MECCANO Magazine

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MAP **HOBBY MAGAZINE**

ABC

CONTENTS

FRONT COVER

Passengers wait to board a "Bluebell Train" at Sheffield Park Station. *(Photo by Stephen Goodger)*

NEXT MONTH

Papermaking and the Road Research Laboratory are two of next month's features, while Meccano Models include a walking tractor (!) and a tracked lorry. Plus another full-size model plan, of course.

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and this would have to be phased over a few years. Repairs also have to be carried out to both the stations and alterations made to the track at Horsted Keynes to make it more suitable for terminal working.

At Sheffield Park Station there has been established a museum, which any visitor to the railway should not miss. Any member of the public can become a member of "The Bluebell Railway Preservation Society", and you should enquire at the stations or write to the Membership secretary at Sheffield Park Station, near Uckfield Sussex.

Thirteen trains are run in each direction on peak summer Sundays and Bank Holidays; on other Saturdays and Sundays nine. During the week, three or four, the same number on week-days and winter Saturdays and Sundays. A goods train will also operate as a attraction on some peak weekends.

The railway is operated by voluntary staff recruited from members of the Society, except for five full time staff, a General Manager, three staff to maintain the locomotives, and one the track; he used to carry out the same job on the same length of track when British Rail worked it. The drivers on the Bluebell line are all skilled men, some being retired, or ex-British Rail. Track and equipment are maintained at Ministry of Transport standards, and are subject to a Ministry inspection, like any other line.

Any visitor to the line will soon realise what inspired E. V. Lucus to write the following words. "My heart leaps up when I behold a single railway line, for then I know the countryside is almost wholly mine". And thanks to the band of enthusiasts in Sussex many people will be able to enjoy the experience of a journey by steam for many years to come.

Among the Model-Builders

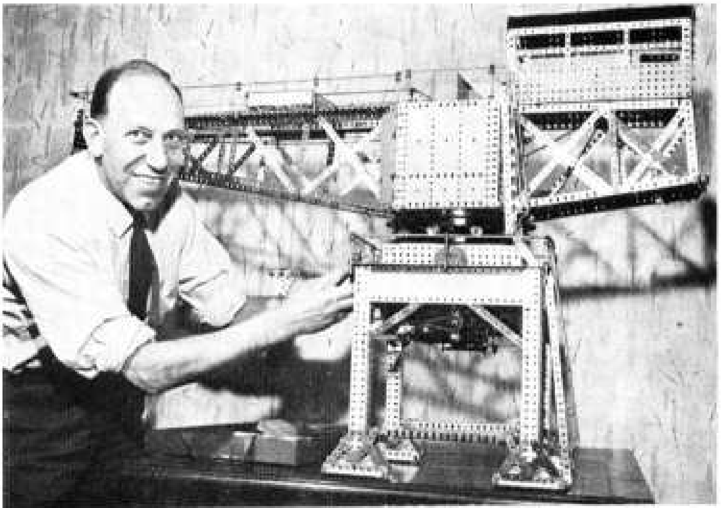
with 'Spanner'

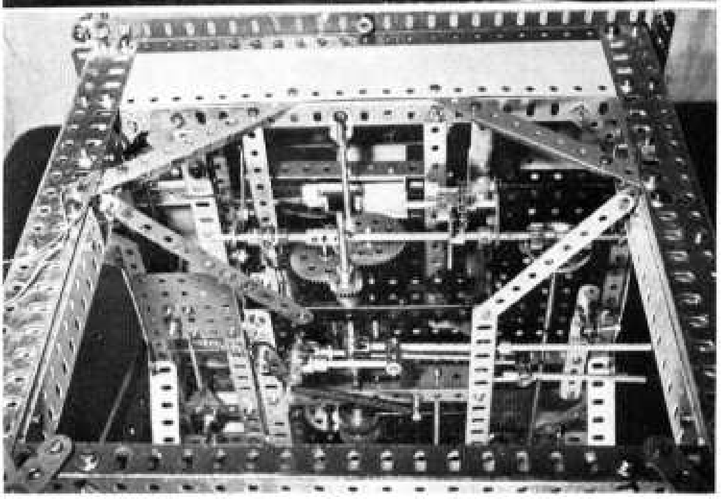
A Look at Hammerheads

LONG-STANDING (I nearly said ageing!) Meccano modellers will remember that most famous of all Meccano models—the Giant Block-setting, or "hammer head" Crane which was featured in a Super Model Leaflet published before the last World War. An artist's impression of a similar model was also illustrated on the front covers of Instructions Manuals and on the lids of Meccano Outfit boxes for many years, with the result that a Giant Hammerhead came to signify the ultimate dream of the Meccano enthusiast. It was the ambition of countless numbers of modellers to eventually collect enough parts together to "build the model on the cover".

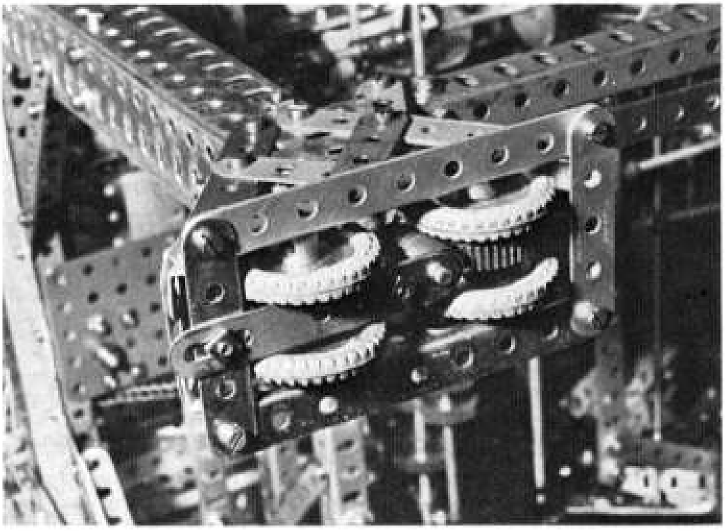
Unfortunately, the original Super Model Leaflet has been out of print now for 30 years and the cover picture was changed nearly 20 years ago, but plenty of modellers still carry their secret ambition with them—so much so that Leaflet No. 7 in the current series of No. 10 Set Leaflets is among the most requested instructional items available. This Leaflet also features a large Block-setting Crane, but one which is somewhat less complex than the original item. In the past year or two, however, this already high interest in hammerheads has risen even more, the reason undoubtedly being the introduction of the Large-toothed Quadrant, No. 167a, and its driving Pinion, No. 167c, in late 1970. It doesn't need me to tell you that these parts are ideal for large-scale models of the type in question and there hasn't been anything to compare with them since the discontinuation of the old Geared Roller Bearing with the last War.

Anyway, with the general interest in hammerheads in mind, I am taking the opportunity of featuring here three readers' models which





Top, Mr. Stan Evans of Bebington, Wirral, at work on his modified No. 10 Outfit hammerhead crane. Right, this close-up view, looking into the underside of the supporting tower, gives a good idea of the initial drive system and the control linkages included in Mr. Evans' model.



A close-up view of one of the model's "feet" showing the driven wheels. Note the use of a straightened-out Formed Slotted Strip, overlaid by a Fishplate, to obtain correct meshing between the Worm and 1 in. Gear.

have come to my attention in recent months. In my opinion they are top-quality constructions and even a glance at their photographs is enough to explain why such models have aroused ambitions in Meccano hearts for so long.

Wirral Wonder

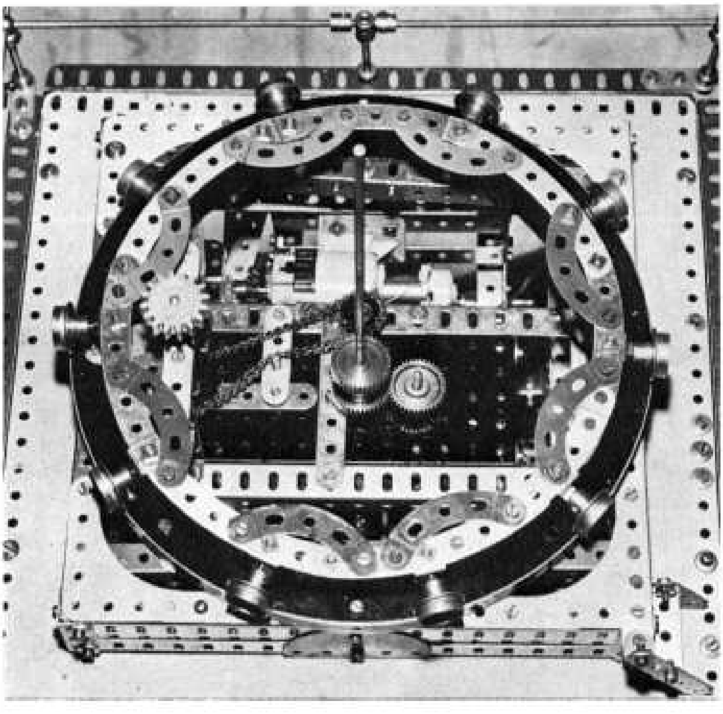
First in line is the wonderful work of Mr. Stan Evans of Bebington, on the Wirral Peninsula in Cheshire. As can be seen, I have covered it in considerable detail, this being possible, not because of favouritism, but simply because Bebington is in striking distance of the office. We went to see it and were able to take the accompanying photographs ourselves, thus making things easier all round. If the photographs are ours, however, the following concise notes are Mr. Evans' own work—and I must say I couldn't have put things better myself!

