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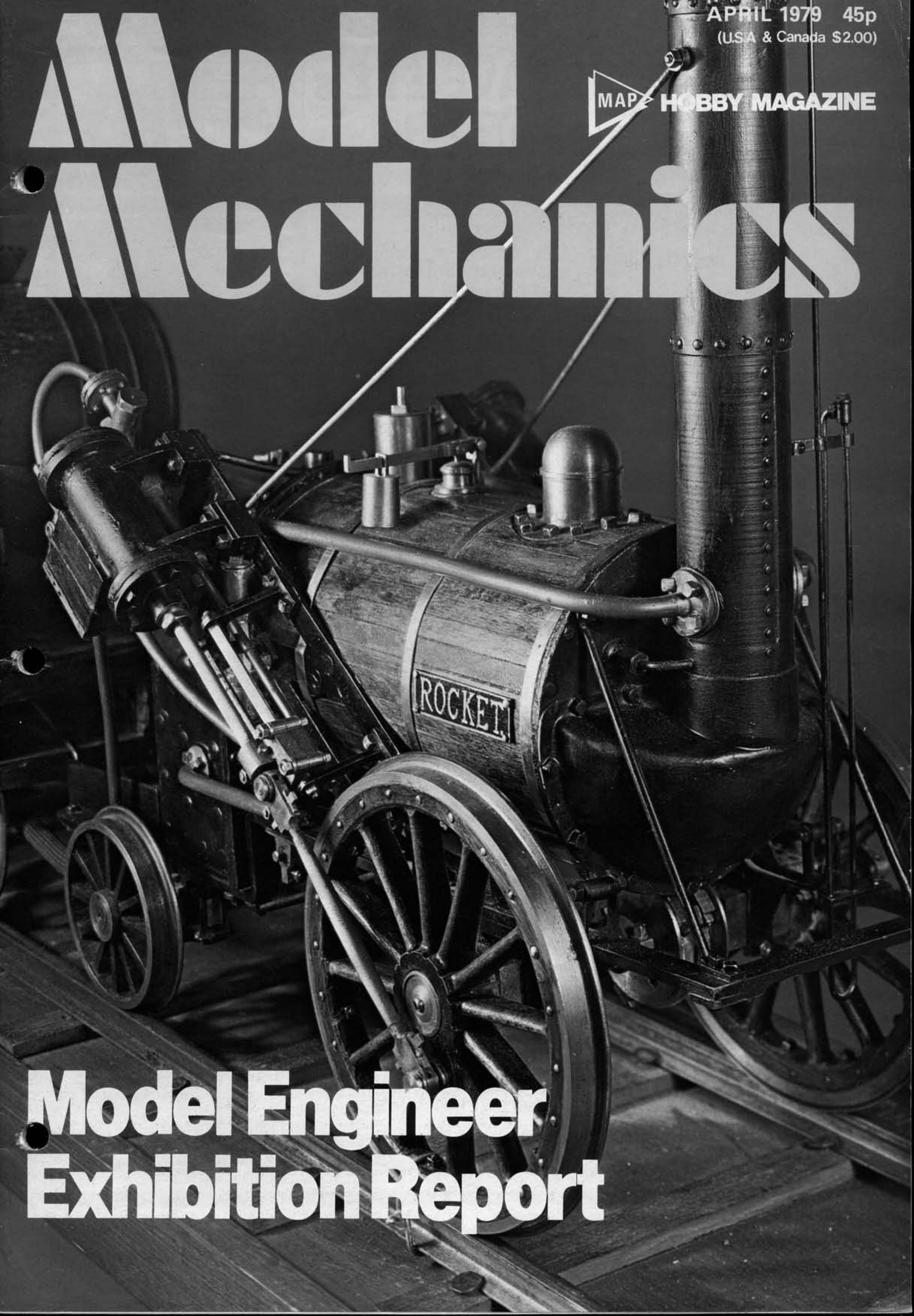
Model Mechanics

MAP HOBBY MAGAZINE



Model Engineer Exhibition Report

centre tapped i.e. a tapping in the centre of the winding). We would now transfer the test leads to this winding and will find that the meter shows a very low reading. Now reduce the range switch progressively until we have a good indication. Check also the voltage from the centre tap to each end — the reading will be half the total. We are beginning to 'see' what is happening using the meter, in our power unit. We can next check the rectified voltage DC across the 220 microfarad filter capacitor.

Remember before connecting to set the instrument properly. Change to DC voltage and select say 100 volt range, reducing to the lowest range that permits the reading to be 'on scale'. When we measured the AC voltage it was unimportant which way round each test lead was connected to the circuit. DC measurements are different in this respect as we are dealing with a polarised or uni-directional voltage. If the meter goes the 'wrong way', simply reverse the leads. Not only can this tell us which terminal is positive with respect to the other, but by observing the actual circuit we can say whether the result is correct. We should find in fact a reading of approximately 14v DC. A point worth noting here, we have 14 volts DC out, yet only 9.5 volts AC in, so let us explain. The capacitor (220 microfarad) allows the DC voltage to rise to the peak value of the rectified DC waveform (Fig. 3). This peak value is 1.414 times the RMS (root, mean, square) value of the AC waveform (for a sine-shaped waveform).

AC meters are calibrated to read the RMS value, as RMS values of voltage and current give equivalent power readings (in resistive circuits) to those that would be obtained from the same DC readings. So a DC voltage across the filter capacitor, as we have here and when the power unit is unloaded, will indicate 1.414 times the AC input.

Let us now make some load measurements as this will involve setting the meter to a current range of about 150 mA DC. We can calculate various loads using Ohms' law and see whether or not these work out correctly in practice.

Taking loads of 50 mA, 100 mA, 150 mA, and Ohm's law:

$$R = \frac{V}{I}$$

R = load resistance in ohms
V = voltage in volts
I = current in **amperes**.

So, for 50 mA (0.05 Amperes) $R = \frac{8}{.05} = 160\Omega$ and similarly 100 mA (0.1A) = 80Ω and 150 mA = 53.5Ω. These 3 resistance values are in fact non-standard values and the nearest standard (or easily obtainable) values would be 150Ω, 82Ω, and 56Ω giving approximately the currents we wish to measure i.e., 53.5 mA, 97.5 mA and 143 mA. Do not forget that we can check the values of these resistances by using the appropriate resistance range on our meter.

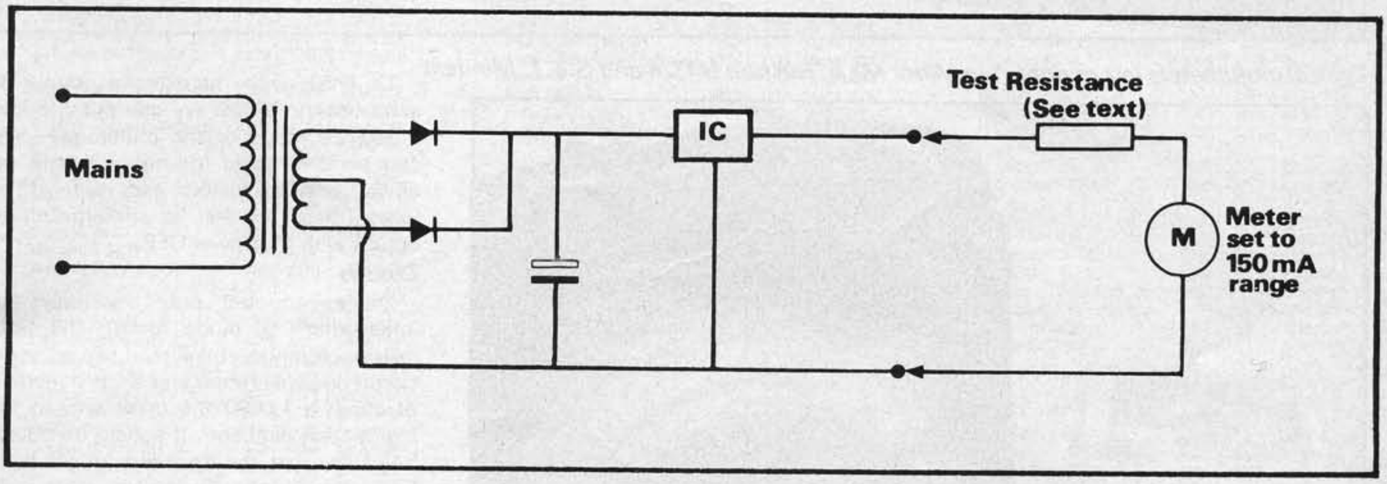
Connect the meter and each resistance (Fig. 2), in turn in series across the output of the power unit and take a reading. Before actually rushing to your local stockists to buy your resistances we must ensure that they will be large enough to dissipate the heat which will be generated without damage. This heat is measured in watts and a resistance is specified by wattage, as well as resistance value (and tolerance or accuracy — in our case 5% will suffice). It is quite simple to derive an expression for wattage rating or power from Ohms' law.

Power in a DC circuit (W) = volts × amperes. So $W = V \times I$ (1) but; from Ohms' law $I = \frac{V}{R}$ so if we replace I in (1) we have $W = V \times \frac{V}{R}$ or $\frac{V^2}{R}$ (2) also we can replace V in (1) by IR (V = IR) i.e. $W = \frac{8^2}{150} = 0.43$ Watt, the nearest standard rating is ½ Watt. Similarly the 82Ω would be 0.78W (1W) and the 56Ω 1.14W (2W). Summing up we would purchase a 150Ω 5% ½W resistance, and 82Ω 5% 1W and a 56Ω 5% 2W, each cost only a few pence each.

A good idea is to look out for surplus electronic equipment which will contain dozens of parts for quite a small sum and these can usually be cut out or unsoldered with care and placed in small containers for future use.

I think one can see the value of possessing a simple multimeter which will perform a large proportion of the tests usually required in electronics.

Two miniature meters useful for the beginner are available from AGW Electronics Ltd.



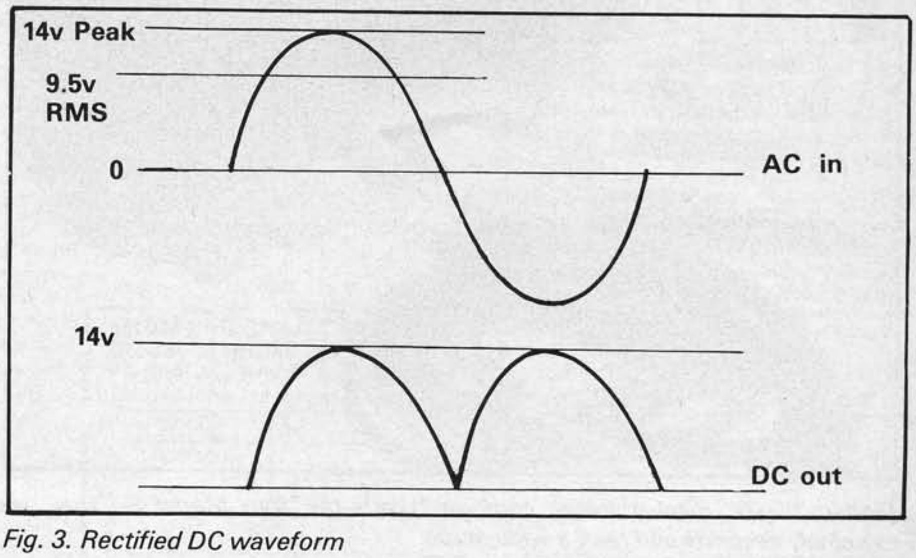
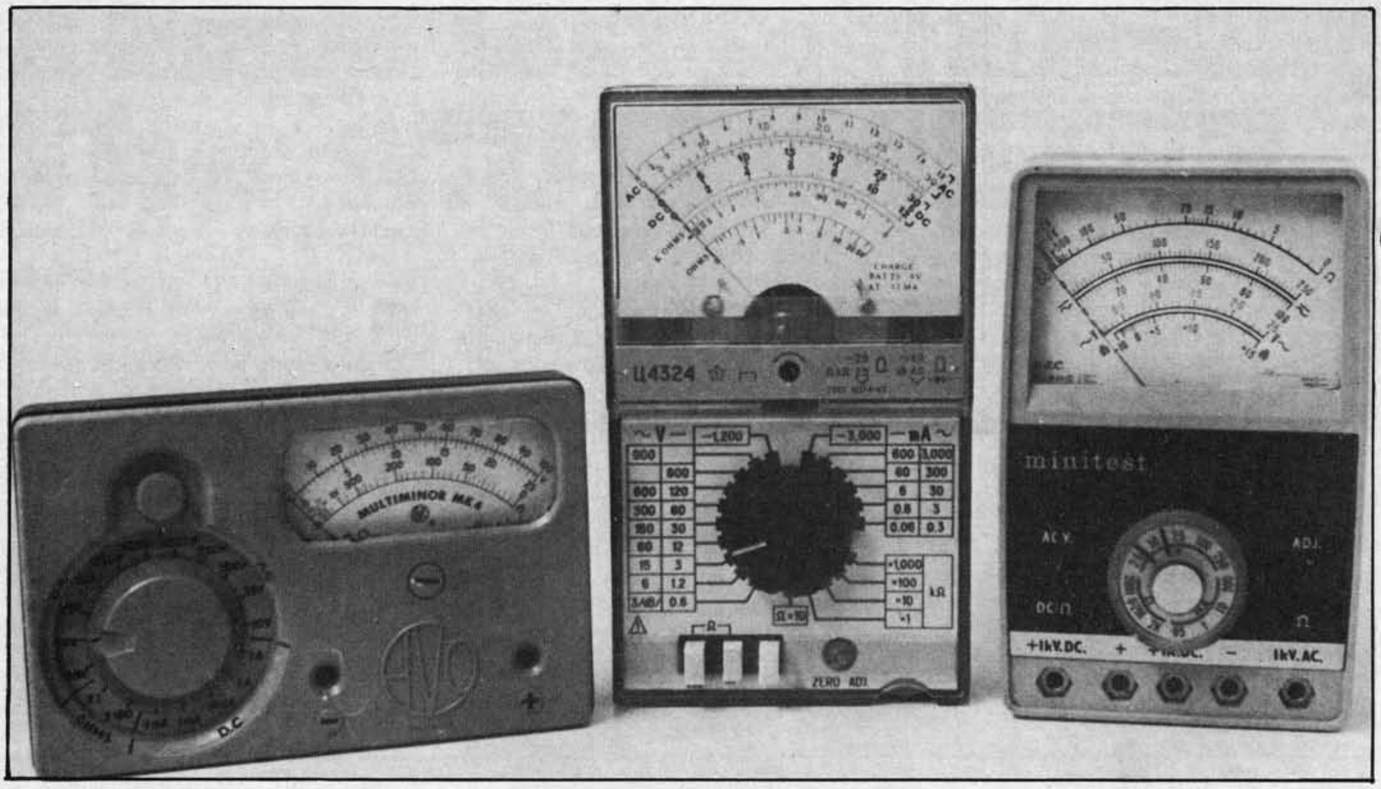
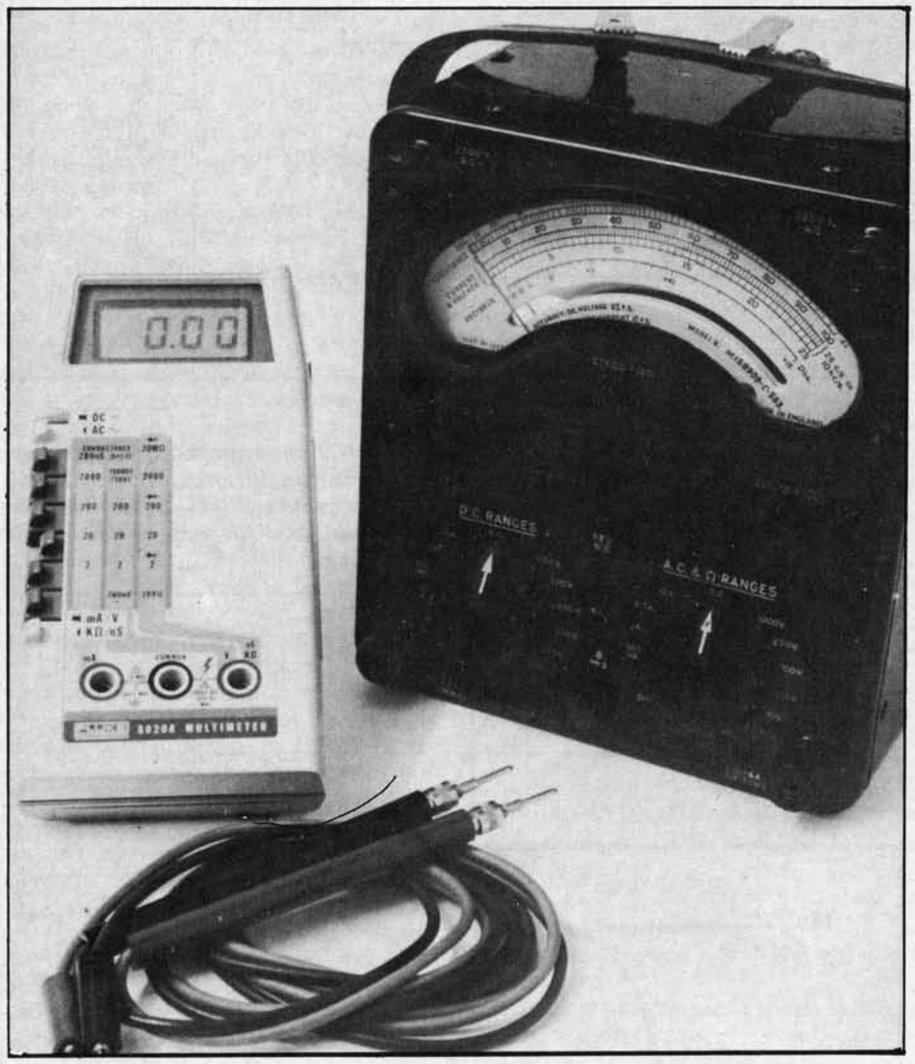


