goods for which no increase in price is expected. He threatened that if there were any serious increases in prices, controls would be reimposed. It is not anticipated that prices will be affected by this decontrol.

### The Festive Season Begins

NOW that the racing season is ending, the spate of dinners and luncheons and prize-giving commences. My diary contains many entries of functions I shall attend. I hope that clubs arranging these functions will separate the prize-giving for a purely formal occasion, except in the cases of national championships and similar events. It is boring to a mixed gathering when considerable time is occupied in presenting small-time prizes won in unimportant events such as club handicaps. Above all, do not have a long toast list, and limit the speeches to five minutes at the outside. One club last year introduced the gong system; when that time had elapsed the speaker who had not finished his oration was compelled to sit down in the middle of a sentence. No one is any the worse off for the loss of the words that are not uttered. If there is a particularly witty speaker introducing a note of levity into proceedings that are tending to fall flat, he may be given a little latitude. The toast to the club, the visitors and the President are the only toasts that are required, for everything that need be said can be said by the proposers of and responders to those toasts.

### The Late Mrs. J. A. Welford

THAT great old Victorian lady, Mrs. J. A. Welford, first lady member of the C.T.C. (she joined in 1880), and wife of a former secretary, Walter D. Welford, died on August 29th. With her husband, she was interested in the photographic business. After retiring from the cycling movement, she renewed her acquaintance with it a few years ago, an interest which she maintained up to her death. She was over ninety years of age, but looked in her sixties, a good example of a woman who grew old gracefully. In her time she knew all the personalities of the cycling movement.

### Bill Richards's New Job

BILL RICHARDS, a member of the Becontree Wheelers, and founder of the Crest Cycling Club, has, I learn, joined the staff of Bates as manager of the firm's depot at 275, Green Street, London, E.7.

### A Pacing Memory

THE original Dunlop Quintuplet, last used for pacing 52 years ago, and now owned by Mr. W. B. Robins, of Sutton, was ridden by five riders in the claret and gold jerseys of the Catford Cycling Club at the festival sponsored by Catford at Herne Hill in September. Dunlop's, in the early days of cycle racing, had a powerful pacing team. That was at the time when cycling sport, contrary to what some would have us believe, was a dirty sport. There was one occasion, for example, when the manager of a pacing team loosened the handlebar bolts of the machine which was to be ridden by a rival team! There is plenty of evidence of the races being rigged in those days, and of certain winners being bought off the night before. Cycle sport to-day is much cleaner, of course, but there is plenty of room for improvement. The racket of taking the prizes back after presentation to the jeweller and receiving a cash payment equivalent to the cost of the prize, less a commission, is not unknown even to-day!

### Tyres with Detachable Walls

FRANZ ALBERT BEIN has invented a tyre known as the Fad, which he states is suitable for bicycles and motor-vehicles. It is a pneumatic tyre with a detachable tread, and it consists of two independent walls which interlock with the tread. This, it is claimed, provides facilities for quick dismantling. When the tyre is deflated it automatically disintegrates into three parts, and I should think that cyclists would find this quite disconcerting in the event of a burst. The walls, by the way, are interchangeable, and it is said that the tyre is easy to assemble and dismantle and that it eliminates the risk of nipping the inner tube. Also, a new tread costs less than a reconditioned or new tyre. The inventor goes on to claim that there is a saving of about 70 per cent. of rubber and almost 75 per cent. of cord by comparison with existing methods of manufacture. A smaller claim, but not an unimportant one, is that the new tyre eliminates frictional heat due to tractive or rolling resistance, even at high speeds. The walls have ridges which, the inventor thinks, achieves this. I learn that an American firm proposes to go into production with it.

### The Cycle Show

THE Cycle Show takes place this year from Friday, October 21st, to Saturday, October 29th, thus getting in two Saturdays and providing two opportunities for those who only have the Saturday afternoons off to see it. This show will be the twenty-fifth of the series organised by the British Cycle and Motor Cycle Manufacturers' and Traders' Union—and every time I write that mouthful or have to address an envelope with it I long for the day when it will be abbreviated and streamlined to something more in keeping with the machines made by those manufacturers whose interests the Union so assiduously watches and fosters.

### Speed Limit Decision

THE Minister of Transport states that he has made the necessary order to derestrict a 550 yard stretch of the Coventry By-Pass—A45.

