BEFORE DOING anything else this month, I would like to express my sincere hope that all M.M. readers, especially Meccano modellers had a very merry Christmas and a splendid New Year. I suspect, though, that I might be just a little too late with my wishes for some people, who, as they read this, are already trying their best to forget all about the "festive season"—helped along by an upset stomach from too much of the "festive spirit"! I might well be doing the same, but it's difficult to be too explicit at this stage: as I write this Christmas is still six weeks in the future!

Constant-Direction Drive

Upset stomach or not, however, I still have some interesting mechanisms to present, the first of these being a Constant-direction Drive Unit designed by Mr. M. C. Tomkinson of Sandbach, Cheshire. No matter in which direction the input shaft of the Unit is turned, the output shaft always revolves in one chosen direction only.

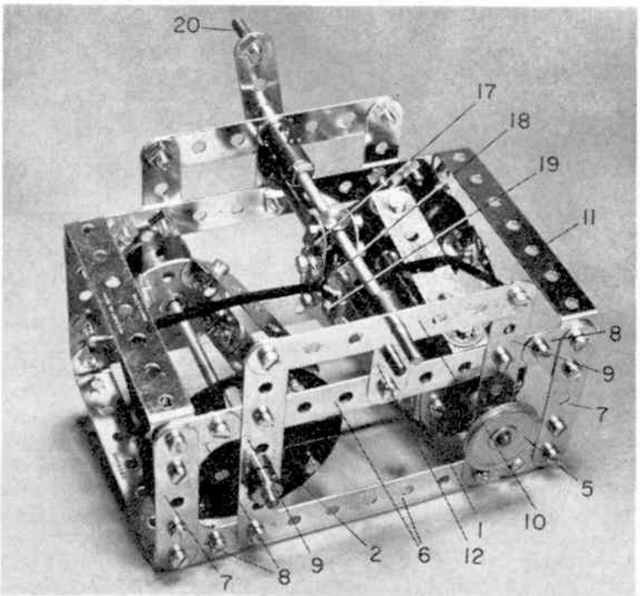
A glance at the accompanying illustration will show that the mechanism is built-up around a differential carried in a simple mounting. Mr. Tomkinson stresses, however, that the unit, as illustrated, was produced for demonstration purposes only and that individual readers may need to adapt it to meet their own requirements. As it stands, the mounting is produced from a $5\frac{1}{2} \times 2\frac{1}{2}$ in. Flanged Plate 1, to each end flange of which is bolted a Flat Trunnion 2 extended by a $2\frac{1}{2}$ in. Strip 3.

As regards the actual mechanism, the input shaft is supplied by a $3\frac{1}{2}$ in. Rod, mounted in one Strip 3 and fitted with, in order, a Crank 4, a Collar, two Washers, a Ratchet Wheel 5, a Socket Coupling 6, an 8-hole Bush Wheel 7, a second Ratchet Wheel 8 and a $\frac{3}{4}$ in. Contrate Wheel 9, the Rod then being inserted, free, part-way into the longitudinal bore of a Coupling 10. Note that Ratchet Wheel 5 and Bush Wheel 7 are carried in opposite ends of Socket Coupling 6, and that all three of these parts are free on the Rod. The remaining parts are fixed, the Collar holding the Rod in position.

Inserted, free, part way into the other end of Coupling 10 is the output shaft, supplied by another $3\frac{1}{2}$ in. Rod mounted in remaining Strip 3. Mounted on this Rod are a fixed $\frac{3}{4}$ in. Contrate Wheel 11, followed by a number of packing Washers and a loose 8-hole Bush Wheel 12, this Bush Wheel being attached to Bush Wheel 7 by one $2\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strip 13 and one $2\frac{1}{2} \times 1$ in. Double Angle Strip 14, using packing Washers where necessary to obtain correct hole alignment with Coupling 10. Contrate Wheels 11 and 9 mesh with two $\frac{3}{4}$ in. Pinions 15 fixed, one in a 1 in. Rod and the other on a $1\frac{1}{2}$ in. Rod, both Rods being mounted in the centre transverse bores of Coupling 10 and in respective Double Angle Strip 13 or 14. A Collar holds the $1\frac{1}{2}$ in. Rod in place.