Fig. 3. Rectified DC waveform



Typical multimeters left to right Avo Minor Mk 4, Russian U4324 and S.E.1. Minitest



Modern digital display meter compared with the Avo Model 8. They are extremely accurate and have a wide range

To finish with, here are a couple of extra uses to which we can put the low resistance range of the multimeter. We can perform basic 'go-no go' tests on diodes and transistors and quite often whilst these are still 'in circuit', but of course with the power OFF.

Diodes

Diodes conduct only one way, so 'measuring' a diode using the low resistance range, it will read like an open circuit one way round and show a reading of about a 1,000Ω the other way in the conducting direction. It should be noted, however, that the **negative** meter lead, for normal measurement, carries a **positive** voltage when used on resistance.

For a diode to give a reading in the conducting direction the negative meter lead must connect to the anode end of the diode. (The cathode end of most diodes is marked with a colour band).

A rough check on a transistor can be made in the same sort of way.

Transistors

You may remember from my first article that we have PNP and NPN transistor types. To carry out this rough check, first determine this by type number and your reference book, then connect the meter across the emitter and collector wires. Connect the positive voltage lead to the collector of NPN types and vice versa.

In each case no reading should be visible in the meter. Now join the base wire to the collector of the transistor being tested, and note the meter will read about 1,000Ω if OK. Remember this is a rough, but useful check, which will show a faulty transistor, but not ensure that all parameters are up to specification.

To be continued

Model Mechanics

PROTOTYPE CAR PLANS

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A/Romeo P3 Monoposto	1932	1/8	MM/132
Alfa Romeo 158	1946	1/8	MM/184
A/Romeo 6c Gran Sport	1925	1/12	MM/397
Allard J2X Comp 2-str.	1952	1/10	MM/227
Alta G.P.	1949	1/8	MM/139
Aston Martin Ulster	1936	1/8	MM/207
A/Martin DB2 Saloon	1949	1/10	MM/224
Aston Martin DB4	1958	1/10	MM/628
A/Martin DBR1/300	1958	1/10	MM/527
Aston Martin G.P. DBR4/250	1959	1/12	MM/562
Austin 744cc O.H.C.	1936	1/8	MM/205
Austin Ulster	1929	1/12	MM/288
Austin Healey	1955	1/12	MM/341
Auto Union G.P.	1938	1/8	MM/134
A/Union 6L Type C	1934	1/12	MM/569
Bentley 4½ L Le Mans	1938	1/10	MM/202
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Bugatti 40	1927	1/8	MM/210
Bugatti 3.3L G.P.	1934	1/8	MM/243
Bugatti 251 F.1	1956	1/10	MM/633
Cisitalia G.P.	1948	1/12	MM/691
Citroen Cloverleaf	1922	1/10	MM/411
Connaught Comp 2Str.	1949	1/8	MM/194
Connaught Dart	1957	1/12	MM/557
Connaught F2	1952	1/12	MM/246
Cooper Climax	1958	1/12	MM/514
Cooper Record Car	1951	1/10	MM/230
Cooper Bristol	1952	1/12	MM/249
Cooper Bristol Mk. II	1953	1/12	MM/280
Cooper Norton Mk. VII	1953	1/12	MM/287
Cooper 1100	1955	1/8	MM/421

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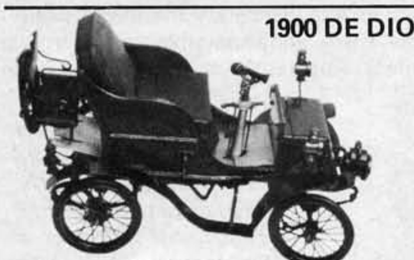
D.A. Lubricant Special	1958	1/12	MM/558
Daimler	1886	1/12	MM/477
Daimler S.P.250	1960	1/12	MM/639
Darracq	1904	1/12	MM/315
Delage 1½L. G.P.	1925	1/8	MM/140
Dellow Mk. V	1954	1/8	MM/383
Dyna Panhard Jnr.	1954	1/9	MM/333
E.R.A. D Type	1938	1/10	MM/129
E.R.A. E Type	1938	1/8	MM/133
Ferguson F.1	1961	1/12	MM/661
Ferrari 125 G.P.	1949	1/8	MM/197
Ferrari 4½ L	1950	1/12	MM/239
Ferrari F.2	1952	1/12	MM/262
Ferrari 2½ L G.P.	1955	1/10	MM/360
Dino Ferrari Standard Model	1958	1/12	MM/584
Ferrari Testa Rossa	1958	1/12	MM/517
Ferrari 555 Super Squalo	1955	1/12	MM/707
Ferrari F.1	1961	1/10	MM/658
Ford Zephyr	1953	1/10	MM/275
Ford Model T	1922	1/12	MM/373
Fordson Major Tractor	1955	1/10	MM/414
G.M. Firebird	1955	1/10	MM/371
Gordini 2L	1952	1/12	MM/259
H.R.G. 1½L.	1937	1/8	MM/200
H.W.M. F.2	1951	1/12	MM/257
Jaguar 3½ L. Mk. VII	1950	1/12	MM/298
Jaguar XK 120	1948	1/8	MM/171
Jaguar D Type	1957	1/10	MM/519
Jaguar Type E	1961	1/12	MM/643
Kieft 1½ L. Sports	1953	1/12	MM/290
Lago Talbot ½ L G.P.	1947	1/8	MM/179
Lancia Ferrari F.1	1956	1/12	MM/509
Lotus F.1	1958	1/12	MM/532
Lotus XV	1958	1/12	MM/534
Lotus 20	1961	1/12	MM/668

CAR	Year	Scale	Plan No.
Maserati 1½ L 6c	1936	1/8	MM/145
Maserati 4CLT	1948	1/8	MM/177
Maserati 250F	1957	1/12	MM/548
Maserati Type 61 Birdcage	1960	1/16	MM/697
Mercedes Benz 1½ L	1939	1/8	MM/149
Mercedes	1908	1/10	MM/186
Mercedes 300SL	1955	1/12	MM/388
Mercedes Benz G.P.	1938	1/8	MM/130
Mercedes Benz 2½ L G.P.	1954	1/12	MM/345
Mercedes Benz 163	1939	1/12	MM/623
Mercer Raceabout	1910	1/12	MM/368
Mercedes Benz W.196	1954	1/12	MM/674
Mercedes B.300 SLR	1955	1/12	MM/648
M.G. Gardener Record Car	1939–46	1/10	MM/131
M.G. Midget T.D.	1950	1/8	MM/213
M.G.A.	1955	1/8	MM/404
M.G. EX181	1957	1/8	MM/671
Morris Bullnose	1924	1/12	MM/502
Novi Special	1947	1/12	MM/379
Pegaso	1953	1/12	MM/328
Porsche Spyder	1958	1/12	MM/525
Porsche F.2	1959	1/12	MM/571
Railton Special	1938	1/16	MM/192
Reo	1904	1/12	MM/399
Rhiando Trimax	1950	1/8	MM/198
Rolls Royce Silver Ghost	1907	1/12	MM/291
Brooklands Riley	1927	1/12	MM/233
Scarab F.1	1960	1/12	MM/604
Sunbeam G.P.	1924	1/8	MM/273
Sunbeam Rapier	1956	1/8	MM/441
S.S.100	1937	1/12	MM/193
Sunbeam Talbot 90	1951	1/12	MM/237
Sunbeam Alpine Sports	1953	1/12	MM/297
Sunbeam Alpine	1959	1/8	MM/681
Sunbeam 350h.p.	1924	1/12	MM/163
Triumph T.R.2	1955	1/8	MM/359
Triumph T.R.4	1962	1/8	MM/710
Vanwall	1956	1/8	MM/446
Vanwall	1958	1/12	MM/552
Vauxhall	1905	1/12	MM/474
Vauxhall 30/98E	1913	1/12	MM/351

WORKING CARS



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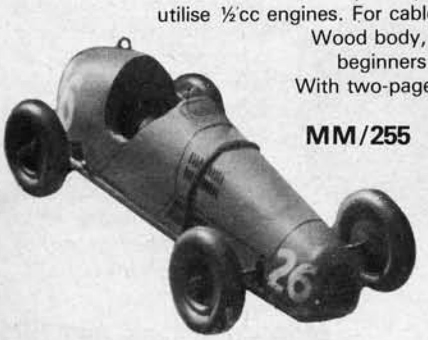

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Tether Car Racing and the 'TRIALIST'

by Geoff S

Wembley

THESE NOTES ARE being written shortly after my visit to the Model Engineer Exhibition. Alas there was no repeat of last year's display of tether cars from the Continent, that re-kindled so much interest. It was, I feel, that exhibit coupled with Tony Higgin's article in *'Model Engineer'*, that started the revival. Unfortunately, the movement has not gathered enough pace yet to be able to put new models to the Show.

I hear that one of last year's exhibitors, our good friend from Munich, Adolf (Adi) Malik did get over on the first week-end, but regretfully, our visits did not coincide. I recall a couple of splendid evenings last year spent along with BTCA chairman, Dick Giles, in the company of Adi and Lydia in their flat in Munich (and in an excellently equipped workshop), catching up on all the latest tether car news and sampling their choice stock of white wine until the early hours. Incidentally, Lydia is as great an enthusiast as Adi, regularly acting as Timekeeper at the Kapfenhardt circuit.

In addition to persuading OPS engines to go at an indecent speed, Adi performs a neat line in operations on Super Tigres, machining off the front of the crankcase, then grafting the main bearing onto the rear end. The crankshaft now points in the same direction as the rearward facing exhaust port, thus providing rear-wheel drive in conjunction with the rear-mounted tuned exhaust pipe. I have never got round to asking if he tried front-wheel drive first, and if so why it was not successful, as many fast cars in the old days had F.W.D. Still, I am told that this drastic modification may not be necessary in the future, as prototype Super Tigres have been seen with detachable main bearings.

Returning to the subject of the Exhibition, the only working scratch-built cars I could find were the radio-controlled stock cars of Mike Varley and Keith Parkin, plus a couple of radio-controlled saloons. The stock cars were the usual neat and workmanlike job that typifies the work of the lads from Yorkshire.

Hardly in the racing car category, but very much a scratch-built i.c. powered vehicle, was the Scammel Recovery Vehicle in R.E.M.E. dress, built by W. B. Stephens of Tring. This impressive machine appeared to be driven by a 15cc 'Seal' 4-cylinder engine to the design of the late Edgar Westbury. It won a Silver Medal and the Badger Air Brush Cup.

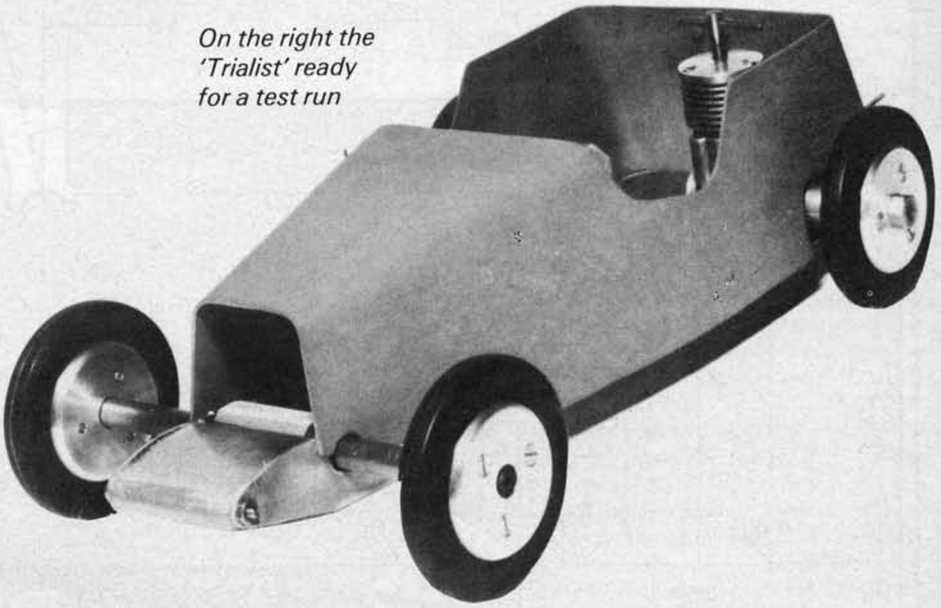
I had a long and interesting conversation with that master car modeller, Gerald Wingrove, whose book I mentioned last month. He tells me that he has another book in preparation, consisting of a collection of drawings of prototype cars suitable for modelling. I look forward to finding this in the bookshop. We discussed the materials used for making small types, and he gave me a couple of addresses of suppliers. He obtains his silicone rubber from Hopkins and Williams, P.O. Box 1, Romford, RM1 1HA. The reference of the rubber is 9161 RTV and the catalyst 9162. I mentioned the problem I had experienced of obtaining small quantities of carbon black. Gerald had the same trouble initially, but he has found the Blythe Colour Works of Cresswell, Stoke-on-Trent to be very helpful.

While I was admiring his display of cars in the case on the Elliott stand, we talked about the differing approaches to car modelling. Gerald feels no urge at all to make a working model, his aim being to produce, as closely as possible, a replica of the full size. On the other hand, later the same day, I returned to the stand with a friend from the Bristol Society (a dedicated live-steam man) whose comment was 'very nice, but they would be a lot better if they worked'. So as you see, opinions vary, but the nice thing about model engineering is that you can please yourself — you are doing the job.