### Wales's Highest Inn

DO you know the highest inn in Wales? England's loftiest is at Tan Hill, on the cold and lonely road north of Reeth in Swaledale, Yorkshire, with the Cat and Fiddle (Cheshire) a good second at 1,690 ft. above sea level. Wales's highest is The Sportsman's Arms, on the moorland road between Denbigh and Bettws-y-coed. Its height above sea level is 1,560 ft. It is remarkable, but there are not many inns above the 1,000ft. mark in Wales. Perhaps the best known is the Pen-y-pass, at the head of the Llanberis Pass (1,100 ft.). In Mid-Wales, the Glan Severn Inn, on the Plynlimmon road, just makes it. The loneliest of these lofty inns is the Star at Dylife, a deserted mining village between Machynlleth and Llanidloes on the old road.

*The Brontë Bridge in its wild moorland setting near Haworth, Yorkshire.*

# Wayside Thoughts

By F. J. URRY


*Considered the second finest castle in Great Britain, this massive fortress was begun in the reign of Edward I and completed by his son. The sketch shows the Well Tower, King's Gate entrance, and the Granary Tower.*

**This Satisfaction**

HAVING grown up with cycling, quite paradoxically I feel I shall never grow up. A ride under June skies, when the air is full of the flavour of the earth and all growing things makes a man wonder why he is sometimes dissatisfied with life. If there is anything more refreshing, more inducive to a quiet feeling of contentment, then I have missed it on my allotted journey. At such times—and how often they occur in the shining days of summer—I wonder why so many people have missed such quiet pleasures which act as a balm to the fevered flow of life. I suppose they either do not know, and there must be thousands such, or (and I'm afraid this is the case with many people) they look upon cycling as a low type of travel mainly designed for the impecunious, and really not to be considered by the standards of health and simple happiness. And there exists, of course, an enormous number of folk who, involved in the hurrying vortex of modern life, imagine they have no time to step aside from its maelstrom occasionally and become natural, individualistic and endowed with a personal freedom only obtainable in the atmosphere of country life. I may be wrong in my summing-up, in my intense feeling that even the faintly artificial finally slurs the smooth living of life; but I am at least certain it suits my mode of existence, giving to me that rhythm in the scheme of things that rub out the inconsistencies and irritations.

**And the Way of It**

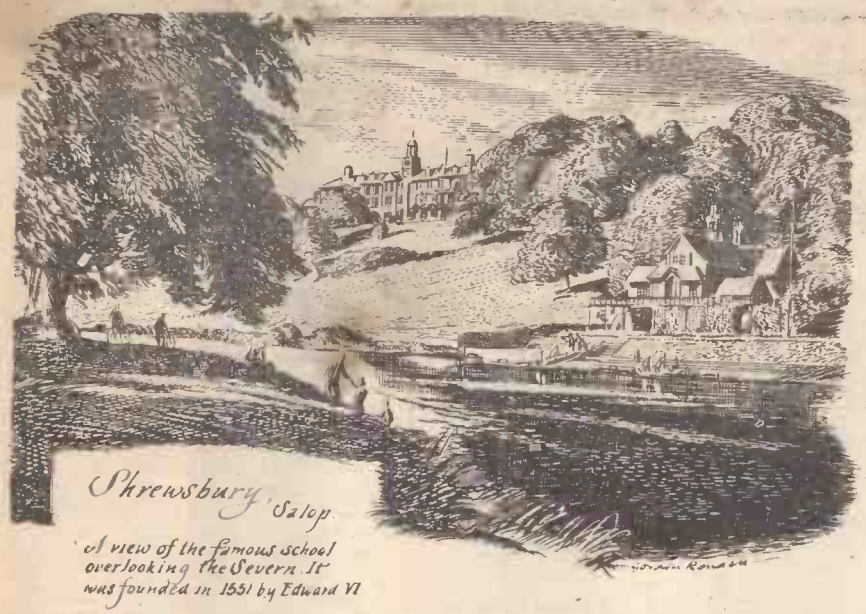
LIFE to-day is so full of little difficulties that it is a relief to leave them behind for an hour or so, and in that short space of time rediscover the verities that resist invasion and make a man glad there are still a few simple things left in this world if he will take the joy to seek them. None of us who earn a living can escape the impact of trouble, the doubts that assail us, or the severe handicaps of direct or indirect taxation. We can only hope the conditions will improve, and the better belief in this idea is evident when you turn from the town and the telephone to the green and gold of a countryside over which flows the sunshine and the warm wind. That perhaps is the main reason why holidays have become an essential in the modern world; we have to take a little free time from the frictional wear of this urgent way of life to recover from the sore places it rubs into our minds. But the space between holidays is sometimes a long and weary one, and for that reason I advocate the frequent use of a bicycle during those shy hours between the end of work and the beginning of bed, hours that most of us fritter away so carelessly that we never quite measure their worth. I use them to go out—just that—and in those simple words another life exists for me, and I believe it would for many another once the habit was formed. And in using the word habit I would have you understand its casual meaning in this sense; I make a decision on the instant of signing the last letter; the sky may be clear or the storm blowing up, what does it matter?—for both conditions are of nature, and it is to nature we must turn in order to be human, and to accept the beauty, in shine or storm, scattered around us. Shaped to sentences, these thoughts appear trite, a mountain made of a mole hill, a picture from a careless thought, but, believe me, in action they are compacted of the grace and loveliness of living, veritable oases in the dreary drift of the days.