Mounted on the Pivot Bolt fixed to one lug of Double Angle Strip 14 is a Pawl 16, the point of the Pawl being held in contact with Ratchet Wheel 8 by a $2\frac{1}{2}$ in. Driving Band. In contact with Ratchet Wheel 5 is a second Pawl 17 mounted on another Pivot Bolt fixed to nearby Flat Trunnion 2. This Pawl is also held in contact with the Ratchet by a $2\frac{1}{2}$ in. Driving Band secured to a $1\frac{1}{2}$ in. Strip bolted to the side flange of Plate 1. Finally, a Threaded Pin is fixed to the arm of Crank 4 to serve as a handle.

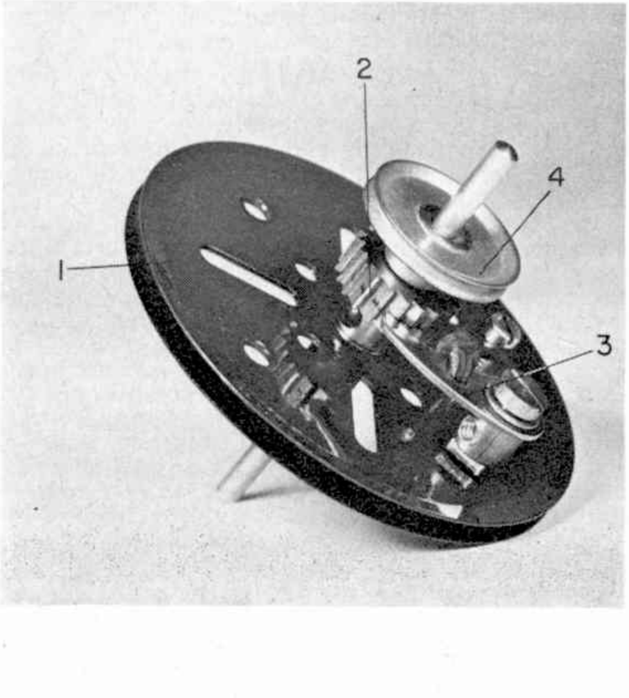
Left: Full credit for this Constant-Direction Drive Unit goes to Mr. M. C. Tomkinson of Sandbach, Cheshire. The output shaft always turns in one direction no matter which way the input shaft is turned.



Above: It may look unusual, but this Speed Variation Unit is amazingly effective in operation. It was designed by Mr. N. Muallern of Tel-Aviv, Israel. Below: Many of our newer readers will not have come across a useful Free-Wheel Mechanism before now. This example was suggested by Mr. M. Miller of Ilford, Essex.

In operation, when the input shaft is turned in a clockwise direction, the whole mechanism, including the output shaft, revolves with is as a single item. If the input shaft is turned in an anti-clockwise direction, however, the action of Ratchet Wheel 5 brings the differential into play which results in the output shaft continuing to turn in a clockwise direction.

As a matter of interest, in submitting his idea, Mr. Tomkinson said it, " . . . can be used for winding something up where space does not permit a full turn to be made and it could also be used to improve a mechanism such as a ratchet spanner. Perhaps readers of *Meccano Magazine* could suggest better uses for it. If so, I would be interested to hear about them." So would I, so, if anybody has any ideas, please send them along to us.

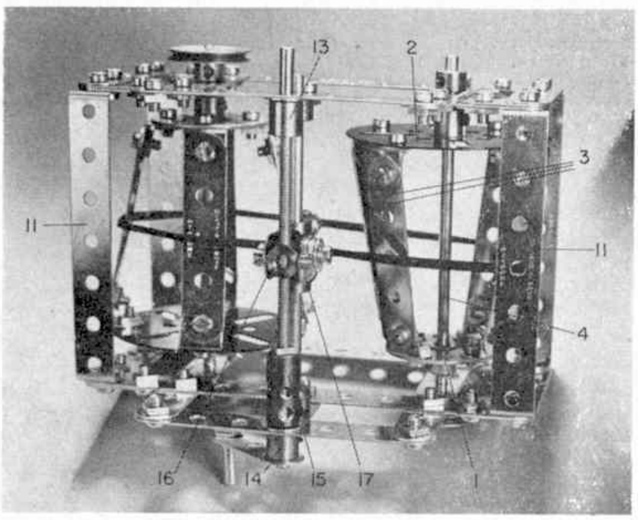


PARTS REQUIRED

2—5	2—25	1—48a	1—115
1—6a	2—29	1—52	2—126a
2—16	20—37a	3—59	2—147
1—18a	12—37b	1—62	2—148
1—18b	10—38	1—63	1—171
2—24	1—46	2—111c	2—186