Of the other non-working models in the Exhibition, I found the 1915 Ford Model T Charabanc by C. Hall of Twickenham particularly attractive. A 14-seater, with soft top erected, it was complete with the Shell Mex can on the running board. One intriguing exhibit on the S.M.E.E. stand attracted my attention. Although still in brass finish and not particularly detailed, I felt that, being on this stand, it had a tale to tell, and so it proved. I was lucky in that its builder, John Wright, of Crystal Palace was in attendance on the stand while I was there and was able to fill in the details. Apparently, early in the 1940s, he

Few visitors to the Model Engineer Exhibition fully appreciated this magnificent model of a Scammell Recovery Vehicles by W. B. Stephens of Trin. Inside the true scale engine compartment is a 4-cylinder "Seal" engine. External finish was rated as the best in the show for air-brush finish and that in competition with all kinds of entry from highly detailed aircraft to military dioramas.

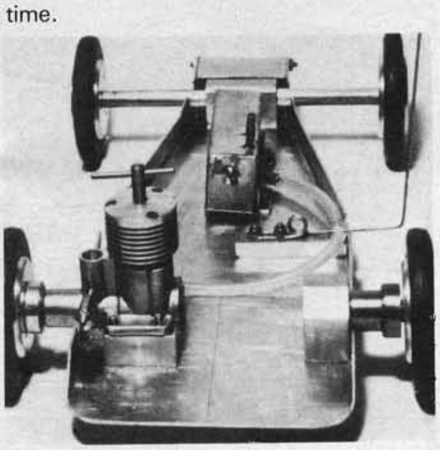
Left: A tear-drop Dooling from the hey-day of tether (or cable) car racing in the 'fifties, one of the cars in Tony Higgins collection.



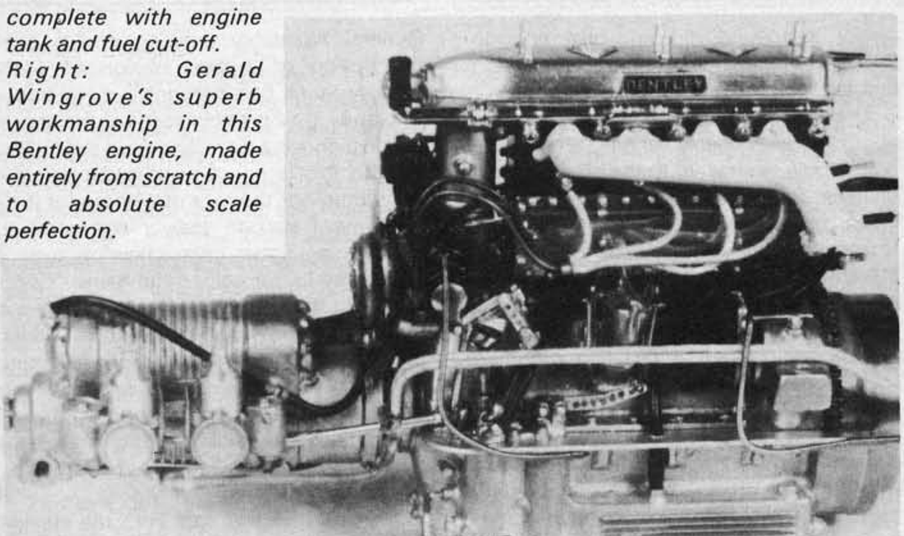
On the right the 'Trialist' ready for a test run

Sheppard

was involved in making some steel pressings. One of the pieces of scrap coming away from the press looked similar in shape to a car front axle, so he put a piece to one side for future use. At a later stage of the war, a photograph in one of the illustrated papers of the time, showed Montgomery standing alongside his Jeep during the desert campaign. Mr. Wright then resolved to build the Jeep to $\frac{1}{10}$ scale, using the previously acquired front axle. The model was built over the period 1943 to 1945, measurements being taken from examples of the full-size vehicle which were, of course, much in evidence at the time.



Above: The 'Trialist' complete with engine tank and fuel cut-off.
Right: Gerald Wingrove's superb workmanship in this Bentley engine, made entirely from scratch and to absolute scale perfection.



Several years later, when Mr. Wright took up caravanning, he built a model of his van to the same scale. This he hitched to the tow-bar of the Jeep and experimented with them, learning how to manoeuver the pair to such effect that the next year he won a major award in driving tests with the full-size van.

To round off these jottings from the exhibition, could I suggest that everyone reading them who is interested in building a model car of any sort, should make an attempt to complete one in time for next year's Exhibition **and to enter it.** It does not matter that you may feel that your standards not not high enough for competition, **put it in the loan section**, and let us see a good variety.

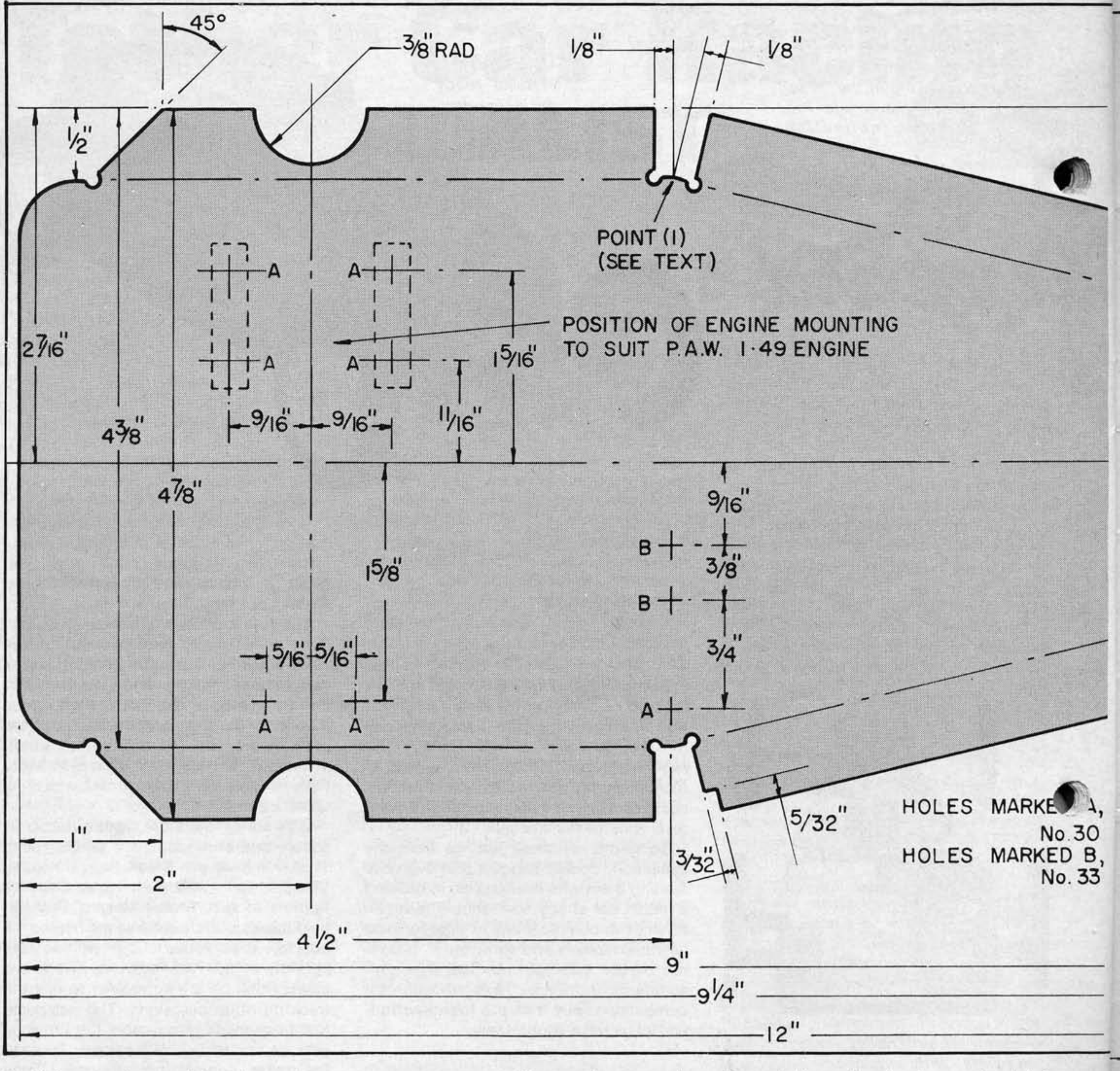
Now — on to Tether Car Running Gear

The first article, in the introduction to 'Tyro', made only brief mention of the track equipment used for running tether cars. When the popularity of the sport was at a peak, in the 1950s, there was a number of purpose-built tracks, but these are now defunct. The only one that I am aware still remains to be seen is in Mote Park in Maidstone, and this is not in a useable condition.

We have, therefore, gone back to square one and adapted a tennis court. This one is at the Brean Sands Holiday Village, and was first used at the Pontins/M.A.P. Model Makers' Festival, held there last October. We are hoping, of course, that tether cars will feature strongly at this year's event, and if the powers that be are agreeable, to use the track on other occasions. The net posts had been made removeable the previous year, so that the whole area could be used for model engineering purposes. Tony Higgins designed us a centre pole, which was made by an eminent model engineer, Derek Williams of the St. Mellons Society. After the initial runs with the pole, Tony has made a few minor modifications to the drawings, mainly to bring it up to FEMA standards. I hear that these drawings are to be made available through M.A.P., so if you wish to make a pole to this design, please write in.

No timekeeping system was used last year, because we were more concerned just to see the cars running after such a long absence. Let's face it, our operating technique was a bit rusty, so no-one achieved headline-making speeds. The provision of timing gear obviously comes high on our list of developments, so I will keep you informed.

The FEMA regulations are specific about the strength of the tether line and



the fixings to be used for the various classes of car. Dick Giles has nearly completed the translation of these from the original German, so they should be available soon through the B.T.C.A.

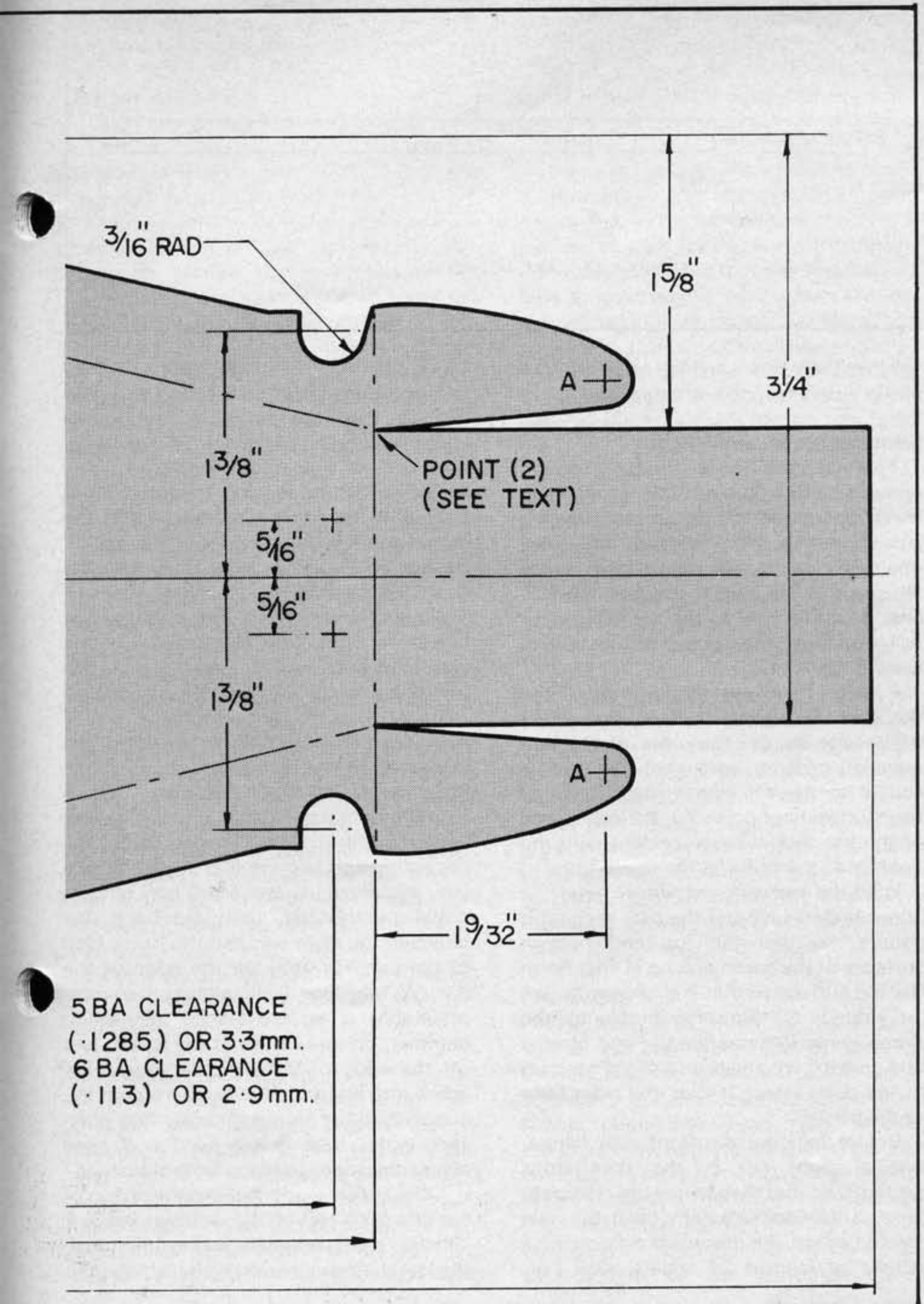
At Brean, we used a stainless steel wire of 20 s.w.g. dia, connected to fork-end fittings with clevis pins (complete with retaining clips) of 5mm dia., which were obtained from the local yacht chandler. It should be remembered that the line when not in use, should be stored carefully on a reel of large dia. (about 9in. min.), and not allowed to develop kinks. We did have one line break at Brean after it was kinked by snagging an obstruction, luckily the damage to Stan Barratt's SMRU-style car was not too serious, being cured with some epoxy glue and a couple of coats of paint.

One point of the design of *Tyro* about which perhaps I did not give enough background, was the direction of rotation and the attachment of the pan handle.

The FEMA regulations are not specific about the direction of running around the centre pole, so it is up to the choice of the designer and builder. If a car is driven by both rear wheels (or alternatively by both front wheels) then it is only the attachment of the pan handle or bridle attachment points, and perhaps the design of the fuel tank and fuel feed system which determines the direction (centrifugal forces can affect fuel flow, and the fuel cut-out lever should be on the outside). If, however, only one wheel is driven, **then that wheel must be on the inside of the circle**, thus keeping the line taut. The attachment points will therefore be on the same side as the driven wheel.

Last month's article included the General Assembly drawing and a brief description of a new design of fairly simple nature, but featuring a metal body. The body style is reminiscent of the sports cars which were popular during the 1930s, though this is no copy of any particular one. I had not thought of a name for it by the time I had to deliver my copy to Hemel, so I have been chewing over it since. The Editor coined the name *'Tyro'*, which so aptly fits the simple beginner's model, so now we need one which represents a little more complication and involvement. In full-size, this type of car was frequently used for a popular form of competitive event of the day, known as the Sporting Trial, so why not *'Trialist'* as a suitable label?

This month I will deal with the chassis and 'works', and next time conclude with the bodywork.



"Trialist" Chassis

The chassis pan introduces a few new features compared with the 'Tyro' design. The rear section is parallel, but the front tapers towards the radiator shell location. This results in the side flanges needing to be split on each side, at the change of section. At the front, these side flanges are profiled to a shape reminiscent of the 'dumb-irons' which carried the front mounting for the leaf springs on many cars. Between the dumb-irons, the chassis pan is folded back over to form the front apron which was a prominent feature of such cars as the M.G.s..