**Now, and the Long Ago**

I WAS out recently watching the lads perform over the measured miles on a quiet evening in June, and it was delightful to think that over 50 years ago I was doing the same thing over some of the same roads, but travelling a good deal more slowly. These boys were trying to beat the hour for a "25," and actually one of them did, while the bright young men seven or eight minutes longer on the journey were disappointed with their form. I have just looked up the record printed on a volume of poems, my first road-racing prize won in June, 1897, and the time is there recorded, 1 hr. 12 m. 3 s., good enough then to win. What has happened to men and machines to so improve the speed of performances? Better roads, it is true, and perhaps better bicycles, particularly tyres and bearings; but more than anything else I imagine it to be intensive training. In my day our method of getting fit, generally speaking, was the club run, the fierce whisk from place to place, and sometimes the long, hard ride until one of us cried enough! And all of us finished the performance shaking at the knees and with a thirst which demanded large quantities of the nearest liquid available. Anyhow, it was great fun if it was not training, and in any case it was cycling, and when we could afford it, week-end cycling with a couple of centuries attached, or as nearly as we could make them. I saw the modern generation start out and come home, nice comely lads as keen on the good game as their elders were, but many more of them. And I thought, will these boys grow into cyclists when the speed urge dies down in them? To-day their vivid interest is in the game; will it be in the pastime to-morrow? I hope so for their sake, for there has never been a greater boon given to humanity; but sometimes a doubt assails me, for I see far too many cycling officials who have remembered the car and forgotten the bicycle. Business, they say, makes the car necessary, which may be partly true in some cases, but on such excuses is superimposed the muscular idleness that settles on a man with the "middle-aged spread."

**West, into the Winds**

I WAS reminded of this thought on a recent occasion when I was on my way to the 70th birthday of that fine old Merseyside club, the Anfield B.C. Out on the road the day started full of storm with a S.W. half-gale bringing up the grey battalions of cloud, wave upon wave. Within a mile of home I sat in a bus shelter for a specially fierce edition to swing over, and while the end of it was still weeping its departure donned a mack and butted into the wind. In thirteen miles I had three such attacks to deal with, and just as the last of them was going over and showing a faint streak of blue in the sky, a car swept by and in a few yards, pulled up. It was full of friends going to a cycling meeting, men who had been good riders in the days of their youth and young manhood, but had allowed themselves to get tired when the "middle-aged spread" invaded their midriffs. So now they tell other people how to ride instead of showing them; which I suppose is better than nothing, but not quite satisfactory. "Where are you going?" they asked, and I told them. "We're going through to there, so come aboard and we'll tuck your bicycle in the boot; it's better than riding into this wind and rain." That was very nice of them and I appreciated the kindly gesture; there have been times when I might have welcomed it. They seemed astonished when I refused the offer, giving as my excuse the fact that I was enjoying the ride—strange as it may seem to them—that I was doing it for fun and in any case a little rain was a perfectly natural occurrence and, if it didn't happen, we'd all be dead in six months. They told me I was incorrigible, slipped in the clutch and disappeared; they probably called me all sorts of other names in the next mile or so. Within a quarter of an hour two other car drivers of my acquaintance stopped after passing me and made similar offers. Evidently they thought the old man was a trifle mad. I can forgive my two latter friends, for they had never been cyclists in the loyal sense of the word, but the first car load were all old riders, and two of them famous in racing circles.




