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APRIL 1968

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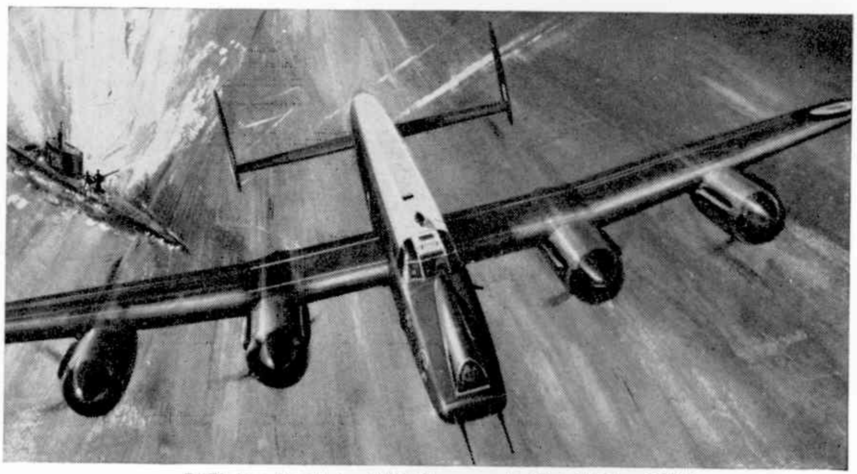

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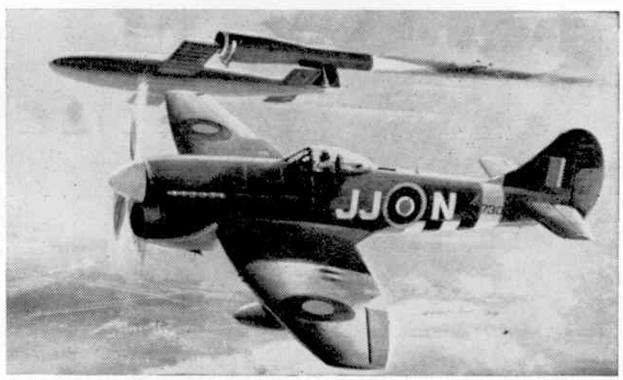

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MECCANO® Magazine

APRIL 1968 VOLUME 53 NUMBER 4

Meccano Magazine, founded 1916.

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Editor
JOHN FRANKLIN

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MAP HOBBY MAGAZINE

FRONT COVER

Artist Laurie Bagley captures Craig Breedlove's "Spirit of America—Sonic-I" at speed, on the Utah Desert, U.S.A., during one of many high speed trials and record runs. The story of this Jet Car appears on page 190, and you can make a simple model of it from the full-size plans on page 200.

NEXT MONTH

Full-size plans for Ray Malmstrom's "Brigadyr," a simple rubber-powered, free flight model, is the main feature, with yet another half-size plan for a simple all-balsa model. Trackside Construction continues with a simple OO gauge tunnel, whilst the A.B.C. of Railways describes some of the more common types of railway goods wagons. Many new interesting Meccano models will be described, together with Dinky Toy news. There will also be a special Captain Scarlet feature, as well as our other regular features, so don't miss this issue—easily recognisable with its futuristic Captain Scarlet S.P.V. and S.P.C. cover.

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CONTENTS

Publishers of Aeromodeller, Model Boats, Model Cars, Model Engineer, Radio Control Models, Model Railway News,

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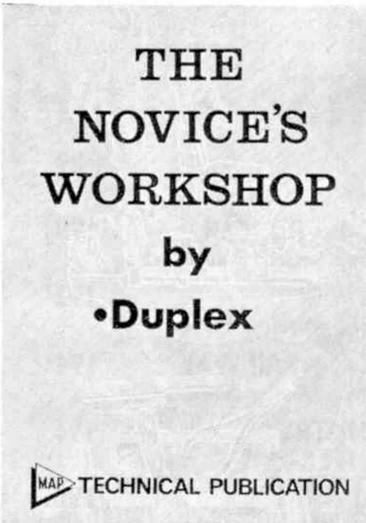

THE NOVICE'S WORKSHOP

Duplex, now known to be Ian Bradley and Norman Hallows in partnership, enjoys a high reputation amongst model and light engineers for wide knowledge of the subject and a happy knack of explaining quite involved operations in a clear and logical manner. This work, which originally appeared as a series of articles in *Model Engineer*, is designed to assist and instruct the *newcomer* to the craft in the all-important matters of planning and layout of the home workshop, the selection of handtools, their correct use and, finally, shows the reader how to apply his newly-developed skill to the making of additional items for his workshop. The book then goes on to deal with the selection, installation, maintenance, and practical uses of machine tools. Primarily for beginners this is a book which even the most experienced worker will find abounding in useful hints and tips.

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AEROMODELLER ANNUAL 67/68

Some very special articles include world record holder Bill Wisniewski on Tuned Exhaust Pipes; other speed flying articles by experts; Fuel Tanks for Control liners; Dr. Hawkins on Jap WWII Colour Schemes; Prop Carving; Woodwork for Modellers; Simple Painting for the Unskilled; Flexwing flying models; plus a really well assorted plethora of model drawings of the world's interesting, exciting, different, special, fancy, and just odd flyers of the year, including r/c, contest and sports power, Winter Cup, slope soarers, chuck gliders, helicopters, indoor . . . the lot. Cover by Bagley shows the French Nord 500 (plans inside, of course).

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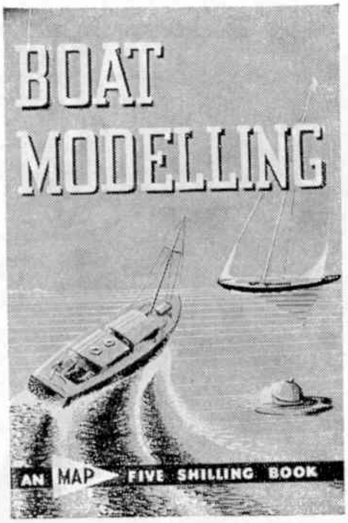

BOAT MODELLING

A book for the not-so-expert modeller covering every aspect of model boat work from construction through to sailing. Author Vic Smeed provides a wealth of practical assistance. Chapters include: tools and materials, hard chine hulls, round bilge hulls, superstructure fittings, finishing, I.C. engines, electric motors, hydroplanes and special models, operation, radio control.

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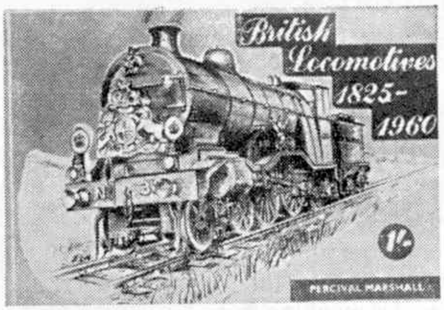

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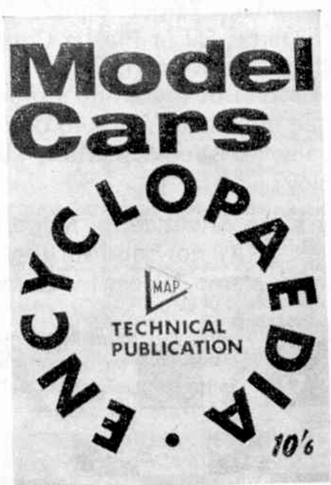

MODEL CARS ENCYCLOPAEDIA

This Electric Model Car Racing Encyclopaedia brings together a wealth of information for the benefit of expert and beginner alike, conveniently arranged in A-Z form. It is an attempt to assemble in one place quite a lot of information about electric model car racing in simple alphabetical form where it will be readily available for reference, ranging from Ackerman steering through Drivers and Driving to Pay Circuits and on to Worms and Zinc Spraying.

151 pages, $7\frac{1}{4} \times 4\frac{7}{8}$ in., 104 illustrations. 45,000 words.

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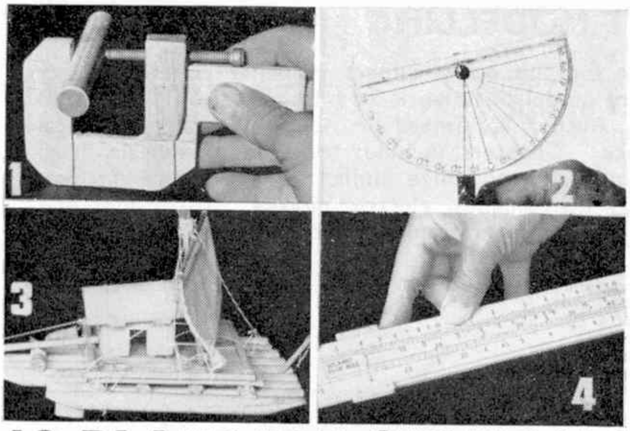

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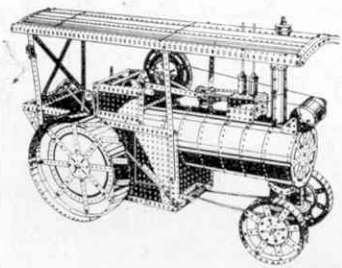

WHAT'S WHAT IN THE MECCANO LINE

The standard progressive Meccano system consists of ten Main Sets, numbered 1-10 inclusive each with an identifying "theme" name in addition to the number. This theme, e.g. "Highway Vehicles" is obtained from the predominant type of model featured in the Instructions Book for the particular Set and does *not* mean that *only* models of that type can be built with the Set. In fact, the number and variety of models that can be produced is limited only by the imagination of the user. Also included in the standard system is a series of seven Conversion Sets. These are not intended as constructional sets in their own right, but simply contain the necessary extra parts to convert a Meccano main outfit into the next larger one, e.g. Outfit 1 + Conversion Set 1A = Outfit 2. Also available, but not included in the standard progressive system, are several self-contained outfits, such as the Power Drive Set and Gears Set, as well as a number of Motors and additional equipment. The following is a list of all items and Sets currently available, with their U.K. recommended retail prices:

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8. Breakdown Crew ...	13	10	0
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The Meccano range of Spare Parts consists of more than 300 individual items, all of which are available for separate sale. A price list can be had on application.

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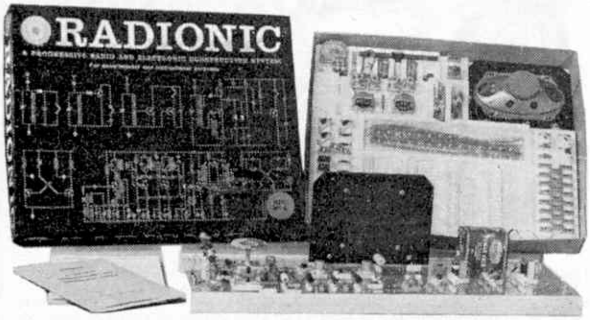

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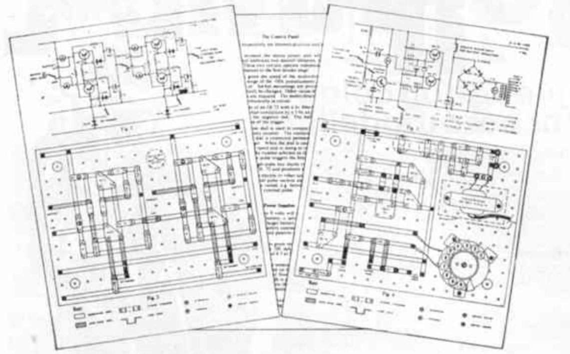

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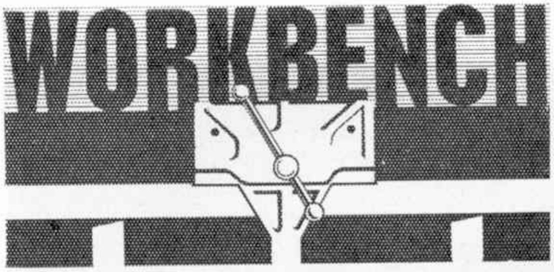


Service to Advertisers

NO LESS than 5,000 readers asked for further information on the "Look it Costs you Nothing" coupon from our January issue. We would like to thank readers for using this service and would point out to present and future advertisers that these readers were so interested in the products advertised they took the trouble to write to us. This service is free to all advertisers who book a one-eighth page or larger advertisement and it really pulls in the replies.

Several readers have written to us complaining about the large number of advertisement pages, compared to editorial pages. You must realise that for the magazine to continue as a viable commercial venture, the advertising revenue is essential. Each month the proportion of advertisement to editorial pages fluctuates, but rest assured that we have a house limit, so that when the advertisement pages reach a certain number, more editorial pages are added to balance things up.

To you, as a reader, the advertisement response may not seem very interesting at first glance, but the health of any magazine can always be gauged by its advertisement content. We cater for individual modeller's advertisements too, you know. If you want to purchase, sell or exchange any model goods, why not try our Classified Advertisements. At a cost of 18 words for 6s. od. and 4d. per extra word, they offer unrivalled value, in a time of rising costs.

Model shop owners and managers who would like to increase their trade by letting *Meccano Magazine* readers know their shop exists, can use our special Model Shop Directory service, again at very reasonable cost. Write for details to our Advertisement Department at Hemel Hempstead.

Congratulations

Not many Assistant Editors can aspire to the position of Editor in four months, but this is the feat of *Meccano Magazine*'s Assistant, John Brewer. John takes charge of our sister magazine *Model Railway News* with the April issue, and, I am sure, you will join with me in wishing him success in his new venture. John is responsible for the very fine series "A.B.C. of Model Railways" and "Trackside Construction in *Meccano Magazine*, but do not despair, both series are to continue for many months to come until both subjects have been fully covered, to set the novice and inexperienced railway modeller off on the right foot.

Model Railway News is *the* magazine for modellers interested in railway modelling. Features for both novice and expert are included every month with the main accent on practical and constructional models, layouts, etc.

Mini tin paint export

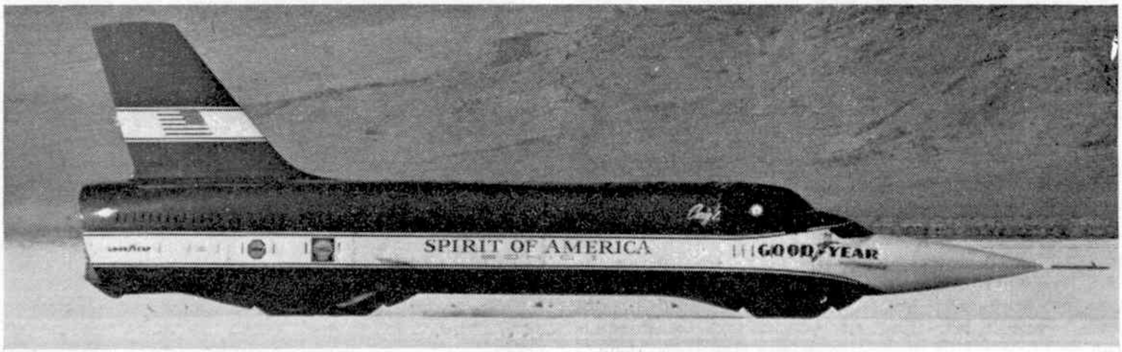
Half a million mini tinlets of paint, each 1 in. tall and the smallest tins of paint in the world, form part of the largest ever single export order for Humbrol Ltd. The container van, seen on this page, in front of the Eiffel Tower, Paris, rushed the 20-ton order from Hull direct to Paris to meet delivery requirements on schedule. The ½ oz. tinlets, if placed on top of one another, would be 39 times taller than the Eiffel Tower! Think how many plastic kits these would last for!

Col. S. N. Beattie poses with an animated Meccano robot on his stand at the Model Aeronautical Press sponsored "Model Engineer Exhibition." Every part of the robot is standard Meccano, including the fingers, arms, etc.

Bumper attendance

The Model Engineer Exhibition sponsored by Model Aeronautical Press Ltd., at Seymour Hall, London W.1, and organised by another of our sister magazines, *Model Engineer*, was a great success, with a total attendance of 30,356 during the period January 3rd-13th. Colonel S. N. Beattie had a really delightful display of all types of modelling goods, including Meccano. Of great interest to Meccano builders was the life-size robot made entirely out of standard Meccano parts, of which Beatties of London carry a full range. A firm supporter of the Meccano Construction System, Colonel S. N. Beattie prides himself on his highly organised spare parts service, for callers and mail orders. Realising that many young modellers have excess equipment and a shortage of spare cash, the Colonel has large second-hand departments at his Southgate and High Holborn shops. The Head Office and Mail Order Department are at Southgate.

The lorry-load of Humbrol mini-tinlets of paint, each one inch tall, poses for a few seconds in front of the Eiffel Tower, while a half million tinlets of Humbrol enamel are delivered to Paris.



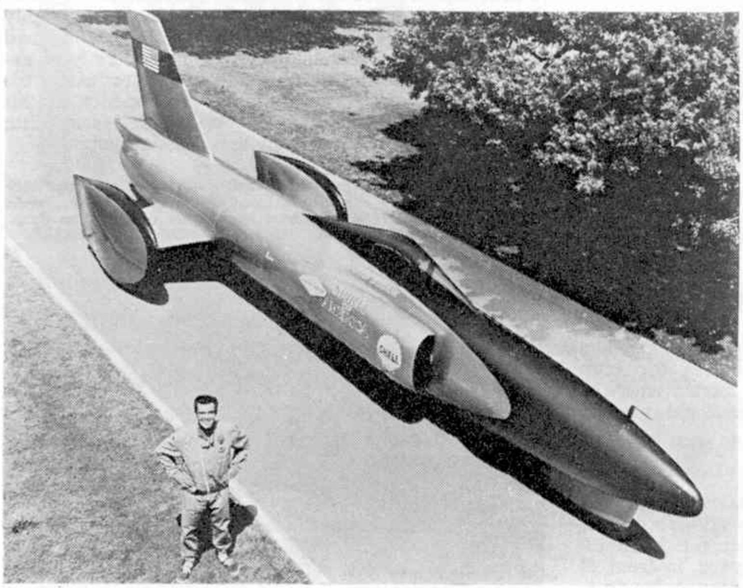
600 M.P.H. RECORD HOLDING CAR

THE TITLE of "The Fastest Man on Earth" belongs, without doubt, to Craig Breedlove, a resident of California, U.S.A., who set a record speed of 600.601 m.p.h. at the Bonneville Salt Flats, Utah, U.S.A., on November 15th, 1965.

A consistent record breaker for several years now, Craig commenced his high-speed career the day he walked into the Shell Oil Company's Santa Monica, California, office and asked to "see the manager." This was in 1961. He commenced construction of his three-wheeled *Spirit of America* in his father's back-garden, while working as a fireman in 1959. When money ran out, he went out in search of sponsors. Shell Oil and The Goodyear Tyre and Rubber Company agreed to help.

Looking rather like an old jet fighter with the wings chopped off and wheels added, special hubs, tyres and oils had to be developed to cope with the blistering heat encountered when travelling at 400-600 m.p.h. Goodyear constructed the tyres, and the disc brakes had to have special lubricants to withstand applications at 150 m.p.h. It took seven hours of hand labour to construct these early record tyres. Modern passenger car tyres are built in minutes. Craig's first shot at John Cobb's record 394.2 m.p.h. at Bonneville in 1962 ended in failure as the car was not handling properly. A fixed tail fin was added to put the centre of pressure at the centre of gravity and a combined steering linkage was developed for the nose wheel and the ventural nose fin. In July 1963 Craig used 90% engine power for a recorded speed of 388.47 m.p.h.; on the return trip he boosted the power to 95% and made 428.37 m.p.h. This gave an average of 407.45 m.p.h., from a car powered by a 5,200 lb. thrust turbo-jet engine; his next car, *Spirit of America—Sonic-1*, painted at speed on the cover, was to be powered by a 15,000 lb. thrust turbo-jet.

The design speed for *Sonic-1* is 800 m.p.h. plus. Again special tyres were developed by Goodyear, and multi-stage dynamometer tested at simulated speeds of 850 m.p.h.—well above the then current speed record of 536.71 m.p.h. The new car was some 34 ft. long, and 10 ft. 6 in. from ground to fin top, with pistol-grip (like handlebars on a bicycle) type steering. Fibreglass



Above, on this and facing page, Craig Breedlove's "Spirit of America—Sonic-1" that set the "Unlimited" speed record of 600.601 m.p.h. on the Bonneville Salt Flats, Utah, U.S.A. Powered by a 15,000 lb. thrust turbo-jet engine, Sonic-1's design speed is 850 m.p.h.

At left, Craig Breedlove's first "Spirit of America" with only three wheels, and powered by a 5,200 lb. thrust turbo-jet engine, was wrecked when both the steering and drag parachutes failed on a speed run, causing the car to leave the course, hit a telegraph pole, and land in a pond some five miles off the planned course.

was used extensively in the body panels on a chrome molybdenum steel tube framework. This car, looking more like a missile than any other known car, was destined to take Craig across the earth's surface faster than any other man—ever.

Record smashing in the U.S.A. is by no means a walk-over for one person, as there is always plenty of hot opposition around. In the *Unlimited* class (where the car does not have to be wheel-driven), Art Arfrons is Craig's main opposition, with his *Green Monster*. The *Green Monster* could well claim to be the ugliest car ever built. With the driver offset to one side of the huge jet engine and a movable airfoil mounted above the nose to hold the front wheels on the ground, it's no slouch, having attained a speed of 576.553 m.p.h. in 1965. Craig's first *Spirit of America* car with three wheels (which still holds the motor cycle record) was in no condition to compete with Afrons, as his final 1964 speed run destroyed the car, when both the steering and drag parachutes failed. Craig's wild ride, which included making matchsticks out of a telegraph pole, was concluded when he travelled 150 feet through the air and landed in a pond some five miles off the speed course!

Sonic-1 was also to be held back by design problems. After several runs over 500 m.p.h. it was discovered the frame needed strengthening. These modifications were carried out the next day, but a run at 534 m.p.h. caused the nose to cave in and the side skins to ripple. The car was repaired in a few days and another speed run embarked upon, this time with the added power from the jet engine's afterburner. Unfortunately, the car went out of control at 600 m.p.h. when the front wheels lifted off the salt and the car veered off the track. After this the nose fins were enlarged, and their angle changed to hold the front wheels onto the track, using air pressure on them at high speed. Arfrons had been watching all this and had the *Green Monster* fired up to go down the speed course. His right-hand rear tyre blew out at nearly 600 m.p.h. but he managed to keep the car under control, and ejected the cockpit at 250 m.p.h. to release trapped smoke. To get this sort of speed he used a three-mile build-up run before passing the electronic timing lights, similar in principle to the photo switch described in February *Meccano Magazine*.

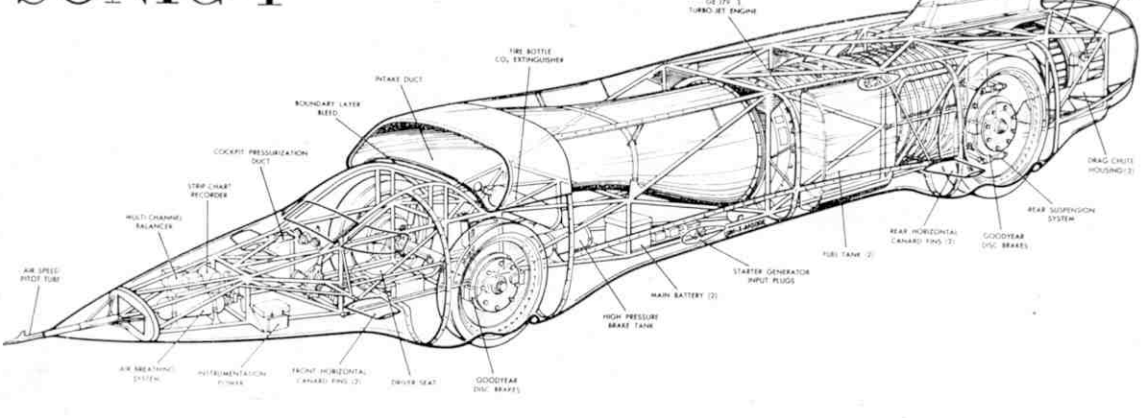
After yet more modifications, Craig Breedlove managed to beat the 600 m.p.h. average, with two runs,

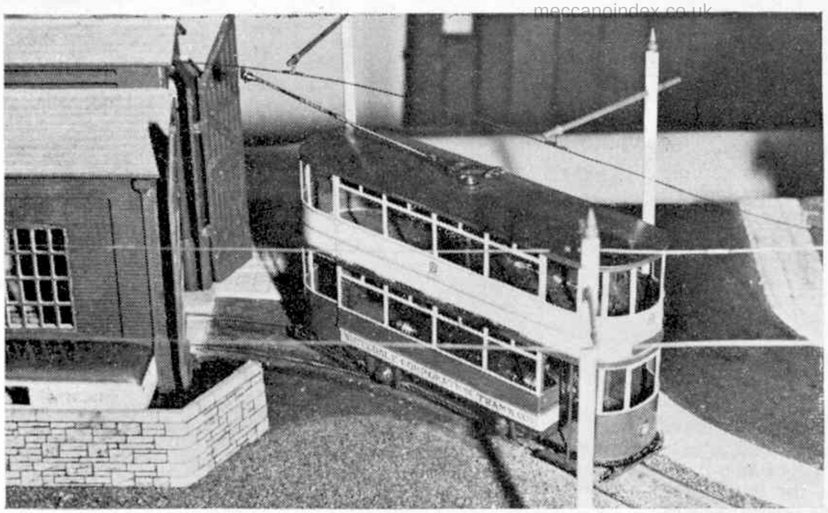
both in opposite directions, to allow for wind speed helping the car. This is the highest speed that any man has ever travelled at, on the earth's surface; but this is not the ultimate as Craig thinks his car is capable of breaking the sound barrier—760 m.p.h. The Breedloves are a fast family as Mrs. Craig Breedlove also holds a speed record, the "Women's Unlimited" at some 308 m.p.h. in her husband's *Sonic-1*.

The Unlimited speed records are always higher than those for direct wheel-driven cars so it is interesting to note that the American Summers brothers in *Goldenrod*, powered by four V-8 engines from an American saloon car driving on all four wheels, have recorded 409.23 m.p.h. The Chrysler "Hemi" engines use fuel injection rather than conventional carburettors—to reduce the car's frontal area, not to increase the performance. All this was rather embarrassing for the Summers brothers, who had broken the record set by the late Donald Campbell at a cost of £80,000 while it is estimated Campbell's venture cost more in the region of £3,500,000 as he used a far more complex system with his gas turbine driving *Bluebird*.

Finally, we would like to thank *Autocar* Magazine, *Rod & Custom* Magazine and The Goodyear Tyre Company for providing essential information to compile this feature. You may well be asking yourself what happened to *Sonic-1* in 1966 and 1967. Unfortunately it did not break any records; it was used as a display piece at many car shows and race meetings.

"SPIRIT OF AMERICA—SONIC-1"





MANCHESTER

The Annual Exhibition staged by the Manchester Model Railway Society at the Manchester Corn Exchange never fails to be a success.

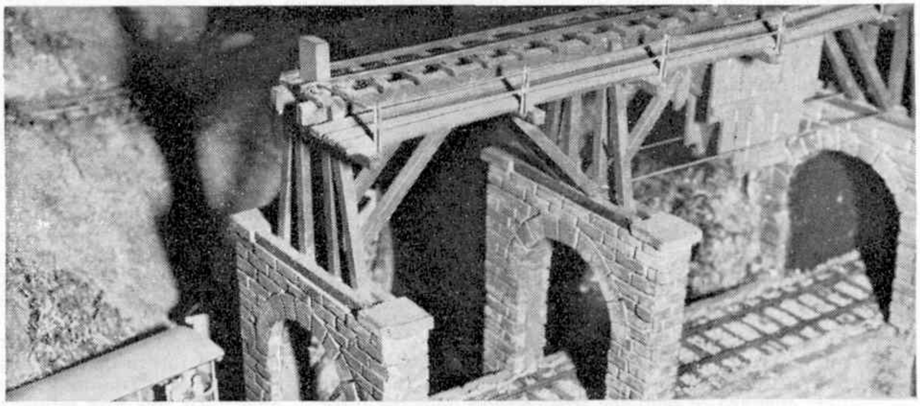
The Whitedale Tramways

by William Burgon and Harry Sumner

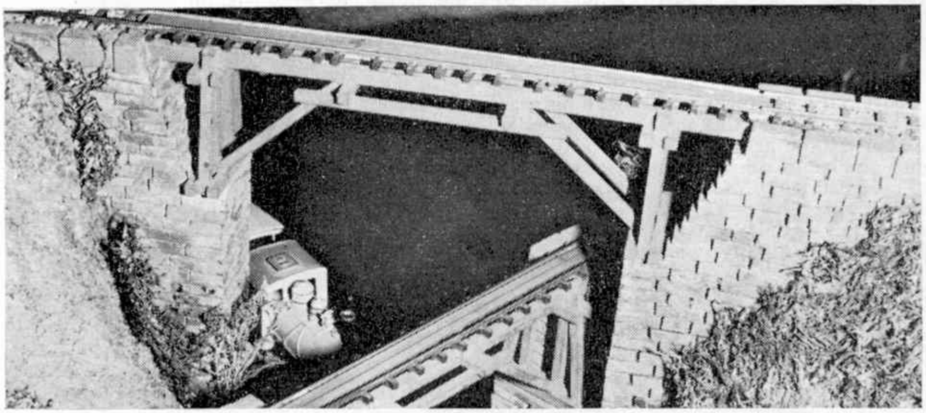
Trams make wonderful models, but not many people build complete tramway layouts. This picture shows a double-deck tramcar leaving the depot on the layout of two Blackburn modellers. The layout is OO scale, and occupies a baseboard measuring only 8 ft. by 1 ft. Automatic operation is an interesting feature, and all the trams are scratch-built, using sheet brass for the superstructures.

Mill Dale

by George Grainger



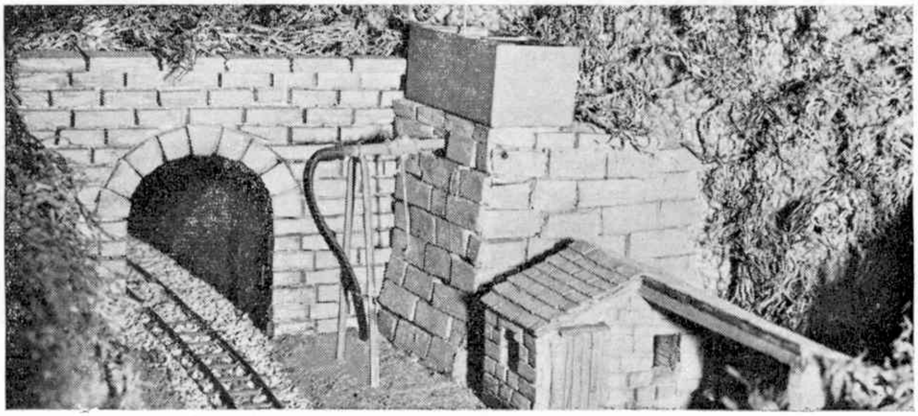
This little narrow gauge layout is built to HO scale, using N gauge track, and is notable for its very realistic scenic work. This view shows the narrow-gauge track carried on a trestle over a standard-gauge "exchange" siding. Narrow-gauge hopper wagons can discharge their loads into standard-gauge wagons waiting below. The trestle itself is of wooden construction, carried on stone arches. Note the stop-block at the end of the narrow-gauge line, to prevent "rough shunts" ending in disaster!