Marking and Cutting-out

To mark out the chassis, once again square up two adjacent edges of a piece of 16 s.w.g. or 18 s.w.g. aluminium sheet, measuring about 12in. × 5in. Coat with marking-out fluid and, from the master long edge, scribe those lines which run parallel to it. These will be the centre line, the fold lines for the rear flanges, the opposite flange edge and the sides of the piece forming the apron. I notice in his article on the oscillating steam engine in issue (1), John Wheeler recommends marking fold lines in sheet metal in pencil. I appreciate his reasoning behind this suggestion, because a deeply-scored line is a stress raiser, which could initiate a crack when the metal is folded. I have never experienced this problem personally, perhaps because with the use of marking-out fluid, I tend to keep the scribed lines fairly light. With the ham-fisted way in which I handle the job, pencil lines would soon be rubbed off, then I would be lost!

As it is, I seem to have enough of a problem keeping the coat of marking-out fluid intact until the job is finished. Still, it is an excellent suggestion, so if you have a fairly delicate touch, go right ahead.

The next lines to be marked are the transverse ones. Working from the rear edge, the main ones are: rear axle centre line, end of parallel chassis section, front axle centre line, apron bottom fold line, extreme front edge of apron.

Marking Tools Required

The accuracy we require in setting out the tapered section of the chassis does not call for any elaborate equipment, a steel rule will suffice. Identify, on each side of the centre, the following points:

(1) where the fold line of the rear side flange cuts the transverse line at the change of chassis section; and

(2) where the transverse line identifying the apron bottom fold line, cuts the apron side.

With rule and scriber, join these up on each side. This, of course, now gives us the fold line for the forward section of the side flanges. Now to mark out the flanges themselves. Most steel rules are marked so that, at least on one side, the scales on opposite edges have the same major index marks. (One could be inches and $\frac{1}{32}$, the other inches and $\frac{1}{20}$, so the inch lines will run right across). Use this to square the rule with the line you have just marked, scribing new lines through points (1) and (2), at right angles to the fold lines and outboard of them. Mark the ½in. depth of flange on each, then join up to define the flange edges. The profile of the dumb-irons is not critical, but the two sides should be of the same shape. Just trace the shape from the plan using the top edge of the flange and our old friend Point (2) as data (which I believe, is the plural of datum). Transfer the shape to a piece of card, cut out a template and scribe this on to the aluminium, turning it over to do the opposite side.

The areas remaining to be marked out are the cut outs in the flanges to clear the various bits and pieces. The front and rear axle clearances are straightforward, as are the cut-aways at the rear, which will eliminate any foul with the rear of the body. For the same reason, it is a good plan to remove $\frac{1}{8}$in. from each of the front and rear section flanges where they meet at the change of chassis section. This will allow the base of the pan to be radiused at this point, so that the body side can be curved, instead of needing to be creased. I found that removal of this section of flange had no disastrous effect on the strength of the pan, but if anyone is not too happy about it, a piece of ½ in. wide strip could be curved, then rivetted to each of the flanges to restore the strength. If the gap is left, the off-side (right-hand) one is a perfect spot to site the fuel cut-out.

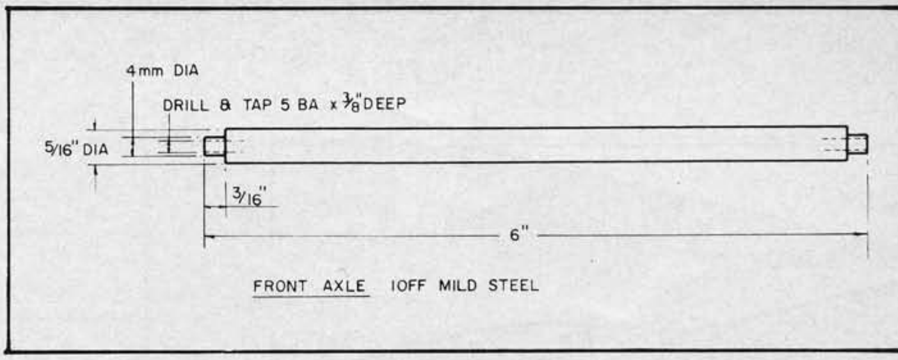
The fixing holes for the piano wire which forms the cut-out must be in the correct relationship to the notch in the flange, and the change of section line looks just about right. I have cribbed the general design for the cut-out straight from 'Tyro', as it is so simple and needs little variation. The end of the 'anvil' block will perhaps need radiiusing to match the base of the pan.

By the way, this position, though so convenient, is purely arbitrary; different engine/fuel tank combinations may result in slight variations in the fuel pipe run and hence a different optimum position for the cut-out. Do not follow the drawing slavishly, try a mock-up of the engine and tank assembly over the marked-out chassis to find the best pipe run, then set the cut-out where the pipe can be run along the flange without having to tie a knot in it to get it heading back towards the engine.

The holes for the engine mountings (which are described later) are positioned to suit the P.A.W. 1.49. Vary these to suit your own installation as required. The point to remember is that the face of the crankshaft drive plate, against which the wheel will butt, should be at 2$\frac{5}{8}$in. from the centre line of the chassis.

Holes are also provided for the supports for the rear off-side stub axle and the front axle. All these are shown as clearance holes for 5 BA set-screw, but if your stock is of a different size, vary these as necessary. As on Tyro, in general, $\frac{3}{32}$in. dia. holes are drilled at the ends of the folds to reduce the chance of starting a crack, but I have omitted them at the front because this section action will not be hidden by the body and may detract from the appearance. Oh! and the couple I nearly forgot; two more 5BA clearance holes at the ends of the club-irons.

Check over your marking out to make sure that you have missed nothing, then cut out the pan using the techniques I described for 'Tyro'. The only real variation will be in the area around the dumb-irons. The V-notch between each side of the developed apron and its adjacent dumb-iron needs a little careful work. When sawing out the shape, there



will inevitably be a small flat at the bottom of the V, but keep this to a minimum.

Bending Apron and Flanges

The first bending job is the fold in the apron. Grip the pan vertically in the vice, front uppermost, and top surface towards you. Clamp a piece of $\frac{3}{16}$in. dia. bar, about 3in. long, to the top surface, across the front of the pan, just below the fold line. It can be held to the material which will form the dumb-irons, with a couple of small G-clamps.

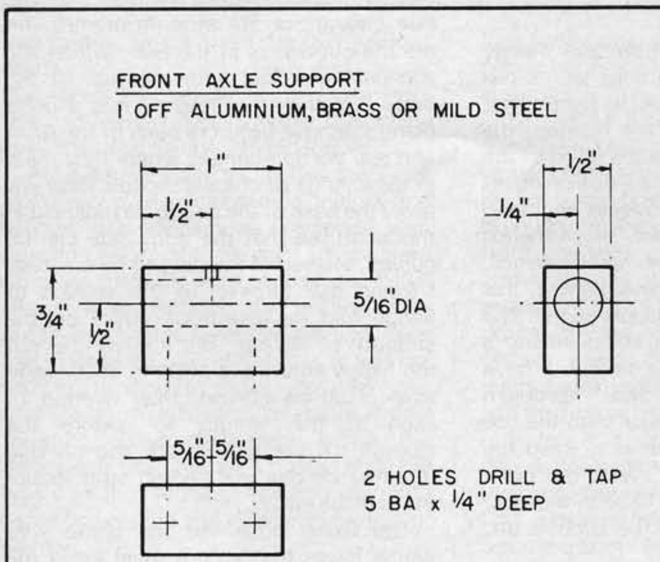
Position it relative to the ends of the dumb-irons, setting it back from their front edge by the thickness of the pan material, making sure that the bar is square to the car centre lines. If things have worked out correctly, the centre line of the bar should be coincident with the centres of the holes in the dumb-irons.

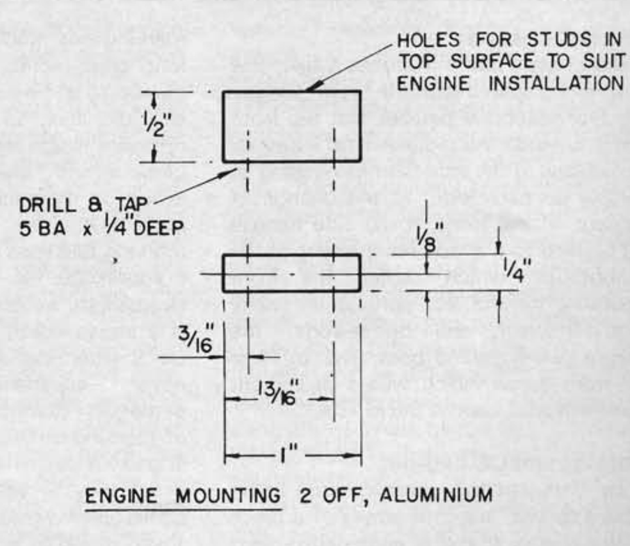
With the bar clamped firmly, bend the apron material around the bar, keeping it square, so that the top and bottom surfaces of the apron end up in line. Form the top surface so that it is as near as can be judged, to the same profile as the dumb-irons. Remove the bar and clamps and give the whole apron a slight bend up at the point where it joins the main floor of the pan.

Before bending the front side flange, put a slight set in the dumb-irons sections, so that they follow the change in lines as they subsequently meet the now formed apron. As described previously, a couple of lengths of square steel bar, (¾in. to 1in. square) with slightly radiused edges are the best aid to bending up the flanges. Grip the steel/aluminium/steel sandwich in the vice, and with a length of wood to keep the whole flange moving together, tap it over until the flange is square and the dumb-iron lies snugly against the apron. Repeat on the other side, then treat the rear flanges similarly.

A short length of $\frac{1}{8}$in. dia. rod (steel or brass), threaded 5BA at each end, with a couple of nuts will clamp the dumb-irons to the apron for final forming. It is likely that the gap at the bottom of the V mentioned previously will result in the underside of the apron not matching the lower edge of the dumb-iron. Grip a length of rectangular steel bar 1$\frac{5}{8}$in. or less wide, in the vice. Ensure that the projecting end is good and square with a very slight radius. Place the pan upside-down on this bar, with the bend line between the main pan and the lower face of the apron exactly on the edge of the bar. A few taps with a light hammer, preferably a square-headed planishing hammer, on the surface of the apron, just off the edge of the bar, will joggle the apron into line with the dumb-irons. If the supporting bar is significantly less than 1$\frac{5}{8}$in. wide, then it will need two goes across the width to shape both sides.

If the apron is not quite to the shape of the dumb-iron along the top, but you are satisfied that it is square and symmetrical, the last thou can be removed from the top





of the dumb-irons with a file, thus tidying up the whole assembly.

Engine Mounting

As it mentioned, the engine mountings must be made to suit your particular choice of engine, but the P.A.W. 1.49 required a couple of blocks 1in. × ¼in. × ½in. The material store carried a length of aluminium bar, 1in. × ⅝in. section, so two slices just over ¼in. thick were sawn off, then mounted individually in the 4-jaw chuck on the lathe, and faced off to ¼in. thick.

To ensure that the ½in. mounting height would be the same on each, they were then gripped in the 4-jaw as a pair, with a piece of parallel packing, behind them, and faced down to the required height. When doing this, either ensure that the packing is gripped securely, or remove it completely as when the lathe is started, it can become a lethal projectile.

The specified way of attaching these blocks to the chassis is by a couple of 5 BA bolts in each, from underneath, with 6BA studs fitted in the top face to hold the engine down. Long bolts through the whole assembly would suffice, but this means that the position of the mounting is disturbed every time the engine is removed. I would not really recommend fixing the mounting blocks firmly, then using set bolts for securing the engine, especially if the mountings are in aluminium, as the bolts would need to be screwed in and out, with possible thread damage.

If you do use long bolts, then locknuts are essential (they are desirable with any arrangements).

Offside Wheel Bearing

As the chassis is so much wider than that of 'Tyro', it is not a good plan to mount a stub axle in the engine back-plate. I feel that the increased bending moment could result in a mischief being done to the engine. At first sight, the way out would be to find a bit of, say 1in. square material and to turn the outer portion to a replica of the engine main bearing and drive plate assembly. The first problem, that I could not lay hands on a suitable piece of material and secondly, this way appeared to be rather wasteful of material.

One good rule to remember in model engineering is that the creation of swarf usually means the expenditure of time and money, so look for the way of doing the job which will create the least swarf. (Two cuts at right angles with a hacksaw will remove a large chunk of material which could take a fair time by milling or filing!).

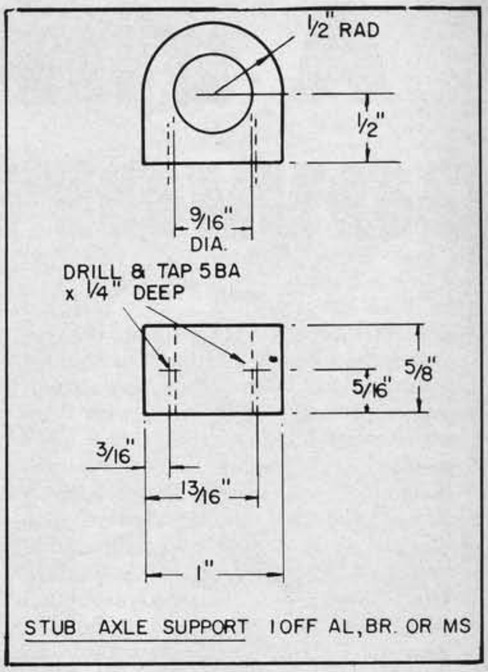
The largest diameter required to match the PAW engine is ¾in. (the size of the drive plate), so a piece of ¾in. dia. steel bar was mounted in the 3-jaw chuck and turned down to 9/16in. dia. over 11/16in. of its length. Turned end for end in the chuck, the outer end was then machined to match the drive plate and to provide the location for the 13mm × 4mm × 5mm wheel bearing (see last months installment).

A piece of the previously mentioned 1in. × 1⅝in. aluminium bar was marked out, faced up, then mounted in the 4-jaw to be bored out to accept the 9/16in. dia. axle. The two Loctited together, with the aluminium bolted to the chassis, formed a perfectly acceptable stub axle.

Set your chosen engine on its mountings and see what profile you need to give the appearance of a symmetrical rear axle, then proceed in the way I have described above, varying the dimensions to suit.