*A view of the famous school overlooking the Severn. It was founded in 1551 by Edward VI*

# CYCLORAMA

By H. W. ELEY

## The Essential Bike

IT takes residence in the heart of the country to bring one to a full appreciation of the value and virtues of the cycle! Since my retirement into the fastnesses of picturesque Derbyshire, I have done a fair amount of cycling, and have discovered that rural life without a bike would be almost impossible. Those trips to neighbouring villages in connection with the thousand and one matters one has to deal with in the running of a country home; those pleasant afternoon runs to some beauty spot, for a relaxation from the gardening jobs and "chores"; those visits to the near-by town, to arrange the grocery order, buy the implements for coping with the hedges, ditches, and paths . . . how would all these be accomplished without the aid of the cycle? Yes! it is small wonder that the average country-town cycle dealer has steady sales, and a good display in his window!

## Get Ready for King Winter

FOR many years I have tried to persuade my young cycling friends to pay some attention to their machines before winter arrives. All too often, the average rider neglects to clean and oil his bike in readiness for winter riding, and he certainly does not give it that overhaul which makes so much difference when it comes to riding along muddy roads and facing the quick changing weather conditions which are the feature of the English winter season. What a big difference it makes if the old mount is thoroughly cleaned and put in good trim for the severer conditions of winter riding. But I must not "preach"—although it is the prerogative of the older rider to pass on good advice to the youngsters.

## Another Page from the Past

MY recent reference to old cycle catalogues and old makes of machines continues to bring me interesting letters from "old-timers," and I have before me, as I write, a long and chatty letter from Mr. Rex Page, who writes from King's Langley, in "homely Hertfordshire." He tells me that when he was about fifteen he purchased for the noble sum of 15s. a "penny farthing" machine, and had great fun on it (and off it!) for about a year. At the age of 25 Mr. Page came to London, saw a "Mead" cycle in a shop in Charing Cross Road, and promptly bought it. He describes it as "a nice little bike, with a 'New Departure' coaster hub." And, to conclude a letter full of interesting memories, my correspondent tells of an agent's window in Bridgwater, full of "Chainless Pearson" cycles. I am grateful to Mr. Page for his letter, and for his recorded memories of his youthful cycling days.

## October Charm

EACH month of the year has its own particular fascination for the nature-lover, and it is not only the sunny days of May or the sultry afternoons of August which make their appeal. October . . . mellow and fruitful . . . has its own charms, and, living as I am in a well-wooded countryside, I am enjoying to the full the delights of colourful woodland, ridges of trees where, on these fine October afternoons, the leaves are golden, and russet, and brown . . . and Mother Nature paints the scene in gorgeous tints and hues. Not too late to gather mushrooms on the dew-drenched fields, if one is willing to get up early enough in the morning; not too late to admire the gardens, where the Michaelmas daisies are abloom in the border and the tall hollyhocks are not over. And it is quite the best time of the year to go out in search of a rabbit. My 16-bore gun, purchased with country pursuits in view before I left London Town, has done good duty, and stewed rabbit has been a favourite and popular dish for these last weeks. Sometimes a wood-pigeon falls to my shot, and I have no regrets at bringing down this marauder of corn and peas.

## Nostalgia

ONE does not leave London, and all the excitements of the advertising business, without some regrets . . . and I am sorry that I am not able to attend those cheery meetings of the "Roadfarers" Club as frequently as of yore. What good lunch-time meetings those were. With Messrs. Camm and West organising the affair, and with a keen club spirit actuating every member, no wonder that this young club made such rapid and healthy progress. But I am always with the members in spirit when they foregather at the Savoy, and I recall the speeches of the past, and the good chats I always had with my old friend, Coles-Webb . . . who, I trust, is as "young" as ever, and as full of enthusiasm for cycling and all connected with it.