"The model", says Mr. Evans, "is based on the Block-setting Crane featured in current Model Leaflet No. 7, the principle differences being in the method of drive an control and in a more solid construction. In the Leaflet model, all controls are located in the boom, which clearly makes it rather awkward to operate, so I located all controls and drives in the supporting tower.

"The boom is mounted on ten ¾ in. Flanged Wheels running between two Flanged Rings, with the new large-toothed Quadrants sandwiched between them and another Flanged Ring. The wheel carrier is made up from eight 4 in. Curved Strips arranged in a circle with a diameter which clears the rings and large-toothed Pinion shaft. The stub axles are Threaded Pins fixed by Angle Brackets as tightly as possible.

"Drive to rotate the boom is taken to the inside of the Quadrants by Chain and Worm from the gearbox below, drive being engaged by Dog Clutch. In the centre of the tower is an 11½ in. Rod, mounted vertically, which centralises the boom and takes the drive to the Trolley. Free to rotate on this Rod is a Socket Coupling with 1 in. Gears fixed at each end. The lower 1 in. Gear meshes with another 1 in. Gear driven from the Gearbox, while the top 1 in. Gear meshes with a 1 in. Gear in the boom. This arrangement forms a planetary gear and provides two independent drives to the boom irrespective of its position, one drive controlling the load hook and the other the gantry trolley. The hook drum-drive is located in the rear of the cab and is driven by chain from a 1½ in. Contrate and 25-teeth Pinion on a vertical Rod offset from the centre Rod by the necessary three holes. The centre Rod takes the drive to the trolley by a 1½ in. Contrate and 19-teeth Pinion, thence by Chain and Cord along the boom.

"Drive to the vertical Rods in the centre is by ⅞ in. Bevels from the horizontal Rods, one end of each Rod having a 60-teeth Gear fitted.



A high view of Mr. Evans' model, with jib removed, looking down into the supporting tower. Note the simple planetary gear arrangement which takes two drives up to the jib.

These Rods are spaced three holes apart and the Gears are offset from each other. Three holes below is a sliding Rod with a 25-teeth Pinion which lies between the two 60-teeth Gears. Thus, on moving the gear lever, one or the other 60-teeth Gears is engaged. A reverse drive is included, this simply consisting of a Contrate and two 19-teeth Pinions.

"A brake is attached to the hook drive, this being automatically released and applied when the drive is engaged and disengaged."

"Construction of the boom is quite straightforward, although the tower is rather difficult because of lack of space to manipulate screwdriver and spanner. As with most hobbies, however, patience will result in success!"

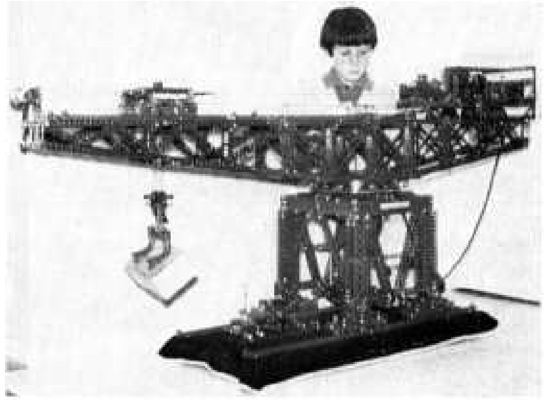
Having seen the model, I can confirm that patience certainly did meet with success! Congratulations, Stan.

Australian Giant

For our second hammerhead we jump the odd 11,000 miles or so to Australia where we find Mr. B. W. Pickersgill of Morphett Vale, South Australia. His outstanding model—pictured here with Cameron Theiley, a young enthusiast from Adelaide—is the classic Block-setting Crane featured in the pre-war Super Model Leaflet No. 4 and, as I have no information to the contrary, I am assuming it has been built to the original specifications. I think everybody will agree that the photo shows just how magnificent a model it is.

Mr. Pickersgill, by the way, is one of those valuable and much-appreciated modellers who greatly assist the hobby by placing their work before the eyes of the public. This particular model, for instance, was loaned to Messrs. Ponsford, Newman and Benson Limited, Australian Agents for Meccano, for display at a Hobbies Exhibition in a large Adelaide departmental store and I have no doubt that it attracted a great deal of deserving interest. I cannot stress strongly enough the tremendous value that publicity of this sort is to the hobby. It shows members of the public how much can be achieved with Meccano; it illustrates the amazing versatility of the medium and generally proves the excellence of what, after all, is a truly excellent system. Equally important, it shows that Meccano is as much alive today as it always has been and that Meccano model-building continues unabated as an active and rewarding hobby.

Perhaps the most famous of all advanced Meccano models—the Giant-Block setting Crane featured in pre-war Super Model Leaflet No. 4. This example was built by Mr. B. W. Pickersgill of Morphett Vale, South Australia and is pictured here with Cameron Theiley of Adelaide, Australia.



Teeside Topper

Pep talk over! Now for our third and final hammerhead which comes from Mr. J. B. Foster of Billingham on Teeside. As a study of the photograph will show, this also is based on the current Outfit 10 Leaflet No. 7, although, as Mr. Forster himself says, "My model is quite a lot different from the original in that I have used a lot more gears, etc. For instance, the original has only two travelling wheels that are driven by the Motor, whereas mine has eight, running on rails. The drive is taken from the tower by Bevel Gears, Pinions and Contrates to the bogie wheels.

"Furthermore", he says, "My model has a five-movement gearbox which provides drive for the following operations: travelling, slewing, bogie-travel and drive to a large pulley block, with block-setting tackle, and also to a small pulley block. This last is shown in the photograph holding an original, but now obsolete Channel Segment, Part No. 119".

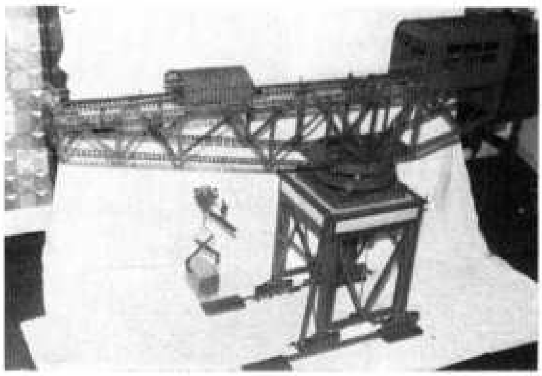
Mr. Forster also mentions that his model includes the new-Large-toothed Quadrants and in fact, I understand he built this particular model to try out the new parts on a subject that really fitted them. The model is undoubtedly an ideal test-bed for this purpose, as well as being a worthwile Meccano subject in its own right.

Meccano Club News

Before signing off, I would like to pop back to Australia for a moment to say "Hello" to the members of the Meccano Club attached to the White Hills Technical School, Bendigo, Victoria. Unfortunately, I do not have much information on the Club at the moment, but I understand from Club Leader Mr. Walter Ashburn that, with some 40 hard-working and enthusiastic members, it is an extremely active organisation indeed. The Club entered a float in the Bendigo Easter Procession and I hope to be able to include a photograph of this in a future issue. In the meantime I would like to welcome all members and offer best wishes on behalf, both of Meccano Magazine and Meccano (1971) Limited. You will find the hobby interesting and absorbing, gentlemen!

(Continued on page 344)

The work of Mr. J. B. Forster of Billingham, Teeside, this hammerhead is also based on current No. 10 Set Leaflet No. 7, but with a number of interesting modifications.



output of 175 B.H.P. at 2,200 r.p.m. Drive is to the rear wheels through a 4-speed "pneumo-cyclic" (something to do with air!) gearbox which is independently mounted on the chassis, i.e., not secured directly to the engine.

British Leyland are perhaps best known in this country for the cars they produce, but they are also among the world's finest manufacturers of "heavy" vehicles. Thus, with a combination of a Duple-built coach on a Leyland chassis, the Viceroy 37 represents the best of both worlds!