Front Axle

The front axle fitted to the full-size cars of this type were often of forged I-section, but quite a few had tubular axles, so I think that we can get away with a simple round one. I have pondered over the question of springing and in the end decided to ignore it for now. The majority of tether cars in the old days, especially the quick ones, seemed to manage with little or no springing, and only with the development of the ultra-high speed

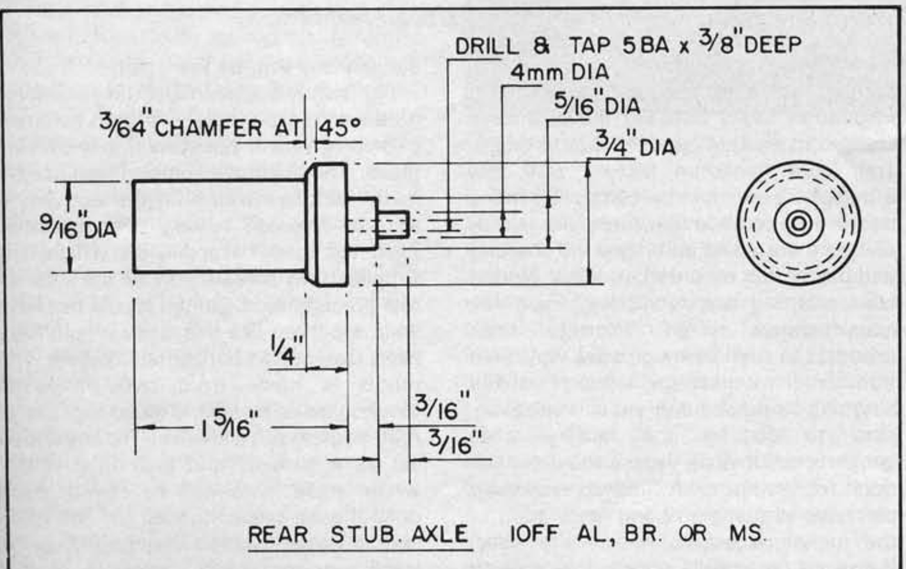


STUB AXLE SUPPORT 1OFF AL, BR. OR MS

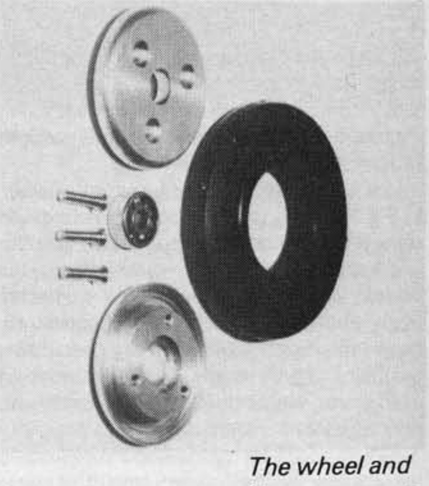
devices on the Continent has it been found necessary to introduce a degree of flexibility in order to get the power on to the road.

The axle is therefore simply a 6in. length of 5/16in. dia. steel bar which has 3/16in. long × 4mm dia., seating for the wheel bearing machined on each end. The ends are drilled and tapped 5BA to accept the Allen screw which retains the wheel. The axle is supported in a simple aluminium block, which is cross-drilled to accept it and which has a 6BA grub screw fitted to stop it wandering from side to side. The block is fixed to the chassis pan by the customary 5BA bolts. Should you feel that the simple axle appears to be a bit stark, then there is nothing to stop you adding dummy finned brake drums, track rod or shock absorbers.

If, when we get round to a track test (the deep snow is not very welcoming at the moment), there appears a need for some flexibility. I have seen some ideas for using Flexane to mould a bush between the axle and its housing.



REAR STUB. AXLE 1OFF AL, BR. OR MS.



The wheel and its components

The next article on the TRIALIST will show plans for building the body.

A vintage steam powered workshop

by Basil Harley

OVER ONE HUNDRED years ago the very first makers of toy and model stationary steam engines also sold accessories or working models for them to drive. After all, once the first fizzing magic of actually seeing the engine at work had evaporated, you wanted to see it doing something. So the designers and manufacturers created a whole miniature world of imaginative machines ranging from such things as waterpumps, fairground rides (particularly Russian carousels), generators, breweries and above all, model workshop tools. The Germans excelled at these and their early catalogues, particularly from Edwardian days and immediately after the first World War, are full of exciting and amusing 'betriebesmodel' very few of which, unfortunately, have survived.

An early Bing vertical engine is shown in Fig 1 driving two tinplate workers made about half a century ago. The grinder produces a stream of sparks from his wheel whilst the blacksmith hammers away and gravely inclines his head as he does so. Such an assembly was very popular and made an interesting composite toy but it could hardly be described as a workshop.

Model tools for workshops were made by virtually all the steam toy firms (and indeed still are today by the few remaining makers) and some, again mainly the Germans, supplied them mounted complete with overhead shafting all ready to run. Fig 2 shows me with an Ernst Plank outfit in my collection dating from about 1905 driven by a contemporary horizontal engine by the same maker. The shop consists of a wooden baseboard covered in tiled paper with three cast columns supporting a shaft and attractive pulley wheels with curved spokes in the traditional manner. A double hammer mill, tinplate circular saw and a lathe are driven by spring belts. It is powered by a charming oscillating cylinder engine which still works happily after over seventy years.

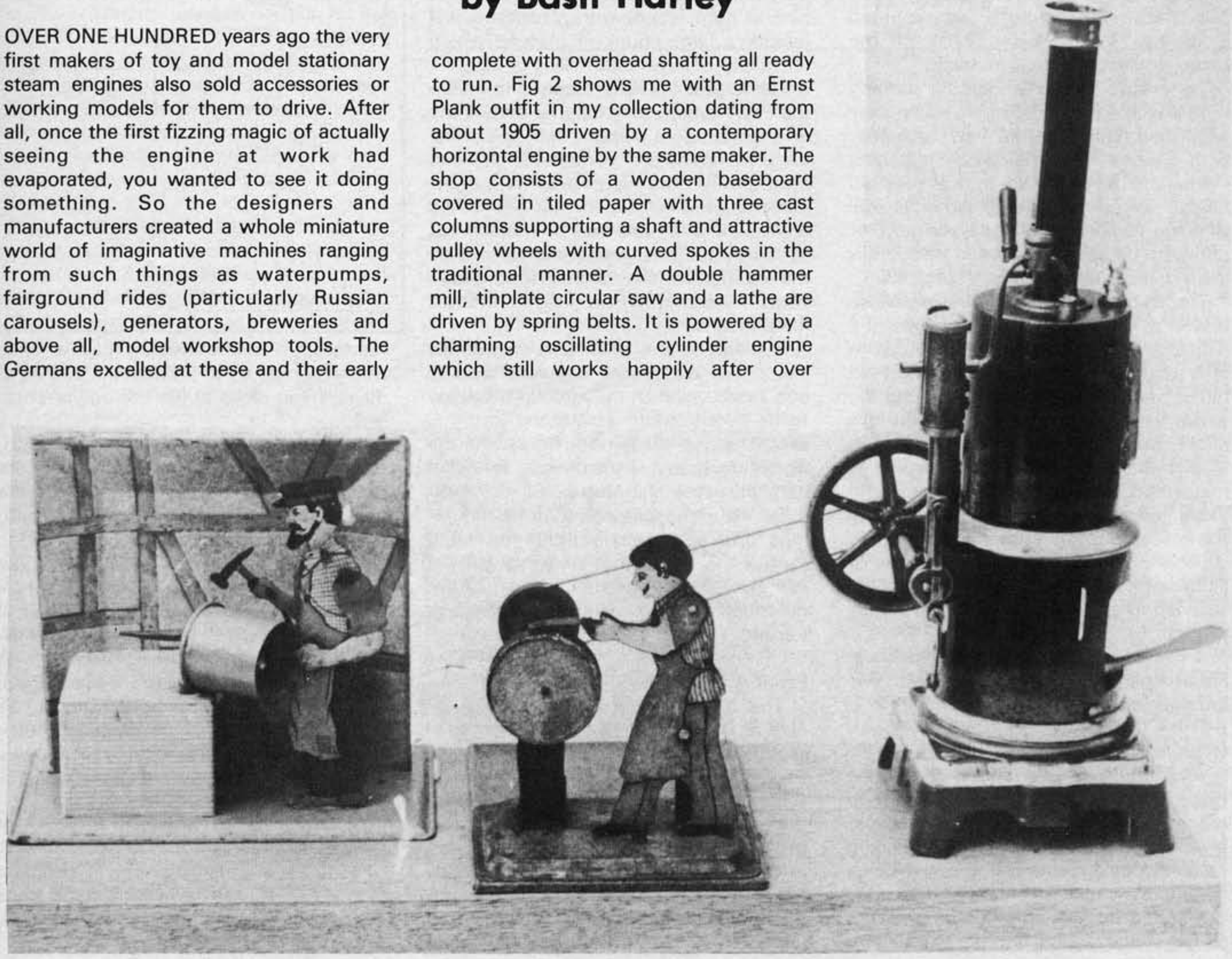


Fig. 1. Two German tinplate workmen from the early 1920s. Powered by a Bing vertical steam engine

Such old toys can provide us with inspiration today because it has always seemed to me that opportunities to create your own miniature factory with real atmosphere are often passed by. So many people just screw a few tools to a board, couple them up to an engine via shafting and belts often mounted at nearly ground level and call it a workshop. Even the manufacturers often illustrate their products in such unimaginative ways. No traditional workshops ever looked anything like these and yet it is relatively easy to do for the factory what generations of dolls' house makers have done for the home. A finished workshop can have all the charm and fascination of the miniature (which makes the dolls' house so perennially popular) as well as actually working by live steam.

Fig 3 shows a simple setting for some modern Wilesco tools — a drop hammer, pillar drill, power hacksaw and a piercing press. The overhead shafting, still used in many factories even after the last war, is also by Wilesco having been removed from the steel baseplate on which it is supplied and screwed on to the wall. In real practice the bearings would not have been mounted like this, they would have been fastened to horizontal brackets. The model is made from two pieces of blockboard screwed and glued together at right angles with a low 'wall' at one end to act as a support and provide a corner where scrap metal can be stored. Brick dolls' house paper is used for the walls and tile paper makes a very good floor. A small wooden bench helps to give a realistic touch. The engine driving the shop is also made by Wilesco. It is free standing out in front and drives the shafting by a conventional spring belt.

Whilst 'I think this is an improvement on the earlier forms of factory settings it is a bit cumbersome, isn't easy to store and is vulnerable to dust and damage when not being used. So I thought round the problem and came up with a design for an overhead belt driven workshop typical of those still in widespread use half a century ago which would be self-contained in its own box, including the engine, can be easily opened up for display and running and takes up the minimum space when closed. Fig 4 (a), (b) and (c) shows an example I have made for the smallest of the Mamod engines and two of their modern machine tools together with an historical lathe from my collection. The design can accommodate a wide range of engines and the dimensions can be varied considerably.

The oscillating engine described in the February issue by John Wheeler would do beautifully with an appropriate boiler. Its quite fun to fit the various component parts so that they will fold together in such a way that they will nevertheless look realistic when opened out and working. The older historical tools (and the Wilesco ones) are made to about 1" to 1'0" scale whereas the Mamod ones are rather smaller but this doesn't matter much. 1/12th scale is a very convenient one to work to and the four Mamod tools can be quite realistically mounted on raising blocks if desired.

Materials need not be expensive. For this version I used hardboard for the flooring, back wall and 'roof' and cut the two end walls from a piece of ½" thick wood which happened to be available. I'm sure most modelmakers will be able to lay hands on suitable sections easily enough but, if you do have to buy specially, then Table I gives the sizes required.

The two end walls are first fastened to the floor and the rear wall as shown in the sketch in Fig 5. Use a woodworking glue, like Evostik woodworking adhesive, and 1" deep drive panel pins. Check that all is square before finally nailing up. Next the other two sections of the floor which will fold up to form the front and the top of the 'box' are hinged together. For bigger workshops where perhaps ¼" plywood is used instead of hardboard small brass hinges would be advisable. In this case I used two lengths of stout webbing to make the hinges. These were well annointed with Bostik clear adhesive, the rough sides of the hardboard similarly treated, and on a flat table top covered with newspaper the 'hinges' were well hammered down.

For the overhead shafting it is convenient to use a $\frac{5}{32}$" dia Meccano spindle and pulleys but if a lathe is available then it is an easy turning exercise to make a few Vee pulleys of appropriate sizes. The support brackets I made from a strip of $\frac{3}{8}$" by $\frac{1}{8}$" mild steel cut and soldered together as indicated in Fig 6. Similar section hardwood would also be satisfactory since the loads are light. If painted black the brackets will look quite realistic. The bearings again can be quite elaborate or, if no lathe is available, two Meccano collars can be soldered to brass or tinplate bedplates (or even fixed with araldite) as shown. It is advisable to drill the collars out to $\frac{11}{64}$" to make sure the shaft is a fairly easy fit since any slight warping of the wooden wall might later jam the shaft or at least increase the friction to an unacceptable limit. The pinch screws in the collars are removed and the tapped holes (set to the top) can be used for lubrication.

Before fixing the bearing brackets I covered the walls of the shop with a stone pattern dolls' house paper and again used the tile paper for the floor. Any good wallpaper paste, made nice and thick, will do for this. When the brackets are fixed the bearing plummer blocks can be Araldited to them — fit the shaft first and make sure all is lined up properly and that it revolves freely before the Araldite sets. The engine can now be fastened down with 6BA countersunk screws as near to the right hand wall as reasonable so as to

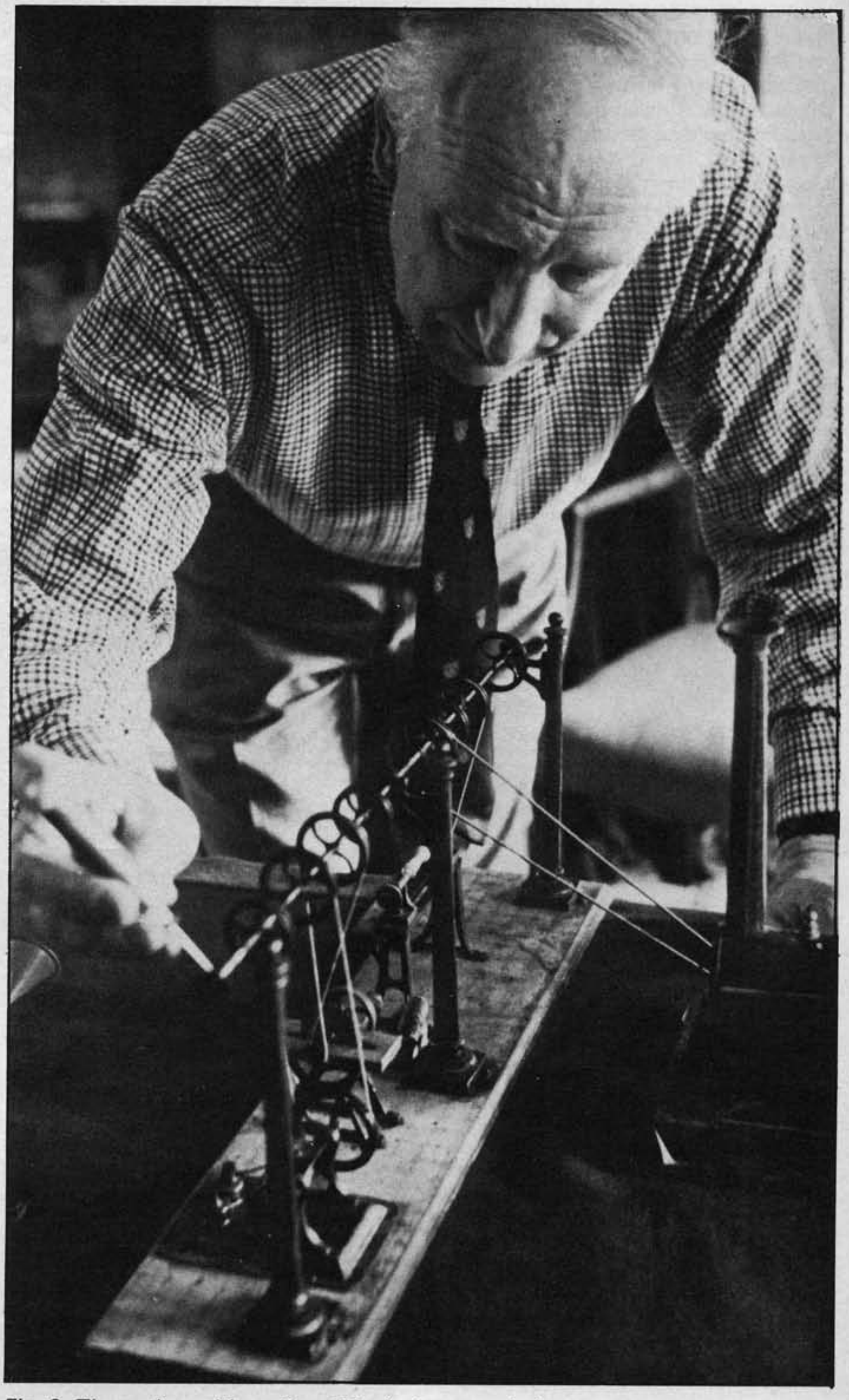


Fig. 2. The author with an Ernst Plank steam workshop

allow plenty of space for the workshop proper on the left. The machine tools that you select for your workshop, whether they be from the Mamod or the Wilesco ranges, will look much better if they are removed from their metal sub-bases. This is particularly true of the Mamod ones with their rather overpowering red Meccano punched plates. Fig 7. I found the Mamod aluminium pop rivets easy to drill out without marking the diecastings. I have used the hammer and the power press together with a pre-1912 German Bing lathe just for variety but even the Mamod Minor 1 engine will drive quite a number of simple tools and a complete press shop for instance, or a polishing and grinding shop looks very effective with three or four examples of each tool lined up as a real old-fashioned workshop. And a row of hammers makes a lovely rhythmic noise too!