Bridges at Mill Dale

Another fascinating feature of the Mill Dale layout is that trains run on several different levels, and at one point, three different track levels cross each other. If you look carefully at this picture, you can see the locomotive of a train running on the lowermost track; above it, there are two bridges! Again, the bridges are of the timber trestle type, with no parapets or handrails, giving the passing trains a most precarious look. The stone embankment leading to the bridge is worthy of note.

Tunnel-mouth at Mill Dale



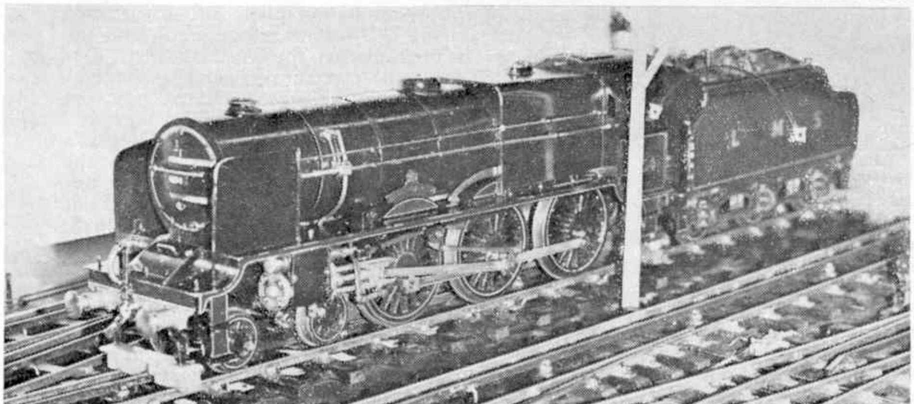
Every stone block in this tunnel-mouth is a separately cut piece of balsa, and the picture proves that this sort of trouble is well worth taking. The overall effect is far more realistic than it would have been if ordinary brick-paper had been used, although the separate-block method does take considerably longer to do. The water-tank by the tunnel is a typical narrow-gauge structure, with its rectangular metal tank atop a stone-built plinth. The building in the foreground is a halt.

MARVELS

This year was no exception with 12 working layouts and two working tramways. Most exhibits were to a very high standard, as shown.

Stone-built Houses
by Ken Ball

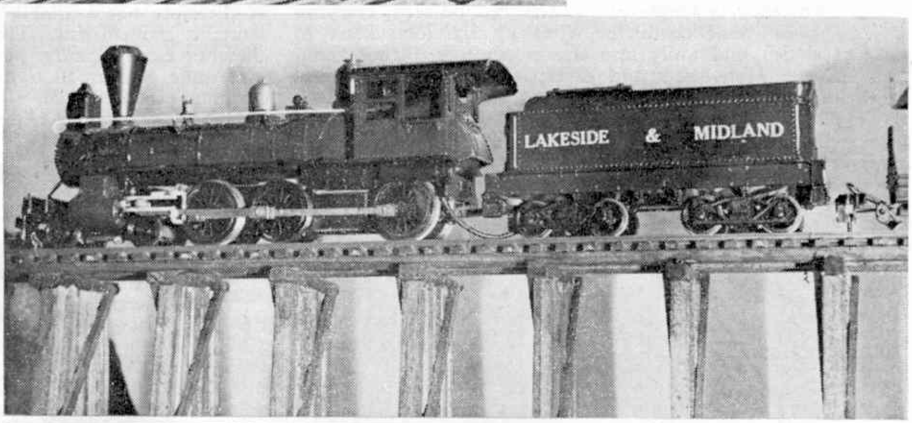
This little group in OO scale earned its builder a Diploma at the show. The slates on the roof are all individually applied, and the old-fashioned square chimney pots are beautifully modelled. Although you can't see in the photograph, the shop window really has goods for sale inside—that's real detail, in so small a scale. The houses were copied from real-life examples, which the builder sketched for modelling references.



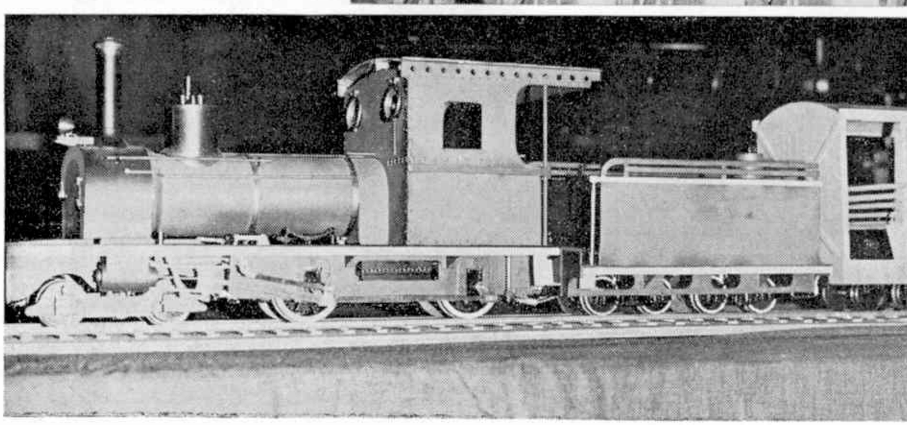
Royal Scot in I Gauge
by "G.M.T."

This large I gauge model of an L.M.S. "Royal Scot" class 4-6-0 is not quite as straightforward as it looks. It is a "live-steam" model, electrically fired. Very simply, electric current, drawn from the track in the conventional way, is used to heat the water in the locomotive boiler, to generate the steam which provides the motive power. This method does away with oil or coal firing. As the wheels of the locomotive are not insulated, the current is collected from a third rail.

American 4-4-0
Macclesfield Model Railway Group



The Macclesfield Model Railway Group had a set of attractive "set-pieces" on show. One of them represented a scene from the American mid-West, and we took this shot of a typical wood-burning 4-4-0, with "balloon" stack, passing over a lofty timber trestle bridge. The huge headlamp and bogie tender are typical American features of the last century, as many readers will know through the medium of "Wild-West" films. The bell on the boiler top was a necessity, as trains often ran through city streets.



Fiji Locomotive
by Don Boreham

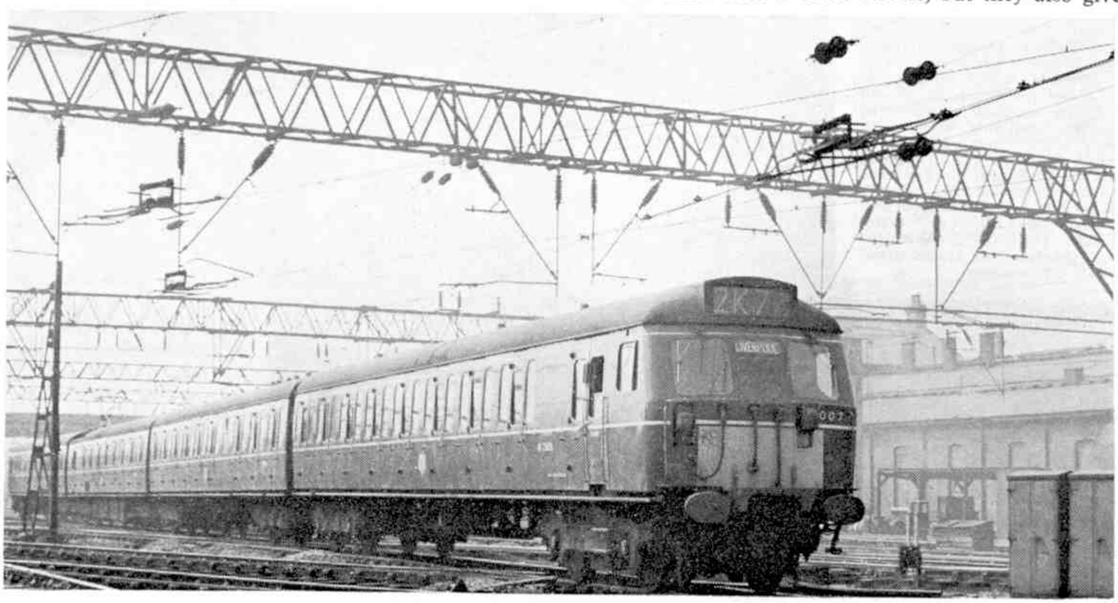
This narrow-gauge model is built to the very large scale of 16 mm. to the foot, and runs upon O gauge track. The prototype is still running in Fiji, and operates one of the only Free Trains in the world. The row of holes along the edge of the cab roof are for ventilation purposes—it's hot work being an engine driver in Fiji! This engine is quite unusual for narrow-gauge as it has a tender, and a large bogie one at that. The coaches of the train are of the open "toastrack" type.

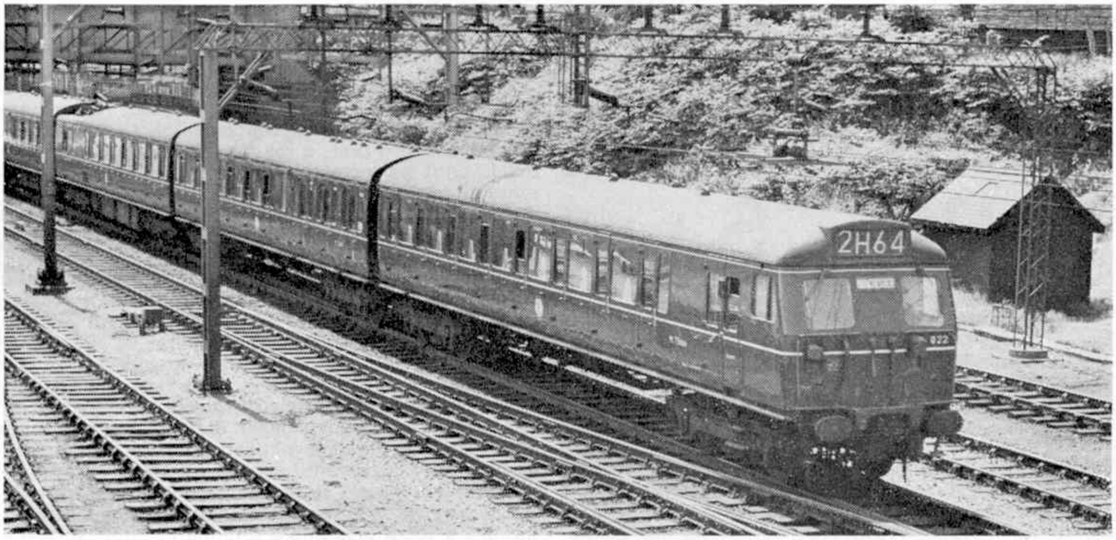
BRITAIN'S NEW 25 KV RAILWAY SYSTEM

Above, cab end of a new AL6 type electric locomotive, which provide motive power for all the new services. 100 m.p.h. speeds are everyday occurrences. At right, this Manchester suburban train is a far cry from the steam services of not so long ago. *All photographs courtesy of British Rail.*

A VISITOR to London's Euston station, who had not seen the place for four or five years, would find it very difficult to recognise today. The old, rambling collection of buildings and platforms, which had been a nightmare to travellers for so many years, have completely disappeared. In their place, a huge and entirely new station is fast approaching completion, with a multitude of long platforms stretching out below an enormous block of railway offices. From the platform ends, a tangle of gantries can be seen, carrying the overhead conductor wires up the long bank to Camden and away into the distance to Birmingham, Stoke, Manchester and Liverpool. Not a steam locomotive is to be seen anywhere; from time to time, sleek electric locomotives, painted in British Rail's new blue livery, arrive and depart with trains of blue and grey main-line rolling stock, and multiple unit suburban trains come and go with commuters from Bletchley, Rugby and Northampton. Apart from the distant throbbing of the diesel station pilot, the only sounds to be heard are the click of wheels on track, and the swish of the pantographs on the overhead wire. Departing trains leave the station with car-like acceleration, and hardly notice the steep gradient past the carriage sheds; this is Britain's New Railway.

The electrification of the London Midland Region's main line to Liverpool and Manchester cost in the region of £175 million, and is probably the most important single piece of modernisation to be carried out since the Nationalisation of the railway system in 1948. How did it come about? The most important factor was the need to abandon steam motive power. Everyone loves a steam locomotive; in fact, apart from possibly the sailing ship, the steam railway engine is the most honoured of all Man's inventions. The steam locomotive is, however, very expensive to run; it needs a great deal of servicing, and uses a lot of manpower. It has to have steam raised before it can be used, and is therefore not available at a moment's notice. In a word, it is inefficient. The choice lay simply between diesel or electric motive power; both can provide a service more efficient in terms of speed, acceleration and running economy than steam—they not only provide the customers with a better service, but they also give





the railways much lower operating costs. Electrification of a railway requires a great deal of civil engineering work; on the London Midland's route, extra clearances had to be provided under 649 bridges and 27 tunnels. A dozen feeder stations were supplied for the electric power supply, 58 track section cabins, and 109 relay rooms. On the other hand, dieselisation would have run up an even bigger bill for rolling stock, and all things being considered, it was decided that electrification of the routes in question would pay dividends.

Electrification on the overhead conductor wire system was chosen because, although the initial installation costs are higher than with the "third rail" method employed by the Southern Region, running maintenance costs are lower, and the "overhead" system is much safer for railwaymen working in yards and on the track. The third rail system is also very unreliable in severe winter weather conditions, due to icing of the conductor rails. The overhead wire is electrified at 25,000 volts a.c.; this very high voltage gives more economical running than low-voltage systems, as fewer sub-stations are needed to feed the system, and the overhead equipment can be much lighter, and therefore cheaper. High-voltage electrification of railways was pioneered by the French and, indeed, many lines on the Continent are being electrified in this way.

The actual work of electrification was a vast job, which involved virtually building a new railway on top of the existing one. Nearly 1,500 miles of track had to be wired, not to mention the many alterations that had to be carried out to bridges, tunnels and stations. All this had to be done with the minimum interference to scheduled trains. Techniques were evolved for the speedy modifications of over-bridges; bridge superstructures were jacked up, and concrete arches cast over the old arches, which were then blown from underneath with explosive charges.

Services were opened by degrees: the Crewe to Manchester line in 1962; southwards to Stafford in 1963, and further south to Rugby in 1964. In September 1965, freight working was electrified as far south as Willesden, and services to Euston started in 1966.

At left, this view shows clearly the overhead catenary system and supporting girders and trusses. Right, wrap-round windscreens distinguish the smart new suburban trains on the Euston-Northampton line.

Today, the whole system is operating; as this was originally scheduled for the early 1970s, work has really proceeded apace!

The standard electric locomotive in use on the "New Railway" is the Class AL6. These are of the Bo-Bo wheel arrangement, that is, they are carried on two four-wheeled bogies, with a traction motor to each axle. These locomotives are equipped with full electric train-heating apparatus, and have rheostatic and air-operated brakes. Speeds of 100 miles per hour are regularly reached in service. The pantographs are of unusual design, as can be seen in the photographs; they will run equally well in either direction, so only one is necessary for each locomotive.

Suburban services are worked by four-coach multiple-unit trains of entirely new design. They have very smart looking wrap-round windscreens, and run on the new B.R. type B4 bogies, which have coil springs and dampers, rather like the front suspension of a motor car, instead of the leaf springs previously used in bogie design. These trains run very smoothly, and their speed of 75 miles per hour has revolutionised the Euston outer suburban services.

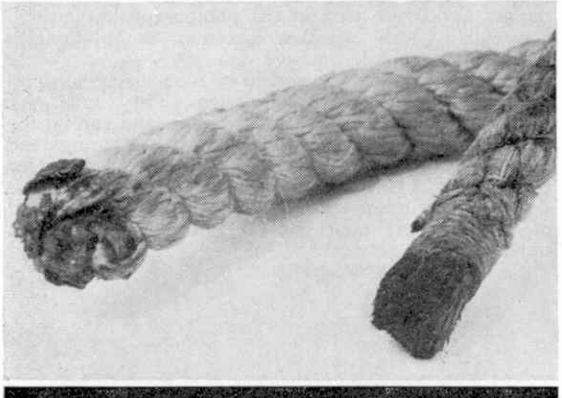
Simple Home Chemistry

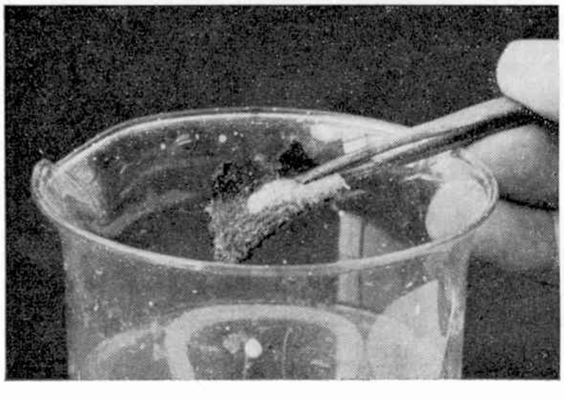
FIBRES AND FABRICS

" Boffin " describes some simple methods of chemical analysis on everyday fabrics

CLOTHS AND fabrics these days are made from both natural and synthetic or man-made fibres, sometimes mixtures of both. Being able to identify a particular fabric or fibre often requires chemical " detective work " or analysis. Also, of course, man-made fibres are produced by what are essentially chemical processes.

The first of the artificial or man-made fibres was rayon (or acetate rayon to give it its proper description), which for a long time was known as artificial silk. Most material of this kind today is viscose rayon, which is almost pure cellulose, made from a thick solution obtained by dissolving wood pulp in a mixture of caustic soda and carbon disulphide. This same solution will produce rayon threads if forced through fine holes into a bath of sulphuric acid—or sheets of cellophane if forced through a long and very narrow slit into the acid bath!





It is quite easy to make a slightly different type of rayon, known as cuprammonium rayon. Make up a really strong solution of copper sulphate and add to this, a little at a time, a solution of dilute sodium hydroxide until no more precipitate is formed. Allow the solution to settle and then pour off the clear liquid. Decant the precipitate into a large glass or plastic funnel fitted with a filter paper and wash with running water for about ten minutes.

Now tip the washed precipitate into a clean beaker and cover with a solution of ammonium hydroxide, stirring until dissolved. Probably not all will dissolve, so add a little more ammonium hydroxide and repeat, as necessary, until you have ended up with a clear blue solution.

This solution will readily dissolve cellulose. Tear up some scraps of blotting paper or filter paper and stir into the blue solution until dissolved. Repeat with more torn-up paper until you have a thick, sticky solution. This is your " stock " for making rayon thread.

To produce a thread this solution must be forced through a small hole into a solution of dilute sulphuric acid. A hypodermic syringe or hypodermic oiler is ideal for this purpose, or any other small syringe with a *fine* nozzle. You can make one from a piece of glass tube, as shown in the diagram. Heat the tube near one end and draw out into a throat. Nick the middle of the throat carefully with a small triangular file, snap off and you have a length of tube with a nozzle end. Trim the plunger to a snug fit with a razor blade and sandpaper and cement to a length of dowel.

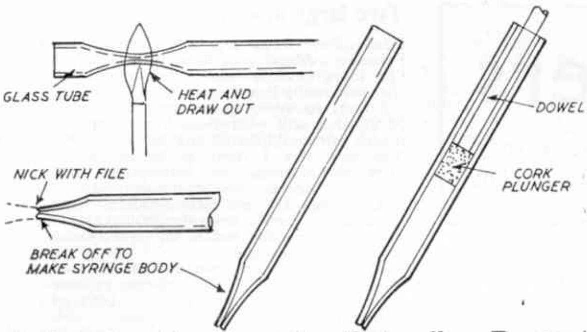
Suck up some of your " stock " solution into the syringe, immerse the nozzle end in a beaker of dilute sulphuric acid and press the plunger down. As long as the " stock " solution continues to be forced from the nozzle it will develop a continuous fine blue thread of rayon. Lift the thread out and wash in water as soon as you can. If left in the acid it will turn white.

Try the same experiment with a different " stock " solution, this time made by dissolving cellulose acetate plastic in acetone. This only needs to be squeezed *gently* out of the syringe into air—not dilute sulphuric acid. If you find that the thread does not solidify properly, try squeezing out into warm water. This will produce a white, rather than a clear, thread of *viscose* rayon.

Now let's turn to *identifying* rather than making fibres. A simple test for an unknown fabric is to hold a scrap in a flame. If it burns readily, the *way* in which it burns will often give a clue. *Wool*, for example, burns slowly with little or no flame and stops burning when it is removed from the flame, leaving a large black mass on the ends of the fibres. The same is also true of *silk* and " Celanese " (artificial silk). Cotton and viscose rayon burn quite readily and tend to go on burning when removed from the flame. Only a light ash is left, with no thickening and blackening of the ends. Linen burns like cotton, only more slowly. The smell when burning can also be distinctive. Wood and silk smell like burning feathers; cotton, linen and rayon like burning paper.

Synthetic fibres such as nylon, terylene and so on tend to melt rather than burn in a flame, and so give

At left, top, man-made fibres (nylon and terylene) melt when heated. Natural fibres char and burn. This photo shows the terylene rope end (melted) and the natural fibre rope (charred). The treatment of a wool mixture fabric with acid, as shown in the beaker, dissolves the wool but leaves synthetic fibre intact.



Making a Syringe for Extruding Rayon

the effect of shrinking away from the flame. They will also go soft and sticky. Nylon and terylene hardens into a regular bead on cooling, Vinyon into an irregular bead. In all cases the bead is too hard to crush with the fingers. Glass fibre will also melt into a bead but takes considerably more heat than other synthetics for this to occur. It also has no tendency to blacken or char.

A pretty positive test for wool is to drop a small specimen into a test tube about one-third full of dilute sodium hydroxide and boil. If wool, the specimen will dissolve rapidly. Some other fibres may be partially dissolved, or attacked, but much more slowly. Wool in a wool mixture will be dissolved out by such a test, leaving the other fabrics used in the mixture behind. Another similar test is to boil the specimen in a solution of potassium plumbate, when wool (or the wool part of a mixture) will turn dark brown or black.

Now for some acid tests. You can boil a small scrap of the material to be tested in a test tube containing a little dilute sulphuric or nitric acid*; or put a spot of acid on the cloth and warm gently by holding over a small flame. Here are some typical reactions.

Wool will show little or no effect, although it may turn yellow. This yellow discoloration is more likely with nitric rather than sulphuric acid.

Cotton and rayon will both go black with sulphuric acid. With nitric acid cotton will not be affected but rayon will be attacked (leaving a yellow discoloration around the edge of the affected area in the case of the "spot" test). Thus you can distinguish positively between cotton and rayon with these two tests.

Nylon will shrivel up in acid and also tend to turn yellow.

Here are some further tests you can make for positive identification:

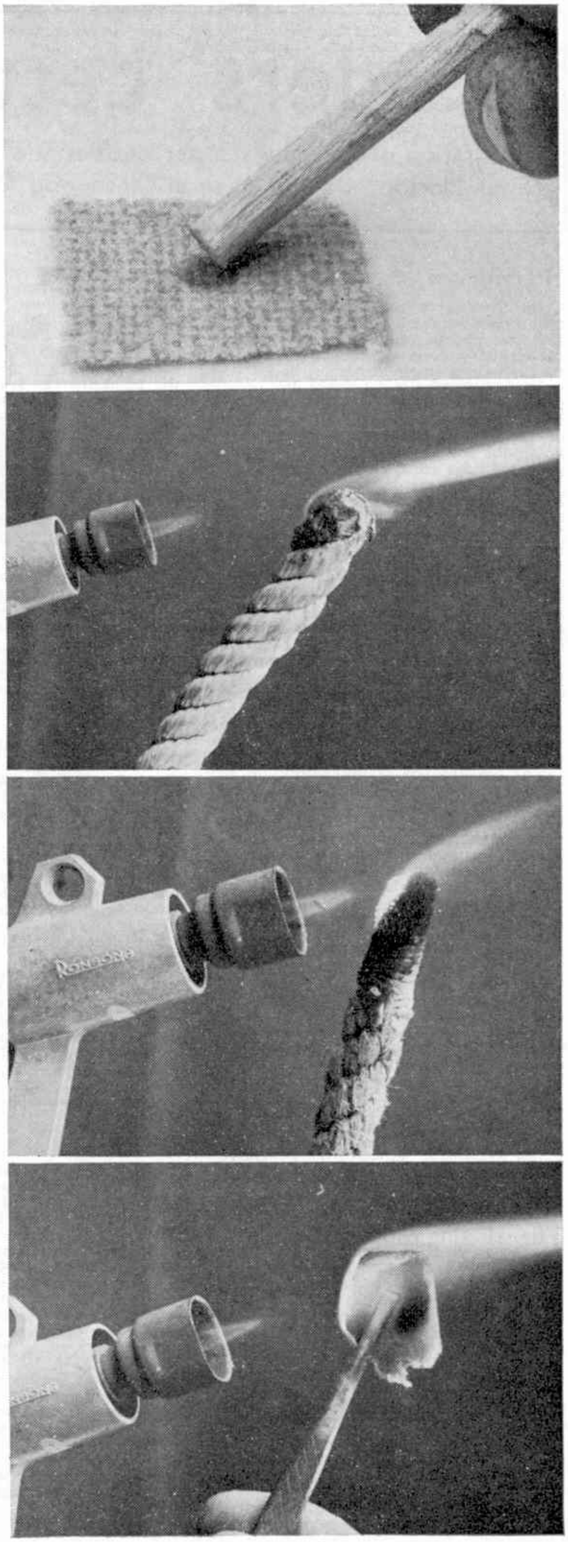
To distinguish between silk and cotton—stir a little glycerine into a solution of copper sulphate and then add sodium hydroxide drop by drop until the precipitate dissolves. This solution will *dissolve* silk, but not cotton.

To find if there is silk in a wool mixture—use the test solution above. Any silk present in the mixture will be dissolved away.

To distinguish between cellulose acetate rayon, silk, cotton, etc.—immerse the specimen in acetone. This

Continued on page 199

* *You can use sodium bisulphate solution if acids are difficult to obtain from your local chemist.*



At right, top to bottom. Spotting with acid on a wooden dowel is another basic test for fabric. The nylon rope is clearly seen melting in the flame whilst below it the natural fibre rope is glowing and charring. Rayon melts and shrinks as well as burning when placed in a flame such as this Ronson blow-torch.

Readers' Letters

Publication of a Reader's letter entitles the writer to a Swan-Morton "Unitool," a small "thank you" from the Ed.

No criticism

DEAR SIR,—I would like to thank you for a really good *Meccano Magazine*. My first impression when I was handed the January copy at the bookstall was that it looked small and poor, and I was unlucky in getting a copy that was poorly printed in parts. It was not long before I changed my opinion for I found plenty of really interesting reading inside, and no doubt we are some way back to the good old days when it was good.

It is good to see Model Railways again, Engineering articles and the new series started in the February issue on "Famous Engineers." I am a Meccano enthusiast so my main interest is in this sphere, and I hope we shall get plenty of good articles on this hobby. I note that one non-Meccano reader requested last month that we should not be given too much space. But may I point out that it is after all the MECCANO Magazine (it was for the purpose of Meccano enjoyment that the magazine was first produced). It owes its existence to Meccano supporters and to Meccano and kindred subjects. By all means let us cater for as many tastes as possible, but don't neglect the very heart of the Magazine.

The smaller size is not helpful to the Meccano model pages, but no doubt we shall settle down to this, though I do hope we shall soon get some first-class models again of the more advanced type. We are fortunate in getting a good selection of models, but mostly for the smaller outfits so far, so don't forget the enthusiast, please.

I like the Workbench page to keep in touch and give the personal touch, and I am very pleased to see the Readers' Letters for this is a real way to knit us together as one big family. Thanks also for Among the Model Builders.

I have no criticism at all really—which is most unusual—so as far as I am concerned it is all right. I would like to see more pages, but I do realise that it has to be an economic proposition, but possibly as it builds up and the advertisers increase, we shall get more. All good wishes and may the magazine prosper.

South Merstham, Surrey. *L. C. Hearn.*

The winning time

DEAR SIR,—I am very glad to see the *Meccano Magazine* back on the bookstands after a lapse of several months.

Being a keen Meccano model constructor, I am glad to see a good selection of simple, easy to construct models from standard outfits, suitable for older readers' (like myself) sons. We made a special point of visiting the Schoolboys and Girls Exhibition this year and were delighted to see the Meccano stand—complete with audience participation and a nice display of "show models" to inspire us to better things. Although we were not fortunate enough to be able to participate in the model building contest, it gave great pleasure to watch the expressions on the contestants' faces as the little hands crafted the strips and plates "against the clock." Could you tell me the winning time for constructing the standard lorry model?

If a Meccano stand is to be at next year's Exhibition, please put a notice in the magazine, as I am sure many junior readers would like to try their hand at this sort of competition. Having purchased my February *Meccano Magazine* at the Exhibition from your stand, and seen the delighted contestants with their free January issues, I am sure you will have several hundred more regular readers as a result of this.

Garforth, Leeds. *E. Cunnington.*

Yes, indeed, we will certainly give readers plenty of notice next year, about the Meccano contest at the Schoolboys Exhibition. The outright winner was Peter Lawrence of Oaklands Road, Hanwell, London W.7, who constructed his Meccano lorry in 9 minutes 48 seconds. See pages 218-219 for further details and photographs of the contest.

Better periodical

DEAR SIR,—The new *Meccano Magazine* improves. I greeted the first issue with only a lukewarm reception. But the February issue makes it plain to see that it is a better periodical than the previous *Meccano Magazine*. The Chemistry articles are excellent, this subject being one of my main hobbies. But please could we see, if space permits, a series of articles on photography? There are many aspects of this hobby that would interest readers.

A few readers have expressed their dislike of the large "Meccano" coverage. Why not leave out the "plastic" Meccano articles (since this kit was originally designed for a children's age group) and insert articles of topical interest?

Newark, Notts. *J. McMullen.*

Thank you

DEAR SIR,—I feel that I must reply to Mr. Stanmore's letter which appeared in the second edition of the *Meccano Magazine*. He criticised the amount of space devoted to Meccano building. I buy the magazine because I am interested in Meccano and have a fairly large Meccano set. I am also interested in model car racing, therefore I also buy *Model Cars*. I would like to suggest to Mr. Stanmore that as he expresses an interest in model railways, there is an excellent publication called *Model Railway News* which should cater for his every need. I would now like to thank you for resurrecting the *Meccano Magazine*, and wish you every success. I hope you will continue to feature many fine models from which the magazine takes its name. There must be many subjects that have not yet been reproduced by means of Meccano. Once again, good luck.