Variable-Speed Unit

Also featured in the accompanying illustrations is a very simple, yet amazingly clever Speed Variation Unit, details of which were sent to me by its designer, Mr. N. Muallern of Tel-Aviv, Israel. Working on the opposed cones principle, the Unit will enable the speed of a drive system to be changed at will—and not changed through a set of fixed gear ratios, either, but rather varied gradually through its entire step-up or step-down range of ratios. The principles followed are really quite straightforward: two similar cones, one driven, are mounted parallel to each other, but pointing in opposite directions, and are connected together by an endless belt. As the cones revolve, the ratio between the two depends on the positions of the belt on the cones, therefore the ratios can be varied by simply altering the positions of the belt on the cones.



A top view of the Speed-Variation Unit showing the layout of the cones.

In Mr. Muallern's mechanism, each of the two cones are built up from one 8-hole Bush Wheel 1 and one Face Plate 2 connected together by four 2½ in. Strips 3 attached by Angle Brackets, the lugs of which are bent slightly to the correct angle. When finished, the cones are each mounted on a 4½ in. Rod 4 held by a 1 in. Pulley 5 and a Collar in a suitable framework. The framework illustrated consists of two similar sides each built up from two 5½ in. Strips 6 connected together at the ends by two 2½ in. Strips 7, with 1 in. Corner Brackets 8 being used to ensure rigidity. Two 3½ in. Strips 9 are also bolted between Strips 6, the upper ends of these being joined by another 3½ in. Strip 10, then the two sides are connected together at the corners by four 3½ × ½ in. Double Angle Strips 11.

Bolted to the centre of upper Strip 6 at each side is a 1½ in. Strip 12, this being secured to relevant Strip 10 by either a Rod Socket 13, or a Crank 14 and Threaded Coupling 15 on a 1 in. Rod, as the case may be. Fixed in the threaded portion of the Coupling, but free to revolve in the Rod Socket, is a 3 in. Screwed Rod, carrying a Universal Coupling " spider " 16, the Rod being screwed through two opposite tapped bores of the spider. Tightly secured to the spider through its remaining tapped bores are two Fishplates 17, between the other ends of which a Coupling 18 is fixed, this Coupling being free to slide on a 4 in. Rod held by Collars in the centre holes of Strips 12. Note that the Fishplate securing Bolts must not foul either the Screwed Rod or the 4 in. Rod, therefore packing Washers should be used where necessary. Two ½ in. Bolts, each carrying a loose Collar 19, are locked by Nuts in the lower end bores of Coupling 18, the Collars acting as guides for a 10 in. Driving Band passed round both cones.

Finally, a Threaded Pin 20 is fixed to the arm of Crank 14 to provide a handle by means of which the Screwed Rod can be turned. As the Screwed Rod revolves, the spider assembly moves along it and the guides provided by Collars 19 alter the position of the Driving Band. Drive, of course, can be taken to either of Pulleys 5. It works extremely well.

PARTS REQUIRED

4—2	1—15b	3—38	2—109
6—3	1—18b	4—48b	2—111a
12—5	2—22	6—59	1—115
2—6a	2—24	1—62	8—133a
2—10	2—35	1—63	1—140y
16—12	56—37a	1—63c	1—173a
2—15a	56—37b	1—80c	1—186b

Free-Wheel Mechanism

I finish this month with a simple Free-Wheel Mechanism sent in by Mr. M. Miller of Ilford, Essex. Actually, regular readers will know that we have featured almost identical mechanisms to this in the past, but as we have not done so for some time, I am sure that there are many newer readers who will not have seen them.

Mr. Miller's particular example consists of a 3 in. Pulley 1, loose on a 3 in. Rod, but held in place by a Collar and a Ratchet Wheel 2. In contact with the Ratchet is a Pawl 3 on a Pivot Bolt held by Nuts in one of the outside circular holes in the Pulley, the Pawl being held against the Ratchet by a 2½ in. Driving Band slipped over a ⅜ in. Bolt fixed in one of the elongated holes of the Pulley. The drive is taken to a 1in. Pulley 4, also secured on the Rod. It's simple, but effective !