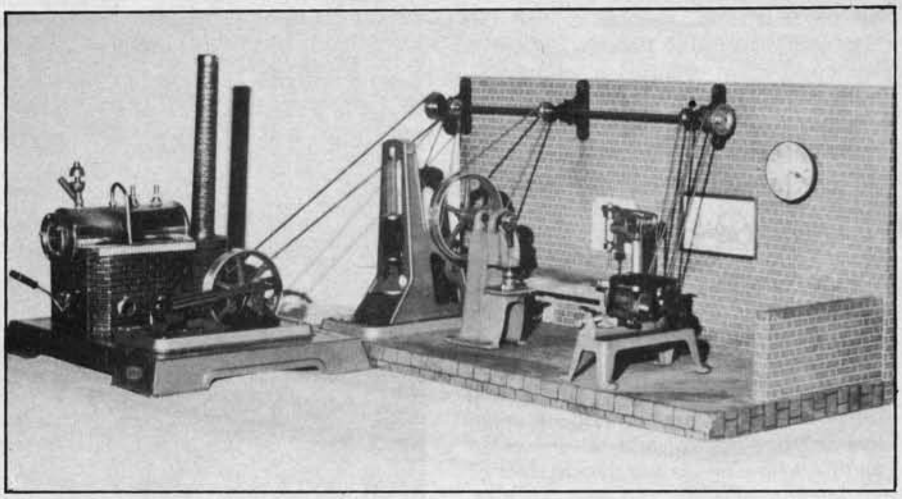


Fig 3 A modern German workshop by Wilesco

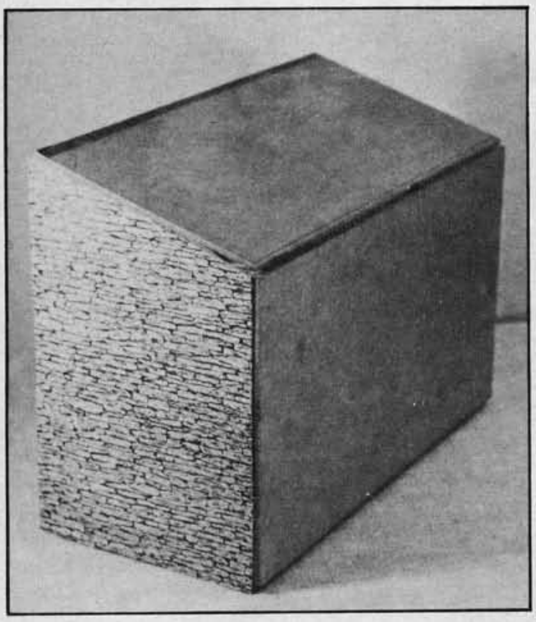


Fig 4a

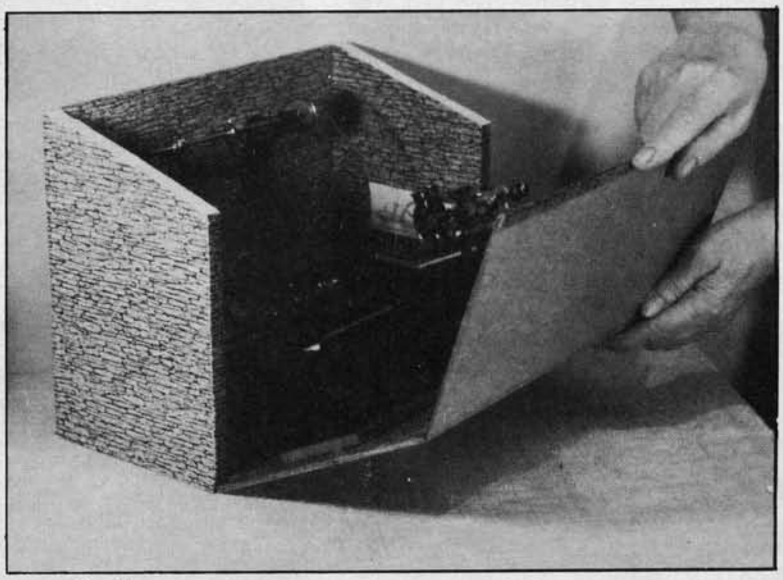


Fig 4b

Fig 4a, 4b and 4c, showing the Mamod powered folding workshop in its various stages

It is best to use small countersunk screws and nuts to fasten the machine tools to the hardboard so that, with proper hexagon nuts they look 'right'. But before deciding just where everything is best to be placed Bluetac is remarkably effective in holding them down temporarily, even when actually running experimentally. The drive from the engine is best arranged with a conventional spring belt. In this case, since the hammer will only work in one direction, the same in which the lathe should revolve, the engine to shafting belt has been crossed to get the rotation right (the press will work in either direction). The other belts can also be spring, but be careful not to make them too tight otherwise a lot of extra friction is generated which slows everything down. I have used a fairly thick brown wool for my other belts, tied at the right tension and the knots annointed with a drop of Bostik clear cement; they look quite realistic, the wool is just 'springy' enough to maintain driving

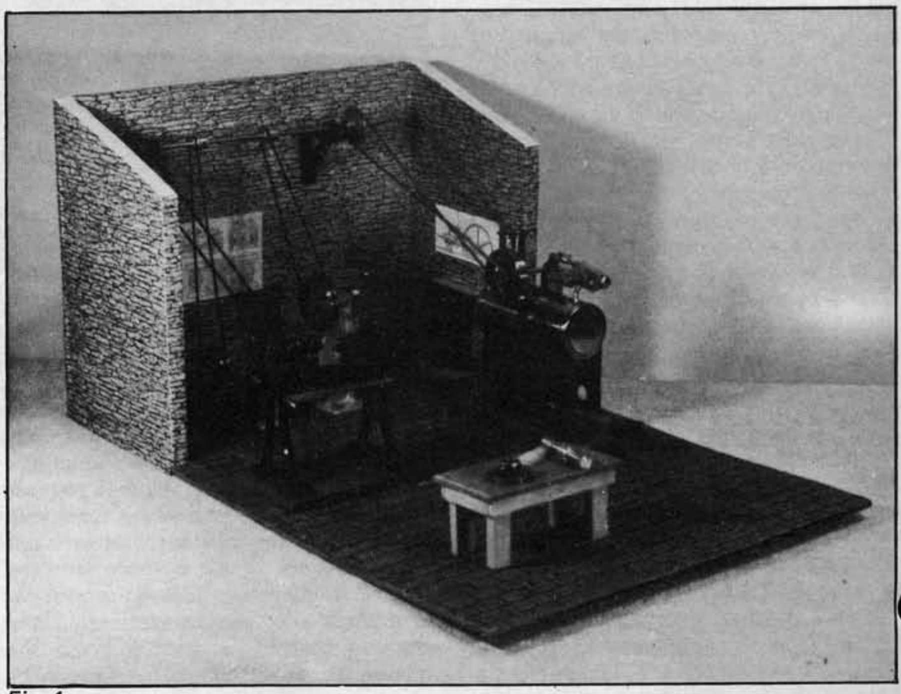


Fig 4c

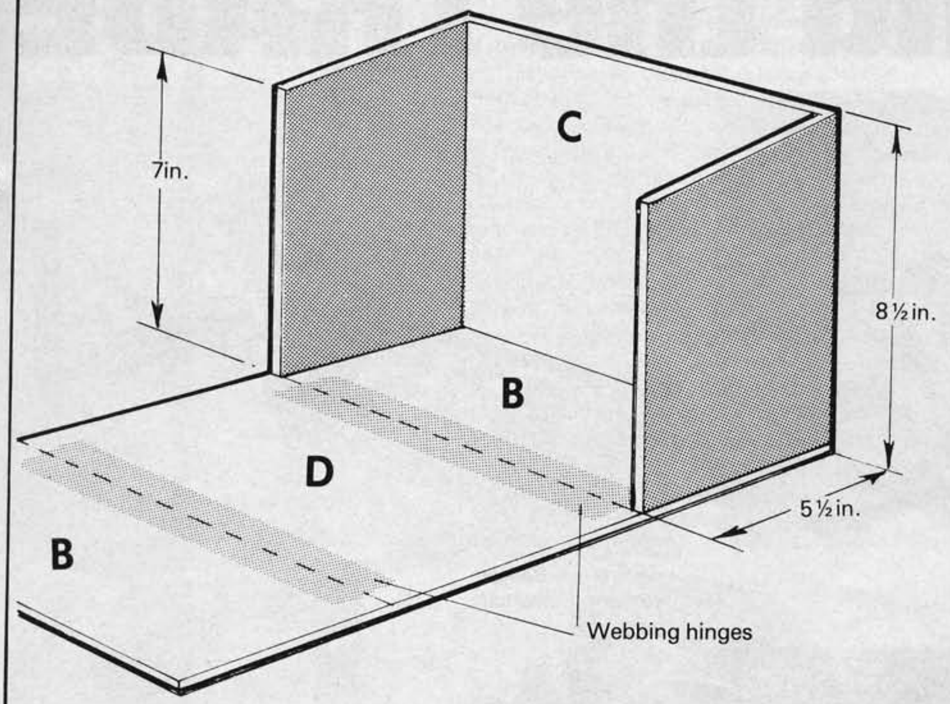


Table 1

A 2 off
Softwood 8½in. × 5½in. × ½in. thick

B 2 off
Hardboard 12in. × 5⅝ in. × ⅛ in. thick

C 1 off
Hardboard 12in. × 8½in × ⅛ in. thick

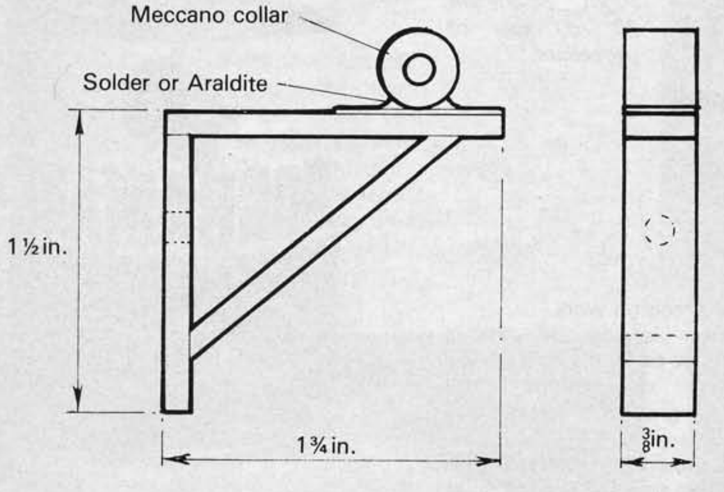
D 1 off
Hardboard 12in. × 7in. × ⅛ in. thick

About two feet of 2in. wide webbing

Panel pins and adhesives

Doll's house paper — brick or stone as preferred and tiles

Fig 5



Material M.S. or wood glued with Araldite

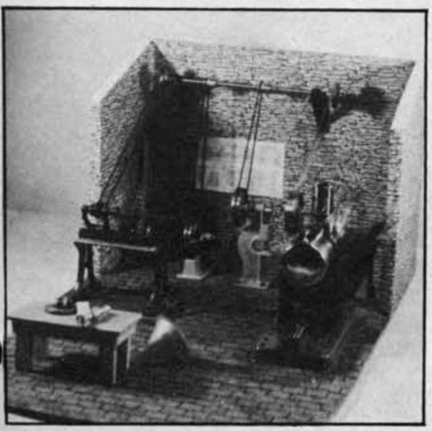


Fig 7

tension and they are remarkably long lasting. Some time ago I had a number of toy engines from my collection working for the whole of two Saturdays in a local museum. The spring belts broke three times, but the wool ones gave no trouble.

Having got the basic engine, tools, belts etc. all coupled up, raise steam and try everything out, adjusting tensions here and there if necessary. And remember, too, that a new engine is a little stiff at first and really does need an hour or so to run it in. The use of a proper steam oil or car engine oil is essential, 3-in-1 or domestic sewing machine oil is just not up to the temperatures of even toy engines.

Now you can begin one of the more exciting and creative parts of the job, actually making things look like a real workshop — dressing it up a little I have only hinted at what can be done in my example. For instance, I have only decorated the interior of the shop. It would be rewarding to consider making an appropriate exterior as well with signs, windows and doorways. Much of the interest and charm of the early dolls' houses lies in their outside appearance and it is a good idea to make a reasonably accurate copy of some small shop known to you. I took for my inspiration one of those curious 'odd-workers' shops common enough even today in Birmingham and the Black Country and often converted from barns, stables or even dwellings. So an old cast iron fireplace is not out of place as is also a pile of old (Meccano) tyres and lengths of old chain in a corner. Oil and water splashed from the engine and the tools when actually working will soon help to give it a lived-in air. Benches, and tools and bits of work in progress all help towards realism as do drawings etc on the walls. Magazines often provide period pictures which can be used (after all, they had pin-ups in the shops in the past just as they do today) and a large clock will also find a place.

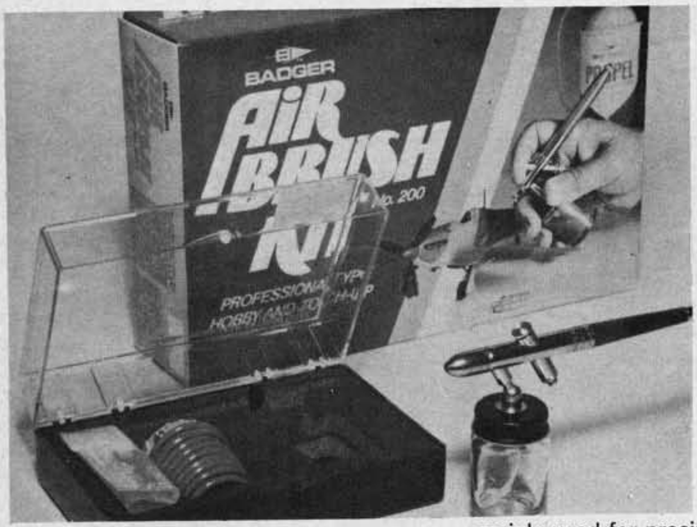
There really is a lot of fun to be had creating a vintage workshop, perhaps inspired by drawings or photographs or perhaps again by one's own recollections of an apprenticeship long years ago or even by seeking out and studying some really interesting survivors in the byways of our manufacturing towns and cities. Why not have a go?

Around the TRADE

Badger model 200 airbrush set.

Above. Badger custom airbrush set.

Left. Badger 350 airbrush.



Right. Mogramair 30 oz. can of propellant.

The Badger range of airbrush equipment needs little introduction since it was first marketed by Morris & Ingram it has become an important brand leader, with equipment designed for the modeller.