Horsley, Glos. *D. Woodward.*

Two large models

DEAR SIR,—After reading through the February *Meccano Magazine*, I would like to agree with other readers and say that it is really great.

I am so pleased to see that Doug McHard is still with us as he did a wonderful job as Editor on the old magazine. The new size I think is better and is very eye-catching at bookstalls. My hobby is Meccano model building and *at last* one can get *two* large models to get stuck into. I only wish the whole magazine could be devoted to this subject—a little greedy perhaps.

Apart from this, the format is well thought-out, but I do believe railway features could be given an extra page or two, things like that "Plastic with Metal Meccano" Biplane and pictures of "Supermodels" being space-wasting.

The reversal to the 1962 type *Meccano Magazine* style and format is indeed good, and I hope successful with the general articles like "Great Engineers" being interesting while informative.

Leigh, Lancs. *David Allen.*

Never powerful enough

DEAR SIR,—I would like to draw attention to the delightful article by Leslie Hunt which appeared in your February 1968 issue, and in particular to the reference to the Invicta locomotive which travelled on the Canterbury and Whitstable line. I do not think this machine ever completed the whole journey under its own steam. There were, from the start, stationary engines to pull trains out of Canterbury to the highest point and also up the incline outside Whitstable, also to the highest point. The Invicta ran only on the level part from Whitstable Harbour to about South Road.

She, a copy of the famous *Rocket*, was never powerful enough for the job. After a short life she broke down, so much so that the Railway Company put her up for sale, but there were no offers. In short, her career was a sad one. But she can claim fame because she was made by the Stephensons (father and son).

Whitstable, Kent. *A. W. Neal.*

Traction engine

DEAR SIR,—Congratulations on the new *Meccano Magazine* and very best wishes for its future.

As a young "boy" of 30 years plus, and with a very young son whom I hope will soon follow my own enthusiasm, I still consider that Meccano is the very finest constructional "toy" of its kind ever produced and will always remain unsurpassed.

I would like to know if it is possible to obtain plans and particularly a list of parts for the magnificent model Traction Engine shown on the front cover of the January 1968 issue of the *Meccano Magazine*. If it is possible to obtain them I will be most grateful if you can tell me how I can obtain them for myself.

Gatley, Cheshire. *Dr. R. J. Lawton,* M.B.Ch.B.

Unfortunately, no plans or instructions exist for the Showman's Traction Engine shown on the front cover of the January issue. As explained on page three of that issue, "this is a standard Meccano Ltd. display model constructed for shop window use." We hope to be able to plan this model for inclusion as an advanced model later in the year.

Very surprised

DEAR SIR,—Some time ago, I received the February issue of the *Meccano Magazine* and it really is an excellent publication, even better than the January issue.

I was very surprised however at Mr. J. Stanmore's letter stating that he hopes the Meccano Model Building section does not become too big.

Mr. Stanmore should realise that this is a Meccano magazine and the only official magazine dealing with this subject; there are several other magazines dealing with the other items which appear in the *Meccano Magazine*. Furthermore it is the only contact that the Meccano factory at Liverpool has with enthusiasts.

When the news came several months ago that the magazine was to cease publication, I feel sure that at least 90 per cent of the letters asking for its continued publication were from people interested in products made by Meccano Ltd.

Your January issue had a Meccano model on the cover—let's hope we get several of this type of cover each year.

Cork, Ireland. *Jack Hackett.*

Let's have more

DEAR SIR,—I have just finished reading the first edition of the new style *Meccano Magazine*. I was pleasantly surprised to see the feature on steam being used to propel a Meccano car. I think that articles of this type are interesting as well as educational. Let's have more of this kind of thing.

I hope that the amateur photographer has not been forgotten in this new *Meccano Magazine*. As I recall there were quite a number of articles on photography during the last sets of *Meccano Magazine*. I like the new *Meccano Magazine*. I think it is about time we had a fresh, new exciting magazine that is a pleasure to read. You have made me take a new look at leisure—thanks.

Worksop, Notts. *P. Coupe.*

Larger balsa model

DEAR SIR,—I think the new *Meccano Magazine* is very pleasing as it has a good variety of subjects. I do not agree with J. Stanmore who thinks the Meccano building section should not get too big, as, after all, it is the "Meccano Magazine."

Would it be possible to include plans for a larger balsa model boat of about 30 in., for more advanced builders?

I think "Have You Seen?" is a good idea, though in the February 1968 issue the Frogflite Marine Kit of the Patrol Boat is shown under the heading "Component parts of the Hales Frogflite M.T.B.-T52" which, according to the June 1967 issue, has a balsa superstructure.

I think you are doing a good job; keep it up!

Aberdeen, Scotland. *Hugh Beyts.*

We are planning to produce a plan for a rather more advanced marine and aviation model at a future date, but in the meantime, may we remind readers of our sister magazines "Model Boats" and "Aeromodeller," both leaders in their respective fields, including many constructional models each month? The Frogflite Marine Kit M.T.B.-T52 does have a plastic superstructure.

Scandalous!

DEAR SIR,—Having read J. Stanmore's letter on "Preservation Societies" (February issue) I feel I must object to his point of view that wargaming would be, and I quote, "much more interesting than articles on slot car racing." He may find that wargaming is interesting and slot cars not so. But there must be hundreds of slot fans who find wargaming boring. I find wargaming absolutely boring and slot car racing not very interesting, but I, unlike J. Stanmore, respect the opinions of others. I find the present format of the *Meccano Magazine* quite agreeable and, judging by last month's readers' page, so do many others. But surely J. Stanmore's remark about not letting the Meccano section get too large is scandalous. May I respectfully suggest that if he does not like Meccano he buy another magazine which does not feature Meccano. Lastly, may I say how much I like the *Meccano Magazine* in its new format, which I think great. It is much easier to carry around.

Exmouth, Devon. *A. P. Orsman.*

Chemistry—**continued from page 197**

will dissolve cellulose acetate rayon, but not silk, cotton, etc.

To find out what type artificial silk is—test with acetone to see if it is dissolved. If so, that distinguishes it as *acetate* rayon. If not, try the effect of strong sulphuric acid to which a small quantity of iodine has been added. *Cuprammonium* rayon will turn light blue under such a test and *viscose* rayon dark blue. A more positive test for viscose rayon is to heat in a weak solution of silver nitrate to which just a trace of ammonium hydroxide has been added. Viscose rayon will turn dark brown.

The synthetic fibres are much more difficult to identify, although they are usually readily distinguished from *natural* fibres and fabrics by the above tests, despite the fact that they may look very much the same. Such tests may also show that the suspected man-made material is, in fact, a mixture with a natural fibre.

Polythene you may come across in fibre form, but most likely in the form of ropes. It's easy to identify in such cases for it is usually coloured bright orange and has a hard, shiny surface. An even more positive identification is that it will float. All other ropes (and all other fibres, in fact) are heavier than water with the exception of coir (a natural fibre used for ropes) and kapok (used as a filling for lifejackets).

Incidentally, there is one type of fabric which actually *dissolves* in water, known as alginate yarns. These do have their uses—joining individual items in a continuous run knitting machine, for example. A rinse in water and the yards and yards of continuous material produced by the machine become individual socks!

Great Engineers—**continued from page 234**

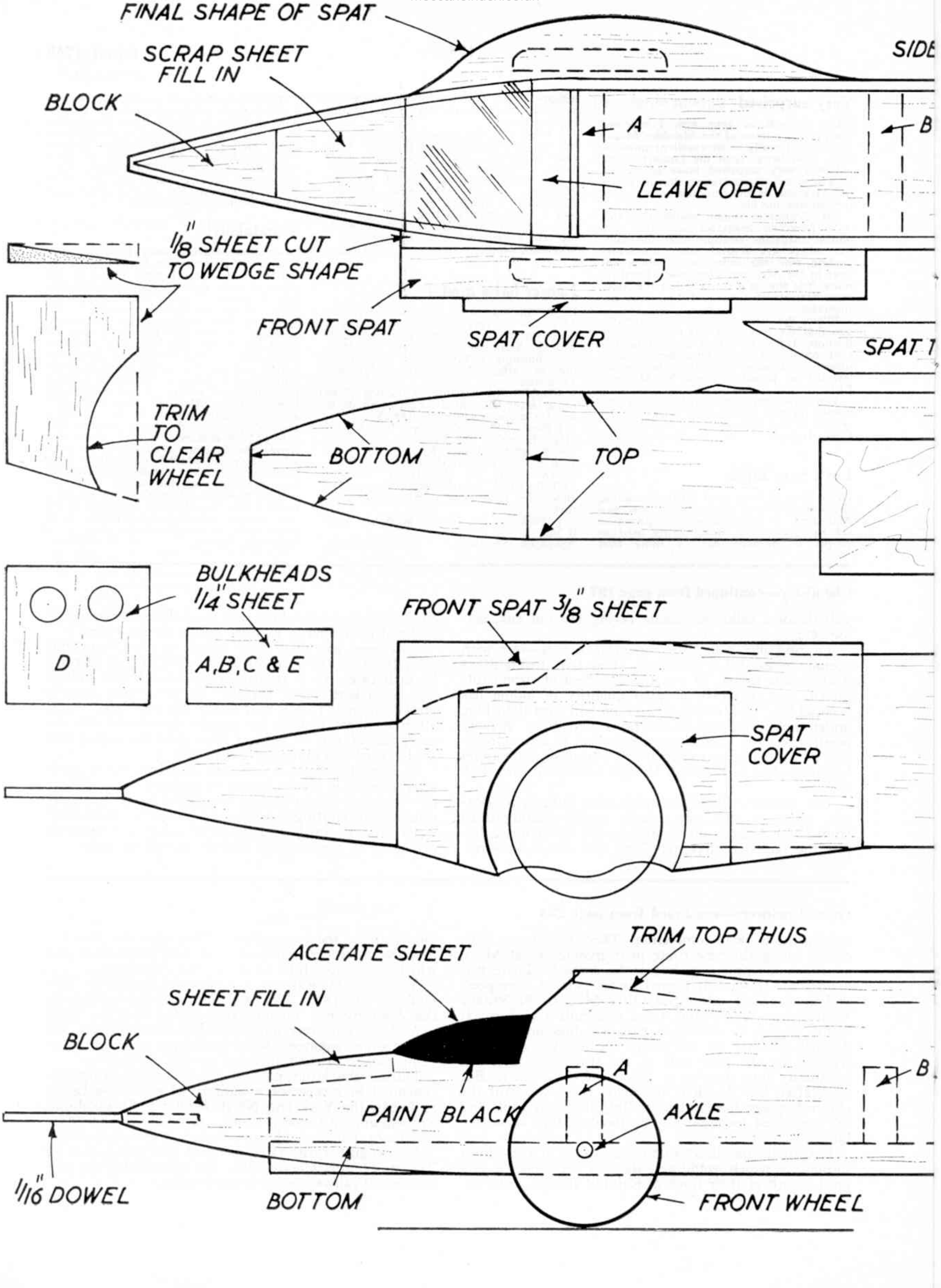
carried the work to completion. There were many difficulties along the new route to overcome. Chat Moss, an enormous peat bog, had to be crossed. There was a one-mile-and-a-half tunnel under part of Liverpool, and a deep rock cutting at Olive Mount. At Sankey Valley, near Warrington, there was built a viaduct. It seems strange in retrospect that the directors had not decided whether to use steam locomotives or horse-traction by the time half of the track was laid, but eventually they decided in favour of the former. But even after this decision was made there was still the choice between fixed engine pulling trains by cable and self-contained locomotives. Fortunately they chose the latter.

Eventually the directors offered a prize of £500 for a locomotive which would give the best performance on a level length of their track at Rainhill Bridge. Five engines entered the competition. They were the *Novelty*, *San Pareil*, *Rocket* (entered by Robert Stephenson and which was successful), *Cycloped* and *Perseverance*.

The L. & M. Railway was officially opened on September 15th, 1830. New and improved locomotives by the Stephenson's, notably the *Planet* and the aptly named *Samson*, were soon to be seen on the tracks. Of course other engineers were developing railways, these being mostly in the south and west of the country.

During the latter part of his life Stephenson was consulted in respect of a number of railways—Derby to Leeds, the York and North Midland, Sheffield and Rotherham, and many others, some overseas More and more, however, his son, Robert, was taking over.

On August 12th, 1848, he died and was buried in Trinity Church, Chesterfield. His memorial is the vast network of railways as we know it today.


FINAL SHAPE OF SPAT
SIDE
SCRAP SHEET FILL IN
BLOCK
A
B
LEAVE OPEN
1/8" SHEET CUT TO WEDGE SHAPE
FRONT SPAT
SPAT COVER
SPAT T
TRIM TO CLEAR WHEEL
BOTTOM
TOP
BULKHEADS 1/4" SHEET
D
A, B, C & E
FRONT SPAT 3/8" SHEET
SPAT COVER
TRIM TOP THUS
ACETATE SHEET
SHEET FILL IN
BLOCK
A
B
PAINT BLACK
AXLE
1/16" DOWEL
BOTTOM
FRONT WHEEL

JET CAR MODEL — YOUR FULL SIZE

Plan for Jetex Power — Semi Scale

THIS IS a semi-scale model based on the *Spirit of America—Sonic-1* jet speed record holder, painted on the cover, designed for Jetex 50c power. For ease of changing the Jetex unit this is mounted on a simple ply tray which can be slipped in and out of the rear of the model.

The basic model is very easy to build. The part that takes a little more time and care is fitting and shaping the spats which completely envelop the wheels and are of a curved shape blending into the streamline shape of the body. If you want to dodge this part, you can; simply build the basic model without spats.

Special note: Use the *lightest* balsa you can obtain throughout for this model. The lighter the finished model, the better its performance will be. Good performance also depends on using wheels that are absolutely true and also very freely mounted on their axles.

The plan is full size, so start by tracing the side shape onto a sheet of $\frac{1}{16}$ in. balsa. Cut out one side, then use this as a pattern to cut another identical side.

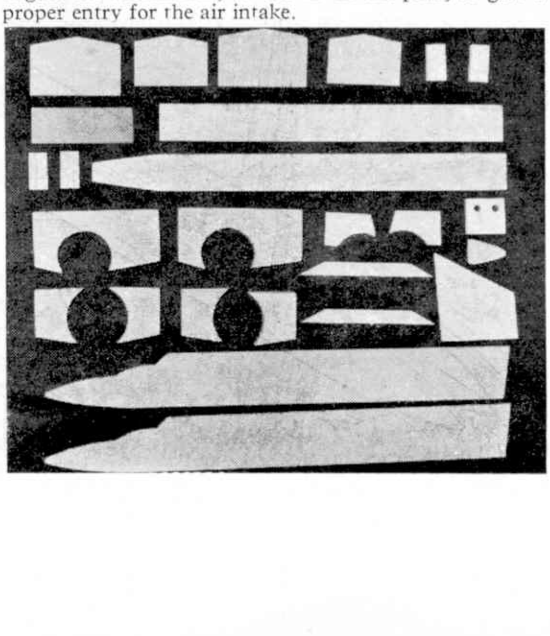
Bottom and top shapes are also shown full size on the plan. Cut these two pieces from $\frac{1}{4}$ in. sheet balsa. Then cut one each of bulkheads A, B, C, D and E. Note that bulkheads A, B, C and E can be cut to length from $\frac{1}{2}$ in. × $\frac{1}{4}$ in. strip. You can make bulkhead D from two pieces of 1 in. long $\frac{1}{2}$ in. × $\frac{1}{4}$ in. strip, if you prefer. Note that the top of bulkhead D should have two holes cut or punched in it. This is to allow a flow of air to pass right through the body to assist in cooling and ventilating the Jetex compartment. Air is inducted through the intake immediately above the cockpit and flows through the inside of the body.

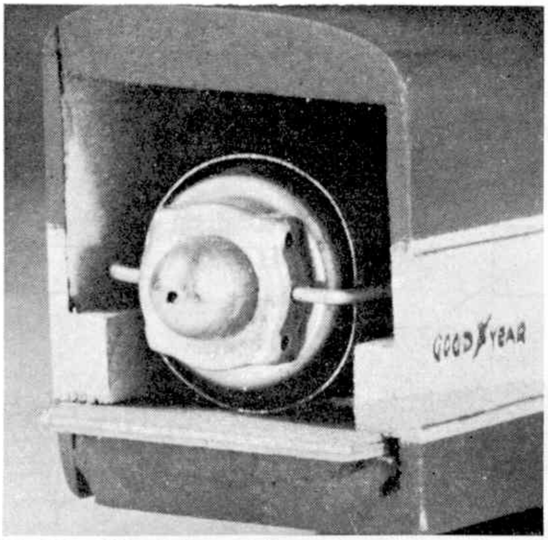
The wheels should be chosen carefully, and should not be more than $\frac{3}{16}$ in. wide. A light plastic type of wheel is to be preferred. The plan shows $1\frac{1}{8}$ in. diameter wheels being used on the front and $1\frac{3}{4}$ in. diameter wheels on the rear, which is fairly close to scale. You may not be able to locate wheels of the right thickness of exactly this size. This does not matter. Get wheels as close to these two sizes as possible. Wheels can also be made from discs of $\frac{1}{8}$ in. plywood, make sure they are true! All it will mean is that you may have to adjust the axle heights slightly so that the bottom of the body is parallel to the ground with a ground clearance of about $\frac{3}{8}$ in.

Start by cementing the two sides to the bottom piece, then add bulkheads B, C and D. Pierce the hole for the front axle at the right height through the sides and cut groove in the bottom, if necessary, to accommodate the axle. Use a 2 in. length of 18 s.w.g. wire for the axle, cement in place and then add bulkhead A to firmly locate the axle. Note that if you are using larger front wheels than the plan size you may have to groove the bottom of bulkhead A to fit over the axle.

Pierce holes in the sides for the rear axle at the same height in a similar manner. This time, groove bulkhead D, at the correct height to locate the axle, then cement bulkhead E up against bulkhead D to secure the axle. Again use a 2 in. length of 18 gauge wire for the axle.

You can now cement on the two $\frac{1}{4}$ in. × $\frac{1}{8}$ in. balsa runners which hold the ply Jetex tray in place, then the body top. Note that the front end of the top should be angled off underneath, as shown on the plan, to give a proper entry for the air intake.





The Jetex 50C unit is mounted on a plywood tray so that the engine can easily be removed from the rear of the model to add fresh fuel pellets. Take care in this operation as the Jetex gets very hot and needs time to cool down.

Pull in the two sides at the front end and trim a 1 in. × $\frac{3}{4}$ in. × $\frac{1}{2}$ in. balsa block to fill in the nose. Cement this block in place, then add the sheet fill in at the top, up to the start of the cockpit. You can now trim off the protruding part of the front of the bottom piece to conform to the shape of the sides. Also trim the top block away slightly so that it curves down to come level with the sides. If you are building only the basic model (i.e. without spats) you can then sand the body to finished shape, rounding off all edges—but don't do this yet if you are going to add the spats.

If you are building only the basic model slip the wheels in place on their axles with a couple of thin washers between them and the body, and then solder washers to the axle on the outside of the wheels to hold them in place. If you are going to fit the spats, leave the wheels off at this stage.

Assemble the rear spats first. Cut two rear spat 1 pieces and two rear spat 2 pieces from $\frac{3}{8}$ in. very light balsa sheet. Also cut two spat top pieces from very light $\frac{1}{8}$ in. sheet.

Slip the wheels on their axles temporarily and cement the spat pieces and spat top to the body, checking that these do not foul the wheels. Remove the wheels and allow this assembly to set (you can hold the spat pieces in place with pins).

Now proceed to the front spats. Cut two to the shape shown from very light $\frac{3}{8}$ in. sheet balsa. Cement to the body, again slipping the wheels onto the axles to check for clearance. Remove the wheels and make sure that the front spats are held in position with pins. Now cut two wedge shaped pieces of $\frac{1}{8}$ in. sheet to fill in the gap between the front of the spats and the body where it starts to curve inwards toward the nose. Leave the assembly to set. Meantime cut the four spat covers from $\frac{1}{16}$ in. sheet balsa.

When the spat assemblies have set, slip the wheels in place with two thin washers between the inside of the wheels and the body, put two more thin washers on the outside of each wheel, then cement the spat covers in place on each spat. These covers will trap the wheels in position in the spats. Again leave for an hour at least, for the cement to set.

Finally comes the job of carving and sanding the spats down to a streamlined shape, blending with the lines of the body. The bulk of the surplus spat material is best removed with a sharp modelling knife. Final shaping is best done with a sanding stick or sandpaper wrapped around a piece of 1 in. × $\frac{1}{4}$ in. balsa.

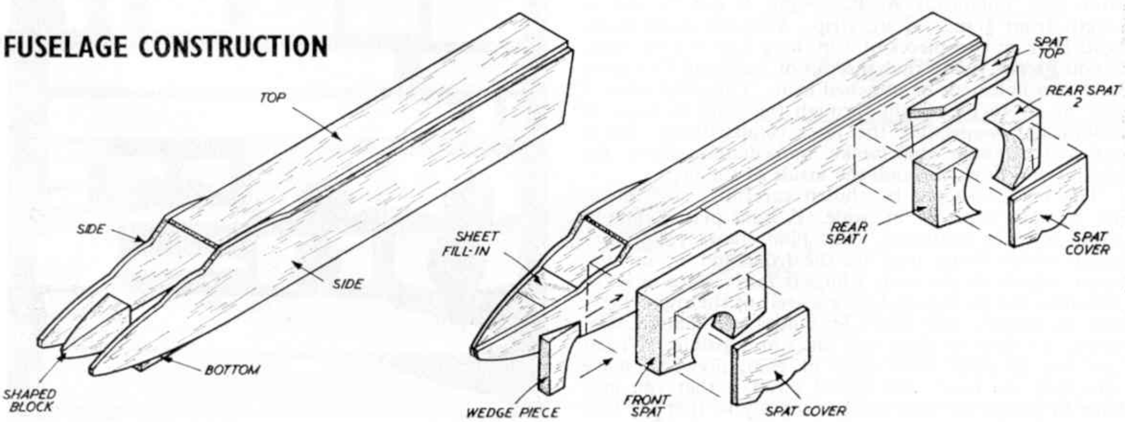
At the same time as shaping the spats, round off the top of the body so that the top blends into the sides; and also round off the bottom edges. Try to end up with a really smooth, sleek-looking fuselage. Use the action cover painting and photographs from the feature article on the *Spirit of America-Sonic 1* as a guide to the finished appearance you want.

That practically finishes the model, except for cutting the fin from $\frac{1}{8}$ in. sheet balsa, sanding to a streamlined shape and cementing to the top of the body. Give a good coat of sanding sealer all over and sand down really smooth prior to painting. Finally cover over the top of the cockpit with a piece of clear acetate sheet and paint the cockpit canopy sides black, as shown on the plan. Note the acetate sheet must stop at the end of the canopy area so as to leave the air intake open.

The Jetex mount is simply a tray of $\frac{1}{8}$ in. ply, cut to the shape shown on the plan. Screw the Jetex mount to this tray and check that it will slide easily in and out of the rear of the body.

That's about all there is to it. You are ready for your first jet run—but remember, you need a really smooth running surface to get good results with a model of this size.

FUSELAGE CONSTRUCTION



Pantograph in Plastic Meccano

A simple but very effective instrument for drawing larger or smaller images of a given illustration, constructed from Plastic Meccano Set A, by I. J. Smith.

ONE OF the earliest "mechanical gadgets" ever employed by draughtsmen and plan-makers was—and still is—the pantograph. With this basically very simple instrument, consisting of a series of pivotally connected strips, a pointer and a marker, it is possible to scale up or down almost any plan, sketch or picture without doing anything more difficult than outlining the original with the pointer while the marker produces a copy on a suitable piece of material. The simplicity of the basic instrument, in fact, is obvious from the photograph below supplied by Mr. I. J. Smith of Ipswich, Suffolk, which shows a Pantograph he built up using his son's Plastic Meccano Set A.

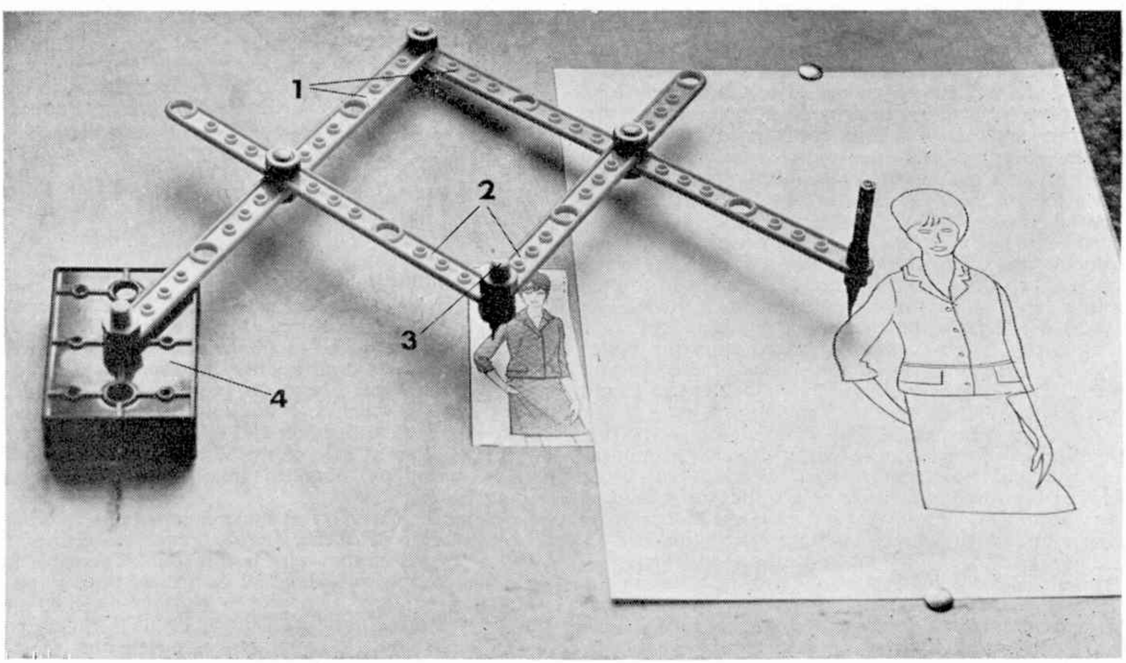
Construction is quite straightforward. The ends of two 5-hole Strips 1 are joined together, as also are the ends of two 4-hole Strips 2, using a 1 in. Bolt 3 in the latter case. Each Strip 2 is then bolted to corresponding Strip 1, as shown, a Base 4 also being attached to the free end of one Strip 1. Note that, in every case, the connection between the various parts must be sufficiently free to enable each part to pivot freely.

A pointer is next provided by any suitable object—a piece of cocktail stick, the end of a knitting needle, etc.—and is wedged into the hole in the centre of Bolt 3. Finally, the marker is obtained from a pencil or ball-point pen which is itself wedged in the free end hole of the remaining Strip 1. When using the Pantograph, incidentally, it is important to remember that the Base must never be allowed to move even a fraction of an inch during the execution of any particular drawing otherwise the finished product will be mis-shapen.

The above photograph shows Mr. Smith's Pantograph set up for producing a magnified image. If the subject is to be scaled down, then the positions of the pointer and marker should be reversed.

PARTS REQUIRED:

2—4-hole Strips	3—Bolts
2—5-hole Strips	2—1 in. Bolts
5—Nuts	1—Base



Meccano Motor Chassis

by Spanner

Started last month, this concludes the first advanced Meccano model for experienced constructors. Last month "Spanner" dealt with the Chassis, Engine, Clutch, Gearbox, Front Axle and Steering.

SO FAR in this two-part article featuring the Meccano special display Motor Chassis introduced last month we have dealt with construction of the basic chassis, engine, clutch, gearbox and front wheel arrangements. We are now left with the rear axle, differential and a rather ingenious working cable brake operated from a foot pedal in the driving position.

Rear axle and differential

The basic rear axle and differential arrangement fitted to this model is more or less the standard Meccano construction found in many models. A 4 in. Rod carrying, in order, a Boiler End, a Collar, a Washer, a 1½ in. Contrate Wheel 74, two more Washers and a ¾ in. Contrate Wheel 75, is loosely inserted half way into the longitudinal bore of a Coupling. Loosely inserted into the other half of the Coupling is a 3½ in. Rod that also carries a Boiler End in addition to a ¾ in. Contrate Wheel, spaced from the Boiler End 76 by three Washers.

Held in the centre transverse smooth bore of the Coupling is a 1½ in. Rod on each end of which a Collar is fixed. Each Collar is connected to Contrate 74 by a 1 in. Screwed Rod 77, held by Nuts in the face of the Contrate and screwed into one tapped bore of the Collar. Screwed into the centre transverse smooth bores of the Coupling are two Pivot Bolts, each carrying a loose ¾ in. Pinion 78 that meshes with the ¾ in. Contrates.

Attached to each Boiler End by two 1½ × ½ in. Double Angle Strips 79 is a Wheel Flange 92 to the inside of which an 8-hole Wheel Disc is bolted to provide a bearing for the corresponding axle Rod. The two Boiler Ends themselves are now joined by four 2 in. Strips, one of which is spaced from the Boiler Ends by three Washers on the shanks of the securing Bolts. This Strip is overlayed by a Double Arm Crank 80.

Bolted to each pair of Double Angle Strips 79 is a Double Bent Strip 81 to the lugs of which a built-up leaf spring is fixed, the forward securing Bolt being screwed into the tapped bore of a Collar 82 instead of carrying a Nut. Two Washers space the Collar from the spring, which is built up from one 5½ in., one 4½ in., one 3½ in., one 2½ in. and one 1½ in. Strip. A right-angled Rod and Strip Connector is bolted to the rear end of the 5½ in. Strip while a Handrail Support 83 is bolted to the forward end of the Strip. This Handrail Support is loose on the shank of a ¾ in. Bolt, held by a Nut in the short lug of a 1 × ½ in. Angle Bracket fixed to rear Angle Girder 6. The Rod and Strip Connector is loose on another ¾ in. Bolt held by Nuts in a Fishplate and Reversed Angle Bracket 84 lock-nutted to a second 1 × ½ in. Angle Bracket fixed to Angle Girder 5.

Mounted, along with three Washers, on the shank of a ½ in. Bolt loose in the bore of Collar 82 is a Rod and Strip Connector which is fixed by a 1 in. Rod to another Rod and Strip Connector, bolted to Strip 2, but spaced from it by a Collar 85 on the shank of the securing Bolt.

At this point, the transmission to the rear axle can be completed. A 1½ in. Rod is held, by a ½ in. Pinion 86 and a Universal Coupling 87, in the boss of Double Arm Crank 80. Pinion 86 meshes with Contrate 74, while Universal Coupling 87 is connected by a 2½ in. Rod to another Universal Coupling 88 on the output shaft of the gearbox.