Helicopter Kit

Released with the Dinky Viceroy is No. 1040 Sea King Helicopter Kit—the latest in the Dinky Kit series of build-them-yourself Dinky Toys. This, of course, is the standard Dinky Sea King Helicopter, only in kit form with .he parts unpainted, although they are specially treated ready for painting. All the components required to build up into the helicopter are included, together with the electric motor for driving the main rotor, all the aircraft marking transfers and even a sample phial of paint. No adhesive is required and the model can be assembled and taken apart again as often as you like. When built and painted it is a real metal Dinky Toy, just like the ready-made model, although the little Apollo capsule sold with the finished Dinky is not included in the Kit. A very good buy!

POCKET MECCANO

Grand "Make a Model" Contest for 1972

FOLLOWING the fantastic success of last year's Pocket Meccano competition, Meccano (1971) Limited are repeating the contest this year—and it's now open for entries! Three fabulous Raleigh bikes are being offered as the major prizes, with 30 No. 5 Meccano Sets going to the runners-up, so there are plenty of prizes to be won. Now is the time to start building.

As existing Set owners will know, Pocket Meccano is a small, but complete "miniature "Meccano Set which contains a carefully-chosen selection of standard Meccano parts. Although comparatively few in number, however, these parts can be used to build an amazing variety of fascinating little models and, equally important, the models can be built almost anywhere in any spare moment because the Set is small enough to be easily carried in a jacket pocket. Plans for 25 suggested models are included with each Set, but these represent only a tiny number of possibilities—more than 750 models were entered in the last competition! (Some examples appear elsewhere in this issue.)

Conditions of Entry

The competition is open only to U.K. residents who buy a 39p Pocket Meccano Set during the competition period and who are aged 15 or under on the competition closing date. Special Entry Forms for the competition are available from all Meccano dealers and each individual entry *must* be accompanied by a correctly completed Entry Form. This Form *must* be signed or stamped by the dealer from whom the Pocket Meccano Set has been purchased to prove that the purchase has in fact been made. All entries submitted automatically become the copyright of Meccano (1971) Ltd., although appropriate entries will be returned in due course if accompanied by a Stamped Addressed Envelope. Families of Meccano (1971) Ltd. employees and of the Company's Advertising Agents are not eligible for entry.

How to Enter

For this competition, the prospective entrant must build a model *to his (or her) own design* from the parts contained in a Pocket Meccano Set. The model must be self-designed and not just a copy of a model in the Set Instructions Leaflet. The model may of course be based on the same type of full-size original, but cannot be an exact copy of an already-published Meccano reproduction.

Having designed and built the model, the entrant must send a drawing or photograph of it, together with the official Entry Form, to POCKET MECCANO CONTEST MECCANO (1971) LTD., BINNS ROAD, LIVERPOOL L13 1DA. There is a space on the Entry Form in which the model can be drawn, but if photographs or additional drawings are supplied, these will be accepted and should be clipped to the Entry Form to ensure that they do not become lost. It is a good idea to write your name, address and age on the back of each additional drawing or photograph sent.

Judging

Entries will be judged in three age groups—up to 8 years old, aged 9–12 years and aged 13–15 years. In each group, the overall winner will receive a bicycle, while the 10 runners-up will each receive a No. 5 Meccano Set. The bike for the first group is a Raleigh Tomahawk, with a Raleigh Chopper for the second group and a Raleigh Olympus Sports for the third, senior group. The prizes will be awarded to those competitors who, in the opinion of the judges, build the most original and ingenious models in their age groups and the judges' decisions are final. No correspondence can be entered into and money cannot be given in place of prizes.

In the event of a tie, the prize will go to the entrant who the judges feel gives the best explanation, in not more than 25 words, of why he likes Pocket Meccano. A space for the answer is included on the Entry Form.

All valid entries will be carefully examined by the judges, but proof of posting cannot be accepted as proof of receipt and no responsibility can be accepted by Meccano for entries lost, delayed or damaged before or after receipt.

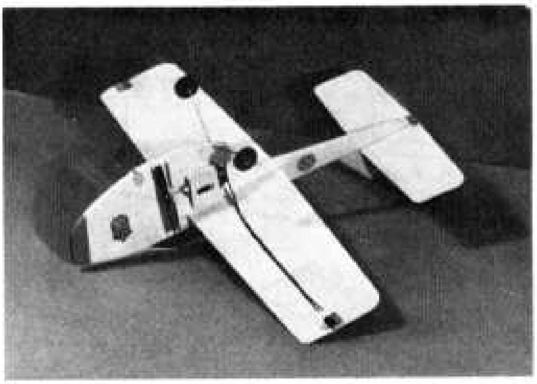
Closing Date

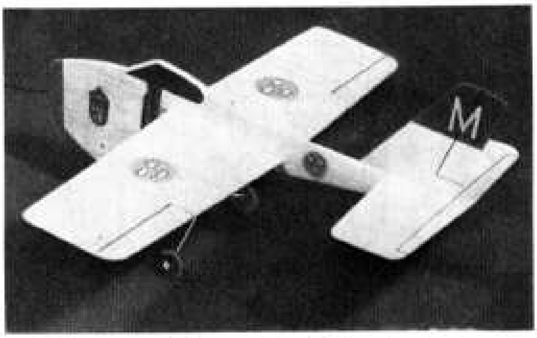
The 1972 Pocket Meccano Competition closes on 31ST AUGUST, 1972 and no entries received after that date can be accepted. The winners will be announced in the November issue of Meccano Magazine, but all successful entrants will be notified in writing before the Magazine appears.

Publication Bonus

As with last year's competition, interesting models entered in this contest might subsequently be described in Meccano Magazine. Such models will not necessarily be drawn from among the prize-winners only and the builders of all those chosen—prize-winners, or not—will receive a publication fee as an extra "bonus". Happy building!

Simple, but very effective and safe in flight is Ray's cute Saab. Such electric models can be flown outdoors in calm weather, given a reasonable surface for take-off.





and reinforce the hole with a small piece of 1/16 in. ply. Pass a piece of strong thin thread through the hole and tie a loop as shown. Sketch 5. Cut a small piece of sheet lead or neatly folded piece of empty cement tube and Evo-stik this weight to the *opposite* wing tip. Sketch 5.

As your SAAB J29F is to be flown indoors there is no need to dope it. The Swedish Royal Air Force insignia on our own model was painted on thin paper, with poster paints, cut out and cemented in position. The colour bands at the nose and the top of the fin can be put on using thick poster colour or with oil-pastels (a small box from any art shop). If you use the oil pastels just put them on thickly, then rub off the excess pastel with a soft rag and there you are. They are a very efficient and colourful way of decorating balsa models. Use Sellotape for masking to give neat lines The squadron letter M on the fin was painted in thick poster colour. Elevator, aileron lines etc. were added using a ruler and a black ball point pen. The cabin is two pieces of black tissue doped in position. Incidentally, if you really fancy your artistic ability with a paint brush and would like to add the squadron symbol on the nose, shown on the plan, and on our original SAAB J29F featured in the photos, here are the colours. The shield is blue, the winged heraldic beast is yellow. The four Tudor-type roses white, the interior of the crown red, with yellow base and cross. This emblem was worn on the SAAB J29F's of Flygflottily (Sqdn) 3 of the Swedish Royal Air Force, when these fighters were based at Malmen, Linkoping, Sweden. (No extra charge for all this info!).

All that remains to be done is to carefully balance your model. Sketch G. Do this by pushing a pin into the balance point, as indicated on the plan. Tie a thread to the pin and see that your model hangs level. Ours needed a tiny piece of lead fastened with Evo-stik to the extreme rear edge of the tailplane. However, as balsa wood varies in density (and weight) your SAAB J29F may not need any weight. Also we had to carefully warp *up* the rear edge of the tailplane in order to obtain extra height when flying. Your first test flight will reveal if this will be necessary.

Well, that's it! Runway clear? Then let's roll. We know you are going to get a real thrill when you open up the motor and your SAAB J29F gathers speed for take-off. Airborne she looks great, and landings are safe and sure on the tricycle undercarriage. Lots of good flying to you.