PARTS REQUIRED

1—16b	1—59
1—19a	1—111a
1—22	1—147
2—37a	1—148
1—38	1—186

Among the Model-Builders

By "Spanner"

A skilful model-builder and competition prize-winner — H. Smith, Port Elizabeth, South Africa.

A CONSTANT DIRECTION DRIVE MECHANISM

From Piddletrenthide in Dorset comes an interesting mechanism designed to give a final drive in a constant direction, irrespective of the direction of the input drive. It was suggested by Mr. G. Welch, and as its uses may not be readily apparent it should be mentioned that Mr. Welch used it in the drive to the distance recorder of a speedometer that he built some time ago. The mechanism is shown in Fig. 1.

The device has an input shaft 1, on the inner end of which is a ¾" Contrate. The Contrate is arranged to be in constant mesh with two ½" Pinions 2, each of which is mounted on the output shaft but is not fixed in place. Collars 3 are used to prevent the two Pinions from sliding on the shaft. It will be seen that when the input shaft is turned its Contrate drives the two ½" Pinions 2 in opposite directions. On the output shaft two ¾" Contrates 4 are fixed as shown.

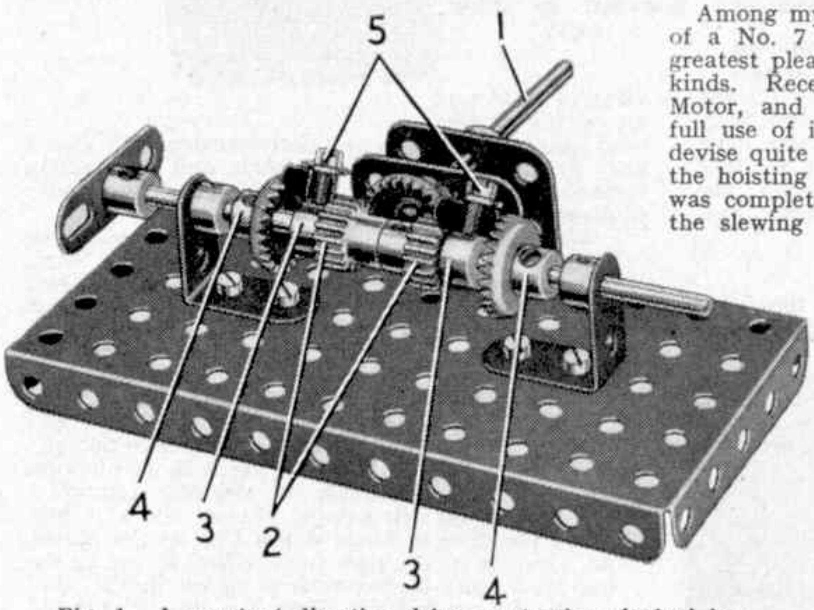


Fig. 1. A constant direction drive mechanism devised by Mr. G. Welch, Piddletrenthide, Dorset.

Screwed tightly into each of the Collars 3 is a ⅜" Bolt 5, on the shank of which a Spring Clip is slipped. Each Clip is arranged so that one of its lugs engages the teeth of one of the Pinions 2, while the other engages the teeth of the corresponding Contrate 4. The Spring Clips act as the pawls in a simple ratchet arrangement, and it is on their free-wheeling action that the working of the mechanism depends.

When the drive is engaged the Pinions 2 turn in opposite directions in relation to each other, but one of them is connected to the output shaft through its ratchet mechanism, while the other ratchet arrangement free-wheels and its Pinion turns idly on the shaft. If the direction of the drive is reversed, however, the ratchet formerly engaged becomes the free-wheeler, while the second ratchet takes over the role of driver. From this it will be seen that the output shaft continues to turn in the same direction, irrespective of reversals in the rotation of the driving shaft.

G. B. Wallis, Rugby, one of the many successful competitors in a world-wide Meccano Competition.

A THREE-MOVEMENT GEAR-BOX

Among my many correspondents is a proud owner of a No. 7 Outfit, who tells me that he finds his greatest pleasure in building model cranes of various kinds. Recently he obtained a No. 1 Clockwork Motor, and quite naturally he is anxious to make full use of it in his models. While he was able to devise quite easily all kinds of schemes for operating the hoisting and luffing movements of his cranes, he was completely stumped when it came to operating the slewing motion, as he found that his stock of gears was insufficient to provide three separate movements, each of which could be independently controlled. Thinking I might be able to help him he wrote to me, and after looking into his problem I was able to suggest the gear-box shown in Figs. 2 and 3. I am glad to say that I have since heard from my correspondent that he finds the mechanism very useful and that he has been able to adapt it for use in several models.