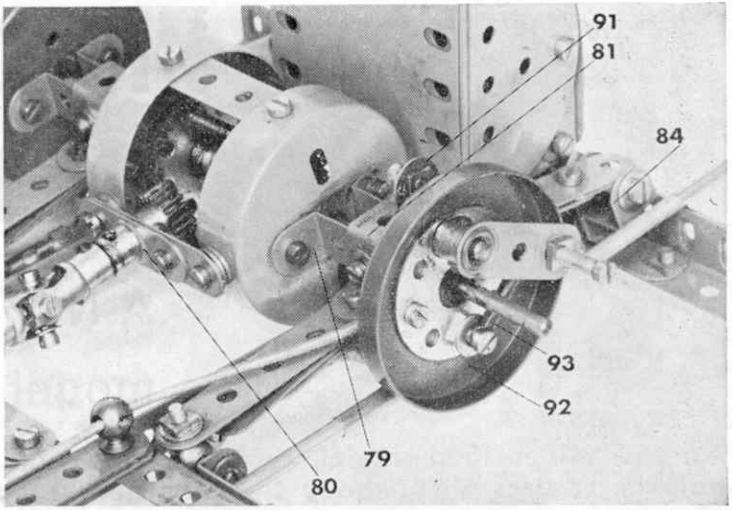
At the rear of the model, a petrol tank is obtained from two vertically-mounted 2½ in. Angle Girders joined at the top by another, similar, Angle Girder. Bolted to their lower ends are two horizontally mounted 1½ in. Angle Girders joined by a 2½ × 1½ in. Flanged Plate 89. The front of the tank is then enclosed by a 2½ × 2½ in. Flexible Plate, while the back is covered by a 3½ × 2½ in. Flexible Plate and each side by a Semi-circular Plate. The finished item is attached to Strips 2 by a 2½ × ½ in. Double Angle Strip 90.

Working brake

The rear wheels are 4½ in. Road Wheels bolted to Wheel Flanges, but, before they are fitted, a special working brake is added to the nearside rear wheel. A Fishplate 91 is fixed on a Threaded Pin which is then journalled in Wheel Flange 92, being held by a Crank, to the arm of which a ¾ in. Bolt is secured by two Nuts. Attached to this bolt and to a ⅜ in. Bolt held by Nuts in the lowest hole of the Wheel Flange is a tensioning spring 93, obtained from a short length of Spring Cord.

A rather ingenious cable brake is now built up from a 10 in. length of Spring Cord, through the centre of which a length of thin wire is threaded. The cable is then mounted in two Handrail Supports, fixed to appropriate Angle Girder 7, and in a Collar mounted on the Bolt securing forward Double Angle Strip 79 to Wheel Flange 92. It is important to remember, how-

Fitted to the Motor Chassis is a working cable brake. In this view, the rear near-side wheel has been removed to show the construction of the brake mechanism.



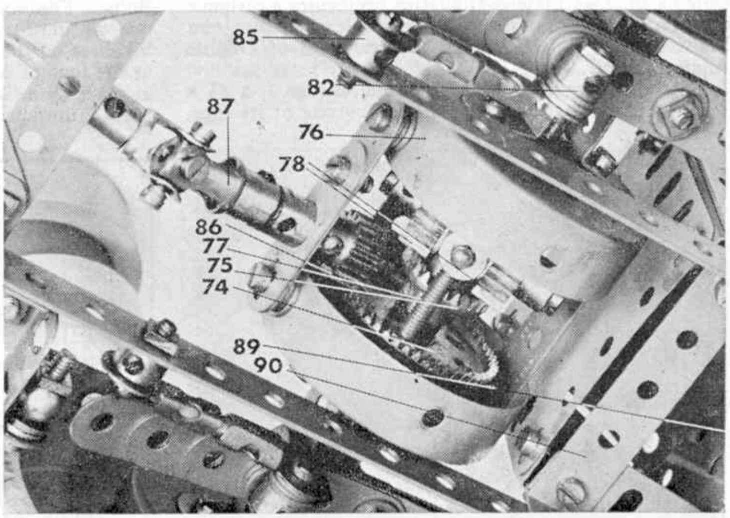
ever, that the Grub Screws securing the cable must grip only the Spring Cord and not depress the Cord so as to foul the wire in the centre.

Finally, the ends of the wire are looped, then one end is secured to a Bolt held by Nuts in Fishplate 91, while the other is fixed to a ½ in. Bolt screwed into a Collar 94. This Collar is mounted on one end of a 3 in. Rod journalled in Angle Girders 1 and held in place at its other end by a Crank 96. A Fishplate is attached to the arm of this Crank by an Angle Bracket to act as a brake pedal. Note that extended bearings for the Rod are provided by two 1½ in. Strips bolted one to each Angle Girder 1.

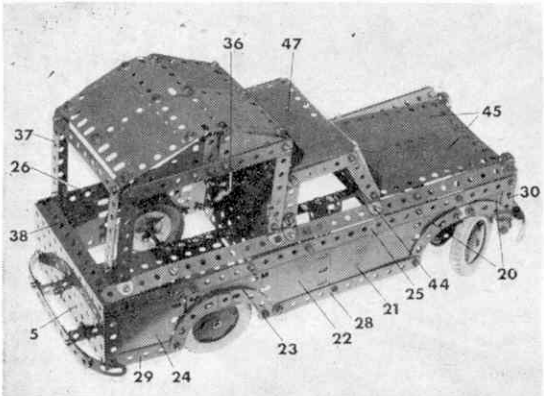
As mentioned at the beginning of this article, the motor chassis described here was built specially for display purpose. When on show, it was mounted on a wooden plinth inside which a slow-running electric motor was fixed. The motor was connected by Sprocket Chain to Sprocket Wheel 24 so that all the mechanisms were shown to be in " working " trim.

PARTS REQUIRED:

2—1	1—16a	3—63	2—140
5—1b	2—17	2—63d	2—147a
3—2	7—18a	1—64	2—147b
10—2a	4—18b	2—72	3—154a
2—3	1—20	1—77	2—154b
32—5	2—22	2—81	1—155
9—6	2—23a	3—82	2—162a
12—6a	6—25	1—89	1—163
2—8	4—26	2—90a	2—164
5—8b	1—28	1—96	2—175
9—9d	2—29	2—103d	2—179
9—9f	150—37	2—103h	1—185a
11—10	70—38	4—111	1—186a
6—11	2—45	4—111a	4—187b
13—12	1—46	8—111c	1—190
4—12a	6—48	1—115	1—190a
8—12b	1—48a	2—115a	10—212
2—12c	2—48b	4—116	2—212a
1—13	3—51	2—120b	2—213
1—13a	1—58	2—125	2—213a
1—15a	24—59	8—133a	2—214
2—15b	4—62	6—136	2—215
6—16	2—62b	Approx. 12 in. of thin wire	



An underside view of the rear suspension and differential in close-up. The differential is a fairly standard Meccano construction and could be fitted as a complete unit into many model vehicles.



ICE CREAM VAN IN MECCANO

A No. 7 Outfit Plus model by SPANNER

An easily identified model, typical of the vans seen in towns, cities and holiday resorts throughout the summer season. It can be built with Outfit No. 7, plus an extra 12 Obtuse Angle Brackets.

IT'S NOT often that Meccano models stir up memories of long-forgotten episodes in my life, but the Ice Cream Van featured here certainly took me back a few years when I saw it. I remember when I was at school working during one summer holiday for eight or more hours a day in a van very similar in appearance to the model. It was parked on a beach in Cheshire and, as it was a beautiful summer that year, we were surrounded by long queues of customers nearly all day long. Believe it or not, I can honestly say that I have never been so hot for so long as I was in that van, surrounded by freezing ice cream and lolly ices! But to get down to the business in hand, the Meccano Ice Cream Van is a pretty straightforward model and should not present any difficulties.

Chassis

Dealing first with the chassis, two 12½ in. Angle Girders 1 are each extended rearwards a distance of four holes by a 3½ × ½ in. Double Angle Strip 2. Girders 1 are then joined by a 5½ in. Strip 3 and a 4½ × 2½ in. Flat Plate 4, the latter projecting a distance of two holes behind the Girders, while a 5½ × 2½ in. Flanged Plate 5 is bolted to the rear lugs of Double Angle Strips 2.

To the forward end of each Angle Girder 1, a 1½ × ½ in. Double Angle Strip 6 is fixed by one of its lugs, as shown. Attached to this Double Angle Strip is a 2½ × 1½ in. Flexible Plate 7, overlayed by a 5½ in. Strip 8 which is bolted between the Double Angle Strips at each side. The securing Bolt in each case also holds a Reversed Angle Bracket, the outside lug of which provides an anchoring point for the front bumper, built up from two Formed Slotted Strips 9 joined by a 5½ in. Strip. A rear bumper is similarly obtained, and is fixed to Flanged Plate 5 also by Reversed Angle Brackets.

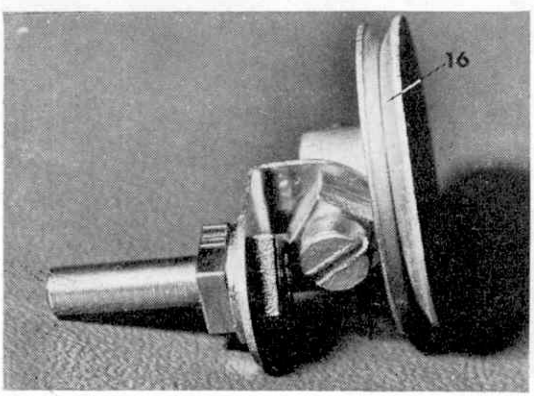
Steering arrangement

Bolted through the fourth hole of each Angle Girder 1 is a 3 in. Strip 10 which is angled slightly, the two Strips then being joined together as shown. Note that the end of each Strip projects a distance of two holes over the edge of the corresponding Girder to allow room for a Double Bracket to be lock-nutted through its end hole. Fixed between the lugs of this Double Bracket by the locking Bolt is a 1½ in. Strip 11, Strips 11 at each side then being joined together by a 4½ in. compound strip 12, lock-nutted in place using ½ in. Bolts. The compound strip, which is obtained from two 2½ in. Strips, is spaced from Strips 11 by three Washers on the shank of each locking Bolt. Journalled in the lugs of each Double Bracket is a 1½ in. Rod held in place by a Collar and a 2½ in. Road Wheel 13.

A Trunnion is now attached to Strip 3 by Bolts 14

PARTS REQUIRED

4—1	1—15a	2—48a	4—187
12—2	4—16	2—48b	4—188
3—2a	2—18a	1—51	1—189
8—3	1—22	1—52	4—190
2—4	2—22a	2—53a	2—191
14—5	1—23a	8—90a	4—192
4—6a	1—24	2—111a	1—193e
4—10	6—35	4—111c	2—194
4—11	151—37a	1—115	2—194a
16—12	144—37b	4—125	4—215
1—12a	26—38	1—126	8—221
20—12c	2—48		



The special arrangement incorporated in the steering gear as it appears before being fitted to the lower end of the steering column. Care should be taken with its construction.

and a Fishplate is in turn fixed to its apex to provide one of the bearings for a 3½ in. Rod 15 forming the vehicle's steering column. Mounted on the lower end of the Rod is an arrangement (see accompanying photograph) which must be built up separately, as follows: an Angle Bracket is fixed to the boss of a 1 in. Pulley 16 by placing the Bracket in position with the hole in one lug coinciding with one tapped bore in the boss of the Pulley. A Nut is next placed over the hole in the Bracket and a Bolt is then screwed through both the Nut and the Bracket and into the bore of the Pulley boss sufficiently far to provide a firm mounting but not so far as to project into the central smooth bore of the Pulley. The Angle Bracket is then fixed tightly against the boss by means of the Nut. A Threaded Pin is attached to the free lug of the Angle Bracket, a Washer being used as a spacer.

The complete unit is now mounted on the Rod, with the Threaded Pin projecting through the elongated hole of a Fishplate that is attached to compound strip 12 by an Angle Bracket 17. The upper bearing for the steering column, incidentally, is provided by a 1 × 1 in. Angle Bracket 18 which will later be fixed to the body. Spaced from this Angle Bracket by a Collar is an 8-hole Bush Wheel, serving as the steering wheel. The rear wheels are 2½ in. Road Wheels mounted on a 5 in. Rod held by a Collar and a ½ in. Pulley 19 in Girders 1.

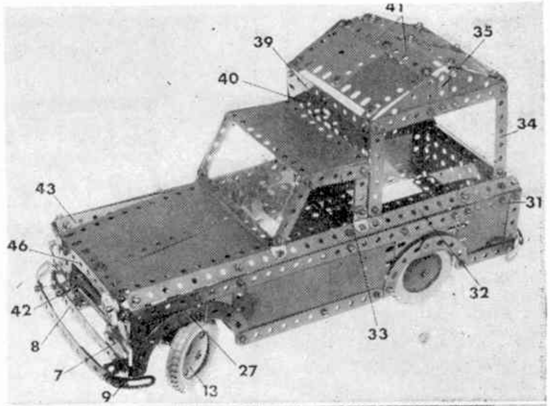
Bodywork

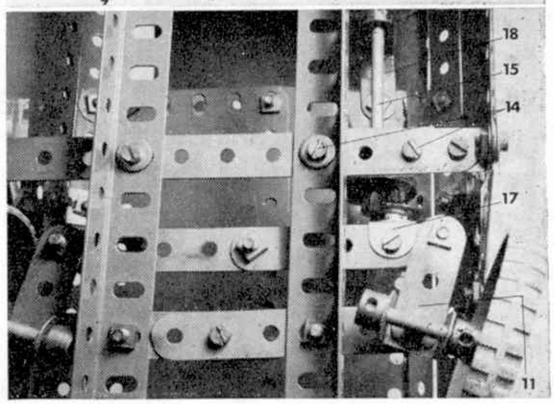
Next we come to the bodywork, each side being similarly built up from two 2½ × 1½ in. Triangular Flexible Plates 20, a 4½ × 2½ in. Flexible Plate 21, a 2½ × 2½ in. Plastic Plate 22, a 2½ × 1½ in. Plastic Plate 23 and a 2½ × 2½ in. Flexible Plate 24, all edged along the top by a 12½ in. Strip 25 on the outside of the Plates. In addition, Plate 24 is edged on the inside top by a 2½ × ½ in. Double Angle Strip 26. The wheel arches are each supplied by two 2½ in. Stepped Curved Strips, those at the front being joined by a Fishplate 27, while the lower edges of Plates 21 and 22 are overlayed by a 5½ in. Strip 28 and Plate 24 by a 2½ in. Strip 29.

At the front of the model, the forward wheel arch is connected to Strip 25 by another 2½ in. Strip 30, the upper securing Bolt also fixing an Obtuse Angle Bracket in position. Another Obtuse Angle Bracket is held by Bolt 31, then the two are joined by a 14½ in. compound strip 32, obtained from a 12½ in. strip extended by a 2½ in. Strip. Two further Obtuse Angle Brackets are added at strategic positions.

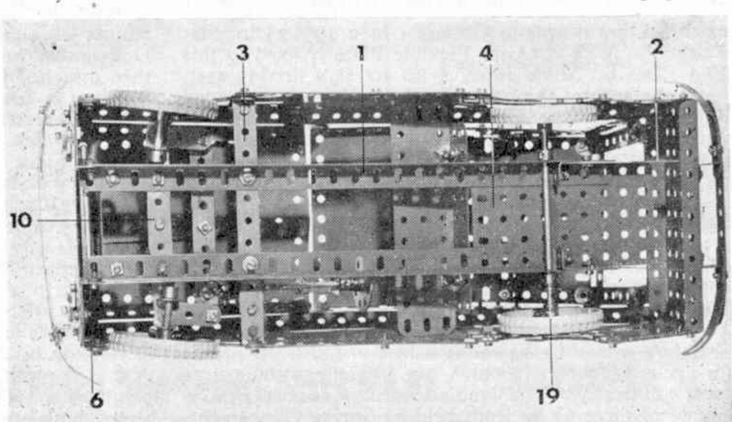
Attached to compound strip 32, also by Obtuse Angle Brackets, are the cab window supports—two 2½ in. Strips joined by another 2½ in. Strip 33—and the sales compartment framework, supplied by two 3½ in. Strips 34 joined by a 5½ in. Strip to which are bolted two 2½ × 1½ in. Triangular Flexible Plates and a 1½ in. Strip 35. Bent to shape and bolted between the cab window rear supports is a 5½ × 2½ in. Flexible Plate,

Continued on page 208

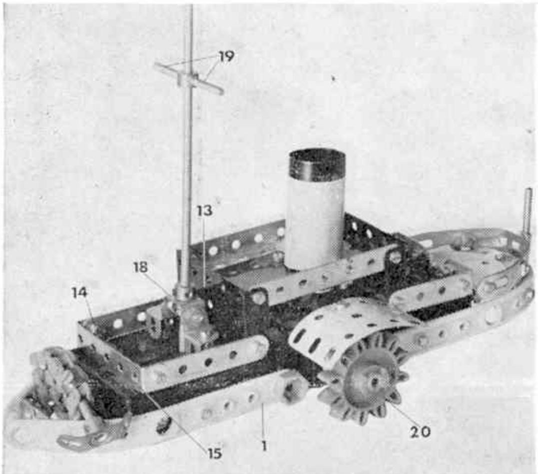




Above top: built with Mecanno Outfit No. 7 plus a few extra Obtuse Angle Brackets, this model Ice Cream Van is typical of the vehicles found in holiday resorts all over the country. Above: a close-up of the steering gear. Note that, although Strips 11 and 12 are lock-nutted together, they are separated by three Washers on the shank of each securing Bolt.



An underside view of the model showing the general layout of the chassis as well as the steering gear.



PADDLING FOR PLEASURE

It's loads of fun making this little Paddle Steamer, built from a mixture of metal and Plastic Meccano by SPANNER.

EVER SINCE *Meccano Magazine* reappeared at the beginning of the year I have stressed that Plastic Meccano, besides being a self-contained constructional system in its own right, is specially designed to be used with the standard metal Meccano system if required. Although the theme of Plastic Meccano is "Big Pieces for Little Hands," the large holes in the various parts, designed to accommodate the big Bolts and Axles in the system, are interspaced with small holes to the same diameter and spacing as those in standard Meccano Parts. Result—the two systems can be "mated" without any trouble at all.

Plastic Meccano, of course, is mainly intended for young children whose fingers are not agile enough to deal with the comparatively tiny Nuts, Bolts and other parts found in the standard system. The built-in design enabling the two systems to be used together is for those more experienced youngsters who, having mastered the plastic system, are making a gradual change-over to metal Meccano. There is, however, another almost coincidental reason for combining metal and Plastic Meccano. In certain circumstances far more realism can be produced using Plastic Meccano than might otherwise be obtained with standard metal parts or, alternatively, sufficient realism might be obtained easily, using a few plastic parts, whereas a highly complicated construction could be needed to give a similar effect with standard Meccano. To put it more simply, Plastic Meccano can have advantages over metal Meccano in some models, and the little Paddle Steamer featured here is just one example showing this to be true.

Construction presents no problems. The hull is built up from two Plastic Meccano Bases, bolted end to end, as shown. To each side of the forward Base a 3-hole Strip 1 is fixed by one Plastic Nut and Bolt and one metal Nut and $\frac{1}{2}$ in. Bolt, while a 5-hole Strip 2 is shaped to form a "U" and is fixed to the sides of the rear Base by only metal $\frac{1}{2}$ in. Bolts in this case. The

Continued on page 213

PARTS REQUIRED:

STANDARD MECCANO

3—5	1—13a	1—48a	1—126a
2—6	3—18a	2—51	1—138
2—9b	1—22	7—59	1—154a
5—10	1—22a	1—62b	1—154b
2—11	2—35	2—82	2—188
1—11a	57—37a	2—111	2—194
9—12	40—37b	6—111a	1—212
2—12b	2—38	9—111c	1—214
2—12c	2—38d	2—125	2—215

PLASTIC MECCANO

2—3-hole Strips	3—Nuts
1—5-hole Strip	2—12-teeth Gear Wheels
2—Bases	30—Chain Links
3—Bolts	

Ice Cream Van—continued from page 207

extended downwards to Girders 1 by a $4\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plate 36. A $5\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plate is fixed to this Flat Plate by Angle Brackets to act as a driving seat.

At the back of the model, a $3\frac{1}{2}$ in. Strip 37, extended downwards by an Obtuse Angle Bracket, is fixed by Angle Brackets to Strip 34 at each side, then the Obtuse Angle Brackets are connected by a $4\frac{1}{2}$ in. Strip 38. Another $4\frac{1}{2}$ in. Strip is bolted between Strips 37 at the top, while a further $4\frac{1}{2}$ in. Strip 39 is attached by Angle Brackets between forward Strips 34, the securing Bolts are holding two $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plates 40 in place. The sales compartment is then completed with a roof, obtained from four $2\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plates joined by two $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plates 41, which is fixed in place by Obtuse Angle Brackets.

Before enclosing the cab it is best to finish the radiator-grille and bonnet, which can be done without any great difficulty. The radiator-grille consists quite simply of three $3\frac{1}{2}$ in. Rods held by Spring Clips in the flanges of a $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flanged Plate 42, fixed by Double Brackets to Girders 1. A $5\frac{1}{2}$ in. Strip 43 is then attached to each compound strip 32 by an Angle Bracket at the front end, these Angle Brackets also being connected together by another $5\frac{1}{2}$ in. Strip, the ends of which are angled upwards to fit in place. Yet another $5\frac{1}{2}$ in. Strip 44 with angled ends is bolted between compound strips 32, and the two are connected by two $5\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plates 45 to provide the bonnet. Angle Bracket 18 is bolted to the underside of Strip 44.

The upper edges of Flexible Plates 7 are joined by a $5\frac{1}{2}$ in. Strip 46, at the same time fixing the Plates to the sides with Angle Brackets. Two 1 in. Pulleys without boss are added to the Strip, using $\frac{3}{8}$ in. Bolts, to serve as headlamps and, finally, the cab is completed with a $5\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plate 47 for the roof and a $5\frac{1}{2} \times 2\frac{1}{2}$ in. Transparent Plastic Plate for the windscreen, both bent to shape.

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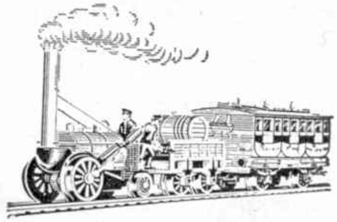

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5 8

PERFORATED STRIPS

No.		s. d.	No.		s. d.
1.	12½"; 32 cm	1/-	3.	3½"; 9 cm	-/6
1a.	9½"; 24 cm	-/9	4.	3"; 7½ cm	-/6
1b.	7½"; 19 cm	-/8	5.	2½"; 6 cm	-/6
2.	5½"; 14 cm	-/7	6.	2"; 5 cm	-/6
2a.	4½"; 11½cm	-/7	6a.	1½"; 38 mm	-/5

ANGLE GIRDERS

No.		s. d.	No.		s. d.
7.	24½"; 62 cm	2/10	9a.	4½"; 11½cm	-/9
7a.	18½"; 47 cm	2/2	9b.	3½"; 9 cm	-/8
8.	12½"; 32 cm	1/5	9c.	3"; 7½ cm	-/8
8a.	9½"; 24 cm	1/2	9d.	2½"; 6 cm	-/8
8b.	7½"; 19 cm	1/-	9e.	2"; 5 cm	-/7
9.	5½"; 14 cm	-/10	9f.	1½"; 38 mm	-/7

10 11 11a 12

No.		s. d.
10.	Fishplate	-/1
11.	Double Bracket ½"×½"; 12×12 mm	-/2
11a.	Double Bracket 1"×½"; 25×12 mm	-/5

ANGLE BRACKETS

No.		s. d.
12.	½"×½"; 12×12 mm	-/1
12a.	1"×1"; 25×25 mm	-/5
12b.	1"×½"; 25×12 mm	-/5
12c.	Obtuse, ½"×½"; 12×12 mm	(6) -/9

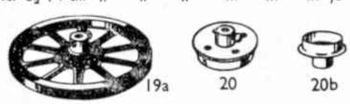
AXLE RODS

No.		s. d.
13.	11½"; 29 cm	-/9
13a.	8"; 20 cm	-/8
14.	6½"; 16½ cm	-/7
14a.	5½"; 14 cm	-/6
15.	5"; 13 cm	-/6

17 19s

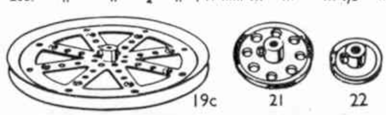
AXLE RODS (continued)

No.		s. d.
15a.	4½"; 11½ cm	-/5
15b.	4"; 10 cm	-/5
16.	3½"; 9 cm	-/4
16a.	2½"; 6 cm	-/3
16b.	3"; 7½ cm	-/3
17.	2"; 5 cm	-/3
18a.	1½"; 38 mm	-/2
18b.	1"; 25 mm	-/2
19h.	5"; 13 cm shaft Crank Handle	-/11
19s.	3½"; 9 cm " " "	-/6



19a 20 20b

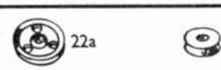
No.		s. d.
19a.	Spoked Wheel, 3" diam.; 75 mm	2/9
20.	Flanged Wheel, 1⅛" diam.; 28 mm	1/9
20b.	" " ¾" " ; 19 mm	1/5



19c 21 22

PULLEYS

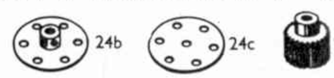
No.		s. d.
19b.	3" diam. with boss and screw; 7½ cm	1/9
19c.	6" " " " " " ; 15 cm	6/8
20a.	2" " " " " " ; 5 cm	1/5
21.	1½" " " " " " ; 38 mm	1/6
22.	1" " " " " " ; 25 mm	1/3



22a 23

PULLEYS (continued

No.		s. d.
22a.	1" diam. without boss; 25 mm	-/8
23.	½" " " " 12 mm	-/5
23a.	½" " with boss and screw; 12 mm	1/3

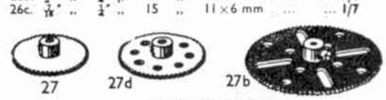


24b 24c 26a

No.		s. d.
24.	Bush Wheel, 1⅜" diam. 8 holes; 34 mm	1/4
24a.	Wheel Disc, 1⅜", diam. 8 holes, without boss 34 mm	-/10
24b.	Bush Wheel, 1⅜" diam. 6 holes; 34 mm	1/4
24c.	Wheel Disc, 1⅜" diam. 6 holes, without boss 34 mm	-/10

PINIONS

No.		s. d.
25.	¾" diam. ¼" face, 25 teeth; 19×6 mm	2/5
25a.	¾" " ½" " 25 " 19×12 mm	2/11
25b.	¾" " ¾" " 25 " 19×19 mm	3/7
26.	½" " ¼" " 19 " 12×6 mm	1/11
26a.	½" " ½" " 19 " 12×12 mm	2/5
26b.	½" " ¾" " 19 " 12×19 mm	2/8
26c.	7/16" " ¼" " 15 " 11×6 mm	1/7



27 27d 27b

GEAR WHEELS

No.		s. d.
27.	1½" diam. 50 teeth; 32 mm	1/11
27a.	1½" " 57 " 38 mm	2/3
27b.	3½" " 133 " 9 cm	4/5
27c.	2½" " 95 " 6 cm	2/7
27d.	1⅝" " 60 " 41 mm	2/4

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28 29

CONTRATE WHEELS

No.		s. d.
28.	1½" diam. 50 teeth; 38 mm	2/4
29.	¾" .. 25 .. ; 19 mm	1/8

30 30a & 30c 31 32

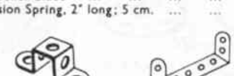
30	Bevel Gear, ⅞" diam., 26 teeth; 22 mm (for use in pairs)	3/6
30a.	.. .. ½" .. 16 .. 12 mm }	1 ea. 10/3
30c.	.. .. 1½" .. 48 .. 38 mm } (Can only be used together)	
31.	Gear Wheel, 1" diam. ½" face, 38 teeth; 25 mm × 6 mm	4/2
32.	Worm, ½" diam; 12 mm	1/9
34.	Spanner	–/7

34b 35 38d

34b.	Box Spanner		1/–
35.	Spring Clip	Pkt. of 24	1/1
36.	Screwdriver		1/1
36a.	.. (longer)		3/7
36c.	Drift (for levering bolt holes into line) ...		–/6
37.	Nut and Bolt, 7/32"; 5 mm ...	Pkt. of 24	2/1
37a.	Nut	.. .. ..	1/1
37b.	Bolt, 7/32"; 5 mm ...	.. .. ..	1/1
38.	Washer ⅜"; 10 mm... ...	 20	–/9
38d.	.. ¾"; 19 mm	(12)	–/9
40.	Hank of Cord		–/6

41 43

41.	Propeller Blade	–/10
43.	Tension Spring, 2" long; 5 cm.	–/8

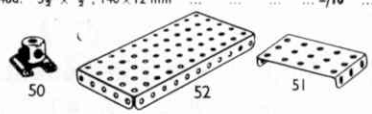


45 46

44.	Bent Strip, Stepped	–/6
45.	Double Bent Strip	–/6

DOUBLE ANGLE STRIPS

No.		s. d.
46.	2½"×1" ; 60×25 mm	–/9
47.	2½"×1½"; 60×38 mm	–/10
47a.	3" ×1½"; 75×38 mm	–/10
48.	1½"× ½"; 38×12 mm	–/6
48a	2½"× ½"; 60×12 mm	–/7
48b.	3½"× ½"; 90×12 mm	–/8
48c.	4½"× ½"; 115×12 mm	–/9
48d.	5½"× ½"; 140×12 mm	–/10



50 52 51

50.	Slide Piece	2/–
51.	Flanged Plate, 2½"×1½"; 60×38 mm ...	–/10
52.	.. .. 5½"×2½"; 14×6 cm ...	2/1
52a.	Flat Plate, 5½"×3½"; 14×9 cm	1/4
53.	Flanged Plate, 3½"×2½"; 9×6 cm ...	1/10
53a.	Flat Plate, 4½"×2½"; 11½×6 cm	–/11

54 55

54.	Flanged Sector Plate, 4½" long; 11½ cm	1/10
55.	Perforated Strip, slotted, 5½" long; 14 cm	–/7
55a.	.. .. .. 2" .. ; 5 cm	–/6

57c 57d 58 58a 58b 59

57c.	Hook, Loaded	–/8
57d.	Wire Hook	(6) –/9
58.	Spring Cord, 40" length; 1 metre ...	3/7
58a.	Coupling Screw for Spring Cord ...	–/2
58b.	Hook for Spring Cord	–/2
59.	Collar with screw	–/8

61 62 62b

61.	Windmill Sail	–/11
62.	Crank	1/2
62a.	Threaded Crank	1/2
62b.	Double Arm Crank	1/2

63 63b 63c

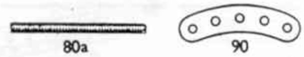
63.	Coupling	2/9
63b.	Strip Coupling	2/9
63c.	Threaded Coupling...	2/7
63d.	Short Coupling	2/4

64 65

No.		s. d.
64.	Threaded Boss	–/10
65.	Centre Fork...	–/6
69.	Set Screw, 5/32"; 4 mm ... ... (12)	–/9
69a.	Grub Screw, 5/32"; 4 mm ... ... (12)	1/6
69b.	.. .. 7/32"; 5 mm	–/2
69c.	.. .. 7/64"; 3 mm	–/2