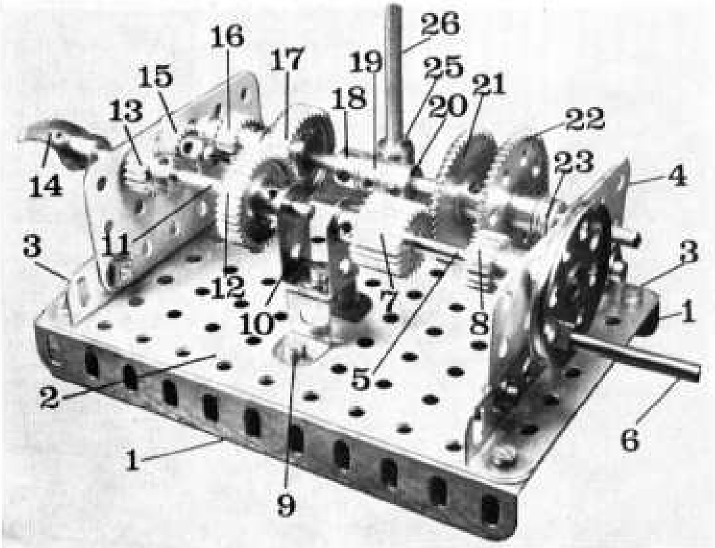
CHAIRLIFT (*Contd. from page 345*)

1 × ½ Reversed Angle Bracket is secured. A 2½ in. Strip 59 is bolted to the spare lug of this Bracket, a 1 × 1 in. Angle Bracket 60 being secured in turn to the upper end of this Strip. Note that the lower fixture in the last case is made, not by a Bolt, but by a Long Threaded Pin, on the shank of which are mounted an electrical 1 in. Bush Wheel 61, a free-running ½ in. Pulley without boss and an 8-hole Bush Wheel 62. The cupola is mounted in position with the ½ in. Pulley running on the rail provided by the earlier-mentioned Flat Girders. Angle Bracket 60 is then connected by a short length of Cord to the cord running around 6 in. Pulleys 18 and 19.

Last of all, we have the cupola loading platform which is built up from a 4½ × 2½ in. Flat Plate 63 secured by Rod Sockets at the corners to four 1½ × ½ in. Double Angle Strips 64. The inner Double Angle Strips are bolted, along with two 2½ in. Strips 65, to appropriate compound girder 1, the free ends of Strips 65 being fixed to the spare lugs of the outer Double Angle Strips. The securing Bolts in the latter case also fix a 4½ in. Angle Girder 66 between the Double Angle Strips. Another Rod Socket 67 is secured to Plate 63 in the position shown, then suitable short Rods are fixed in all the Rod Sockets, Handrail Couplings or Short Couplings being fixed on the top of these to carry the horizontal handrails. The outer rail is supplied by a 5 in. Rod 68 and the end rail by a 2 in. Screwed Rod, with a short rail on the loading side coming from a 1½ in. Rod. A set of access steps is provided by two 1½ × ½ in. Double Angle Strips, bolted between two 3 in. Narrow Strips 69 which are attached to Plate 63 by Angle Brackets. Finally, handrails for these steps are supplied by two further 3 in. Narrow Strips connected to Strips 69 by two 2½ in. Narrow Strips 70. And that's it!

PARTS REQUIRED

7—1a	2—16	1—50	4—103g
2—2	1—16a	2—51	8—111c
14—3	1—17	1—52a	1—111d
16—5	5—18a	4—53	6—115a
6—6	2—18b	17—59	1—120b
15—6a	2—19c	1—62	7—124
8—7	2—21	1—62b	2—133
4—7a	4—22	3—63d	2—133a
6—8	6—23	4—72	2—136
10—8a	6—24	2—73	2—136a
2—8b	5—26	6—80a	1—155
5—9	1—26b	1—81	6—162a
2—9a	2—27a	1—89a	5—179
3—9b	1—29	1—94	1—186b
2—9d	2—31	1—95	1—186e
2—9f	2—32	1—96a	6—187d
11—12	320—37a	3—99a	2—188
6—12b	288—37b	2—103	6—196
1—15	80—38	6—103b	2—197
4—15a	13—48	2—103d	2—235
2—15b	2—48b	1—103f	2—235a
6—518	1—6-ratio Motor with Gearbox		



MECCANO PARTS AND HOW TO USE THEM

By B. N. LOVE

Part 7
Making Gears Work

EXPERIENCED Meccano constructors take most of the standard gear arrangements for granted, but we all have to learn the basic forms at some stage and it is with the younger reader in mind that the first mechanism described is done so at some length. Since we are all familiar with the motor car as common transport these days, its gearbox is a convenient starting point and Fig. 1 shows a very elementary type which is simple to construct, but which will show the novice precisely what is happening. For the purposes of our discussion, the car engine is taken for granted and is replaced in the model by a hand-wheel.

There are three shafts common to most car gear-boxes, known as the input shaft, the layshaft and the output shaft, and these are made from standard Meccano Axle Rods in the mechanism of Fig. 1. Each shaft has a special job to do and this will become clearer as construction proceeds.

Start by building the baseplate from a 5½ × 3½ in. Flat Plate 2 bolted to two 5½ in. Angle Girders 1 and reinforced by two 3½ in. Angle Girders 3 to form a rigid platform. (Note how we are continually using Girders and Plates in basic construction.) Bearings for the gearbox shafts are provided by 3 × 1½ in. Flat Plates 4 bolted *inside* the slotted flanges of the 3½ in. Angle Girders to give maximum adjustment of height when aligning the shafts. It is important that the input shaft 5 and the output shaft 11 are in line and at this stage the pedestal bearing which supports these shafts in the middle of the gearbox should be fitted. This is made from a Double Bent Strip 9 and a 1 × ½ in. Double Bracket 10 bolted together as shown. Washers are placed on the Bolt holding these two parts to give a tight grip and to prevent the Double Bracket from turning out of line. Before finally tightening up the pedestal bearing, pass a long Meccano Rod through the end plates and the pedestal bearing and adjust the alignment so that the Rod is reasonably free to revolve in all four holes.

For the input shaft take a 2½ in. Rod and fix a 1½ in. Pulley to its outer end. This Pulley is fitted with a Long Threaded Pin 6, Part No. 115a, to form the hand wheel. Slide a Washer on to the Rod and pass it through the second top hole of the right-hand end plate, then slip on a 19-teeth Pinion 8 and a 25-teeth Pinion with a ½ in. face, Part No. 25a, and finish with a second Washer. Now tighten Pinion 8 with enough adjustment from the end plate to make a smooth-running bearing without too much end play and do the same for Pinion 7. Spin the input shaft to see that it is running nicely and then make up the output shaft 11. This is a 3 in. Rod carrying a 1 in. Gear Wheel 12 and a 19-teeth Pinion 13. Both gears are secured to rod 11 and spaced with one Washer at each end between the left-hand end plates and the centre pedestal bearing. A Pawl with Boss 14, Part No. 147a, is fixed to the end of the output shaft to act as a rotation indicator when studying the completed gearbox. Again, test the shaft for free-running, without excessive slop. In the next hole immediately to the rear of Pinion 12, a second 19-teeth Pinion 15 is freely mounted on a ¾ in. Bolt, lock-nutted to the end plate. This Pinion remains in constant mesh with Pinion 13 and is the only gear in the box not fitted with a Grub Screw. Its purpose is to act as a reversing gear.

The long shaft at the rear of the gearbox is known as the layshaft and, by contrast with the other two shafts, it is deliberately given end play to allow the set of gears fixed on it to be slid bodily left or right across the gearbox by the gear-change lever 26. A 6½ in. Rod is required and this is passed through the right-hand end plate in the top row of holes, three holes in from the rear. Parts required for the layshaft operation should be slipped on to the 6½ in. Rod in the following order. First, four Washers 23, to act as spacers, followed by a 57-teeth Gear Wheel 22 and a 50-teeth Gear wheel 21. These are followed by three Collars, with Washers between them, placed approximately in the centres of the layshaft, all Grub Screws being left slack for the moment. Finally, a 1 in. Gear Wheel 17, a 19-teeth Pinion 16 and four more Washers are slipped over the end of the layshaft before it is pushed through the corresponding hole in the left-hand end plate. Gear Wheel 22 can then be locked to the 6½ in. Rod so that, when it is pushed to the right, about 1 in. of Rod overhangs the right-hand end plate. In this position, Gear Wheel 22 will mesh with Pinion 8 on the input shaft.

Keep the layshaft in this position and then set Gear 21 so that it clears Pinion 7 on its right-hand side by about $\frac{1}{8}$ in. Lock Gear 21 in place and then slide the layshaft to the left, bringing Gear 22 out of mesh with Pinion 8 and, after a slight further movement, bringing Gear 21 into mesh with Pinion 7. The 1 in. Gear Wheel 17 can now be set to mesh with its partner, Gear 12, and it must remain in mesh while either Gear 21 or 22 is engaged. However, it must also be set so that, when there is further movement to the left by the layshaft, Gear 17 must come out of mesh before Pinion 16 engages with Pinion 15 for the reverse drive. These last two gears require critical spacing and some experimenting with their positions is necessary together with the number of packing Washers used at either end of the layshaft.