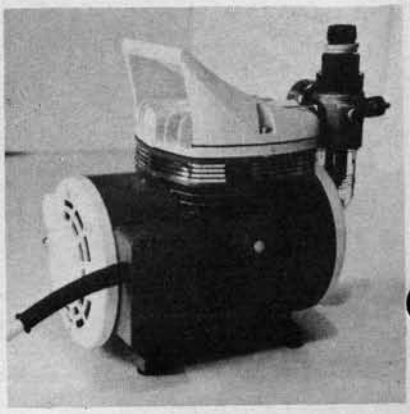
We illustrate a selection of equipment. The 200 airbrush has been proved in use over many years, it is ideally suited to both beginner and expert. The model 350 is an advanced external mix, without the precision needle it is less subject to accidental damage, but is less suited to precision work. For large models (even car-respray!) it is ideal. The newly introduced Custom airbrush set provides an economical general purpose needle control brush for jar or cup use. The two cup pattern brushes 100 XF and 100 IL are mainly used for precision work.

Propellant from an aerosol can is convenient but, in time, expensive, the serious airbrush user prefers the compressor which gives as much air at 25 psi as one needs.

The model shown incorporates the invaluable moisture trap and is both quiet and portable.

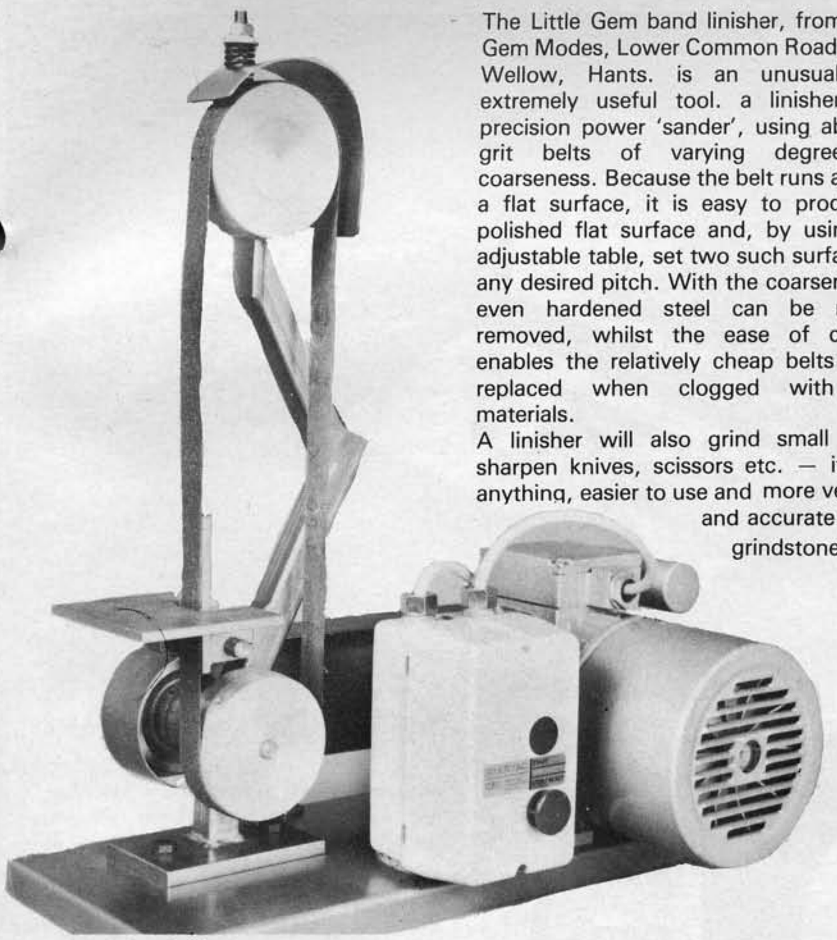
Finally, a little known Morris & Ingram product is Sprayway, an aerosol solvent formulated for unblocking blocked airbrushes — and keeping well maintained ones perfect.

Left. Mogramair sprayaway. Right. Badger 180 E compressor.



Badger 100 XF airbrush.

Badger 100 IL airbrush.



The Little Gem band linisher, from Little Gem Modes, Lower Common Road, West Wellow, Hants. is an unusual, but extremely useful tool. a linisher is a precision power 'sander', using abrasive grit belts of varying degrees of coarseness. Because the belt runs against a flat surface, it is easy to produce a polished flat surface and, by using the adjustable table, set two such surfaces at any desired pitch. With the coarser belts, even hardened steel can be rapidly removed, whilst the ease of change enables the relatively cheap belts to be replaced when clogged with soft materials.

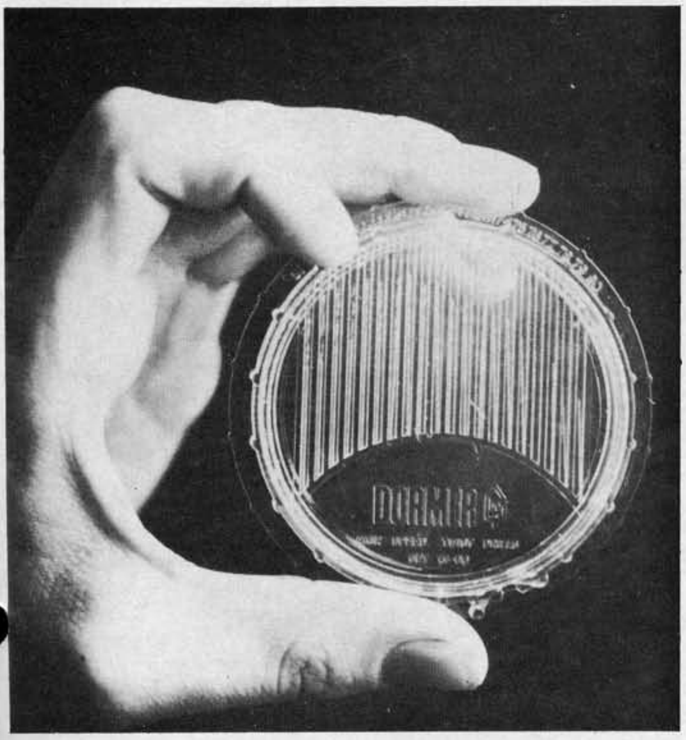
A linisher will also grind small tools, sharpen knives, scissors etc. — it is, if anything, easier to use and more versatile and accurate than a grindstone.

Knife for many uses.

The Nova Knife from Stanley Tools Ltd. will be welcomed by model makers for its convenience of storing blades not in use. As you can see in the photograph the handle has a compartment which retains a spare blade and four styles are available. The cost is 55p with two blades and spares cost 35p for three.

New pack for drills.

Dormer Tools (Sheffield) Ltd have sent us details of a new pack for their small drills which should prove more convenient to use and will protect each drill thoroughly. They call it their "Dial-A-Size" container and it holds 20 drills in sizes 61 to 80. The selected drill is obtained by twisting the outer ring until a hole aligns with the size required. Price at the time of going to press is £4.50.



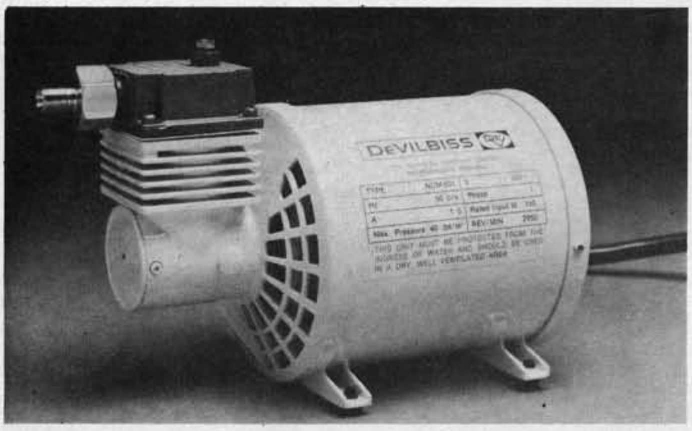
The Humbrol Modeller's Airbrush Set is an inexpensive 'fly spray' pattern airbrush. While lacking the fine precision of the more sophisticated (and expensive) units, it certainly can apply even coats of paint on quite large surfaces. It is intended for use with propellant cans — naturally, compressors are not ruled out, but somehow one feels that this would be somewhat out of proportion to this low cost unit.

THE FORERUNNER OF what we today call the air brush started as far back as 1893, when a Mr. Burdick invented a needle valve controlled air atomising device, which he called the Aerograph.

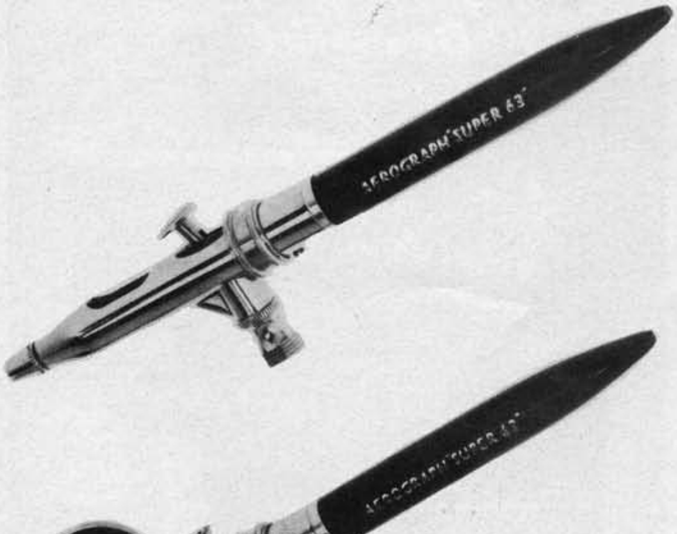
The air brush was primarily designed for the artist, and a heavier spray gun for various industrial uses.

For most model makers, a simple spray gun is quite adequate for finishing their models, finer detail being done by hand. But if he requires to achieve fine detail with the spray, or graduating tones, an air brush is essential.

Aerograph. Sprite major airbrush kit.

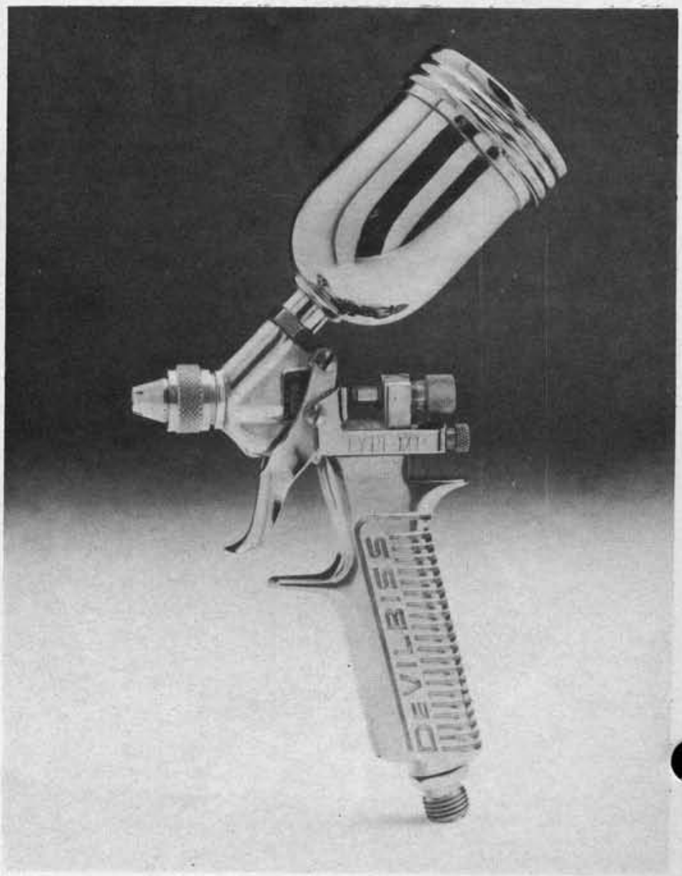


De Vilbiss. Mini compressor.



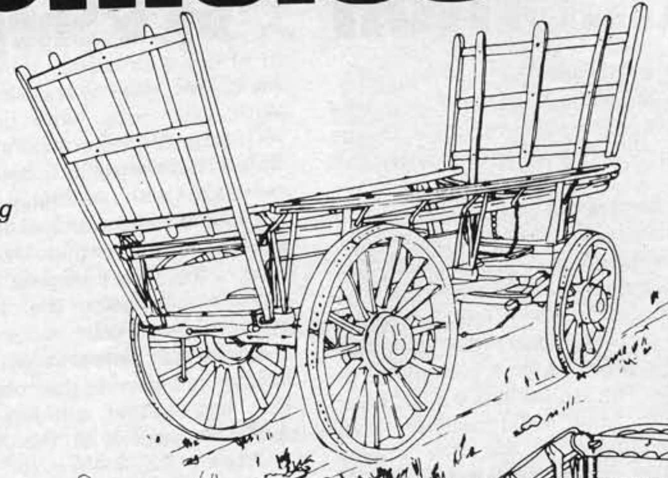
Aerograph. Super 63 A and E airbrushes.

MP. Lightweight gravity feed spraygun.

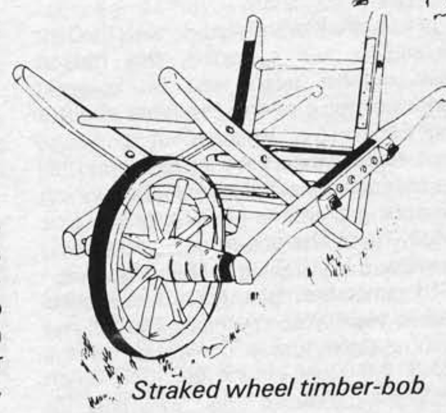


Horse drawn Vehicles

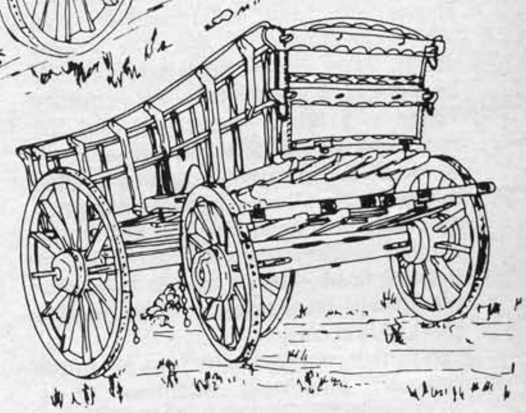
by John Thompson



Hop tug



Straked wheel timber-bob



East Anglian wagon of 1850

IT WAS ONLY a generation ago that horse-drawn vehicles disappeared from our every day lives, and many people still recall the familiar sights of the milkman's pony and float, the baker's van and totter's cart in the town and the harvest wagon and muck cart on the farm. However, it is only in the last few years that these vehicles have come to the fore in the model world — perhaps for the very reason that they are no longer familiar objects to us.

Certainly, it is the nostalgic appeal of the old wooden wheels clattering over the cobbles, or rumbling down a rutted country lane, which attracts many people to the hobby, just as sailing ship models from a past age inspire an enthusiastic following.

However, once you have become involved in the hobby, you may find the most satisfying aspect for the "model wheelwright" is making a model of a cart or carriage, one can actually follow the same methods and use the same materials as the original craftsmen used on the full-size vehicles. This is in distinct contrast to most other fields of model making in which you are generally using plastic or metal to make a "shell" of the real thing, but not reproducing its structure.

Plans of horse-drawn vehicles have been available for only a few years and still there is a scarcity of kits and parts on the market. Even so, the hobby can be said to have come of age as was demonstrated by the fine display at the Model Engineer Exhibition in January, when separate classes were devoted to carts, wagons and to carriages and caravans.

Future articles will give 'step-by-step' instructions for the construction of some vehicles and a further range of vehicle plans can be found in 'The Model Wheelwright'. (See note at end of article).