Other model-builders may find the following details useful. The housing for the mechanism is made by bolting two 3½"×½" Double Angle Strips across a No. 1 Clockwork Motor, with a Washer on each bolt between the Motor and the Double Angle Strip. The lugs of the Double Angle Strips support two 3½"×2½" Flanged Plates, and these are connected by two 3½" Strips 1. A 3" Pulley 2 is then attached underneath the Motor by a ½" Reversed Angle Bracket and a Double Bracket, and a 1½" Rod fixed in the boss of this Pulley is passed through a 3" Pulley 3 and is held in place by a Collar. In a model the Pulley 3 is attached to the base of the crane by two Double Brackets.

On the Motor driving shaft is a Worm 4, and two ½" Pinions 5 on the hoisting and luffing shafts respectively are arranged so that by sliding the shafts they can be moved into mesh with the Worm. Each of these shafts is a 5" Rod, and its movement is controlled by a lever that engages between two Collars fixed at one end of it. The lever is a 3½" Rod gripped in a Rod and Strip Connector lock-nutted to an Angle Bracket bolted to one of the Flanged Plates.

The drive to the slewing motion of the crane is brought into operation by sliding a 6½" Rod 6 so as to bring a 57-tooth Gear on it into mesh with the Worm 4. Movement of this Rod is controlled by a lever 7, which is a 3½" Strip lock-nutted to an Angle Bracket bolted to one of the Flanged Plates. In this Strip is a ⅜" Bolt held by two nuts, and this projects between two 1" Pulleys fixed on the Rod 6. The extent of the movements of the three sliding shafts is limited by Spring Clips placed at suitable positions on the Rods.

To complete the mechanism a Driving Band is placed round a 1" Pulley on Rod 6, then passed over a 3½" Rod 8 and round the 3" Pulley 3. Rod 8 is held by Spring Clips in Fishplates bolted to the lugs of a 2½" × 1" Double Angle Strip fixed underneath the Motor.

THE NEW MECCANO PARTS

This year, for the first time since the war, we have been able to add quite a number of new parts to the Meccano System. These have a great variety of uses and together they make a big contribution to the construction of better and more realistic models.

You cannot consider yourself up-to-date in Meccano matters until you have obtained these new parts, and have familiarised yourself with their uses, so if you have not already done so I advise you to go along to your dealer and see them as soon as you can.

In addition to the new parts and Outfits, a completely new range of Instructions Books has been published. These contain many new and attractive models in which good use is made of the new parts.

Some of the new parts have been on sale for some weeks and have already been used in new models described in the *M.M.*, but some of the others have only become available to Dealers very recently. No doubt many model-builders have already added the new parts to their stocks and have discovered for themselves their usefulness and adaptability. I have, however, been asked by some of my correspondents to give a brief description of the new parts and to mention some of their main uses, so I am taking the opportunity of doing so now.

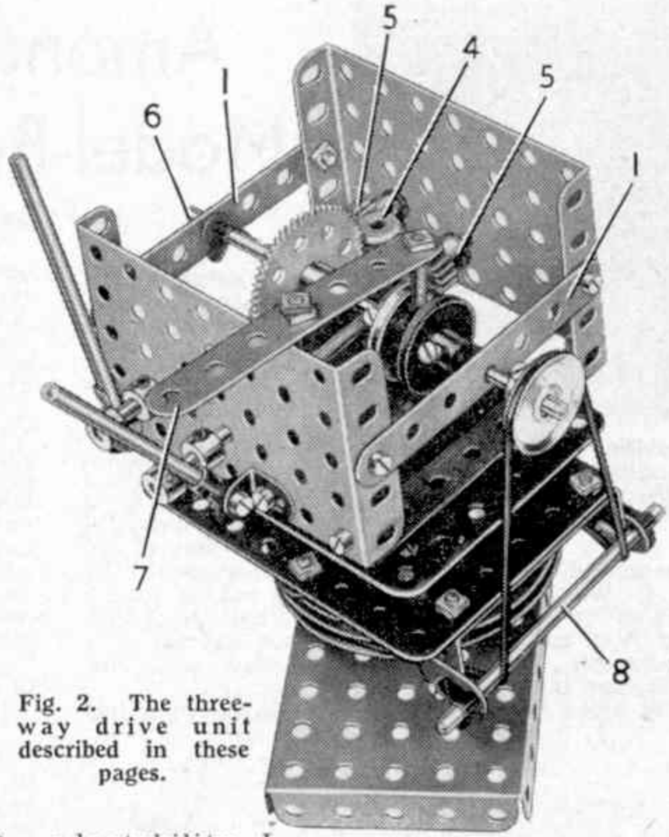


Fig. 2. The three-way drive unit described in these pages.