It remains only to install the gear-change lever and this requires care plus a fine-bladed electrician's screwdriver. Any suitable Axle Rod may act as a gear lever and this carries a Collar 25. Before fitting the Collar, its standard Grub Screw is removed and the longer $\frac{7}{32}$ in. Grub Screw, Part No. 69b, is fitted in its place, but screwed right through the tapped bore by means of the fine screwdriver until the Grub Screw shows on the far side of Collar 25. It is then offered up to the tapped hole of Collar 19 and screwed in a few turns until both Collars each have a portion of the long Grub Screw which forms a pivot joint between them. The original Grub Screw of Collar 25 is then inserted from the rear of the gearbox to lock the change lever in place. No other fixing is required as the lower end of the gear lever rests in a hole in the baseplate. Two other Collars, 18 and 20, are locked to the layshaft to keep Collar 19 in position. A movement of the gear lever will now move the layshaft to left or right.

Now we can study the gearbox motion. Going back to the input shaft 5, this is assumed to be revolving while the engine is running. By sliding the gear lever to its extreme right, Pinion 8 will be engaged by Gear 22 to give a 3:1 step-down ratio. This would be known as first gear. The layshaft will then turn in the opposite direction to that of the input shaft. At the same time, Gears 17 and 12 are in mesh so that the layshaft motion is passed on to the output shaft 11 which will then be turning in the same direction as the input shaft, but three times slower. This is conveniently observed by watching the Pawl 14 when the hand wheel on the input shaft is turned.

A slight movement of the gear lever to the left will disengage Gear 22 from Pin'on 8, thus disconnecting the engine drive to the lay shaft. This position is known as neutral. A further slight movement to the left will bring Gear 21 into mesh with the broad-face Pinion 7, giving a 2:1 step-down ratio, known as second gear. This time the layshaft is turning at one-half of the speed of the input shaft and, again, its motion is passed to output shaft 11 by Gears 17 and 12 which are still in mesh. A final movement of the gear lever to its extreme left will take Gears 17 and 12 out of mesh. Gear 21 will still be in mesh with long-face Pinion 7 so that the layshaft will continue to rotate at half input speed, in the opposite direction. At the same time, Pinion 16 engages with Pinion 15 which is in constant mesh with Pinion 13. The result is that the output shaft 11 is now running at half the speed of the input shaft 5, but in the reverse direction, as will be plainly shown by the movement of Pawl 14.

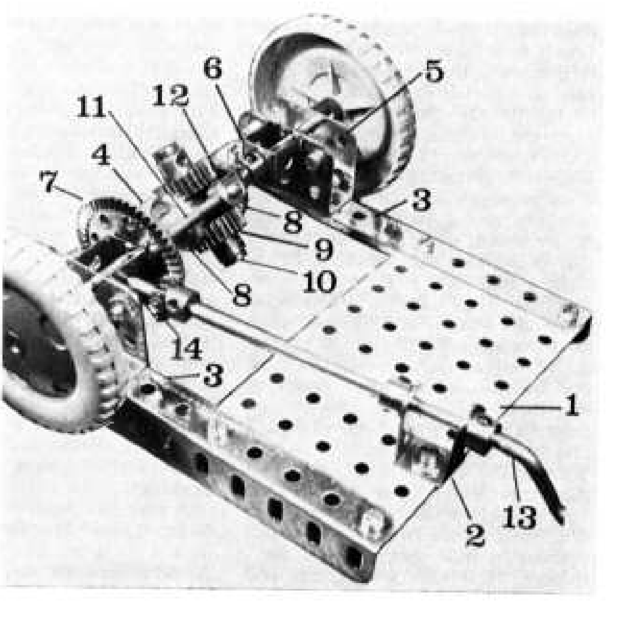
It must be emphasised that the two-speed forward-and-reverse gearbox illustrated is a very elementary design to show the principles of the mechanics involved in changing the speed of coupled shafts and reversing them. Modern car gearboxes are very sophisticated and, generally speaking, the gears inside the box are never moved out of mesh. Instead, they are fitted with driving 'dogs' which virtually lock or unlock the gears on to their respective shafts. However, the model is simple to build and most instructive in operation. As an extension of the exercise, the reader might add a 15-teeth Pinion to the input shaft and a corresponding 60-teeth Gear Wheel to the layshaft to produce a three-speed gearbox.

Differential Gear

Our second mechanism is shown in Fig. 2 and represents a working model of the differential gear fitted to car driving axles. Even experienced Meccano modellers have difficulty in adjusting differential gears to run smoothly, but there have been several excellent designs published in Meccano Magazine over the years. Most of them employ some kind of box cover over the differential gears themselves so that it is not always easy to observe the gears in motion and this is essential to the visual understanding of the differential gear.

Any simple Meccano model fitted with a pair of road wheels on a "solid" axle will just not turn corners. Some arrangement is essential to allow one wheel to travel faster than the other when cornering and the real problem is to make

Heading picture opposite is Fig. 1, a car-type gear-box. Fig. 2, on the right, demonstrates how a differential gear arrangement works.



sure that the engine is still driving the wheels even though one is going faster than the other. When a moving object like a vehicle changes direction, such as in cornering, it requires additional power to cope with the forces set up in opposition to its change of direction. This is catered for by selecting a lower gear when cornering, but we must still get drive to the road wheels. Once again, it is much easier to build a working model and to examine its motion than it is to discuss or describe it theoretically, so instructions are given here for making the model differential shown in Fig. 2.

Start by bolting a pair of 5½ in. Angle Girders 3 to a 4½ in. × 2½ in. Flat Plate 1 to form a base. A 4½ in. Angle Girder 4 braces the frame at the rear behind the differential gear. An essential part of the car differential is a split axle divided into what are known as half-shafts. In a full-size vehicle these are supported in bearings carried in an axle tube of stout construction running right across the car between the suspension, and with a differential casing enclosing the gears in the centre. So that we may dispense with this casing and observe all of the gears in motion, however, the half-shafts in the model—which are 2½ in. Rods—are carried in bearings on either side made from a Channel Bearing 5 reinforced by a Double Bent Strip 6. This gives each half-shaft a three-point support and raises the Road Wheels off the ground for demonstration purposes.

The gears themselves are assembled as follows: Attach a Road Wheel to a 2½ in. Rod and pass the Rod through the Channel Bearing 5, seen to the rear in Fig. 2. Place a Collar on the Rod as it emerges from the Double Bent Strip 6 and then mount a 25-teeth Contrate Wheel 8 close up to the Collar. Now prepare the large Bevel Wheel 7 by removing its Set Screw and fitting it with two ¾ in. Bolts 11 in a pair of diametrically opposite holes, locking each long Bolt in place with a single Nut. Prepare a second half-shaft with Road Wheel, then hold the large Bevel Gear 7 against the Double Bent Strip forming the other bearing and pass the half-shaft through, letting it go through the centre of Bevel 7 and into the second 25-teeth Contrate Wheel 8. Note that, although the large Bevel Gear has no Set Screw, the two Contrate Gears 8 are fitted with Grub Screws which will eventually lock them to the half-shafts. Now take a Coupling and place it between the two Contrate Gears 8 so that the inner ends of the half-shafts may be entered part way into the long bore of the Coupling. At this stage, the Contrate Gears may be fixed in place, temporarily, by their Grub Screws, just to hold things in position ready for the next stage.

Mount two 25-teeth Pinions 9 on Pivot Bolts 10 and screw them in a few turns into the centre tapped bores of the Coupling. Two collars 12 are now required and these are screwed for a few turns on to the ends of the 1¼ in. Bolts sticking out from Bevel 7. Now take a 1½ in. Rod and pass it through Collar 8, shown in Fig. 2, through the smooth bore in the centre of the Coupling and then through the Collar on the second long Bolt hidden from view below the differential. Now screw up the two Pivot Bolts carrying the 25-teeth Pinions 9 and these will lock the 1½ in. Axle Rod in place. Do not attempt to secure the Collars 8 by means of a Grub Screw as they will then tend to bind Bevel Gear 7 when it turns freely on the half-shaft. By leaving the Collars 8 "loose" like this, they provide the necessary turning motion to the differential Pinions carrier with sufficient "give" to prevent binding and they cannot become unscrewed, despite their not being screwed up tight, or fitted with Grub Screws. This "slack" is deliberately introduced to help smooth running.

It will be necessary at this stage to do some adjusting so that the teeth of the Contrate Gears mesh nicely, but not tightly, with those of Pinions 9. Careful packing with Washers is essential and all bearing points should receive attention. See that the bosses on the Road Wheels have a Washer between them and the Channel Bearings and that the Collar on the half-shaft shown to the rear in Fig. 2 also has a Washer between itself and the Double Bent Strip 6. This particular half-shaft can be set up first and its Contrate Gear locked in place to allow just the right amount of half-shaft to fit into the central Coupling. Careful packing with Washers is also required between the boss of Bevel 7 and its adjacent Contrate Gear. Check that the long Bolts are firmly lock-nutted to the large Bevel and that there is a Washer between the large Bevel and the Double Bent Strip against which it is bearing.