76

70.	Flat Plate, 5½"×2½"; 14×6 cm	1/2
72.	.. .. 2½"×2½"; 6×6 cm	–/10
73.	.. .. 3" ×1½"; 75×38 mm	–/10
74.	.. .. 1½"×1½"; 38×38 mm	–/6
76.	Triangular Plate, 2½"; 6 cm	–/8
77.	.. .. 1" ; 25 mm	–/5



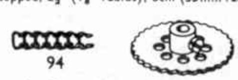
80a 90

SCREWED RODS

No.		s. d.	No.		s. d.
78.	11½"; 29 cm	3/7	80b.	4½"; 11½ cm	1/9
79.	8" ; 20 cm	2/7	80c.	3" ; 7½ cm	–/6
79a.	6" ; 15 cm	2/1	81.	2" ; 5 cm	–/5
80.	5" ; 12½ cm	1/11	82.	1" ; 25 mm	–/4
80a.	3½"; 9 cm	1/7			

CURVED STRIPS

		s. d.
89.	5½" (10" radius); 14 cm (25 cm radius) ...	–/8
89a.	Stepped, 3" (1¾" radius); 7½ cm (4½ cm radius)	–/7
89b.	Stepped, 4" (4½" radius); 10cm (11½ cm radius)	–/7
90.	2½" (2⅞" radius); 6cm (6cm radius)	–/6
90a.	Stepped, 2½" (1⅜" radius); 6cm (35mm radius)	–/6

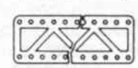


94 95

94.	Sprocket Chain, 40" length; 1 metre ...	3/1

SPROCKET WHEELS

95.	2" diam., 36 teeth; 5 cm	2/5
95a.	1½" .. 28 .. ; 38 mm	1/7
95b.	3" .. 56 .. ; 75 mm	2/9
96.	1" .. 18 .. ; 25 mm	1/6
96a.	¾" .. 14 .. ; 19 mm	1/5



99a

BRACED GIRDERS

97.	3½" long; 9 cm	–/10
99.	12½" .. ; 32 cm	2/–
99a.	9½" .. ; 24 cm	1/5
99b.	7½" .. ; 19 cm	1/3
100.	5½" .. ; 14 cm	1/–

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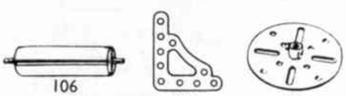
MECCANO PARTS BOUGHT - SOLD - EXCHANGED


101 102 103d

No.		s. d.
101.	Heald for Loom (24)	1/6
102.	Single Bent Strip	-/5

FLAT GIRDERS

No.			s. d.	No.			s. d.
103.	$5\frac{1}{2}$" long;	14cm	-/10	103e.	3" long;	$7\frac{1}{2}$cm	-/8
103a.	$9\frac{1}{2}$" ..	24cm	1/2	103f.	$2\frac{1}{2}$" ..	6cm	-/8
103b.	$12\frac{1}{2}$" ..	32cm	1/5	103g.	2" ..	5cm	-/7
103c.	$4\frac{1}{2}$" ..	$11\frac{1}{2}$cm	-/9	103h.	$1\frac{1}{2}$" ..	38mm	-/7
103d.	$3\frac{1}{2}$" ..	9cm	-/8	103k.	$7\frac{1}{2}$" ..	19cm	1/-


106 108 109

106.	Wood Roller (complete with Rod and two Collars)	4/6
108.	Corner Gusset	-/9
109.	Face Plate, $2\frac{1}{2}$" diam.; 6 cm	1/5


110a 113

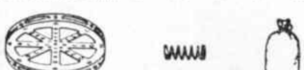
110.	Rack Strip, $3\frac{1}{2}$" long; 9 cm	1/-
110a.	.. .. $6\frac{1}{2}$" .. $16\frac{1}{2}$ cm	1/3

BOLTS

111.	$\frac{3}{4}$"; 19 mm (12)	1/1
111a.	$\frac{1}{2}$"; 12 mm (12)	-/9
111c.	$\frac{3}{8}$"; $9\frac{1}{2}$ mm (12)	-/9
111d.	$1\frac{1}{8}$"; $28\frac{1}{2}$ mm (12)	1/6
113.	Girder Frame	1/2


114 115 116a

114.	Hinge	-/11
115.	Threaded Pin	-/11
115a.	Threaded Pin, Long $1\frac{3}{8}$"; 34 mm	1/2
116.	Fork Piece, large	1/2
116a.	Fork Piece, small	1/-


118 120b 122

118.	Hub Disc, $5\frac{1}{2}$" diam.; 14 cm	4/-
120b.	Compression Spring, $\frac{9}{16}$" long; 14 mm	-/2
122.	Loaded Sack	-/9


123 125 126

No.		s. d.
123.	Cone Pulley, $1\frac{1}{4}$", 1" and $\frac{3}{4}$" diam. 32 × 25 × 19 mm	5/8
124.	Reversed Angle Bracket, 1"; 25 mm	-/4
125.	.. .. .. $\frac{1}{2}$"; 12 mm	-/3
126.	Trunnion	-/7


126a 128

126a.	Flat Trunnion	-/5
128.	Bell Crank, with boss	1/3


130 130a

130.	Eccentric, Triple Throw, $\frac{1}{4}$", $\frac{3}{8}$" and $\frac{1}{2}$" 6 × 9 × 12 mm	5/2
130a.	Eccentric, Single Throw, $\frac{1}{4}$"; 6 mm	3/7


133 133a 134

133.	Corner Bracket, $1\frac{1}{2}$"; 38 mm	-/7
133a.	Corner Bracket, 1"; 25 mm	-/5
134.	Crank Shaft, 1" stroke; 25 mm	-/8


136 136a 137 138

136.	Handrail Support	1/11
136a.	Handrail Coupling	1/11
137.	Wheel Flange	1/-
138.	Ship's Funnel, Raked	3/-


139 140

139.	Flanged Bracket (right)	-/10
139a.	.. .. (left)	-/10
140.	Universal Coupling	3/7


142c 143 144

No.		s. d.
142a.	Motor Tyre (to fit 2" diam. rim); 5 cm	2/1
142b.	.. .. .. 3" .. .. $7\frac{1}{2}$cm	3/7
142c.	.. .. .. 1" .. .. 25 mm	-/7
142d.	.. .. .. $1\frac{1}{2}$" .. .. 38 mm	1/4
143.	Circular Girder, $5\frac{1}{2}$" diam.; 14 cm	4/-
144.	Dog Clutch	2/1


145 146

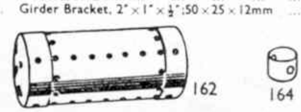
145.	Circular Strip, $7\frac{1}{2}$" diam. overall; 19 cm	3/-
146.	Circular Plate, 6" diam. overall; 15 cm	3/4
146a.	.. .. 4" diam. overall; 10 cm	2/1


147 & 148 153 154a & 154b

147.	Pawl with Pivot Bolt and Nuts	1/5
147a.	Pawl	-/10
147b.	Pivot Bolt, with two Nuts	-/8
147c.	Pawl, without boss	-/3
148.	Ratchet Wheel	1/11
151.	Single Pulley Block	3/7
153.	Triple Pulley Block	4/6
154a.	Corner Angle Bracket, $\frac{1}{2}$" (right-hand); 12mm	-/5
154b.	Corner Angle Bracket, $\frac{1}{2}$" (left-hand); 12mm	-/5
155.	Rubber Ring (for 1" Pulley); 25 mm	-/5


157 160 161

157.	Fan, 2" diam.; 5 cm	2/1
160.	Channel Bearing, $1\frac{1}{2}" \times 1" \times \frac{1}{2}"$; 38 × 25 × 12 mm	-/9
161.	Girder Bracket, $2" \times 1" \times \frac{1}{2}"$; 50 × 25 × 12mm	-/8


162 164

162.	Boiler, complete, 5" long × $2\frac{1}{16}$" diam. $12\frac{1}{2}$ × 5 cm	4/-
162a.	Boiler, End $2\frac{1}{16}$" diam. × $\frac{3}{4}$"; 50 × 19mm	1/1
163.	Sleeve Piece, $1\frac{1}{2}$" long × $\frac{11}{16}$" diam. 38 × 17 mm	-/9
164.	Chimney Adaptor, $\frac{5}{8}$" diam. × $\frac{1}{2}$" high 16 × 12 mm	1/-

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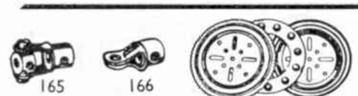

165 166 168

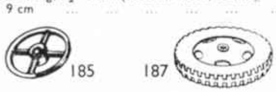
No.		s. d.
165.	Swivel Bearing	2/9
166.	End Bearing	1/3
167b.	Flanged Ring, 9⅞" diam.; 25 cm	7/2
168.	Ball Thrust Bearing, 4" diam.; 10 cm	5/10
168a.	Ball Thrust Race, flanged disc, 3¾" diam.; 9½ cm	2/1
168b.	Ball Thrust Race, toothed disc, 4" diam; 10 cm	2/1
168c.	Ball Cage, 3⅝" diam., complete with balls; 9 cm	3/7
168d.	Ball, ⅜" diam.; 9½ mm	-/2


171 173a 176

171.	Socket Coupling	3/5
173a.	Adaptor for Screwed Rod	-/9
175.	Flexible Coupling Unit	2/9
176.	Anchoring Spring for Cord	-/5


179 180

179.	Rod Socket	1/7
180.	Gear Ring, 3½" diam. (133 ext. teeth, 95 int.) 9 cm	3/7


185 187

185.	Steering Wheel, 1¾" diam; 4½ cm	1/7
185a.	,, ,, 2½" diam; 6 cm	1/9

DRIVING BANDS

186.	2½" (light); 6 cm (12)	1/6
186a.	6" ,, 15 cm	-/3
186b.	10" ,, 25 cm	-/5
186c.	10" (heavy); 25 cm	-/7
186d	15" ,, 37½ cm	-/11
186e.	20" ,, 50 cm	1/3
187.	Road Wheel, 2½" diam; 60 mm	1/7
187b.	Road Wheel, 4¼" diam; 108 mm	3/10
187a.	Conical Disc, 1⅞" diam; 47 mm	-/9


190a

FLEXIBLE PLATES

188.	2½"×1½"; 60×38 mm.	-/6
189.	5½"×1½"; 140×38 mm	-/10
190.	2½"×2½"; 6×6 cm	-/9
190a.	3½"×2½"; 9×6 cm	-/9
191.	4½"×2½"; 11½×6 cm	-/11
192.	5½"×2½"; 14×6 cm	1/-

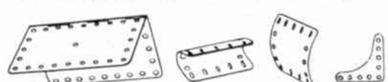
PLASTIC PLATES

No.			s. d.
193.	2½"×1½" (Transparent)	60×38 mm	-/5
193a.	2½"×2½" ,,	60×60 mm	-/5
193b.	3½"×2½" ,,	90×60 mm	-/8
193c.	4½"×2½" ,,	115×60 mm	-/9
193d.	5½"×1½" ,,	140×38 mm	-/7
193e.	5½"×2½" ,,	140×60 mm	-/10
194.	2½"×1½" (Black)	60×38 mm	-/5
194a.	2½"×2½" ,,	60×60 mm	-/7
194b.	3½"×2½" ,,	90×60 mm	-/8
194c.	4½"×2½" ,,	115×60 mm	-/10
194d.	5½"×1½" ,,	140×38 mm	-/8
194e.	5½"×2½" ,,	140×60 mm	-/11


197

STRIP PLATES

195.	7½"×2½"; 19×6 cm	1/7
196.	9½"×2½"; 24×6 cm	1/11
197.	12½"×2½"; 32×6 cm	2/3


198 199 200 201

198.	Hinged Flat Plate, 4½"×2½"; 11½×6 cm	2/9
199	Curved Plate, U-Section, 2½"×2½"×5/16" radius; 60×60×7 mm	-/9
200.	Curved Plate, 2½"×2½"×1 11/16" radius; 60×60×43 mm	-/9
201.	Flexible Gusset Plate, 2½"×2½"; 60×60 mm	-/8


211a & 211b 212a 213

211a.	Helical Gear, ½"; 12 mm (Can only be	
211b.	,, ,, 1½"; 38 mm used together) ea.	10/3
212.	Rod and Strip Connector	-/5
212a.	Rod and Strip Connector, Right Angle	-/5
213.	Rod Connector	-/6
213a.	Three-way Rod Connector	-/9
213b.	Three-way Rod Connector with boss	1/7

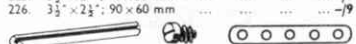

214 215 216

214.	Semi-Circular Plate, 2½"; 6 cm	-/10
215.	Formed Slotted Strip, 3"; 7½ cm	-/7
216.	Cylinder, 2½" long, 1¼" diam; 60×30 mm	1/5


222 223

TRIANGULAR FLEXIBLE PLATES

No.		s. d.
221.	2½"×1½"; 60×38 mm	-/7
222.	2½"×2"; 60×50 mm	-/7
223.	2½"×2½"; 60×60 mm	-/8
224.	3½"×1½"; 90×38 mm	-/7
225.	3½"×2"; 90×50 mm	-/8
226.	3½"×2½"; 90×60 mm	-/9


230 231 235

230.	4" Rod with Keyway; 10 cm	-/9
231.	Key Bolt	(6) 1/3
235.	Narrow Strip, 2½"×11/32"; 60 mm×9 mm	-/6
235a.	,, ,, 3"×11/32"; 75 mm×9 mm	-/6
235b.	,, ,, 3½"×11/32"; 90 mm×9 mm	-/7
235d.	,, ,, 4½"×11/32"; 115 mm×9 mm	-/7
235f.	,, ,, 5½"×11/32"; 140 mm×9 mm	-/8

MECCANO BOOKS OF MODELS

0 1		1/3
2 3		1/9
4 5 6		4/3
7 8		6/9
9	Wallet with ten leaflets (*see below*†)	10/-
10	Wallet with 12 leaflets (*see below*‡)	15/-
Gears Book		1/3
Book of Mechanisms		1/9
Elektrikit Manual		3/6
Power Drive Manual		2/3

† No. 9 Special Model Leaflets

9/1	Fire Escape	-/9
9/2	Wharf Crane	-/9
9/3	Fork Lift Truck	-/9
9/4	Giant Dragline Excavator	-/9
9/5	High Speed Press	-/9
9/6	Bascule Bridge	-/9
9/7	Robot or Mechanical Man	-/9
9/8	Freight Plane	-/9
9/9	Car and Caravan	-/9
9/10	Articulated Lorry	-/9

‡ No. 10 Special Model Leaflets

1	Railway Service Crane	1/3
2	Sports Car	1/3
3	Coal Tippler	1/-
4	Cargo Ship	1/3
5	Double Deck Bus	1/3
6	Lifting Shovel	1/3
7	Block Setting Crane	1/3
8	Beam Bridge	1/3
9	Dumper Truck	1/-
10	Automatic Gantry Crane	1/3
11	Automatic Snow Loader	1/6
12	4-4-0 Locomotive and Tender	1/6
13	Combine Harvester	1/6
14	Eiffel Tower	1/-
15	Showman's Traction Engine	1/3
16	Twin Cylinder Motor Cycle Engine	1/3
17	Trench Digger	1/3
18	Bottom Dump Truck	1/6
19	Road Surfacing Machine	1/6
20	Mechanical Loading Shovel	1/3

WONDERFUL SHOPS — HOLBORN — SOUTHGATE — MANCHESTER

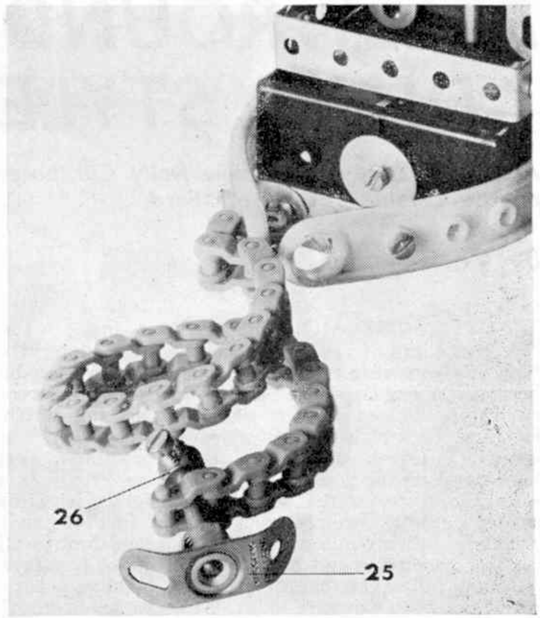
free ends of Strips 1 are brought together at the front to represent the bow and are held in position by two standard Obtuse Angle Brackets joined by a Fishplate 3. At the stern, the "after-deck" is provided by a Flat Trunnion 4, fixed to Strip 2 by a standard Angle Bracket, the securing Bolt also fixing in place a Rod and Strip Connector, carrying a $1\frac{1}{2}$ in. Rod 5.

Also fixed to Strip 2 are two Fishplates 6, to the upper ends of which two shaped Formed Slotted Strips 7 are bolted, the securing Bolts also holding two Angle Brackets 8. The free lug of each of these Angle Brackets projects beneath Flat Trunnion 4, but it is not bolted to the Trunnion. Lying on top of the Trunnion, on the other hand, is a Semi-circular Plate 9, attached to the rear Base by a Double Bracket, remembering to fit a $\frac{3}{4}$ in. Washer on the Bolt to lie over the large hole in the Base. Bolted to this Semi-circular Plate are two Angle Brackets 10, the upper lugs of which are also bolted to Formed Slotted Strips 7. A further two Angle Brackets are bolted to the top of the Plate to provide anchoring points for two $1 \times \frac{1}{2}$ in. Angle Brackets, to the small lug of which a metal 2 in. Strip 11 is fixed. Bolted between the free ends of these Strips is a $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flanged Plate 12.

Another $2\frac{1}{2}$ x $1\frac{1}{2}$ in. Flanged Plate 13 is bolted between two $2\frac{1}{2}$ in. Strips, attached to the forward Base by standard Angle Brackets 14, the securing Bolts also fixing a standard $2\frac{1}{2}$ x $\frac{1}{2}$ in. Double Angle Strip 15 between the Strips. Flanged Plates 12 and 13 are now joined by two $3\frac{1}{2}$ in. Angle Girders 16, the centres of which are themselves joined by a $2\frac{1}{2}$ in. Strip 17. Bolted to this Strip is a $3\frac{1}{2} \times 1\frac{1}{2}$ in. compound plastic plate, obtained from two standard $2\frac{1}{2} \times 1\frac{1}{2}$ in. Plastic Plates. Above this and bolted to Girders 16 is a Raked Ship's Funnel (standard Part No. 138).

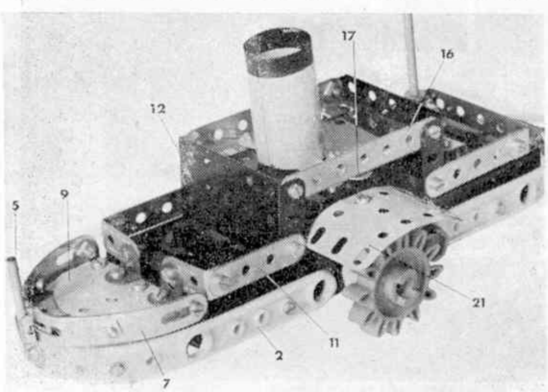
A mast is next provided by an 8 in. Rod, held by Collars in a Double Bracket 18. The lugs of this Double Bracket are bolted to one right-hand and one left-hand Corner Angle Bracket, each of which is fixed to the top of the forward base by a $\frac{3}{4}$ in. Bolt, but is spaced from it by two Collars on the shank of each Bolt. The "crosstrees" is built up from two 1 in. Screwed Rods 19 mounted in the transverse tapped bores of a Collar situated about $1\frac{1}{2}$ in. from the top of the mast. The mast, incidentally, projects some distance downwards through the centre hole in the forward Base.

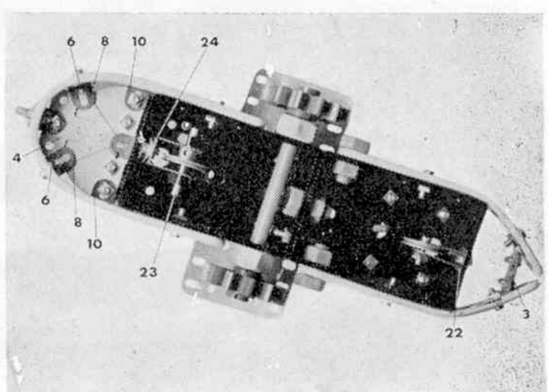
We come now to the paddle wheels, which illustrate admirably the point I made earlier about a few Plastic Meccano parts often giving as good an effect as a whole load of standard Meccano parts. Each paddle wheel, in fact, is obtained from only one Plastic Meccano Part—a 12-teeth Gear Wheel 20, mounted on a



$4\frac{1}{2}$ in. Axle journalled in the forward side holes of the rear Base—and the effect is excellent; better even than it would be possible to produce with standard Meccano considering the size of the model! A cover for each wheel is provided by a shaped $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plate 21, attached to the rear Base by a Reversed Angle Bracket.

Finally, because the Paddle Steamer is only a model representation, and cannot actually float, two jockey wheels are provided to enable it to run on land. The front wheel consists of a 1 in. Pulley without boss on a $1\frac{1}{2}$ in. Bolt lock-nutted in a Single Bent Strip 22 fixed to the forward Base by a Fishplate, again remembering to include a $\frac{3}{4}$ in. Washer. The rear wheel is a 1 in. Pulley with boss, mounted on a $1\frac{1}{2}$ in. Rod 23 held by Spring Clips in the lugs of a $1 \times \frac{1}{2}$ in. Double Bracket 24. This is attached to the rear Base, also by a Fishplate and then an anchor, connected to the boat by a number of Plastic Meccano Chain Links, is built up from a standard Double Arm Crank 25, the arms of which are bent to shape. Mounted in the boss of the Crank is a $1\frac{1}{2}$ in. Rod, towards the top of which a Collar 26 is fixed by two standard Bolts.





RALLY ROUND —DINKY STYLE

A look at Dinky Toy's new Rally Car based on the Cortina Lotus from Ford.

by Chris Jelley

EXCITEMENT MOUNTS in your inside. The cars ahead of you have started at regular intervals. Now it's your turn. You move up to the start—a bit nervous. A few last-second checks with your co-driver/navigator. The marshal is staring at his stop-watch. His arm rises slowly, then snaps down. "Go!" he shouts. Lever into first gear; let in the clutch; foot hard down on the accelerator—and you're away with a screech of tyres as the wheels spin slightly with the sudden take-off. You're away on the first of many gruelling, rallying miles that may take you through all weather conditions and over all types of road surface.

Motor rallying is one of the most popular participation sports in existence today. Most weekends during the "season" there will be a rally or rallies going on somewhere up or down the country: some large, some small; some taking the whole weekend, some taking no more than a couple of hours on a Saturday afternoon. The biggest, most important event in the world, however, is the famous Monte Carlo Rally and it happens that, as I am writing this, the 1968 Monte is being fought out on the roads of Europe. It also happens that Meccano Ltd. have just released a Dinky Toy rally car to commemorate this year's Monte—No. 205 Cortina Lotus Rally Car.

A splendid model it is too! Based, as its name suggests, on the high-performance Cortina Lotus from the Ford Motor Company, it is unmistakable as a model intended for sporting events. Predominant finish is white, but the bonnet and boot lids are red as also is the back of the body casting above the rear bumper. A red flash runs the length of the car at each side while transferred on the right side of the roof is a striking group of red speed stripes consisting of one thick band flanked on each side by a thin band. The black identification number 7, on a yellow background, beneath a 1968 Monte Carlo Rally plate, appears on both the boot and bonnet lids and the number on its own is repeated on each door. The combined baseplate and radiator grille casting is silver coloured, the interior upholstery of the model being a beautiful pale blue.

Next we come to Dinky features and this model has just about everything: Prestomatic steering, four-wheel suspension, opening doors, bonnet and boot, tipping backs to the front seats, windows and full interior fittings. Also present are twin radio aerials, one on each rear wing, twin streamlined racing-type mirrors, one on each front wing, a group of three spotlights fixed to the radiator and, of course, 1968 number plates. Another interesting feature is the bonnet opener—a little button in the baseplate which, when pressed, raises the snug-fitting bonnet sufficiently high for it to be easily opened by hand. Windscreen wiper and rear-view mirror representations appear in the windscreen moulding.

Undoubtedly, the Dinky Cortina Lotus is packed with play-value, as we say in the trade, and, being a good scale model, it will appeal to anybody interested in die-cast miniatures. The real-life Cortina Lotus, on the other hand, is designed not so much for mass appeal, but is aimed at the much smaller enthusiasts' market. I did not actually intend to deal with the real car here, but I came across such a good yet short description of it in some Ford publicity literature that I felt it well worth reproducing for the benefit of *Meccano Magazine* readers interested in high-performance cars.

According to Fords, "The Cortina Lotus, first introduced in 1963, is a brilliant combination of Ford Cortina and Lotus racing know-how. It's a production performance car without precedent in the history of motoring, and a striking indication of the outstanding quality of the basic Cortina design. It is a car for the enthusiast, for the driver who likes to take his driving professionally.

"Since the car was introduced it has been continually refined so that today it is not only an outstanding performance car, but also an exceptionally well-mannered cars that's as pleasant to drive on crowded roads as on race tracks."

American ambulance

Leaving the Cortina Lotus, we still have room to look at another new Dinky Toy released recently, No. 267 Superior Cadillac Ambulance. This model, not to be confused with the existing Dinky Superior Criterion Ambulance, is based on a vehicle seen everywhere throughout the U.S.A. today. Indeed, I am sure that almost everyone in Britain is familiar with it, thanks to its frequent appearances in numerous American films shown in cinemas and on television in this country.

The actual ambulance in question, the Superior Rescuer, is built by the Superior Coach Corporation of Ohio and Mississippi and is mounted on a Cadillac chassis. Superior and Cadillac are two entirely different companies, so, if you should be puzzled by their apparent connection, remember that it is common practice in Britain for one company to make the bodywork and fittings for a bus, for example, while another company makes the chassis. In fact, I doubt if there is any mass-produced vehicle in existence today which is made completely by one company. Some part or parts of it will almost certainly be made by sub-contractors and purchased from them by the original company who planned and who market the vehicle and who, because of this, are able to "claim" it as their own. By the same token, there would be nothing legally to stop me from designing a body to fit, say, a Triumph Herald chassis; paying a body-builder to make it for me; buying Herald chassis from Triumphs and employing another company to assemble them for me. I need not do a thing to the car myself, but I would still be entitled to market it as mine!

Returning to the Dinky Toy Ambulance, however, we have the most sophisticated model of its type ever produced by Meccano. Earlier I mentioned the existing Criterion Ambulance. You may remember there are two of these in the Dinky range, one sold complete with a patient on a stretcher and the other with a working flashing roof light, but without a patient, as the battery mechanism occupies the interior of the model. Well, the new Ambulance has the best of both worlds—a working roof light and a patient on a stretcher! By using a new, improved electrical system it has been possible to leave ample room inside the model for a stretcher patient who is loaded and unloaded through a large opening door at the rear.

At left, the Superior Cadillac Ambulance complete with patient on stretcher and working roof light; the opening rear door and interior are clearly visible at right. The world famous Ford Cortina Lotus in complete rally trim is seen above with a typical rallying map of the Continent as the background.

Other features include Prestomatic steering, four-wheel suspension, special green-tinted and patterned windows, seats, steering wheel and American-style number plates. An imitation siren is mounted on the cab roof, while four pairs of simulated red lights are built one pair into each corner of the raised sections of the main roof. "Ambulance" signs also appear on the front and sides of this section. Finish is in two-tone cream and red with pale green interior and black base.

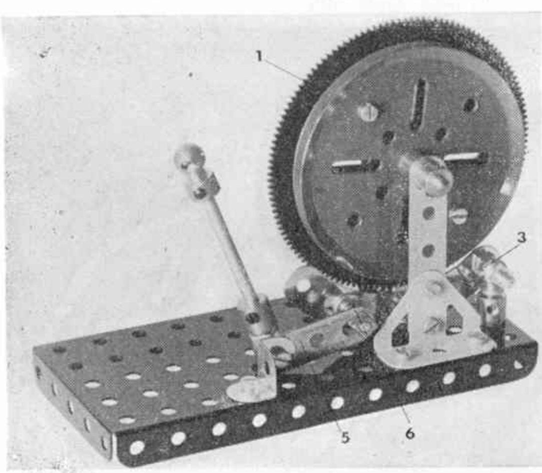
Power for the flashing light comes from a Vidor V16 or equivalent battery which slots into a cavity in the base. Because of storage difficulties, the battery is not sold with the model, but is readily obtainable separately. Full instructions for fitting the battery as well as for replacing the roof light are included with every model. Both these operations are very simple, but the effect of the flashing light in action gives the finishing touch to a first-class toy.

AMONG THE MODEL BUILDERS with Spanner

★ Winding Drum Brake for cranes
★ Simple Roller Bearing
★ Adjustable Throw Crankshaft
★ Vertical Shaft Bearing

FEATURED IN our February issue was an interesting Twin-Drive Unit for cranes designed by a reader in Burton-on-Trent. Since then I have received details of a very effective brake for the winding drums of cranes from Mr. J. G. Gamble of Lenton, Nottingham, and, as this is an extremely useful piece of apparatus, I felt it a must for this article.

Mr. Gamble, whose mechanism appears in the accompanying photographs, writes, "I designed this brake for a dragline I'm in the process of building. It is set up here, as is obvious, for demonstration." It follows from this, of course, that it is the actual mechanism that matters, not the mounting, which depends entirely on the model to which the brake is fitted. In other words, the accompanying pictures (and the following description) show Mr. Gamble's brake mounted on a $5\frac{1}{2} \times 2\frac{1}{2}$ in. Flanged Plate. In a model, this Flanged Plate might well be replaced by a different or collection of different parts. As the brake stands, however, a $3\frac{1}{2}$ in. Gear Wheel 1 is mounted on the Rod normally carrying the crane winding drum, this Rod being journalled in two $2\frac{1}{2}$ in. Strips each bolted to a Trunnion fixed to the $5\frac{1}{2} \times 2\frac{1}{2}$ in. Flanged Plate. Attached to the Gear, but spaced from it by two Washers and a Nut on the shank of each securing Bolt, is a 3 in. Pulley carrying a 6 in. Driving Band in its "V" groove. Acting on this Driving Band is a "brake shoe" obtained from a 3 in. Stepped Curved Strip 2, *stiffly* pivoted at one end on a Handrail Support 3 screwed into a Threaded Boss, which is itself bolted to the $5\frac{1}{2} \times 2\frac{1}{2}$ in. Flanged Plate.