## The Power of Colour

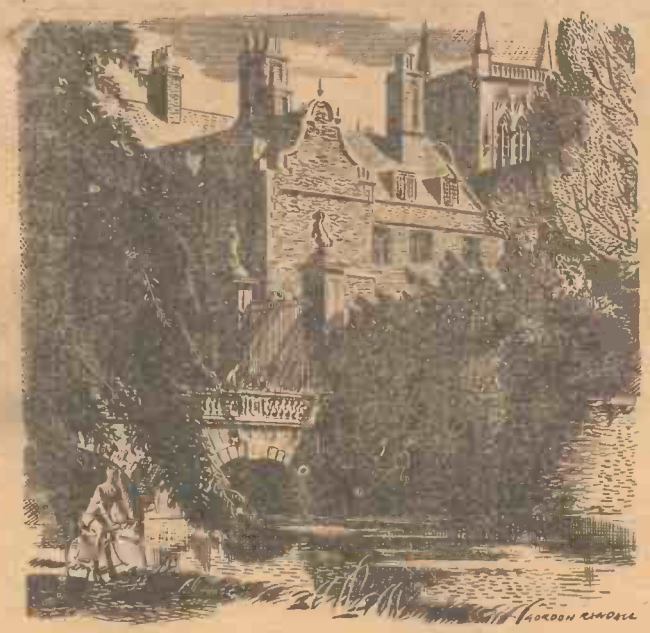
NOT only on bikes (and how fine some of the gaily-coloured sporting machines look these days)—but in advertisements. I have been looking at some of the coloured "Hercules" appeals on the backs of some journals, and I thought how gratified my good friend McLachlan, that company's advertising manager, must be at these sales-efforts in connection with the bike which one meets so frequently on the roads. Manufacturers have discovered that COLOUR is a magnet . . . a power in selling . . . and, with somewhat easier paper conditions, it is good to see that some newspapers can now give the advertiser colour. For too long the British manufacturer, and the British people, stuck to sombre hues: it is well to take a tip from Mother Nature in this matter—she knows how to tint the scene!

## Keeping "Tyre Conscious"

RIDING, as I now do, on many rough country roads and lanes I find that I am more conscious of my tyres than when in town. Even a good rugged roadster tread will pick up grit and stones, and I find it helpful to take a look at my tyres after a run, and keep them free from "menaces." But, on the whole, these Derbyshire roads are in tip-top condition, and the County Council does a good and worthy road job. And signposts are clear and newly-painted . . . so that when I find myself in unfamiliar lanes I am soon directed to the hamlet I seek. And how pleasant are some of these Derbyshire villages, hard by the border of Staffordshire. Big and well-kept farms; duck-ponds where the ducks glide like flotillas over the water; little inns where the signs are homely and inviting . . . "The Three Horse Shoes," "The Haycock," "The Roan Mare." I love them all, and am glad that my lines have fallen in pleasant places, and that I may ride in a green and smiling land.

# My Point of View

By "WAYFARER"



*St. John's, Cambridge, seen from the river Cam. This beautiful College was founded by Lady Margaret Beaufort in 1509.*

### *Inviting Trouble*

A SERIOUS "accident" recently occurred in the Midlands, when a woman motorist, ignoring a "Halt" sign, is said to have dashed over a road-junction at 40 miles an hour. Unfortunately, a motor-lorry was in the way. A collision occurred, with the result that the woman and her companion were killed, the third occupant of the private car being severely injured. Fate, at times, is more than willing to oblige people who clamour—positively clamour—for trouble. Here, I think, is a case in point.

### *Out of the Rut*

CAN it be accepted as a statement of fact that most of us, long before reaching middle age, settle down to live stodgy lives, accepting an unimaginative programme which comprehends a regular visit to "the pictures," a spot of gardening (not to be deprecated!), an occasional journey to "the local," and a lot of sleep at the week-ends? I believe that to be a not unfair picture of the life—or the existence—of the average man and woman. How different is the case of the cyclist! He, too (or she), may be a regular patron of the said "pictures," and may grow vegetables and flowers and may sample the local brew from time to time, but he (or she) gets out of the rut at week-ends, seeking (and finding) enrichment of body and mind by going off to encompass new scenes, new experiences and new horizons—not to mention a change of food.

This train of thought arose simply because a few days ago I happened to pass the house of a middle-aged couple whom I have known for some years. They possess three children —their main source of wealth, though their own mental and physical health, their enlightened minds and the knowledge they possess are things not to be sneezed at!—who have been brought up properly. That is to say, they are all cyclists, passive or active. As soon as possible, No. 1 baby commenced to share its parents' excursions into the country, first in a side-car and then on a tandem. When the family increased in number the bicycle idea developed, a second tandem being purchased, followed by a triplet, with singles being made available for the growing youngsters. If ever a middle-aged couple climbed well and truly out of the rut and avoided the mental stodginess which so often arrives in the middle thirties the people here mentioned have done so, and to a marked degree. Theirs is the joy of the open road and the wind on the heath, and the infinite delights of the ever-changing countryside and the unending pageantry of nature and the frequent glimpses of distant hills. For others—less-enlightened folk—the (very) common round—and stodginess! Yet for all, or nearly all, there are much greater and finer things than "the pictures" and "the local."