A propellor shaft is provided by a 5 in. Crank Handle 13 mounted in a 1 × ½ in. Double Bracket 2. A side hole in the Double Bent Strip alongside the large Bevel provides a suitable bearing for the small Bevel Gear 14 which should then mesh smoothly with the larger one. If there is any stiffness in the differential gears, check the central Coupling; better still, check it before you put it in for trueness of tapped and cross-bored holes.

Provided that all is running smoothly, it will now be possible to observe the differential in motion Turn the propeller shaft 13 and watch the Road Wheels. They should both turn at the same speed. Keep turning the propeller shaft and put a slight drag on one wheel with a light touch of the finger and notice that the other wheel turns faster. Repeat these trials and this time watch the 25-teeth Pinions 9. When both Road Wheels are running at the same speed, the Pinions will be carried round in space but will not actually spin on their own Pivot Bolts. When there is a difference in speed, however, the "differential" movement of the Pinions begins to show and they will be seen to turn on their own Pivot Bolts.

Hold the propeller shaft still and turn one Road Wheel. It comes as a surprise to many (including adults) to see that the other wheel turns at the same speed but in the *opposite* direction and the differential movement of the Pinions 9 is clearly seen. Finally, turn both Road Wheels at the same speed in the same direction and note the speed of the propeller shaft. Now stop one wheel and turn the other. This will double the speed of the propeller shaft. By turning the model upside down it will perform its "tricks" very well on carpet or similar flooring.

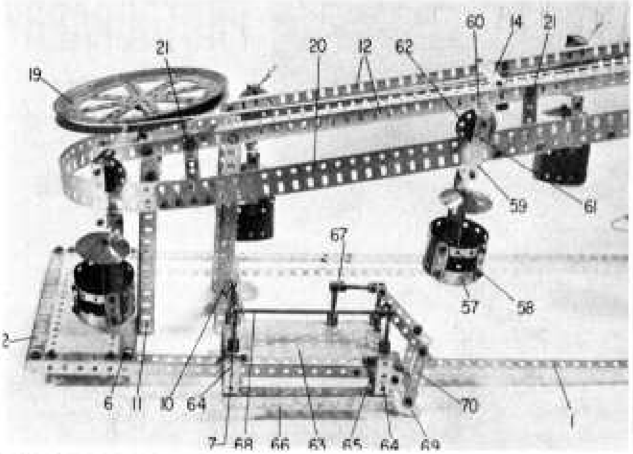
A little thought will show that any of the three shafts in a differential may be used as an input or output shaft to great advantage in various mechanisms requiring differential movement.

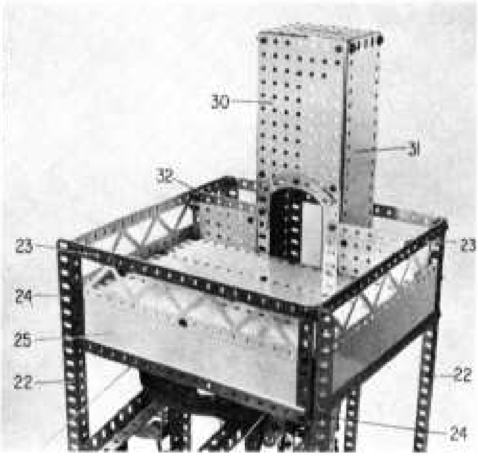
MODEL BUILDERS

(*continued from page* 327)

Postscript

In the May issue we featured an illustration of a magnificent veteran car model, based on a 1904 Singer and built by Mr. Cyril Potter of Chatham, Kent. As I said at the time, I have no details of the model, but I have since been advised that it is fully described in one of the GMM Super Model Leaflets, privately produced by the Meccanoman's Club, 248 Woolwich Road, Abbey Wood, London, SE2 0DW. The Leaflet in question is No. 15 in the series and it might well be of interest to advanced builders.





AUTOMATIC CHAIRLIFT

Part Two of a description of a fine continual-running model ideal for displays and exhibitions. By 'Spanner'

Above, the top of the taller tower in the model.
Left, a close-up view of the lower tower, showing the cupola loading platform.

We come next to the drive system. As already mentioned, the model was originally designed for unattended dealer display work and, as such, incorporates an automatic reversing mechanism controlling continuous operation of the lift. This mechanism is actually a "standard" unit which has been used for many years by the Model-building Department of Meccano and it has also been featured in Meccano Magazine in the past. However, for the benefit of readers unfamiliar with its construction, it consists of two 3½ × 2½ in. Flanged Plates 38, connected by two 2½ × 2½ in. Flat Plates 39. Journalled in the Flanged Plates is a 4½ in. Rod held in place by a Collar outside the Plates and carrying, inside, a ½ in. Pinion, a Worm 41 and a 1 in. Gear 42. The Pinion meshes with an "idler" ½ in. Pinion 43, revolving free on a 1⅛ in. Bolt secured in the nearby Flanged Plate. A 2 in. Sprocket Wheel 44 is fixed on the end of the Rod.

Running parallel to the first Rod is a second 4½ in. Rod, free to slide in its bearings and carrying a ½ in. Pinion 45, a Collar and a 1 in. Gear 46 inside the plates and a ½ × ¾ in. face Pinion 47 on the end of the Rod. The Pinion and 1 in. Gear should be so arranged that, as the Rod slides, Gears 42 and 46 mesh together, or Pinions 43 and 45 do so—*alternately*. The two sets of gears must never mesh at the same time and there should be a short neutral period between the change-over. A third parallel 4½ in. Rod carries a ¾ in. Contrate 48 and a 57-teeth Gear 49, the latter outside the Plates and in constant mesh with wide-faced Pinion 47.

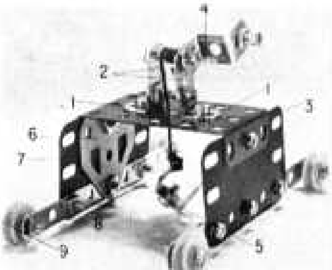
Now bolted to the inside of one Plate 40 is a Double Arm Crank, the boss coinciding with the centre hole in the Plate and two corresponding 1½ in. Strips being bolted to the outside of the Plate to provide an extended mount for a 1½ in. Rod held in the boss of the Crank. Running free on this Rod, but held in place by a Collar, is a 57-teeth Gear, suitably packed with Washers to mesh with the underside of Worm 41. Pivotally attached to the outside face of this Gear is a Slide Piece carrying a 3½ in. Strip 50. The upper end of this Strip is tightly fixed to, but spaced by Collars from a Crank 51 mounted loose on a 2 in. Rod held in another Crank. This Crank is bolted to four 2½ in. Strips, fixed one on top of the other to nearby Plate 40 to provide a really strong support. Held by Nuts in the centre hole of strip 50 is a ½ in. Bolt, the head of which engages between the boss of Gear 46 and the adjacent Collar to actuate movement of the carrying Rod for changing gear. The completed unit is bolted to two 2½ in. Angle Girders 53, one secured to Angle Girder 3 and the other to the Flat Girder bolted to Flat Plate 28.

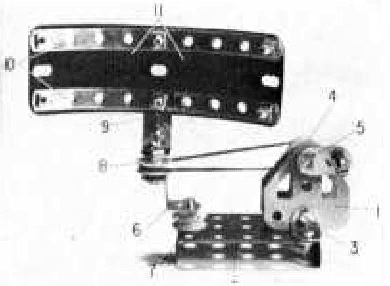
For display purposes, the original model was powered by a special mains motor, but, for our purposes, this is replaced by a 3–12 volt Motor with Gearbox (set in the 16:1 ratio) which is bolted to a 3½ × 2½ in. Flanged Plate secured to Angle Girders 8. A 1 in. Pulley 54 and a ¾ in. Sprocket Wheel are fixed on the output shaft of the motor, the Pulley being connected by a 20 in. Driving Band to Pulley 16 and the Sprocket by Chain to Sprocket Wheel 44. In mesh with Contrate 48 is a ½ in. Pinion 55 on the end of a 4½ in. Rod journalled in nearby Plate 40 and in a 3½ in. Strip bolted between rear Girders 29. A 1 in. Pulley 56, fixed on the other end of the Rod, is connected by a 10 in. Driving Band to Pulley 36 to complete the drive system.

Coming to the travelling cupolas, each of these consists of a Boiler End 57, to which a 5½ × 1½ in. Plastic Plate is bolted, the ends of the Plate being edged by 1½ in. Strips. As can be seen, a space remains between the ends of the Plate to represent the entrance, a safety bar being provided by a shaped 2½ in. Narrow Strip 58, bolted between the upper corners of the Plate.