The operating lever is a suitable Axle Rod, to the lower end of which is fixed a Rod Socket 4 screwed into one transverse tapped bore of a Threaded Crank 5. The complete arrangement is then pivotally connected, as shown, to a right-angled Corner Angle Bracket, using a $\frac{3}{4}$ in. Bolt screwed through the Bracket and into the central bore of the Threaded Crank, where it is lock-nutted *stiffly* in place. The arm of the Crank is, in turn, pivotally connected, using a Pivot Bolt, to Curved Strip 2, but it is spaced from it by a Washer and a Compression Spring 6 on the shank of the Bolt. A Handrail Coupling 7 is mounted on the upper end of the brake operating lever. Drive to the winding drum Rod is, of course, transmitted via Gear Wheel 1.

PARTS REQUIRED:

2—5	1—52	2—126
1—16	2—59	1—136
1—17	1—62a	1—136a
1—19b	1—64	1—147b
1—27b	1—89a	1—154a
18—37a	1—111	1—179
9—37b	3—111a	1—186a
6—38	1—120b	

N.B.: The above Parts List applies to the Crane Brake exactly as it is illustrated.

Small Roller Bearing

On a different subject, but still with Mr. Gamble, we come to a small roller bearing, details of which he sent along with his Crane Brake. The most common use for a roller bearing, of course, is in a crane, where it gives the swivelling superstructure a good, strong "seating," at the same time allowing it to turn with the minimum of friction. Long-established readers of *Meccano Magazine* will know that we have featured many built-up roller bearings over the years, perhaps one very similar to Mr. Gamble's, yet his is such a strong but simple mechanism that I feel it well worth including here for the benefit of our newer readers.

A glance of the relevant pictures will show you just how simple it is. A roller race is built-up from eight $\frac{1}{2}$ in. Pulleys without boss 1, each loose on a $\frac{3}{4}$ in. Bolt, lock-nutted to a Hub Disc 2. The locking Nuts must be as close as possible to the tip of the Bolt. The roller race is then "sandwiched" between two 6 in. Pulleys 3, Pulleys 1 riding on their angled circumferences. Lastly, a $1\frac{1}{2}$ in. Axle Rod is fixed in the boss of lower Pulley 3, is passed through the centre of Hub Disc 2 and the boss of upper Pulley 3, to be held in position by a Collar 4. Note that the Rod is free in the boss of the upper 6 in. Pulley.

The final word comes in the form of a hint from Mr. Gamble himself. "The 'V' groove in the large wheels," he writes, "offers a perfect track for a friction drive using a Small Pulley fitted with a Motor Tyre."

PARTS REQUIRED

1—18a	16—37a	8—111
2—19c	1—59	1—118
8—23		

A useful Brake, at left, for the winding drums of Meccano Cranes, designed by Mr. J. G. Gamble of Lenton, Nottingham. Although very simple in design, this mechanism is extremely effective in operation.

Adjustable Throw Crankshaft

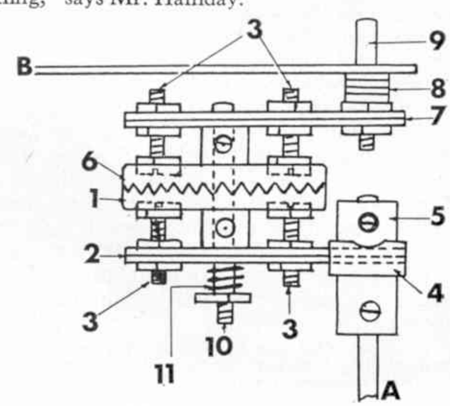
Keenly interested in the sort of mechanical designing machine we have christened "Meccanograph" is Mr. H. J. Halliday of London, S.E.15. Judging from past correspondence, in fact, I would classify him as an expert on "this ever-fascinating gadget," as he calls it. He has certainly produced some mechanisms seemingly insignificant in their simplicity, which, in actual practice, tremendously increase the scope of a "standard" Meccanograph such as that featured in the current 7/8 Instructions Manual. The adjustable Throw Crankshaft illustrated here is just such a mechanism.

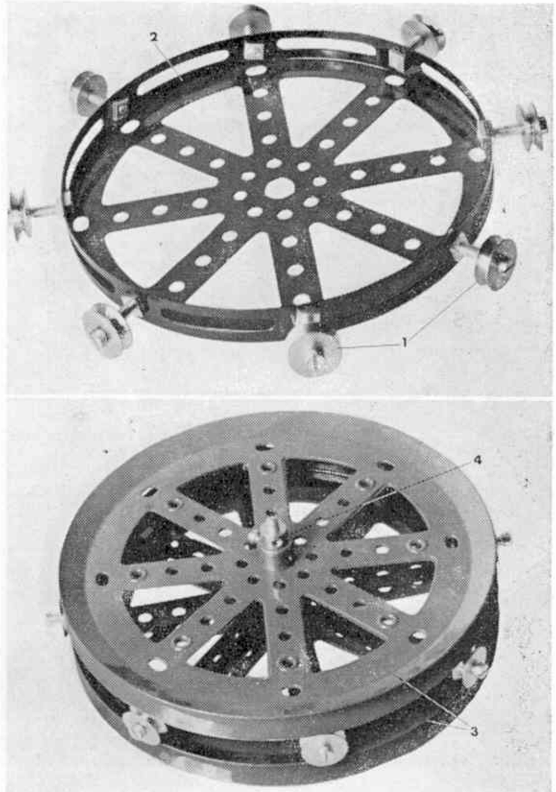
In a Meccanograph, one of the chief ways of varying the pattern is to alter the throw of the crank actuating the pen arm. What is required, therefore, is a variable throw crank and most standard models do incorporate such a mechanism. It's usually a pretty basic thing, however, allowing only limited changes to be made, while Mr. Halliday's mechanism is a very much more sophisticated offering. As he says, "With careful building of the unit, a range of "throws" from absolute zero to a maximum of 2 in. is obtainable in 25 stages, with a positive setting at each stage." This is a vast improvement.

The accompanying diagram of the Crank, with its key, is so self-explanatory that no building instructions are necessary, but I must leave the last comment on the Unit to Mr. Halliday, who writes, "I would point out that the Meccanograph into which it is fitted at the moment is not the standard Meccano model, but I don't doubt that enthusiasts for this partciularly model are quite capable of any modifications that may be necessary to make the mechanism fit in." I'm sure he's right!

Final hint

I close this month with a useful model-building "tip," also supplied by Mr. Halliday, on a method of greatly reducing the friction resulting from a considerable weight acting on the bearings of a vertical shaft. In most cases, the bearings of a vertical shaft are supplied by Strips or Plates or perhaps the bosses of Bush Wheels, etc., the shaft passing through a hole in the part, and usually being held in place by Collars or Pulleys. The weight of any equipment mounted on the shaft forces the securing Collar against the adjacent bearing, causing friction. Mr. Halliday's solution is easy: simply replace the lower bearing with a Rod Socket, used as a "footstep bearing." and mount the shaft in this, first inserting a 3/32 in. ball bearing. (This last is not a Meccano part but it is easily obtainable from any bicycle repair shop.) "The ease with which a vertical shaft will spin after this operation is most startling," says Mr. Halliday.

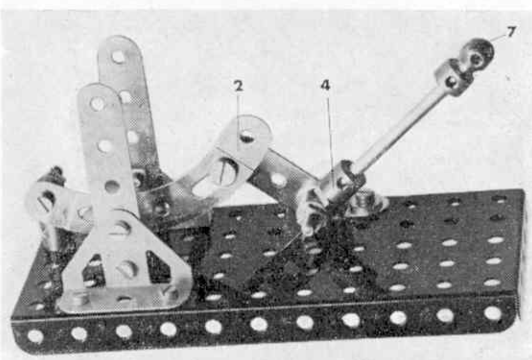




Also designed by Mr. Gamble of Lenton, Nottingham, is this small Roller Bearing, above, which, he informs us, has proved highly successful in his own models. As this picture shows, the actual roller race consists quite simply of eight ½ in. Pulleys loose on ¾ in. Bolts fixed by Nuts in a Hub Disc.

Mr. Gamble's Brake, below, with the 3½ in. Gear Wheel and 3 in. Pulley removed. Note that the winding drum of the Crane would be mounted on the Rod normally carrying these parts.

An Adjustable Throw Crank at left, designed by Mr. H. J. Halliday of London, S.E.15. KEY: 1—1½ in. Contrate; 2—2 in. Strips; 3—½ in. Bolts; 4—Slide Piece; 5—Collar; 6—1½ in. Contrate; 7—two 2 in. Strips; 8—packing Washers; 9—Threaded Pin; 10—Long Threaded Pin; 11—½ Compression Spring; A—Meccanograph driven Rod; B—Meccanograph pen arm.



THE MAGIC of the Meccano constructional system was displayed to all who attended the Daily Mail Schoolboys and Girls Exhibition at Olympia this year.

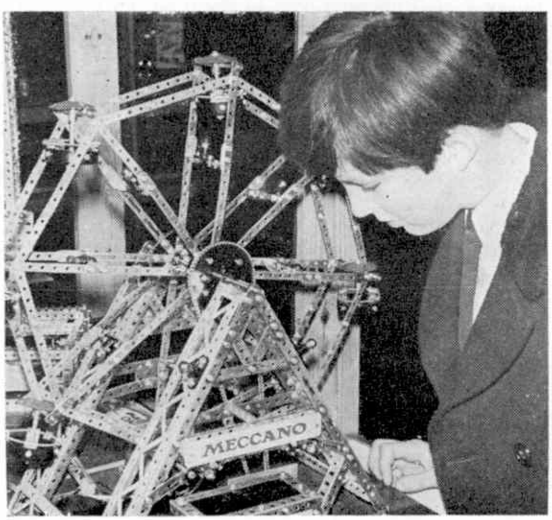
Meccano Ltd., Liverpool, and the *Meccano Magazine* were well represented with a large corner stand just off the central hall's main entrance. The accent was on action, with plenty of working Meccano display models and audience participation in a content organised on the stand. The contestants had to construct a Meccano Lorry composed of 93 parts in the shortest possible time against five other contestants. Six competitors sat down to each contest, run every half hour, each winner having a choice of a Meccano Playset or Plastic Meccano Set A. Besides, each contestant was presented with a free January *Meccano Magazine* and could purchase the February issue if they wished.

In all 834 boys and girls entered the contest and 139 heat winners were found from the 139 contests run. Such was the interest in the contest, that queues very often formed enforcing a long wait for lucky contestants. The age range was wide, youngest being six years old and the oldest 15 years, including a few girls.

The versatility of the Meccano constructional system was demonstrated by the master timing clock, this, unbeknown to most contestants, being operated by a Meccano Electric Motor with standard Meccano Gears; also a panel of gear and pulley layouts attracted a lot of interest. With a 15 minute limit on building time, after which a run-

THE MAGIC OF MECCANO

A short report and list of winners from the Meccano contest at the Schoolboys and Girls Exhibition, Olympia, last January



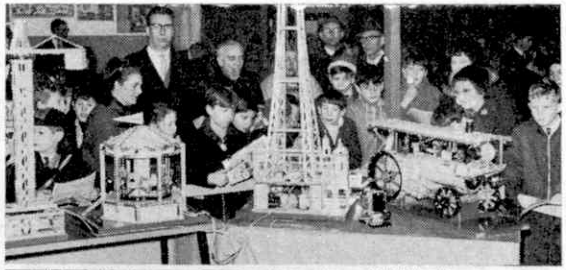
off for the two most advanced contestants was held, 12 minutes was reckoned as a good time, but 13-year-old Peter Lawrence of Oaklands Road, Hanwell, London, W.7, the overall Exhibition winner, just flew through his Meccano Lorry in 9 minutes and 48 seconds. Such an effort deserved a worthwhile prize, and this Peter received after the Exhibition.

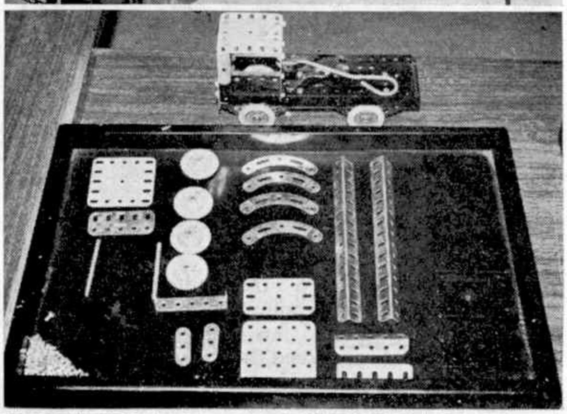
Peter's prize was a No. 6 Meccano Outfit and it was presented to him by W. G. Lines, Esq., Chairman of Meccano Ltd., at the Tri-ang Toy Fair on Monday, January 22nd, held at Tri-ang House, London. Peter explained his Meccano interest to Mr. Lines and was privileged to be shown some of the new products to be marketed during 1968-69 by Meccano Ltd., including some not yet released Dinky Toys—lucky lad. Congratulations, Peter—we hope to see you at next year's Exhibition trying to make it two in a row!

Mr. W. G. Lines, Chairman of Meccano, presents Peter Lawrence with his No. 6 Meccano Outfit at the Tri-ang Toy Fair. At left, Peter examines a motorised Meccano display model.

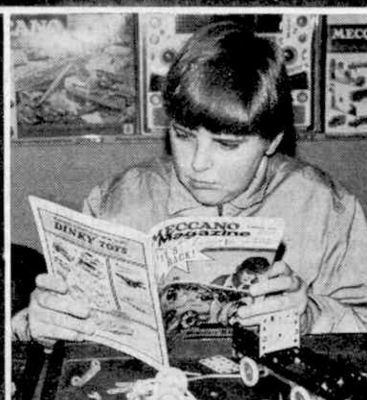
★ Contest Heat Winners ★

BEDFORDSHIRE: S. Heath, Dunstable. **BERKSHIRE:** A. Matthissen, Sunninghill; J. Cox, Maidenhead. **BUCKINGHAMSHIRE:** T. Thornton, Beaconsfield. **CAMBRIDGESHIRE:** D. Blunn, Cambridge. **DERBYSHIRE:** R. Booth, Chesterfield. **ESSEX:** M. Lethan, Romford; S. Trayman, Ilford; S. Turner, Romford; M. Bateman, Rainham; T. Falcon-Uff, Romford; S. Takobeck, Theydon Bois; K. Wynne, Hornchurch; G. Claridge, Dagenham; R. Barton, Romford; P. Rhodes, Ilford. **GLOUCESTERSHIRE:** N. MacDawell, Archdeacon Street. **HAMPSHIRE:** D. Foley, Alton; M. Prince, Southampton; L. Underdown, Portsmouth. **HERTFORDSHIRE:** J. Lee, Hemel Hempstead; G. Perry, Berkhamsted; S. Kearney, Ware; M. Evans, Watford; M. Benson, Hemel Hempstead. **KENT:** P. Jones, Tunbridge; P. Bridges, Nr. Faversham; C. Randall, Welling; M. Green, Barnehurst; J. Hooper, Shortlands. **LINCOLNSHIRE:** S. Fell, Brigg. **LONDON:** R. Jackson, Lynewood Close; S. Hotham, Tottenham; T. Pearce, Clem Atlee Court; P. Lacey, W.12; B. Webb, Stepney; A. Grey, Blackheath; G. Horncastle, Stepney; S. Charnley, Mile End; J. Champkin, Barnes; C. Gray, S.W.3; C. Cockerell, Fulham; A. Lawrence, Hanwell; H. Davies, Hendon; A. Dillon, Streatham; T. Ronson, N.W.11; M. Owen, W.4; M. Keegan, West Ealing; N. Reeves, Cricklewood; Miss J. Greenwood, Hendon; G. Richards, Eltham; D. Spinks, Forest Hill; D. Charles, Golders Green; P. Briscall, Chingford; D. Bushell, Roehampton; M. Gee, Hallfield Estate; A. Karsan, W.1; J. Gaffney, N.19; P. Blunden, Ealing; G. Smith, Hanwell, W.7; G. Macey, Palmers Green, N.13; A. Stickley, East Dulwich; K. White, Fulham; M. Borudan, Friern Barnet; P. Roseberg, S.W.16; J. Harrison, S.W.19; J. Nuttall, Mill Hill; R. Tuckwell, Fulham; K. Kierns, Brixton; R. Oscroft, N.W.10. **MIDDLESEX:** C. Edwards, Pinner; K. Bishop, Harrow; B. Taylor, Kenton; P. Saunders, Harrow; N. Bradbury, Potters Bar; T. Jones, Twickenham; N. Taylor, Greenford; P. Myrants, Harrow; J. Savage, Isleworth; D. Wedd, Shepperton; P. Cumber, Teddington; G. Behr, Greenford; J. Parsons, Heston; C. Peers, Hanworth; C. Ellson, Kenton; N. Brant, Brentford; D. Boorman, Hounslow; P. Crush, Hounslow; K. Hall, Hounslow. **NORFOLK:** G. Overell, Thetford. **NORTHANTS:** M. Dixon, Peterborough. **NORTHUMBERLAND:** J. Ellwood, North Shields. **OXFORDSHIRE:** D. Butterfield, Tiddington; P. Foxley, Emmergreen. **SURREY:** M. Gibson, New Malden; M. Winsbury, Worcester Park; L Naef, Lightwater; A. Corbett, Ashtead; R. Garrett, Sutton; S. Meech, Warlingham; K. Bosher, Thorpeley; N. Hemming, Caterham; P. Saunders, Kew; M. Wright, Mitcham; R. Burch, Redhill; N. Bruver, Richmond; J. Gribble, Carshalton; C. Blackler, Wallington; D. Worth, Ashtead; I. Hudson, Milford; J. Knight, Wallington; P. Gilbert, Walton-on-Thames. **SUSSEX:** C. Patrick, Lewes; J. Gordon, Chichester; D. Mint, Brighton.
17 others did not leave their names and addresses.





At right, top to bottom. A selection of the Meccano show models on display in the Meccano stand. Mike Rickett, Meccano Limited, Liverpool, looks at his watch as the six lucky contestants commence construction of their lorry. Next, we see the lorry composed of 93 parts in its finished form, with the trayful of components. Below, some of the lucky contestants, left to right, were Howard Eastwood, Adrian Worth and James Gray, seen reading his free Meccano Magazine.



Cricket on Stamps

by James A. Mackay

CONSIDERING ITS tremendous popularity throughout the Commonwealth it is surprising that there have been so few stamps in honour of cricket. This was remedied, however, by a splendid issue made jointly last January by Guyana and Jamaica to commemorate the West Indies v. England Test Matches held in January and February. Both countries issued small sheets containing nine stamps arranged in three rows of three. The stamps in each row were quite different from each other and depicted a wicket keeper, a batsman and a bowler respectively, in such a way as to make up a spirited action scene. Inset in the top left-hand corner of the stamps was a badge, that on the stamps depicting coloured players (wicket keeper and bowler) showing the emblem of the West Indies Cricket Association, while that on the centre stamp showing an English batsman featured the badge of the M.C.C. The Jamaican stamps were all of 6d. denomination, but the stamps in the Guyana sheets were of 5c., 6c. and 25c. denomination in each row.

The sheets were surrounded by an attractive and amusing background showing a West Indian cricket ground at the top and various small boys in precarious vantage points (shinning up trees and telegraph poles) at the sides. Along the foot of the sheet was a little girl bowling to a boy, with cricket bat, stumps, ball, gloves and cap in the centre. The stamps were designed by Victor Whiteley and printed in multicolour photogravure by Harrison and Sons of High Wycombe. The stamps were released in Guyana on 8th January and in Jamaica a month later.

The very first stamp to depict cricket came, oddly enough, not from any cricketing country but from the Portuguese colony of the Cape Verde Islands which, in January 1962, issued a series of six diamond-shaped stamps featuring various sports. The 1E.50 denomination depicted a batsman, but unfortunately the artist who produced the design had obviously never seen the game played, since there are a number of mistakes in the illustration, particularly in the stance of the batsman!

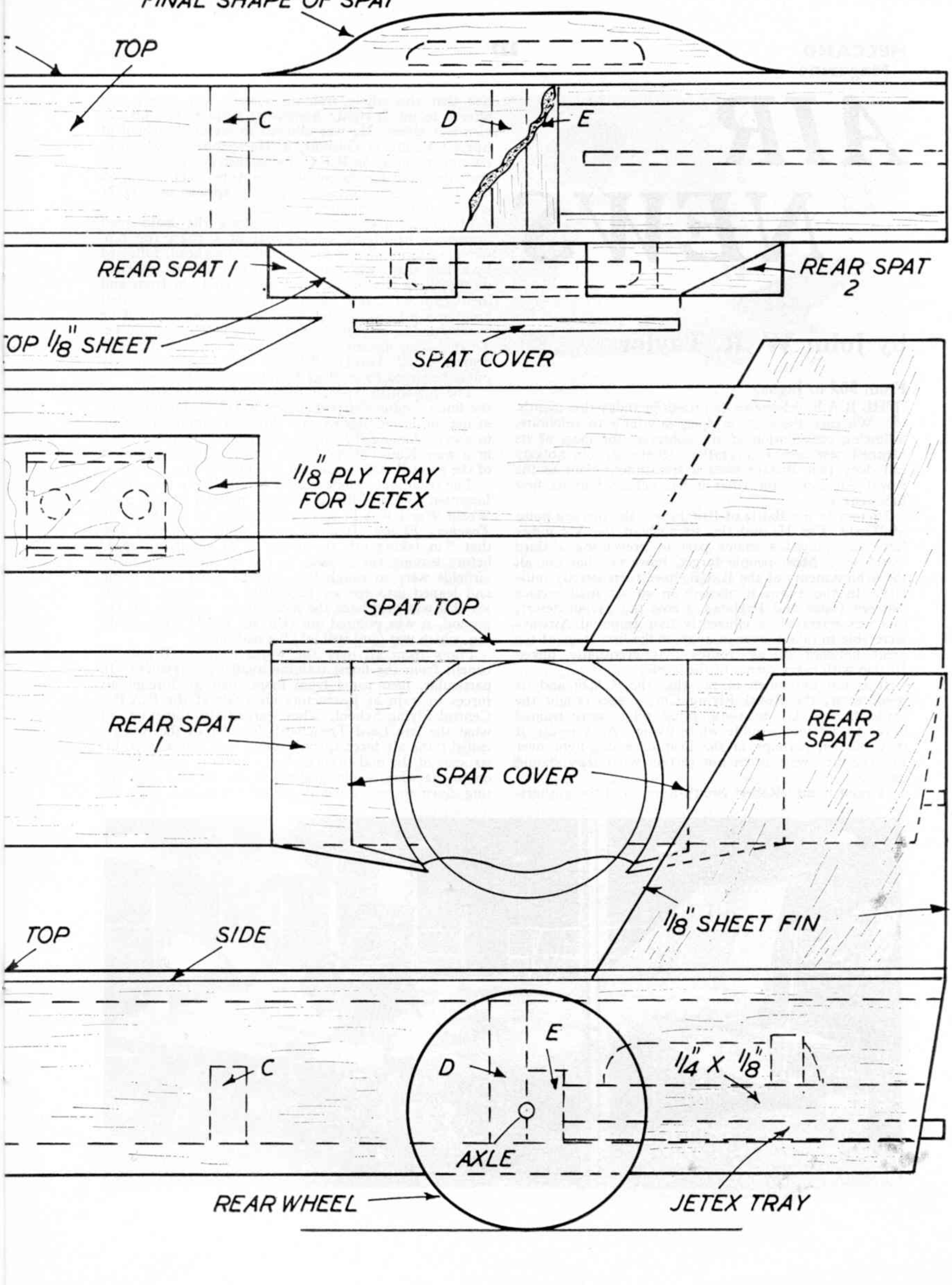
The following August, Pakistan issued a set of stamps to commemorate the fifteenth anniversary of independence and chose the theme of sport. Each of the four stamps depicted the ground plan of the pitch or court, the equipment used and a prominent trophy relating to the following sports: football (7p.), hockey (13p.), squash (25p.) and cricket (40p.).

Next to England, India has probably the oldest cricketing traditions, there having been a club in Calcutta before the end of the eighteenth century. There was a triangular tournament between Europeans, Hindus and Parsees from 1907 onward and in 1912 Moslems joined in, so that Pakistan's cricket stamp may be regarded as marking the golden jubilee of first-class cricket in that country.

At the partition of 1947, India lost many fine cricketers to Pakistan, which was admitted to the Imperial Cricket Conference in 1952. In 1954 a Pakistani team made history by becoming the first team to win a Test Match in its first visit to England and on this occasion they drew the rubber of four Test games. Norman Yardley has written of them: "During their tour their modesty, cheerfulness in face of a wretched summer, and eagerness to learn made them popular and their victory widely acclaimed." Their best bowler that year was Fazal Mahmood, who took 12 wickets for 99 in the final Test Match, and Hanif Mohammed made his debut as an attractive opening batsman.

In November 1962 Pakistan issued a set of five stamps publicising small industries. The 13p. stamp featured an array of sports equipment—football, tennis rackets, shuttle-cock, tennis ball and, inevitably, cricket bat, stumps, ball and gloves.

That remained the sorry score of cricket on stamps until December 1966 when Barbados issued a set of four stamps to celebrate Independence and chose as the subject of the 35c. stamp a picture of Gary Sobers straight-driving the ball for six.


FINAL SHAPE OF SPAT
TOP
C
D
E
REAR SPAT 1
REAR SPAT 2
TOP 1/8" SHEET
SPAT COVER
1/8" PLY TRAY FOR JETEX
SPAT TOP
REAR SPAT 1
SPAT COVER
REAR SPAT 2
1/8" SHEET FIN
TOP
SIDE
C
D
E
1/4" X 1/8"
AXLE
REAR WHEEL
JETEX TRAY

AIR NEWS

by John W. R. Taylor

From 504 to Jaguar

THE R.A.F. celebrates its fiftieth birthday this month. Whether there is, in fact, anything to celebrate, following cancellation of the contracts for most of its planned new combat aircraft is debatable; but nobody can deny that Britain owes a tremendous debt to the Royal Air Force for what it has achieved in its first half-century.

Victory in the Battle of Britain was the turning point of World War II, and the strength of the V-bomber force has played a major part in preventing a third world war. Most people forget, however, that not all the achievements of the R.A.F. have been strictly military. In the 1920s it opened up an air mail service between Cairo and Baghdad, across the Syrian desert; this was operated so efficiently that Imperial Airways were able to take it over in 1926 as the first stage of the great network of air routes that eventually linked Britain with every corner of the world.

It is not too much to say that the R.A.F. and its predecessor, the Royal Flying Corps, also taught the world to fly. Up to 1916, pupil pilots were trained never to get into trouble while flying. As a result, if they did so, perhaps in the heat of a dog-fight over France, they were often not certain what they should do.

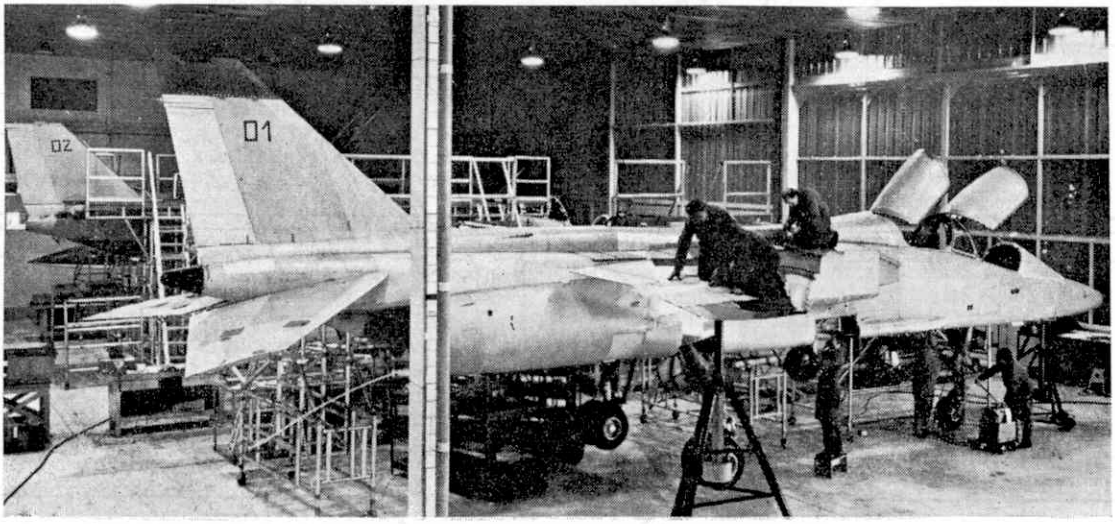
A pilot named Robert Smith-Barry told the authorities that the whole training system was wrong and offered to put it right. Somewhat surprisingly, his advice was taken. He was allowed to set up a School of Special Flying at Gosport, in Hampshire, at which to try out his ideas on R.F.C. flying instructors. The aircraft he chose for the job was the Avro 504J, and soon the area around Gosport began to appear unsafe for anyone, in the air or on the ground.

Motorists driving peacefully along the main road sometimes heard the sudden roar of a 504's 100 h.p. Gnome Monosoupape rotary engine overhead, followed by a dark shape which just missed their bonnet, touched its wheels briefly on the road immediately in front and then climbed away. Smith-Barry's axiom was that nothing a pilot could do in the air was dangerous if he knew what he was doing and what the result would be. To the astonishment of everyone but himself, the accident rate fell sharply. What is more, British military pilots began to enjoy their flying as never before.

The School of Special Flying proved the 504 to be the finest training aircraft in the world, and it remained in use, in various forms with different engines, right up to 1933. Among the pupils who gained their "wings" in it were King George VI (as Prince Albert) and most of the great R.A.F. leaders of World War II.

The techniques pioneered by Smith-Barry were never forgotten and the flying training manual of the post-World War I R.A.F. was based largely on his *Notes on Teaching Flying*. It might seem amusing to read now that "in taking off, the object is to get flying speed before leaving the ground"; but in those days many airfields were so rough that aircraft often hit a bump and leaped into the air regardless of airspeed. If the joystick was held back the moment the machine left the ground, it was pointed out that she would start climbing, which was (and still is!) "a bad thing."

Pilots from all over the world came to Britain to benefit from the finest training available anywhere. In particular, men came from more than 40 foreign air forces to train as instructors on 504's at the R.A.F.'s Central Flying School. They learned also something of what the late Lord Trenchard, founder of the R.A.F., called "the air force spirit," for at least one C.F.S. instructor of the mid-twenties had a habit of stepping out on to the wing, walking along to the tip and then sitting down to read a neatly folded newspaper, while his



pal flew the aircraft. Pilots from the nearby basic flying school at Netheravon, upon their first flight, are said almost to have had a heart attack on sighting this ghastly apparition.

One of the last great duties performed by the 504, still at the C.F.S., was to give the first-ever instruction in blind-flying "on instruments." This was done by letting pupils fly the aircraft with a canvas hood over the cockpit, so that they could see only their instrument panel. One of the instructors became so adept that he was able to take off solo under the hood, climb in an orbit, perform a couple of aerobatic manoeuvres, including a spin, and then glide down to 200 ft. before opening the hood and landing without restarting his engine.