To make a start you can use balsa wood which many model shops stock in a good selection of sizes. However, it is not really strong enough and does not easily take a good finish. The hardwood 'ramin' which is sold at most D.I.Y. shops is much better, provided you fill the grain before painting and drill holes for all pins as it splits rather easily. For the very best model making timbers, such as lime, beech or sycamore, you will need to send to a specialist supplier. Brass is the best metal to use as it is easy to cut, file and solder; it polishes well and takes a good paint finish. A very wide selection of sizes in strip, rod and other sections can be purchased by mail-order from model engineering suppliers.

Many people are concerned about the difficulty of making wheels. In fact once you have set up a few simple jigs it is very satisfying and interesting work, but you do need a means of turning. A bench mounted drill will suffice but a spindle driven by a motor from an old washing machine is even better. The subject is dealt with at length in my book 'Making Model Horse-Drawn Vehicles'. Should you prefer to buy them, then a range of ready made wheels are now available.

Apart from those needed in wheelmaking, no special tools are required in this hobby. Naturally the work is made easier by aids such as a bandsaw, drill stand and belt sander, but if needs be you can manage with a little more than a hacksaw, a drill, hammer and craft knife. In fact once the timber has been cut to size you can do a lot of the shaping work with just a craft knife, even sitting in an arm chair if you wish.

It is usual to select a simple vehicle such as a farm cart for a first attempt, but after some skill has been acquired there is a great number of vehicles types from which to choose. Indeed at this stage in the development of the hobby, there are many subjects which have never before been constructed in miniature so that instead of being one of thousands of model makers assembling the same plastic kit, you can be truly creative and produce items of considerable value and historic interest.

The English farm wagons and carts together with caravans, carriages and brewers' drays have been in the most popular subjects but dozens of trade vehicles such as bakers' carts, millers' wagons, laundry vans etc., offer just as much variety and character. Going further afield, horse-drawn vehicles played a key part in bringing civilisation to the "frontier" countries and some have become legendary. A collection of pioneer vehicles such as the American covered wagon, the "Wells Fargo" coach, the Boer Trek wagon, the Australian "Cobb & Co." mail coach and the New Zealand wool wagon would be a fascinating project. If you have suggestions for plans you would like to see featured in this magazine or if I can help locate sources of information for you, then I will be pleased to help.

The Model Wheelwright 1979 Handbook gives details of the hobby, including many illustrations from which detailed plans are available. This is available from John Thompson, 1, Fielding, Fleet, Hants.

A plan to construct a coal cart will be published next month.

Internal Combustion at the Model Engineer Exhibition

by G Sheppard

Professor D. Chaddock caught in full flight as he explains the rotary engine in foreground.

AS HAS BEEN the trend, unfortunately, at recent Model Engineer Exhibitions, the home-built internal combustion engine was a fairly rare bird at Wembley this year.

In the competition section, Class K, I could locate only two, both from P.B. Allen of Wokingham. The first was a 15cc glow plug engine, water cooled for marine installation. It featured rear crankcase induction of, presumably rotary valve type and what seemed to be a multiplicity of glow plugs. The second was a 3.5cc glow engine with front induction and fitted with a carburettor of Mr. Allen's own design. The notes displayed near the engine told us that the bore and stroke are 19mm and 12mm respectively and the compression ratio 12.5 to 1. It is designed to run at 25,000 to 30,000 rpm on a timed exhaust pipe. A very neat anti-vibration mounting is incorporated and both these engines displayed a very high quality of external finish, leading one to think that the internal standards would be nothing short of first class.

A further, unlisted entry from Mr. Allen was an interesting adoption of a commercial Fox F7 22cc industrial engine for marine use. It would be most interesting to hear more details of all three engines from their builder.

The main locomotive, Class A, contains one of my favourite designs, Edgar Westbury's petrol engined version of the diesel shunter No. 1831. This was described in Model Engineer back in 1941, and the builder of this version, L. J. Parkins of Temple, near Marlow, started his in 1942. Work was suspended in 1945, with the job half finished, and recommenced when Mr. Parkins retired in 1976. These years of patient work were rewarded with a Highly Commended Certificate which was well deserved. I was interested to see that Mr. Parkins had kept to the original design of transmission, using the friction design specified by ETW.

I recall that several versions were made with quite elaborate gear boxes. I am told that one builder decided to install a miniature version of the Austin Seven gearbox.

I have often wondered if, with modern techniques and materials, this friction drive system might not be a good candidate for a re-design. What about it you loco. men; what about a change from steam power? As far as I know, all the castings are still available, the running gear being similar to LBSC's tank engine "Molly" and the power unit parts being available from Woking Precision Models.

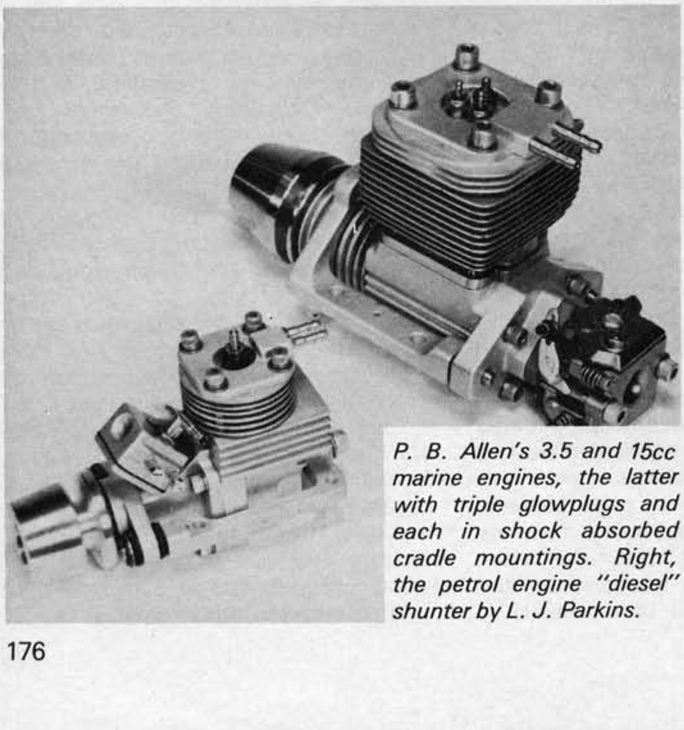
If I remember right, these two models were in friendly competition. The full size diesel shunter was a conversion of the L.M.S. 0-6-0 tank engine No. 1831. When E.T.W. announced his intention of describing the 3½" gauge model, LBSC replied by producing his version of the same class.

Loan Section

The loan section produced a couple of engines we have seen before, L. C. Mason's 4 cylinder 4cc in-line engine and his 5 cylinder radial. The dimensions of the former are $\frac{7}{16}$" bore × ½" stroke and the latter, which incidentally is described in the 19th January issue of Model Engineer, ½" bore × $\frac{9}{16}$" stroke.

The S.M.E.E. stand featured nothing new in this line, but Professor Chaddock was astounding the assembled multitudes by running (or attempting to start—he had run out of petrol when I saw him) his rotary aero engine. Yes, that's the sort where the crankshaft is held stationary and the cylinders, complete with propeller attached, rotate. It always looks to be a fearsome business, but the sight and the sound always fascinate me.

The North London stand contained yet another Westbury design, the 10cc Dolphin, built by Mr. Starnes. It was



P. B. Allen's 3.5 and 15cc marine engines, the latter with triple glowplugs and each in shock absorbed cradle mountings. Right, the petrol engine "diesel" shunter by L. J. Parkins.

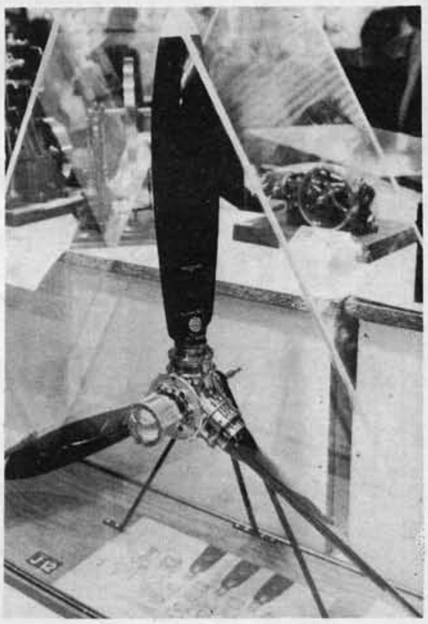
slightly modified from the original design and was also fitted with an electric starter with automatic disengagement. Tucked away in one of the shop counter style glass cases on this stand was something a little outside the scope of this article, but which brought back memories. It was Tom Pinnock's rail racing model of an Indianapolis racer, powered by a commercial 1½cc diesel. Tom said that their rail track still exists, but a recent survey had shown that only one member expressed serious interest in using it again. A great pity—I am sure there are dozens of old rail cars just itching to come to the start line again.

The Harrow and Wembley stand produced two interesting models. The first was a Mastiff, the 24cc flat four designed by L. C. Mason, the description of which appeared in Model Engineer some while back and is now published as a book. Ralph Dapling, its builder, was full of praise for the design.

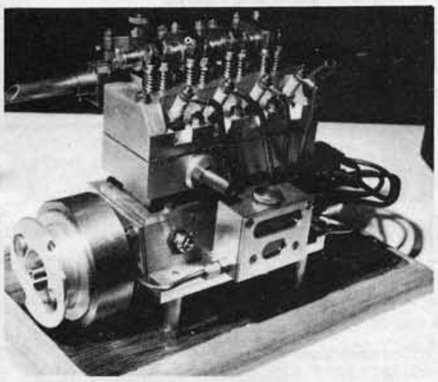
The second was a very unusual model. The prototype was the Hagon JAP Special Motor Cycle; a supercharged 1,260cc O.H.V. V-twin machine, which once held the world record for the ¼-mile standing start. It is still, apparently, the current holder of the 1 Km standing start record. The model, built by Jim Gough, features a 19.6cc OHV twin glow plug engine, also complete with blower. I have never seen a write-up on this fascinating model, but doubtless there is one in the archives somewhere. I must try to find out more about it.

Further along the row, the Welling and District stand contained another example of the popular Westbury 4 cylinder design, the 15cc "Seal". This was the side valve motor, similar in layout to the pre-war popular car engine, which was later followed by a 30cc version and ultimately by the 30cc OHC Sealion.

Finally, one other exhibit in the Competition section attracted my attention. Though not itself an i.c. engine, it promises great things to come. B. Hares of Birmingham won a Silver Medal with his ⅙th scale model of a Rotol 3-bladed constant speed airscrew. This superb example of skill was complete in every detail, both internal and external. It also bore the interesting note, "Intended to be fitted to a ⅙th scale model of the Rolls-Royce Merlin XX, as installed in the Hurricane Mk II. Screw tested up to 2,800 rpm". I cannot wait to see this model. I do not know whether many visitors to the Exhibition connected the two, but on the other side of the same display stand was an award card proclaiming that Mr. Hares had also won the highest award in the machine tool section. The Bowyer Lowe Trophy, for his geared dividing head. A photograph showed this, mounted on a Centec miller, cutting one of the gears for the Merlin. Shades of Professor Chaddock, who I am told, designed and built the Quorn cutter grinder to grind the cutters he required to machine the cylinder heads of the V-16 B.R.M. engine he is building. The mind boggles—or at least, mine does anyway.

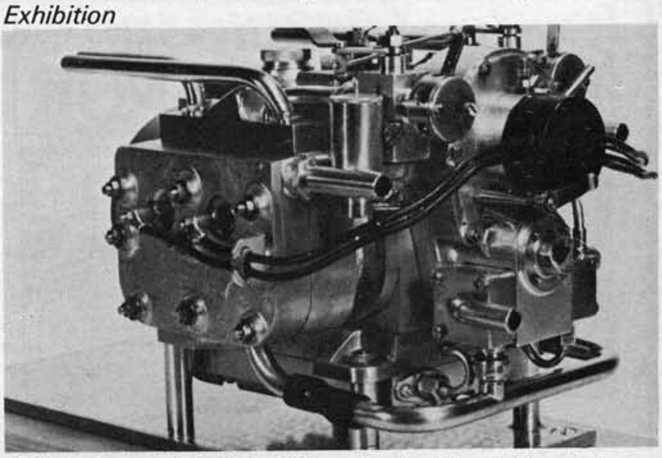


B. Hare's scale Rotol airscrew, an unusual entry which was greatly admired and intended for a scale Rolls-Royce Merlin engine!

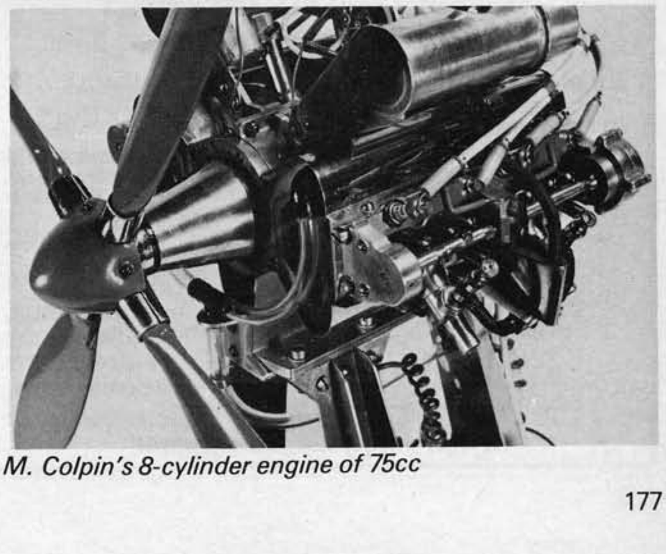


Left: L. C. Mason's 4-cylinder OHV 4cc unit and below, the Harrow & Wembley M.E.'s stand with some of their fascinating models evident, the 20cc Hagon—JAP motor cycle in the centre even has the supercharger! Made by J. Gough, it is a remarkable project.

Below: two superb engines from last year's M.E. Exhibition



4 Cylinder modified Mastiff engine by Mr. J. Dempster



M. Colpin's 8-cylinder engine of 75cc

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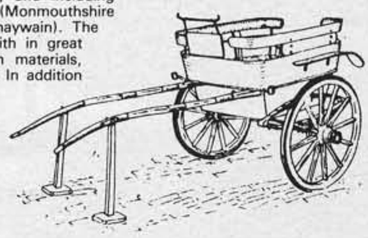

Fully illustrated with photographs, and including detailed plans of three vehicles (Monmouthshire waggon, Pony trap and Cornish haywain). The construction of wheels is dealt with in great detail, and there are chapters on materials, tools, finishes, horses and display. In addition there is a survey of types of vehicle, and a review of books and other sources of information. To order by post please send £3.80, or $10 for air mail postage to U.S.A. Illustrated 24 page catalogue with details of 50 plans, send 4 × 9p stamps.

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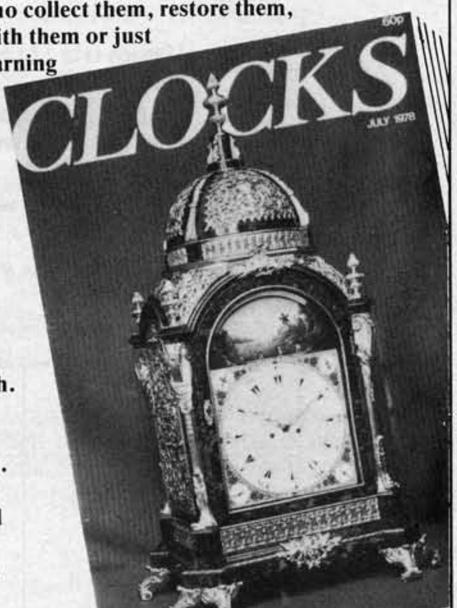

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