### *Super-Nonsense*

IN days to come, when the mysteries of this world are revealed to us, we shall realise exactly why cyclists are now threatened with compulsion to wear three forms of rear "protection"—a lamp, a reflector and a white patch; why, indeed, any form of "protection" is required when obviously the onus of avoiding trouble must rest on the overtaker; and why the reflector, having (it is to be presumed) been found wanting by people in an awful hurry and thus compulsorily superseded by a live lamp, may yet be relied upon if and when the lamp fails to function. There are some things which "no feller can understand," and this is one of them. It is super-nonsense. It is a case of the largest class of road-user being dragooned by a minority of people who insist on fast night driving in all circumstances, and who persistently refuse to adopt the elementary precaution of relying on their own head-lights to show them the way—people who claim the right to "drive blind," and who cannot see (or will not see) that reason and commonsense demand that their pace must bear strict relation to the power of their lamps and their brakes.

The half-hearted testimonial to the value of the reflecting device, which is implicit in the suggested regulation that we cyclists should carry all three forms of "protection," is welcome: it is also unnecessary because the effectiveness of such devices can be seen on roadside notices (official or advertising), on the cats' eyes which motorists proclaim are so very useful in indicating the middle of the road, and in the recesses of some of our modern concrete kerbing. Why, then, is the reflector useful on a bicycle only as a stand-by in case the live lamp fails? I cannot answer that question except by repeating the parrot-cry of motorists to the effect that the reflector on a bicycle cannot be seen!

For the position which has unfortunately now come about, we cyclists have only ourselves to blame. Some of us have seen the red light (abstract) and have inveighed against it for years. If we had joined our national cycling bodies in hundreds of thousands instead of in paltry thousands we would not have come to this pass, the development of which may well be that, when the rear lamp and the reflector and the white patch have failed, and it has been found impossible to compel us to carry on our backs a string of phosphorescent kippers and to send up a rocket at frequent intervals, then there will be only one remedy left—the roads (which belong to the public and which are open to all) will be denied to us. That is what will happen if the existing apathy continues, and if our cause is sabotaged by the vast majority of cyclists who will not raise a little finger, or pay a cent, in the conservation of their rights.

### *Fragrant Names*

IS anybody here interested in the announcement that electricity charges for consumers in Morar, Lochalsh, Lochcarron, Skye and the Fort William area are to be reduced? Yes! I am! My mind, rather than my pocket, is affected by that news, because each of those names has a "heather-honey taste" upon it. Morar—its loch, its falls, its silver strand, its views of the Island of Skye. Lochalsh—its promise of the joys to come on that tumbled island across the tide. Lochcarron—its sublime views and its memories of Strome Ferry. Skye—its infinite glories. Fort William—its mighty background of Ben Nevis, its neighbouring lochs, its Great Glen and the "Road to the Isles."

### *Cyclists' Loss*

WHEN tootling along the Holyhead Road one evening at the end of July I called to see my ancient gossip, Mrs. Jones, of "Rose Cottage," Felton Butler, and I was sorry to learn that, not unexpectedly, she had died a few weeks earlier. I have been a regular visitor at "Rose Cottage" for about 20 years, and found that Mrs. Jones was one of the best caterers ever. She was a grand and most efficient house-keeper, and the way in which she produced eatables—mostly home-made or home-grown—from her magical larder was marvellous. Her death is a sad loss to cyclists and to mountaineers, all of whom had a great opinion of her hospitality. I always viewed her establishment as No. 1 in Shropshire, and I was wont to say that, given a bundle of firewood, she would transmute it into a delicious dish. That, of course, was an exaggeration, but it is *no* exaggeration to assert that a commonplace rabbit, passing through her hands, was almost as good as pheasant when it appeared on the table.



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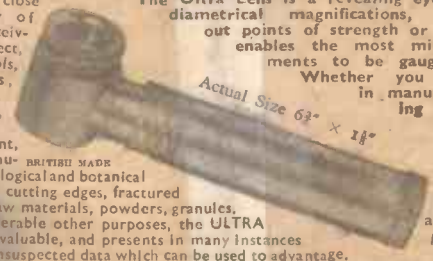


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