Top speed of the 504N, last of the series, was 100 m.p.h. Today the R.A.F. is looking forward to the day when it will receive the first of its Anglo-French Jaguar strike and training aircraft, which will have a speed of well over 1,000 m.p.h. at height. Only one thing will not have changed—the quality of R.A.F. training which has made its pilots the finest in the world for 50 years.

Farewell to the Hastings

The Handley Page Hastings recently retired from service with R.A.F. Air Support Command (formerly Transport Command) after nearly 20 years' operation all over the world. In that time, Hastings squadrons have logged more than 155 million miles and carried nearly $1\frac{1}{4}$ million passengers, as well as 180,000 tons of cargo.

Above, the Handley Page Hastings, for many years a familiar sight in R.A.F. markings all over the western world, wherever the R.A.F. serve, is now retired from active service in the Air Support Command after nearly 20 years of operation. The Hastings made history by flying 55,000 tons of coal and other supplies into the besieged city of Berlin in 1948.

At left, the first two prototypes of the Jaguar, produced jointly by the British Aircraft Corporation and Breguet Aviation (France), near completion at the Breguet Aviation factory at Villacoublay on the outskirts of Paris. The first aircraft is almost complete and will fly for the first time this spring.

At right, the Avro 504 Flight Trainer is seen here being taken off blind by a student flying solo in the rear hooded cockpit. This aircraft trained the backbone of the R.A.F., as we know it today.

First big job done by the Hastings, when it entered service in October 1948, was to fly coal into Berlin during the great Air Lift. Altogether, aircraft of this type made 9,698 flights into the besieged city, carrying 55,000 tons of coal and other supplies, before the operation ended. The Hastings played its part later in every campaign from Kenya, during the Mau-Mau troubles, to Malaya and Suez. Between times it carried millions of sandbags to Britain from the continent, after the disastrous floods of 1953, and even operated in the Arctic Circle in support of the British North Greenland Expedition.

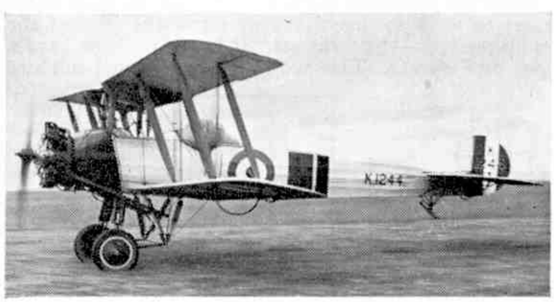
A total of 146 Hastings transports were delivered to the R.A.F. With their retirement, all tactical and strategic transport squadrons now fly jet or turboprop aircraft.

Big chopper

When a new drugstore was opened in Hurst, Texas, Mayor Russell Johnson cut the ribbon with giant 8 ft. shears attached to the hovering helicopter in which he was travelling.

Keep your hair on

Turbine engines have a habit of sucking in all debris within range and suffering damage in consequence. When, therefore, a ground crewman of New York Airways, saw something blowing away from a group of passengers boarding a Boeing-Vertol 107 helicopter, he promptly stamped on it . . . and flattened an expensive wig belonging to a very embarrassed lady.



SIMPLE RADIO RECEIVER UNIT

Anyone can construct this working radio set using a balsa base and pin terminals.

Meccano Magazine secretary Ann Logan " tunes-in " to B.B.C. 1 for a spot of relaxation in the office with the finished simple radio receiver. Note the aerial and earth leads; also, earphone.

YOU THINK building a working radio receiver can be tricky? Well, it is not, using a special *easy* form of assembly developed for this *Meccano Magazine* design. It's even simpler than ordinary model building, and the only skill you need to have is the ability to use a soldering iron. You don't have to be an expert at soldering, either.

Figure 1 shows the circuit diagram of our receiver. Unless you are familiar with electronic component symbols and " reading " circuit diagrams. Forget the circuit diagram entirely. That's quite all right. You do not *need* it to build this set, although it can be useful for *checking* the complete set once you have made it. In fact, if you do this it will *teach* you how to " read " a circuit diagram and you will find it is quite easy to understand. However, as we have just said, don't bother any more with Diagram 1 until the set has been completely assembled.

Let's start with the components list. These are items which you must buy—and also a list of tools and other materials which you need to have. Make sure that you have everything required before you start. You can buy the *radio* parts from most radio suppliers. They are all standard and readily obtainable components.

Start by cutting a piece of 3 in. × ¼ in. hard balsa sheet to an 8 in. length. This forms the base of the radio receiver—the " chassis " if you like. Now have a look at *Figure 2*. This shows the balsa panel full size with a number of circles drawn on it. These circles represent positions for pushing in 1 in. long (¾ in. will do) brass or copper pins (or nails). Make a tracing of this diagram and transfer the circles carefully onto the balsa sheet. Then push all the pins in position. Note that pins A and W are pushed into the end of the panel. All the other pins are pushed into the face of the panel to a depth of nearly ¼ in. That is to say, each pin B to V, inclusive, stands up at right angles to the panel and protruding just a little more than ¾ in. above the balsa. Try to get all the pins more or less the same height.

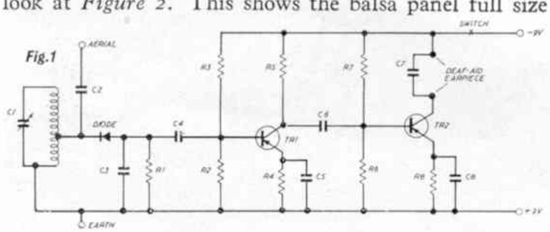
Now refer to *Figure 3*. Take some ordinary 15 amp fuse wire and join the following pins (as shown on the diagram), just winding the fuse wire around each pin. Join pin A to pin B; join pins F, G, H and J; join pins P, Q, R, S, T, U, V and W.

The next stage is shown in *Figure 4*. Taking your tuning capacitor (component C1), mount it in the position shown. The size and shape of this capacitor may vary somewhat from different suppliers, also the method of mounting. If it has a screw for mounting, drill a hole in the balsa panel to match. Secure the capacitor in place with a nut, screwing this down tight below the back surface of the balsa. Then cut off any surplus length of screw with a hacksaw blade. If the capacitor has no mounting bolt, then you can simply *glue* it to the panel with a dab of Araldite.

Once mounted on the panel, connect one tag of the capacitor to pin V, as shown, again using 15 amp fuse wire. *Solder* the wire both to the capacitor tag and pin V.

Now we have to sort out all the resistors. You will have ordered them according to the values required, but these values will not be marked on the resistors themselves. They will all look very much the same, except that they will have different coloured bands around them—see *Figure 5*. These bands are a colour code, by which the resistor values can be determined.

The colour of the first ring (nearest to the end) gives the first figure of the resistance value; the colour of the second ring the second figure; and the colour of the third ring the number of noughts to be put after the first two figures. If you want to work it out, this is what the various colours mean:



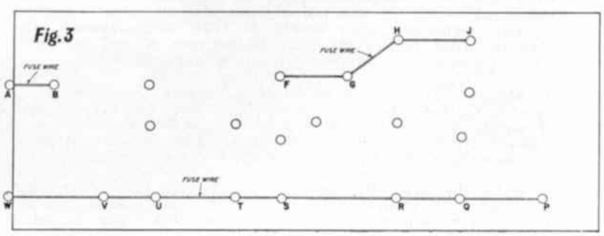
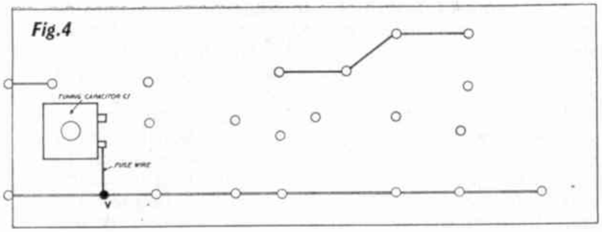


Fig.4



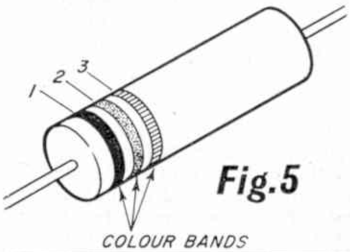
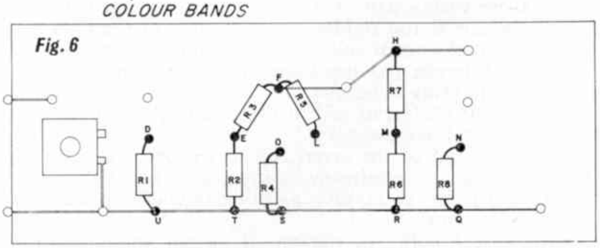


Fig.5

Figure 2 at right is drawn full-size for ease of constructing the ¼ in. sheet balsa baseboard. The colour code used for resistors is standard for all electrical work and the table below may be taken as an all-time reference.

Fig. 6



COLOUR CODE:

Black—0 (or 0 noughts)	Green—5 (or 5 noughts)
Brown—1 (or 1 nought)	Blue—6 (or 6 noughts)
Red—2 (or 2 noughts)	Violet—7 (or 7 noughts)
Orange—3 (or 3 noughts)	Grey—8 (or 8 noughts)
Yellow—4 (or 4 noughts)	White—9 (or 9 noughts)

Just as a check—or in case you have difficulty working it out—here are the various colours for the resistors in the set:

Resistor	1st ring	2nd ring	3rd ring
R1	Yellow	Violet	Orange
R2	Yellow	Violet	Red
R3	Red	Red	Orange
R4	Red	Violet	Red
R5	Red	Red	Orange
R6	Brown	Black	Orange
R7	Red	Red	Orange
R8	Yellow	Violet	Red

Now refer to *Figure 6*. This shows the position in which the various resistors must be mounted. To mount, wind one lead of the resistor around one pin, cut off the surplus and solder in place. Repeat to complete the other connection to the other pin. Thus:

Connect R1 between pins D and U. R2—E and T. R3—E and F. R4—O and S. R5—F and L. R6—R and M. R7—M and H. R8—Q and N. This has now wired up the set with all the resistors.

Continued on following pages

Fig.7

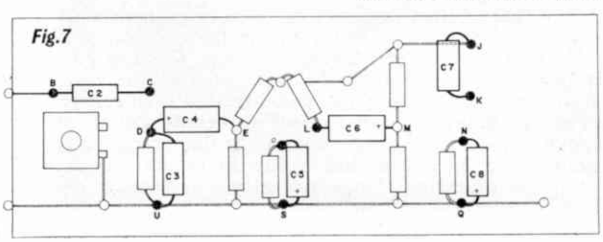
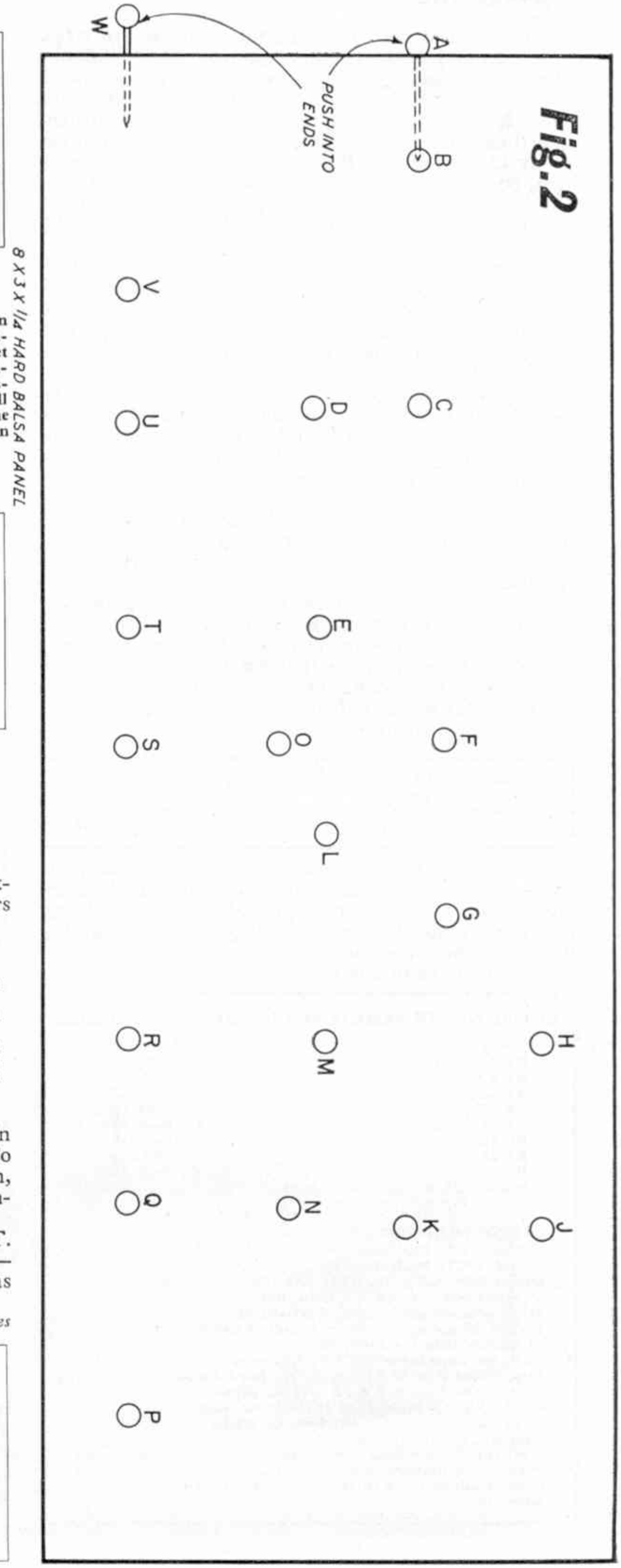


Fig.2



Now to deal with the capacitors. These are larger components than the resistors and may also be different shapes and sizes to those shown in *Figure 7*, depending on where you have bought them. Don't worry about this. It is the values of the capacitors which matter, and these will be marked on each capacitor so you can easily identify them. Proceed to mount them in position, one by one, just as you did with the resistors, i.e.: Connect capacitor C2 between pins B and C. C3—D and U. C4—D and E. C5—O and S. C6—L and M. C7—J and K. C8—N and Q.

There is one thing to watch, however. Capacitors C4, C5, C6 and C8 will probably have metal cases. These are electrolytic capacitors and *must* be connected the right way round. You will see a + sign marked on one end. Be sure that this agrees with the connections shown in *Figure 7*.

Now refer to *Figure 8*. The *diode* is mounted between pins C and D. The diode will have one end coloured red. This is the positive end, which should be connected to pin C. Unlike the electrolytic capacitors, though, it does not really matter if you get the diode the wrong way round.

With the two transistors (TR1 and TR2) it is *most important* that you connect them up exactly as shown. If not, the set cannot work, and you may well ruin the transistors in the process.

The transistors have three thin wires emerging from their base. Near one lead is a white or coloured spot or mark. This indicates the *collector* (C) wire. Next wire in line will be the Base (B) and farthest away from the collector the Emitter (E). As a further check, the B wire will be nearer to E than C.

Check these connections carefully:

Transistor TR1	Transistor TR2
C wire to pin L	C wire to pin K
B wire to pin E	B wire to pin M
E wire to pin O	E wire to pin N

When connecting the transistor leads, leave the wires long—at least 1 in.—and hold with pliers when soldering in place. This will prevent heat from the soldering iron being conducted up the leads and possibly causing damage to the transistor.

We now have to make the aerial coil—see *Figure 9*.

COMPONENTS REQUIRED TO CONSTRUCT RADIO

Resistors	Capacitors
R1 47 kilohm	C1 500 pF
R2 4.7 ,,	C2 220 pF
R3 22 ,,	C3 .001 mF
R4 2.7 ,,	C4 8mF/15 v.
R5 22 ,,	C5 8mF/15 v.
R6 10 ,,	C6 8mF/15 v.
R7 22 ,,	C7 .005 mF
R8 4.7 ,,	C8 8mF/15 v.

Note: C1 is Jackson miniature plastic with spindle for tuning knob.

DIODE TRANSISTORS
TR1 OC71 Mullard.
TR2 OC71 Mullard. PP3 battery.
Diode GEC G5 x 34, BTH CG 10E or equivalent.
4 inches Ferrite rod x 5/16 in. dia.
High impedance crystal deaf-aid earpiece.
1 yard 38 s.w.g. silk or enamelled copper wire.
12 inches thin insulated flex.
Push on connector for PP3 battery.
One sheet 8 in. x 3 in. x 1/4 in. hard balsa.
One sheet 8 in. x 3 in. x 1/16 in. plywood.
One strip 1/4 in. x 1 in. 36 in. hard balsa.
24 brass or copper pins: 1 in. or 3/4 in.
Approx. 24 in. 15-amp fuse wire.

Note: All resistors and capacitors must be of the modern miniature type. Contact the electrical component advertisers in this issue for the supply of components.

Take a 3 to 4 in. length of 1 in. wide gumstrip, moisten and wrap round the ferrite rod gum side out to form a sleeve which can be slid up and down the rod. Let this dry before attempting to wind the coil onto this paper sleeve.

The coil is wound from 38 s.w.g. double silk covered wire—you will only need a yard or so. Starting about ¼ in. in from one end of the paper sleeve wind on 16 full turns. Take a loop in the wire, twisting to secure, and then wind on a further 34 turns to complete the coil. In other words, you have wound on a 50-turn coil with a tapping point at 16 turns. Secure the loose ends of the coil with a dab of sealing wax or cement. Leave 4 or 5 in. of wire at each end of the coil for connections. Bare the loop of wire and solder on a 5 in. length of wire for the tapping point connection. This completes the coil assembly.

The ferrite rod with coil mounted on it should now be mounted on the balsa panel, as shown in *Figure 10*. A very easy way of doing this is to cement two small pieces of ⅛ in. thick balsa to the base panel to support each end of the ferrite rod and then secure the ferrite rod to these with a dab of Araldite. It is important to mount the ferrite rod rigidly, but also clear of the base panel so that the aerial coil can be slid along its length.

Once the ferrite rod has been mounted, connect up the aerial coil leads as follows:

One end of the aerial coil to the free tag on capacitor C1 (the tuning capacitor).

The other end of the aerial coil to the other tag on the tuning capacitor (already connected to pin V).

The lead from the *tapping point* on the aerial coil is connected to pin C.

Still with *Figure 10*, the on-off switch should be mounted on the top right of the panel adjacent to the edge, as shown. Again a very easy method of mounting is to glue in place with Araldite. Switch connections can then be completed with any *insulated* wire as follows: One of the switch tags to pin J. The other tag to the *negative* terminal of a press-on fitting for a PP3 battery, again using *insulated* wire.

The other battery lead can also be fitted, once again using insulated wire. This is from pin P to the *positive* terminal of the press-on fitting for the PP3 battery.

Figure 11 shows the battery in position and also the connections for the high impedance deaf-aid earpiece—one lead to pin J and the other lead to pin K. This completes all the wiring up but, before switching on, *check all the connections right through* in case you have not connected some of the components to their proper pins. You can use *Figure 10* for a check through, but it is better to use the circuit diagram *Figure 1* and trace the complete circuit through. The finished set will give you a "picture" which will now make sense compared with the theoretical circuit diagram and you should have no trouble in relating the two.

Figure 11 also shows the edging strips of 1 in. × ¼ in. balsa strip which can now be cemented to the bottom panel. On the upper side strip you will have to cut notches to clear the switch and also pass the deaf-aid leads through.

Now cut a panel 8 in. × 3 in. from 1/16 in. mahogany ply for a face panel. Drill a hole in the right place so that the spindle of the tuning capacitor (C1) can pass through and then secure the face panel to the main assembly with a small plated woodscrew at each corner, as shown in *Figure 12*. Cut off any excess length of spindle on the tuning capacitor and fit the tuning knob. Your set is now complete, ready to switch on and adjust, as necessary. For *initial* setting up, remove the

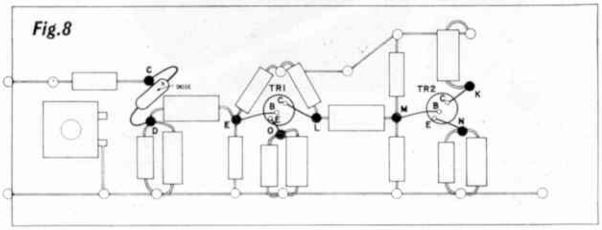
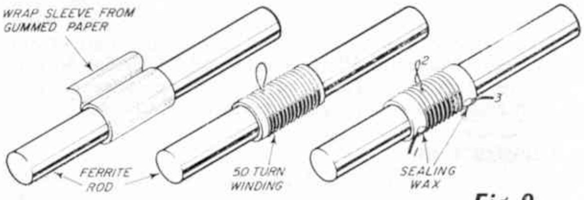


Fig. 8



AERIAL COIL WINDING

(1)—START (2)—TAPPING POINT AT 16 TURNS (3)—END OF COIL

Fig. 9

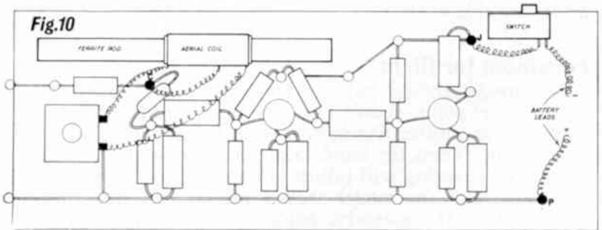


Fig. 10

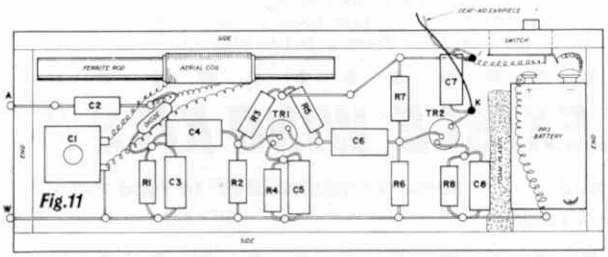


Fig. 11

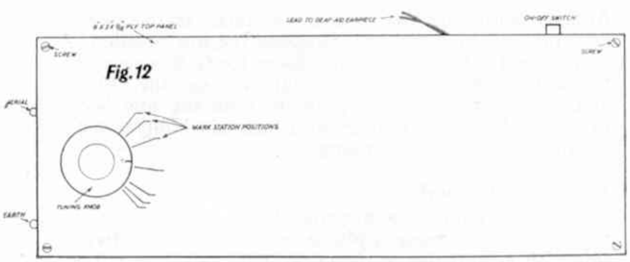


Fig. 12

screws holding the face panel in position as you may need to adjust the aerial coil position or even alter one or two connections.

Tuning and setting up

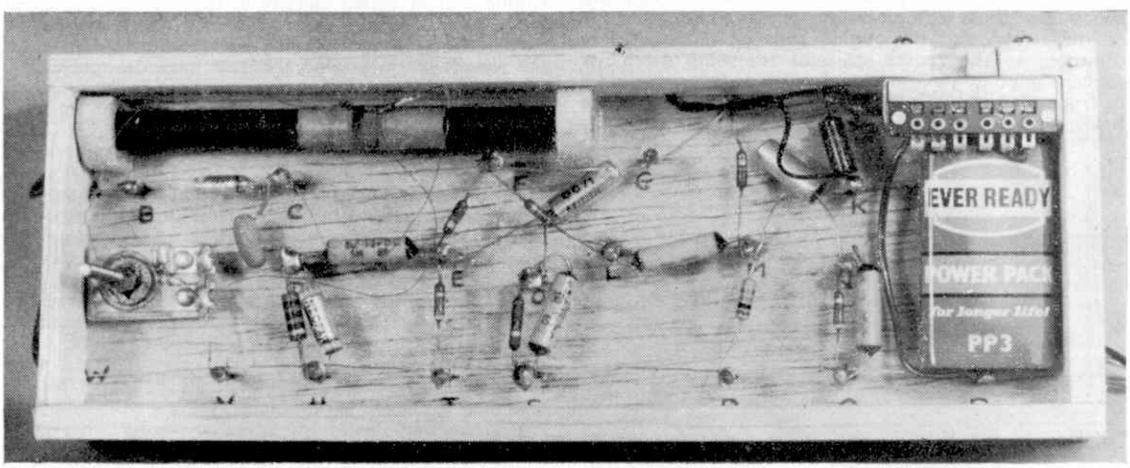
Turn the tuning capacitor clockwise as far as it will go, then turn back half a turn. Switch on the set and slide the aerial coil backwards and forwards along the ferrite rod until the B.B.C. Third Programme can be heard. Then fit the aerial coil in position with a dab of wax or sealing wax.

You should now be able to tune in to various other stations in the medium wave band. The names of the stations as they are identified can be marked on the face panel. If stations cannot be tuned in at the end of the medium wave band—e.g. Radio Luxembourg—turn the tuning capacitor to its limit at the appropriate end, back off a little and then readjust the position of the aerial coil on the ferrite rod to bring in the station.

Note that the set is directional, i.e. the signal strength will vary as the set is turned around, altering the aerial position relative to the station. You can use this characteristic as a volume control.

Good reception of several stations should be obtained without an external aerial. However, fitting of an external aerial will considerably improve both the volume and the number of stations which can be received (and also make the set less or even non-directional). The aerial should be a long length of wire soldered to pin A, taken up as high as possible (e.g. into the loft) and then along as far as possible horizontally (preferably in an East-West direction).

Further improvement in reception may be achieved by connecting terminal W to a good earth, such as a water pipe, but this may not be necessary at all. In other cases, where neither an external aerial nor external aerial and earth connections produce good reception, better results can often be achieved by connecting the external aerial to the *earth* pin.



WHY NOT BUILD A FLEXIBLE WING KITE?

A simple balsa model with kite/glider action, based on the same principles used to land space capsules and rockets

HERE'S A model with a difference which you can build as a glider, or a power model—or even fly like a kite. In fact, it looks more like a kite than anything else, yet it makes a very stable free-flight model. One other advantage, it takes very little materials or time to make the model.

You will need to scale up the plan full size on a sheet of paper about 18 in. × 15 in. to build the wing properly (or you can obtain a full-size plan from **Meccano Magazine Plans Service, 13-35 Bridge Street, Hemel Hempstead, Herts, price 2s. 6d. post free**). The plan as reproduced here is exactly one-half size.

Construction

Start by cutting out a piece of cellophane sheet to the dashed line outline shown on the plan. You can use clear or coloured cellophane, the latter giving a more interesting looking model.

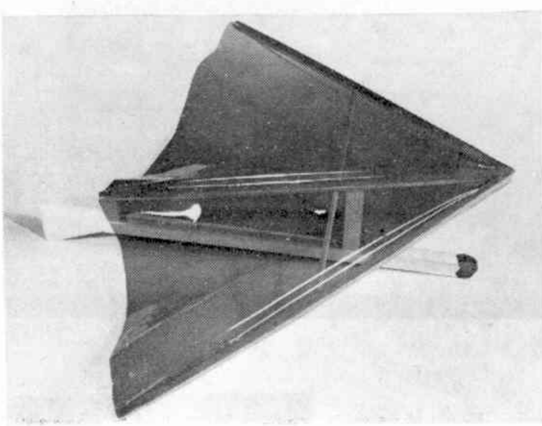
Now cut the two leading edge spars to length and trim off one end of each at the angle shown on the plan (50 deg.). Also cut the centre spar exactly $12\frac{1}{2}$ in. long. All three spars are cut from $\frac{1}{4} \times \frac{3}{16}$ in. hard balsa.

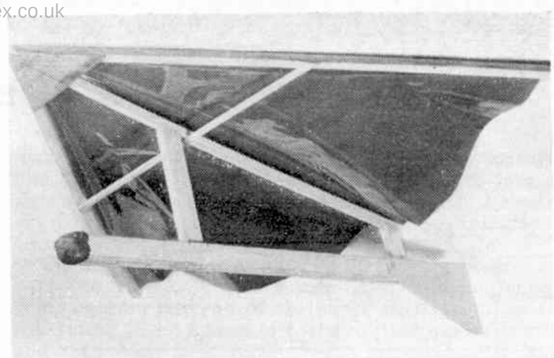
Lay the cut-out cellophane shape carefully in position over the plan and pin the two leading edge spars down over the *first* position as shown on the plan. Make sure that the cellophane is stretched out taut without wrinkles. Coat one face of the centre spar with cement, lay down in position on the cellophane and hold this in place with a few pins. Now cement the overlapping strip of cellophane in front of each leading edge and smooth round the leading edge so that it is stuck in place. All three spars are now stuck to the cellophane panel.

Leave the centre spar still pinned down, but remove the pins holding the two leading edges down. Move these leading edges to the *second position* shown on the plan and pin down again in this position. This will, of course, cause the cellophane to slacken and wrinkle, but ignore this.

Cut the nose cap from $\frac{1}{16}$ in. ply to the shape shown and cement in place. Cut and cement the $\frac{3}{16}$ in. × $\frac{1}{8}$ in. spruce spreader in position and leave the assembly to set. Do not remove from the plan until this assembly has set quite rigid.

Cut the two $11\frac{1}{4} \times \frac{1}{2} \times \frac{1}{8}$ balsa side pieces, also the two struts from $\frac{1}{2} \times \frac{1}{4}$ balsa. The side view drawing shows how these side pieces are cemented on each side of the struts, and the angled ends of the struts are cemented to the centre spare of the wing assembly. Cement another piece of $\frac{1}{2} \times \frac{1}{4}$ balsa between the sides in front of the first strut to produce a solid nose to the fuselage. This about completes the glider model, ex-





cept for cutting the fin from $\frac{1}{16}$ sheet balsa and cementing to one side at the rear, as shown.

Trimming for flight

The model should balance level when supported at the balance point shown (i.e. on the spreader). Add plasticine or similar trimming weight to get the balance point right. Then try hand launching the model. The cellophane covering will billow out and fill as the model is released and the model should behave just like any other glider. If necessary, adjust the amount of trim weight to get the best possible glide.

The model can also be tow launched. The approximate position for the tow hook is shown on the plan. Bend the tow hook from a paper clip and bind to the fuselage with cellulose tape for a start. If the model does not tow properly, try adjusting the tow position—moving it farther back if the model tends to weave, or forwards if the model simply pulls to one side. Once you have found the best position, bind the tow hook permanently to the fuselage with thread, adding a coating of cement over the binding.