Held by Nuts in the centre of the Boiler End is a 3 in. Screwed Rod, on the upper end of which a Conical Disc is held by further Nuts. The supporting arm is a 3½ in. Strip bolted to the Boiler End and Plate and to the top of which a

(please turn to page 340)





MORE FROM POCKET MECCANO

TO continue our series of interesting models entered in last year's Pocket Meccano Competition, I feature here three more ingenious productions, two of which were prize-winners, and one which was not. It was an extremely difficult task selecting these particular examples, as there were so many excellent models to choose from, but they were finally picked because they are all well-built and appealing reproductions, based on three totally different subjects. I hope you like them.

Radar Scanning Aerial

Congratulations go to 13 year-old J. C. Steventon of Upminster, Essex, for our first model—an imaginative Radar Scanning Aerial which actually revolves, controlled by a small crank connected to the Scanner by an elastic band. Two Flat Trunnions 1 are mounted vertically on a 2½ × 1½ in. Flanged Plate 2 by means of two ½ × ½ in. Angle Brackets 3, the securing Bolts for which pass through the centre base holes of the Trunnion, and the rear corner hole of the Flanged Plate. A ½ in. Pulley 4 carrying an elastic band is secured between two Nuts on a ¾ in. Bolt passing through the apex holes of the Trunnions, then a Fishplate 5 is locked by a further two Nuts on the end of the Bolt. A ½ in. Bolt is secured in the other hole of the Fishplate to complete the "driving" assembly.

In constructing the scanning aerial unit, a ½ in. Reversed Angle Bracket 6 is locked by two Nuts on another ½ in. Bolt. A ½ in. Pulley 7 is added, then the Bolt is fixed in the end row centre hole of Flanged Plate 2, as shown. Another ½ in. Pulley 8 is tightly fixed by two Nuts, one each side, on a ½ in. Bolt free to turn in the upper lug of the Reversed Angle Bracket. An ordinary Angle Bracket is locked on the upper end of the Bolt shank, a Fishplate 9 being bolted to the vertical lug of this Bracket, then the scanner itself is finally produced. This consists of two 4½ in. Narrow Strips 10, curved slightly and bolted to two 2½ × 1½ in. Plastic Plates 11, overlapped one hole. When completed, it is bolted to Fishplate 9. The elastic band looped round Pulley 4 is of course looped round Pulley 8 to complete the drive.

PARTS REQUIRED

7—10	26—37a	1—111	2—126a
4—12	11—37b	1—111a	2—194
4—23	1—51	1—125	2—235d

Gantry Crane

Our second offering is another working model in the shape of a Gantry Crane designed by G. R. Laming 'Middle Herrington' Sunderland. To build it, two Angle Brackets 1, each extended upwards by a Fishplate 2, are bolted to a 2½ × 1½ in. Flanged Plate 3. Lock-nutted in the circular holes of the Fishplates is a ¾ in. Bolt which turns freely, controlled by a ½ in. Reversed Angle Bracket 4 tightly fixed on the Bolt. A handle is supplied by an ordinary Bolt locked by two Nuts in the spare lug of the Reversed Angle Bracket. The ¾ in. Bolt, of course, serves as the hoisting winch and a length of Cord is therefore tied to the Bolt shank. From here it is threaded through the centre hole of Plate 3 and tied to a "hook" 5, built up from two Angle Bracket bolted together.

Each leg of the Gantry consists of a Flat Trunnion 6 and a 2½ × 1½ in. Plastic Plate 7, bolted to one or other flange of Plate 3. Tightly fixed to the lower edge of Plate 7 and to the apex hole of the Flat Trunnion is a 4½ in. Narrow Strip 8, in the end holes of which ½ in. Bolts are held by Nuts. A ½ in. Pulley 9 revolves on the shank of each of these Bolts to act as the travelling wheel and to complete the model.

PARTS REQUIRED

2—10	26—37a	1—111	2—126a
4—12	14—37b	4—111a	2—194
4—23	1—51	1—125	2—235d

Push-chair

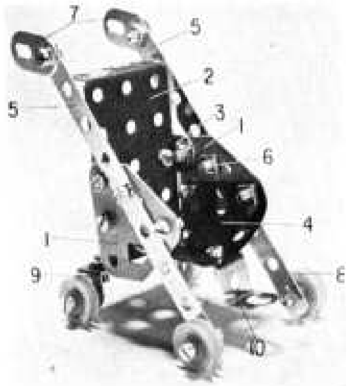
Finally, we have an excellent little representation of a Pushchair, which is the pleasing work of 13-year-old Andrew Bell of Churchlawton, Stoke-on-Trent, Staffs.

Two Flat Trunnions 1 are attached one to either side of a 2½ × 1½ in. Flanged Plate 2, by means of an Angle Bracket 3, in the position shown. A 2½ × 1½ in. Plastic Plate 4, formed into a "seat" shape, is then bolted between, and along the "centre-line" of the Flat Trunnions, this obviously serving as the seat. A 4½ in. Narrow Strip 5 is attached to the outside of each Trunnion by one Bolt which passes through the centre hole of the Narrow Strip and the upper, large wedge-shaped hole in the Trunnion. To the top end of each of these Narrow Strips, a Fishplate 7 is bolted to provide handles, while a ½ in. Bolt carrying a ½ in. Pulley 8 (serving as one of the front wheels) is locked in the lowest hole of the Strip. The rear wheels are also supplied by ½ in. Pulleys on ½ in. Bolts, these fixed in two Angle Brackets 9 bolted to the lower flange of Plate 2.

Last of all, a ½ in. Reversed Angle Bracket 10 is bolted through the front centre hole of Plastic Plate 4 to finally complete the model—and a fine little model it is too!

PARTS REQUIRED

4—12	21—37a	1—51	2—126a
4—23	15—37b	4—111a	1—194
		1—125	2—235d



Top, the revolving Radar Scanner won a No. 5 Meccano Set for 13 year-old J. C. Steventon. Not a prize-winner in the Competition, but still an appealing working model, is the little Gantry Crane designed by G. R. Laming. Left, fully deserving of the prize it won is this captivating Pushchair by Andrew Bell.

REPORT OF THE 10th MEETING OF THE

MIDLANDS MECCANO GUILD

by the Secretary

DESPITE a casualty list of 14 members, absent through sickness or because of previous commitments, the 10th Meeting of the Midlands Meccano Guild was once again a successful turnout. A warm, dry day greeted the members as they approached Shakespeare country on Saturday, March 25, in a wide variety of transport ranging from light vans to minibuses. By 2 p.m., the models they carried were set up in the St. John's Ambulance Hall in Stratford-upon-Avon and, in no time at all, the gallant band of volunteer wives had the first brew of tea handed round.

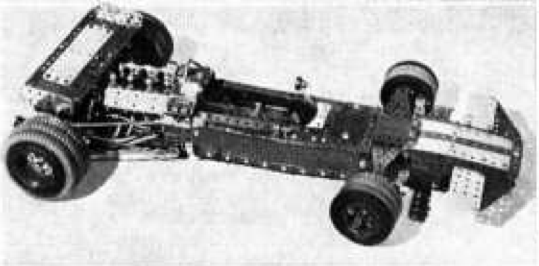
Shortly after this welcome refreshment the Meeting proper began with a short address from the Secretary who demonstrated a recent genuine Chinese "Meccano" set—a remarkable copy in silver, yellow and blue—and then went on to show some further small items of recent manufacture for the enthusiast. This was followed by a series of demonstration talks by individual members who described their models from the platform, each member being limited to ten minutes' talk. David Guillaume, of Alcester, started the ball rolling by showing part of an automated industrial processing plant which went through a sequence of dipping parts by a vertical and horizontal conveyor mechanism. The section displayed was of module construction so that sub-sections could be easily serviced and demonstrated, Motors with Gearbox being used for the sequencing and operational movements.

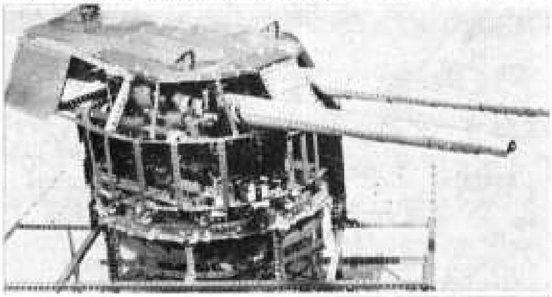
Transport models were again a prominent feature of the meeting and Peter Dixon of Stourbridge showed his excellent Formula 1 Grand Prix racing car. Almost 2 feet long, Peter's car was a prototype incorporating the main features of a modern car including a well moulded body form and cockpit, wishbone suspension and flexible steering geometry, as well as aerofoils front and rear, fully operative foot pedals on clutch, accelerator and disc brakes, and a very neat compact six-speed gear box of all-Pinion design. This was the first advanced model which Peter had ever designed and he made a first-class job of it.