Power conversion

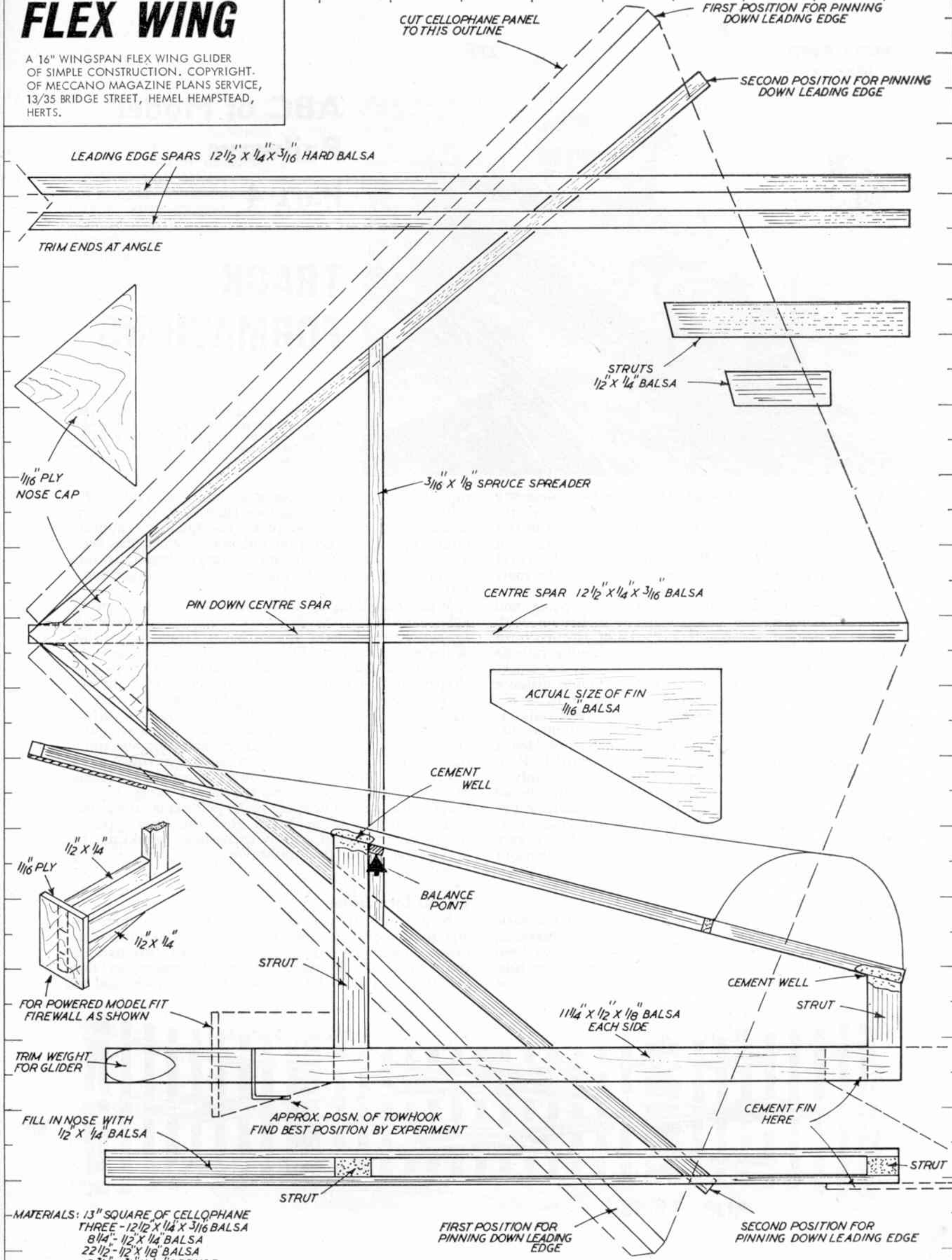
To convert into a power model, cut off the fuselage nose short and cement a ply firewall to the front. Brace this with $\frac{1}{2} \times \frac{1}{4}$ balsa as shown in the detail sketch. The engine is then bolted directly to the firewall, but check first that the balance point will come out right. Shorten or lengthen the nose, as necessary, to compensate for the weight of the engine and still have the model balancing on the spreader.

This size of flex wing is about right for an .010 engine. It is a little too small for safe flying with anything larger, so if you do want to use a bigger engine you should build a bigger flex wing. Build it in exactly the same way, but twice as big to suit an .049 engine. You can use the same spar sizes, but this time use spruce instead of balsa. You can also beef up the fuselage sides, if necessary—e.g., use $\frac{1}{2} \times \frac{1}{4}$ balsa instead of $\frac{1}{2} \times \frac{1}{8}$.

Thin polythene sheet rather than cellophane will be better on larger models. This cannot be cemented, so you will have to use a slightly different technique for sticking the polythene panel to the spars. Lay the spars down *first* this time with the polythene panel on top and then pin down to the plan. Using a soldering iron, rub along the line of the spars to "weld" the polythene to the balsa. This is quite easy to do, but do not use too much heat or you will melt the polythene. Then turn the wing over and complete welding the polythene overlap around the leading edges. Finally, pin down in the second position for cementing the nose cap and spreader in place.

FLEX WING

A 16" WINGSPAN FLEX WING GLIDER OF SIMPLE CONSTRUCTION.



MATERIALS: 13" SQUARE OF CELLOPHANE
THREE - 12 1/2" X 1/4" X 3/16" BALSA
8 1/4" - 1/2" X 1/4" BALSA
22 1/2" - 1/2" X 1/8" BALSA
8 3/4" - 3/8" X 1/8" SPRUCE
SCRAP PIECES 1/16" PLY & 1/16" BALSA SHEET

MEC 104

ABC of Model Railways Part 4

TRACK FORMATIONS

Left: In this picture, taken on the L.M. region of British Railways, a double-slip can be seen, partly hidden by the building in the foreground. At the foot of the page is the Peco Streamline double-slip for OO scale.

ALTHOUGH TRACKWORK is the basic necessity of any railway, a great many newcomers to the hobby find the terms used rather confusing, and in this article we hope to explain some of the mysteries of pointwork formations. We couldn't possibly cover everything in one short article, so there will be more to follow at a later date.

As mentioned in a previous article (" Scale and Gauge," January) the standard gauge in Britain, with the exception of Ireland, is 4 ft. 8½ in. Railwaymen always refer to the space between the running rails as the " four foot " and to the space between the tracks themselves as the " six foot." The minimum distance apart of two parallel tracks is, in fact, 6 ft. 6 in., measuring the distance between the two inside rails. It should be remembered that this is the minimum distance, and a little more clearance is usually provided if possible. On the Western Region of British Rail, parallel tracks are often very widely spaced; this is because the Great Western Railway was once broad gauge (7 ft. 0¼ in.) and conversion to standard gauge over 70 years ago entailed moving the innermost rails inwards to narrow the gauge; this resulted in a very wide " six foot," and accounts for the very spacious appearance of many Western Region stations.

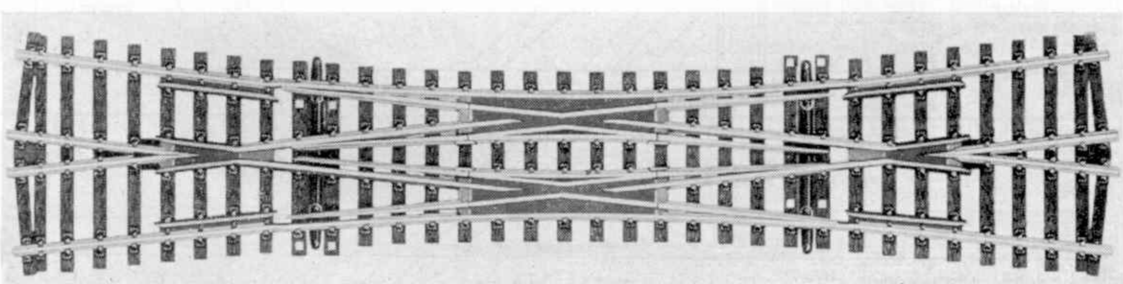
Improvements

Most railway enthusiasts will be aware of the basic construction of railway track; in recent years, however, great improvements in " permanent way " have been made, to give passengers a smoother and safer ride. The old style " bullhead " rail, held in cast chairs, is rapidly giving way to heavy-section " flat-bottomed " rail, welded in long continuous lengths, and very often carried upon concrete sleepers. The familiar " dum-de dum " sound of wheels on rail joints, which has been a feature of rail travel since railways began, is fast disappearing, greatly to the benefit of passenger comfort.

When travelling by train, many of you have probably marvelled at the extremely complicated pointwork formations used at the approaches to large stations like Waterloo or Euston. From the train, these appear to be a fantastically complicated jumble of rails and sleepers, almost impossible to " sort out " with the eye as the train speeds over them. Although this sort of trackwork *looks* complicated, it is really only a collection of individual points, which in themselves are quite simple. The basic point, which provides for one route turning off another, is known to railwaymen as a " turnout." Our diagram shows the component parts of an ordinary turnout, with the correct names for the various features. These are really self-explanatory, but it is important to remember that the term " frog," much used by model railway enthusiasts, would not be understood by a true railwayman; to him, it is a " crossing."

Useful formations

Now we shall look at some of the more common, and most useful, pointwork formations. The first diagram shows a facing crossover between two parallel main lines. It is called " facing " because, in this country, all trains run on the left-hand track, and in



this case, the crossing *faces* the train, which can run straight through on to the other track. Below it is shown a trailing crossover; in this case, in order to change tracks, the train must stop and *reverse* over the crossover. When designing a realistic model railway layout, it must always be borne in mind that, in actual railway practice, facing crossovers are avoided like the plague; they are only used when absolutely necessary, because it is always safer for trains to run at speed through trailing points, rather than facing ones. When planning pointwork for a layout, it is a good idea to remember that two left-hand turnouts make a trailing crossover, and two right-handers a facing one. In your railway is based on American practice, of course, you will run on the right, and the above rules will be reversed.

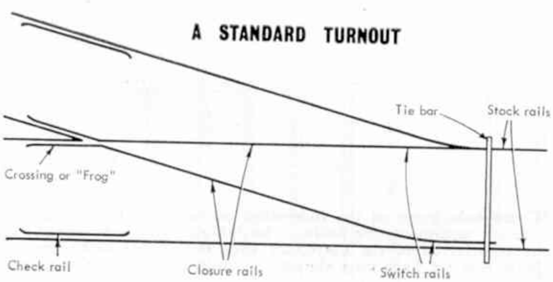
The third diagram shows a scissors crossover, which is really facing and trailing crossovers superimposed and incorporating a diamond crossing in the centre. This formation is not all that common, but can be very useful, particularly outside terminus stations, where it can give universal access to, and exit from, two platforms.

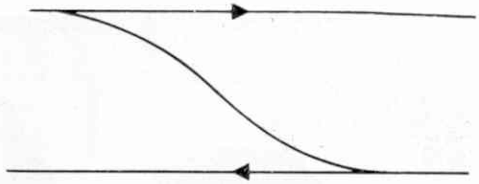
Diamond

Next we come to the simple diamond crossing, where one track simply crosses another, intersecting it, but providing no method for trains to change from one track to the other. Remember that this sort of formation is known as a crossing—*not* a crossover. A very useful development of the diamond crossing is the single slip, which is shown in the next diagram. Here, the " diamond " is interlaced with two turnouts, enabling a train to miss the " crossing " altogether. The advantages of the single slip are rather difficult to put into words, but a glance at the drawing should make things clear. The double slip is an even more useful piece of equipment, and is satisfyingly " complicated " to look at. We have included a photograph of a double slip from the Peco track range, and the picture is well worth studying. As you can see, the double slip really performs exactly the same duty as two ordinary turnouts placed back to back, but requires very much less space.

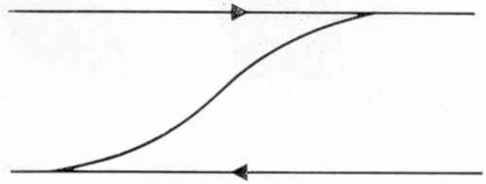
It is seldom possible for the manufacturers of model railway trackwork to build pointwork in *exactly* the same manner as the full-size article. Widths of wheel tyres, and depths of flanges on model rolling stock are usually over scale, and the radius of the curves over which we expect our model trains to run is really ridiculously sharp. If you have an oval of track, with curves of, say, 15 in. radius in OO scale, you are expecting to turn your express train round through 180 degrees in about the length of a football pitch. Because of this, most model trackwork is a compromise, and individual manufacturers often solve problems in their own way.

A STANDARD TURNOUT

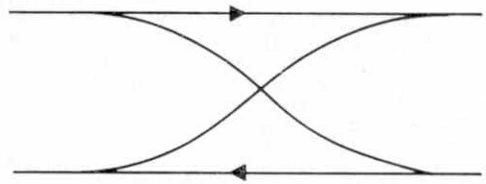




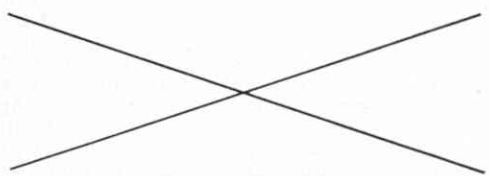
FACING CROSSOVER



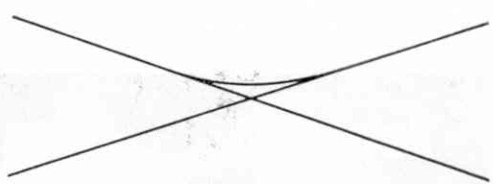
TRAILING CROSSOVER



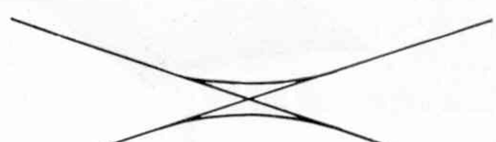
SCISSORS CROSSOVER



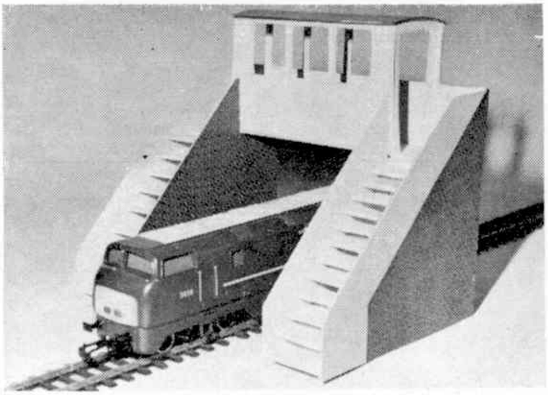
DIAMOND CROSSING



SINGLE SLIP



DOUBLE SLIP



00 Gauge Trackside Construction
BUILDING A PLASTIKARD FOOTBRIDGE

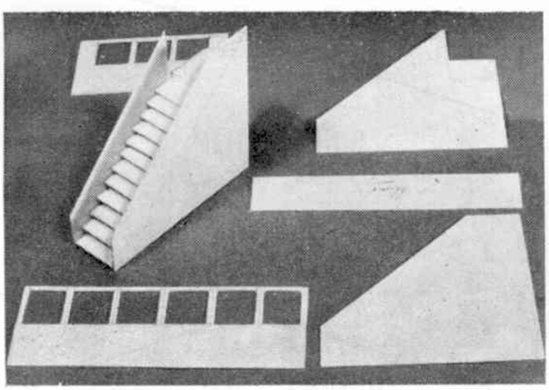
THIS MONTH'S trackside model follows much the same simple constructional methods as described in previous articles, with one important difference. Instead of using ordinary card or Bristol board, we have built our footbridge from Plastikard. This material, which is available from most good model stockists, is really styrene sheet. It looks very much like card, and is available in a large variety of thicknesses. Its advantages are its superb surface (absolutely smooth, and slightly shiny) and its terrific strength when assembled correctly. It can be cut, sawn, filed and drilled (and even turned, if you have a lathe) with great success, and all edges look nice and smooth, with none of the "furry" trouble associated with cardboard. The one important thing to remember is that, as its name suggests, it *is* plastic, so it is no use trying to stick it with conventional glues. A polystyrene cement of the sort used in plastic kit assembly *must* be used, or, far better, Mek-Pak. This latter is a fluid cement, made by Messrs. G. Slater who make Plastikard, and is a fantastic improvement on ordinary tube cement. Applied with a fine brush (keep one handy for cement only) the fluid is drawn into the join by capillary action, and a very neat "welded" joint results, without the surrounding area being affected and without those ghastly "cob-webs" which used to be an occupational hazard of plastic modelling.

Construction of the footbridge is very simple, and the full-size diagram opposite gives a good idea of its appearance, although the drawing is not meant to be a "working" one. Our footbridge has open staircases, built on solid "brick" bases, and a covered "bridge." Other permutations could include covered stairs, or all open construction. The length of the "bridge" part will depend entirely upon how many tracks you want your footbridge to span, so we have not suggested any dimension for this part. If more than three tracks are spanned, the bridge will probably need an additional support in the middle to prevent disaster.

The pictures show the basic construction, which is straightforward. Start by building the two staircases, and make the installation of the "bridge" section the last job. A tall "box" forms the basis of each staircase, to two sides of which are fixed the large triangular walls. These walls are tied together by the steps themselves, which are merely small pieces of thick ($\frac{1}{16}$ in.) Plastikard. You will notice that the steps have treads only, and no "risers"; this is quite common practice, and makes life easier for us.

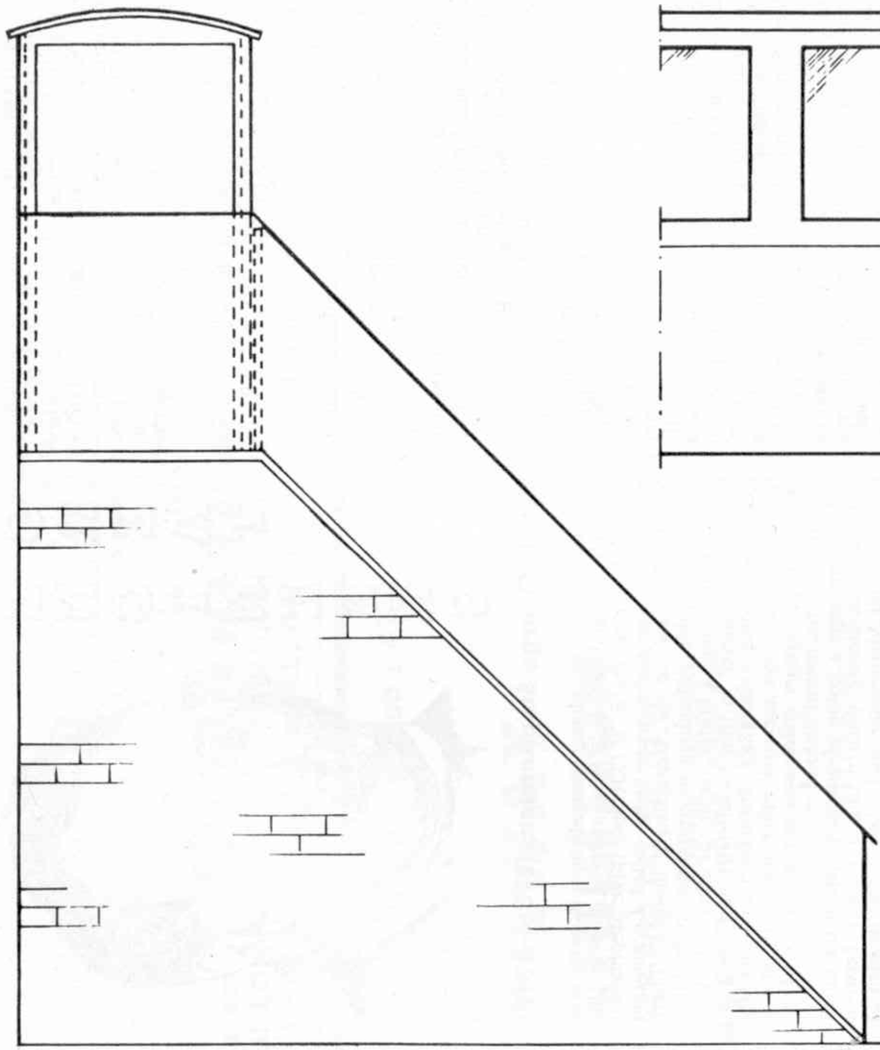
The side walls of the staircases can be covered with brick paper below the line shown on the diagram, and the "balustrade" can be painted to represent either wood or metal as you wish. The roof of the covered portion can be painted grey, to represent roofing felt, or covered with imitation "corrugated iron" sheets, from Slater's.

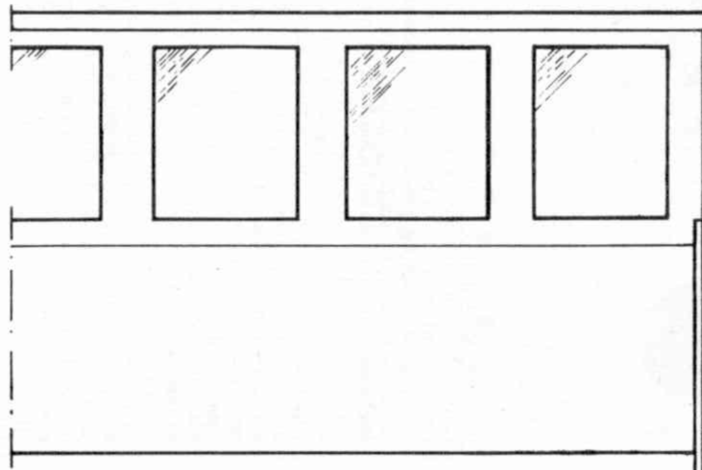
In the heading photo above, the completed single track span footbridge finished with brick paper, and matt enamel paint, looks extremely realistic with a Marklin "Majestic" diesel locomotive passing underneath it on Gem flexible railway track.

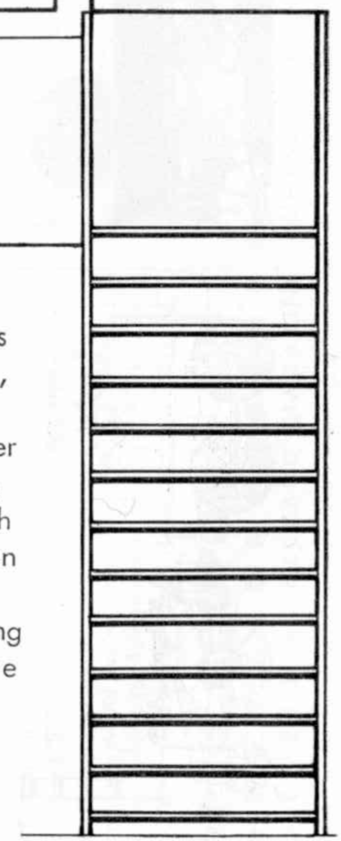


Component parts of the footbridge as cut from Plastikard with scissors and modelling knife. The full-size plan opposite should be transferred to the Plastikard with the use of carbon paper. Note that we have only shown one staircase in this photograph.

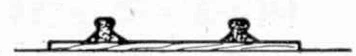
FULL SIZE PLAN FOR AN "OO" SCALE FOOTBRIDGE







This simple footbridge is made from sheet plastic, joined with plastic or fluid cement. Brickpaper may be added, painting the fluid cement through the paper. The final span of the footbridge is for you to decide, depending on how many tracks have to be spanned over.



GREAT ENGINEERS

No. 3. George Stephenson (1781—1848)

GEORGE STEPHENSON was born at Wylam, a Tyneside colliery village, of very humble parents. His father was a fireman in the local coal pit, and when the coal there became exhausted he moved his family to Dewsley Burn, where he obtained similar employment. George was one of six children, and so poor were the family that he received no formal education. But he was a bright lad and took a great interest in the mine engine and in making rudimentary models of it. These were the first signs of his inborn genius. At the age of 18 he commenced seriously lessons in reading and writing, and two or three years later was showing aptitude for the three "Rs."

About the age of 12 he took employment as a farm hand. His heart, however, was in industry and he became a coal "picker," or sorter, at the village colliery. It is not possible in an article of this length to detail his rise from "picker" to engine-wright to the Killingworth Pits in 1812, but that was his achievement.

Colliery explosions due to "fire-damp" were familiar to the mine owners and workers of Killingworth, and Stephenson gave considerable thought to this subject. The outcome was his safety lamp, which he first tried out by the simple hazardous method of trial and error in the gaseous workings of the colliery.

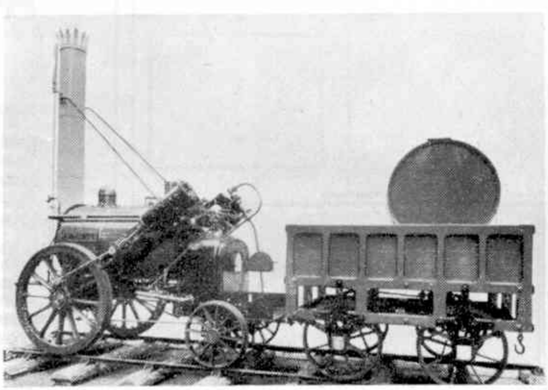
He became interested in steam traction as a convenient way of hauling coal. Various people had built steam-carriages long before this. There was Cugnot, probably the first, followed by Evans, Trevithick, Murdock and others. Hedley and Hackworth built an engine for the Wylam Colliery, but it was a failure. They followed this up with others which brought a little more success. One of their better locomotive became *Puffing Billy*. Stephenson persuaded his employers to allow him to build a locomotive for their waggon-way. In July 1814 his first engine, the *Blucher*, took the track. Before Stephenson finally left Killingworth he had built 16 engines for colliery lines about the district.

At this time Stephenson's spirit was very low and he saw no future for himself in England. He considered going to the New World and making a fresh start. Then out of the blue came an offer from the Hetton Colliery, Durham, to build locomotives and convert a track to suit. The distance involved was about eight miles, the work being completed in 1822. From that time he never looked back.

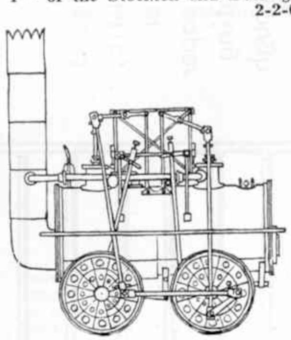
Edward Pease was the principal promoter of the Stockton and Darlington Railway, and when work was started on this project Stephenson was brought in. First he proposed to lay his and William Losh's design of rail, but eventually decided to use John Birkinshaw's rails. This led to a break between the co-inventors and resulted in the formation of Robert Stephenson and Company, the locomotive firm. Robert was George's son and we shall hear more of him in this series. Ultimately the S. & D.R. had three Stephenson engines, the first to be made being called *Locomotion No. 1*. Each was to the Stephensons' designs. There were considerable difficulties to overcome in building the track, including a bridge across the river Gaunless, but all was achieved in time to officially open the project on September 27th, 1827. Initially a coal-carrying railway, it was soon carrying other materials, and a caravan-like passenger coach was put in service. Possibly this was the first of its kind.

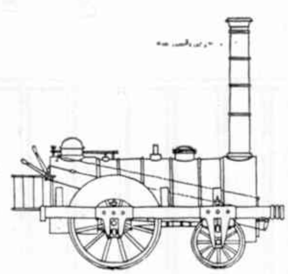
For some time a group of business men in the north had been considering constructing a railway between Liverpool and Manchester, and when it was decided to promote a bill in Parliament for powers to proceed with the project, Stephenson became the principal engineer. During making the preliminary survey of the route Stephenson and his helpers were much impeded by land owners, and sometimes surveying had to be done by moonlight. The bill promoted in Parliament for the railway wast lost and the project came to a stand-still. The whole scheme was modified and a second bill was successful. Stephenson had little to do with this, but he was retained as principal engineer and

Continued on page 199



On the left is the replica of Stephenson's Rocket at present in the Science Museum, London, by whose courtesy this photo is reproduced. Below, the two drawings show "Locomotion No. 1" of the Stockton and Darlington Railway and a Stephenson 2-2-0.





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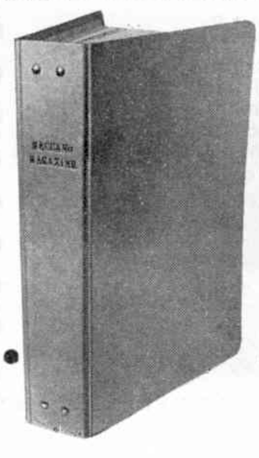

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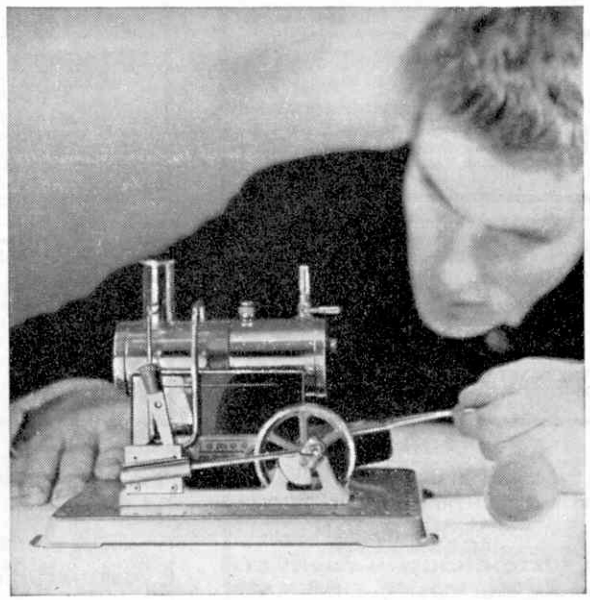

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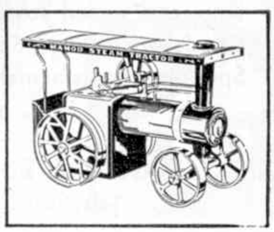

model shops who specialise in MECCANO spare parts

Listed below are some of the dealers who sell Meccano accessories and spare parts. This is intended to aid enthusiasts—and there are many of them—who constantly require additional spare parts for their sets. All dealers can, of course, order Meccano spare parts for their customers, but those listed here are among our spare part specialists.

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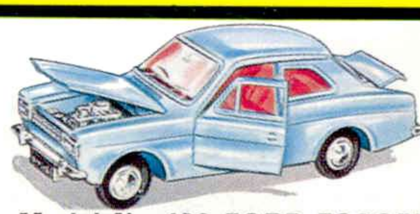

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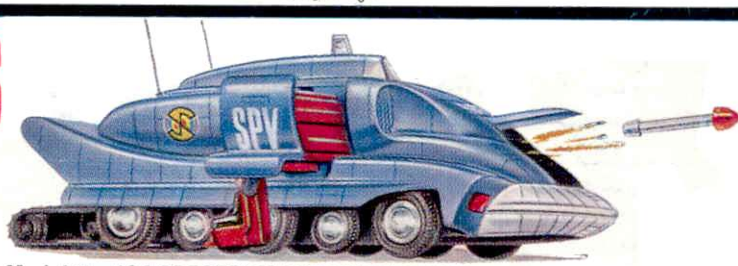

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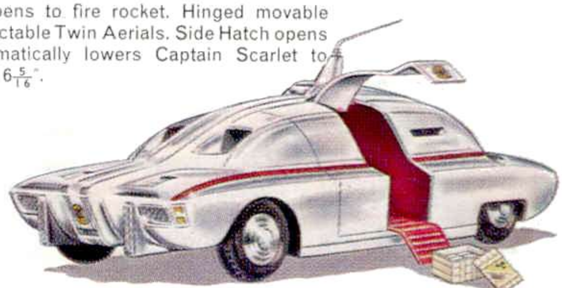

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