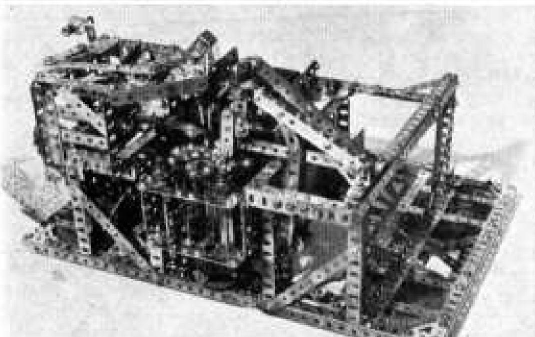
Peter was followed by a veteran in vehicle modelling, Brian Edwards of Bedford, who demonstrated a very neat vintage Morgan three-wheeler car complete with outboard twin-cylinder motor-cycle engine and transmission. Prototype two-speed gearbox, clutch and parallel bar steering geometry were included. Front mudguards and headlamps swivelled authentically with the steering and the suspension—coil spring at the front, twin cantilever leaf springs at the rear—performed in a realistic manner. As usual, detail was excellent in Brian's model.

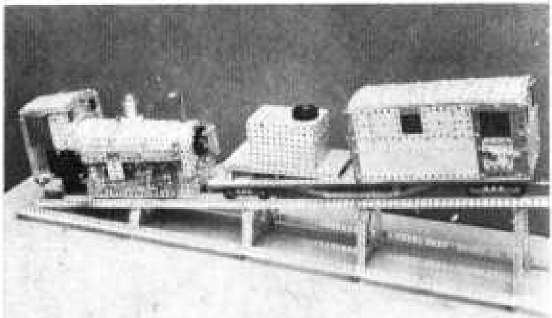
A novelty item was provided by Mike Nicholls (a brand new Guild member and self-confessed novice!) in the form of a "Sawing a Woman in Half" sideshow. The fiendish magician, with remarkable likeness to Alf Garnett, rolled his head and politely raised his hat as he cut through his victim who also rolled her head and both feet at the same time! Mike also showed a modernised version of a pre-war Watts

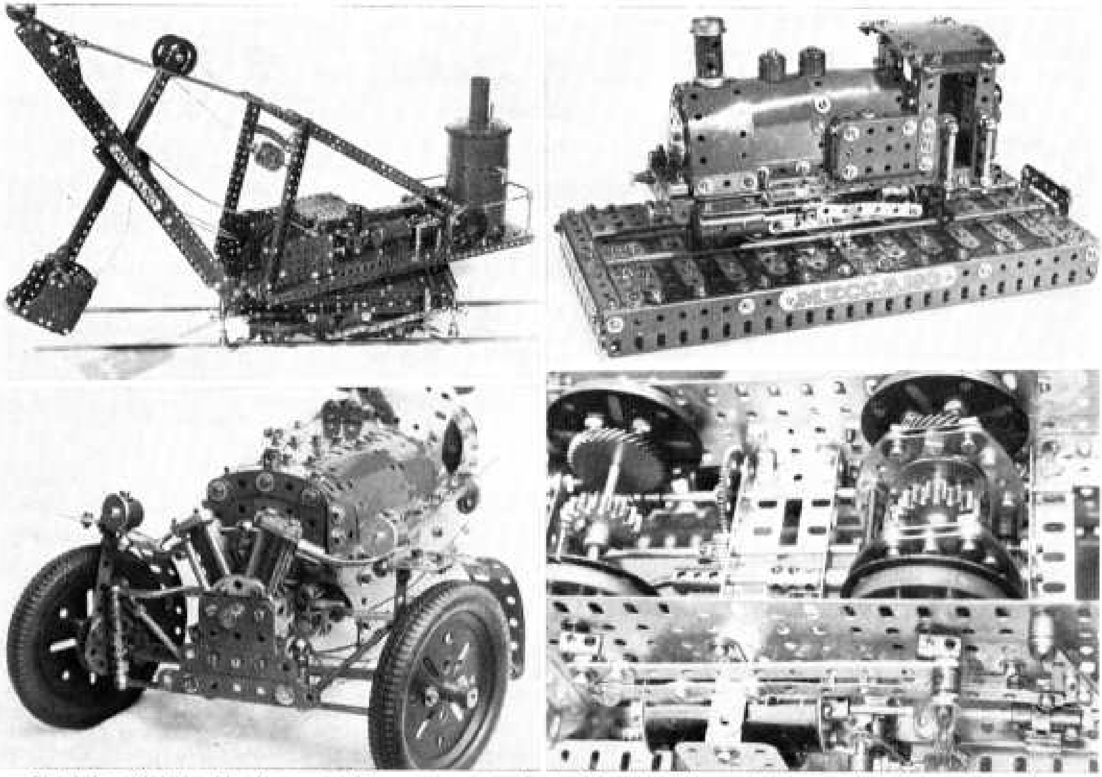
Below, reading clockwise, a Formula 1 Grand Prix racer by Peter Dixon. The model is complete with working 6-speed gearbox, clutch, differential and many other features. One of the two "king-size" models on show—a 16 in. gun-turret of 1914 vintage modelled by Tony Homden. The Snowdonian Rack Railway by Stephen Lacey with water-tank truck and luggage van. The valve gear and angle of tilt of the boiler are as per the original. The President's Prize-winner—an elegant high-speed French Knitting Machine by Phil Ashworth. The tip of a standard crochet hook is the only non-Meccano part required!











Top left, a "freelance" rail-mounted Steam Excavator by Jim Gamble. The model has excellent lines with motions controlled through gear linkages from realistic steam engine detailing. Top right, a neat 0-6-0 Tank Locomotive reproduced by Bob Faulkner. Bottom left, speedster of a different age! A vintage Morgan Three-Wheeler by Brian Edwards, including authentic suspension and steering geometry with 2-speed gearbox. Bottom right, an underside view of Stephen Lacey's rack locomotive showing the novel use of a large-toothed Quadrant Pinion to grip the made-up centre rack between the rails.

Beam Engine and explained how he had overcome some of the early imperfections common to such models. Jim Gamble then brought his first-class freelance railway excavator up to the platform. This model was beautifully detailed with a fully "riveted" boiler (concealing a Motor-with-Gearbox which supplied all movements!), steam motion with valve gear, flywheel etc. and a four-movement gearbox supplying drive to travelling, slewing, bucket racking and jib luffing. A fully-sprung railway truck base was provided and a novel turntable to Jim's design incorporated a "spider" made from a Circular Girder carrying ½ in. Pulleys which ran between roller races comprising 6 in. dia. Pulleys. The excavator was beautifully built in the advanced manner of the modern supermodel.

Clive Hine had two excellent models on show, one being a six-car fairground ride on undulating tracks which ran throughout the meeting accompanied by piped fairground organ music. His second model was an automated Coles self-propelled crane where steering, road travelling, hoist, slew and luffing were controlled by a drum-switch operating relays made from Meccano Electrical Coils and Brass Strips. By contrast, the next model, exhibited by Len Wright of E. Brough, Yorkshire, was one of the two "King-size" models on display. Len had made a replica of the giant Lorry-Mounted Crane, designed by Eric Taylor for a previous Guild Meeting. Len had managed to improve the wheel arrangement by using a heavier gauge of large-diameter tyre (available on certain ash-trays), but otherwise this was an exact copy of Eric's original model in a slightly different colour-scheme.

Last of the platform demonstrations was given by Phil Ashworth of Hull. Phil is noted for his sophisticated models, modular construction and total surprises! This time he astonished the Guild once again by showing a French Knitting machine in answer to the President's prize challenge made some two years previously. The machine was completely automatic and had mechanical linkages throughout. The "cotton reel" and four "panel pins", common to childhood days when French knitting was done on such homely items with the aid of a pin, were replaced in the Meccano model by a hollow drum based on spaced Gear Rings with four Keyway rods mounted vertically in the centre. The drum is indexed through 90 deg. for each stitch by a gear train and a dipping mechanism, fitted with the tip of a crochet hook (the only non-Meccano part permitted within the rules for the President's prize), picked up a loop at each oscillation, synchronised with the 90 deg. turn of the knitting drum. A high speed spinner, also synchronised, fed the wool yarn from a storage reel via a tensioning device, the business end of the spinner being a Cord Anchoring Spring, the tiny loop of which proved ideal as a feed for looping after the stitch was completed. The machine was hand-operated with a motorised alternative and, in either model, the machine knitted faultlessly to give Phil the prize which his brilliant