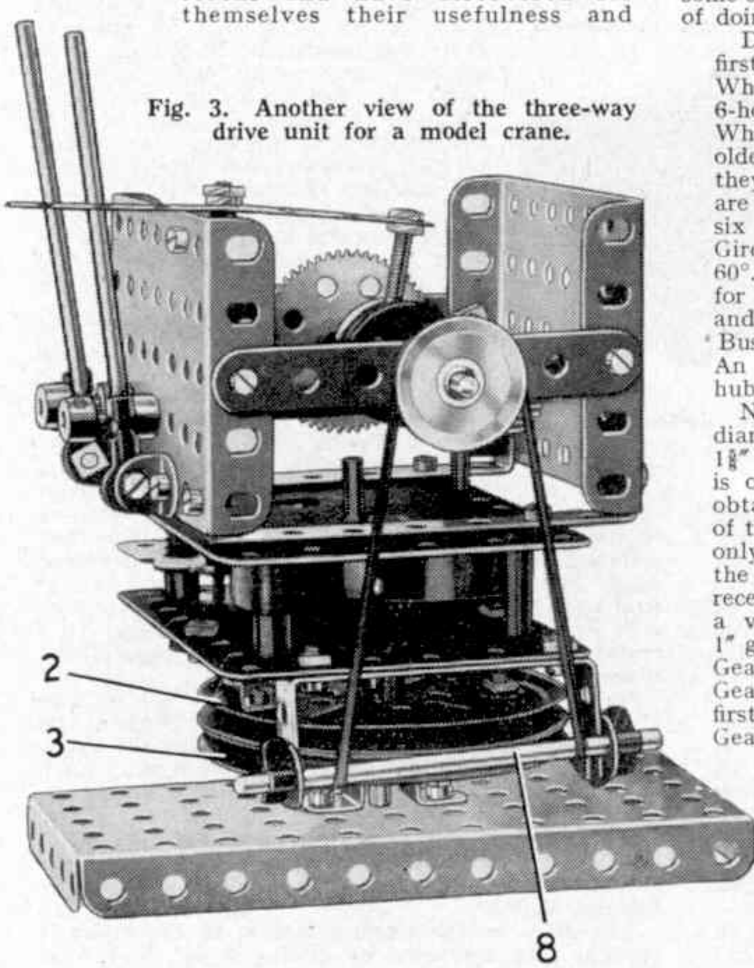


Fig. 3. Another view of the three-way drive unit for a model crane.

Dealing with the parts in catalogue order, the first to be mentioned are Part No. 24b, Bush Wheel, 6-holes, and Part No. 24c, Wheel Disc, 6-holes. These are similar to the 8-hole Bush Wheels and Wheel Discs, which are two of the older and most useful of all Meccano parts, but they can be used in cases where the older parts are not really satisfactory. The provision of only six holes in the new parts enables Strips and Girders to be bolted to them at angles of 30° and 60°. The value of this arrangement is obvious, for it is now quite easy to assemble triangular and hexagonal structures braced to a 6-hole Bush Wheel or a 6-hole Wheel Disc at the centre. An example of the new Bush Wheel in use as the hub of a three-bladed vane is shown in Fig. 6.

Next in the list are Part No. 26c, Pinion 7/16" diam., 15 teeth, and Part No. 27d, Gear Wheel, 1⅝" diam., 60 teeth. The value of these new gears is obvious, for with them a ratio of 4:1 can be obtained in a single stage. Before the introduction of these new gears a ratio of 4:1 could be obtained only by using two stages of gearing, involving the use of four separate gears. As a result of the recent introductions it is now possible to make a very compact four-speed gear-box, using two 1" gears for fourth gear, a ¾" Pinion and a 50-tooth Gear for third gear, a ½" Pinion and a 57-tooth Gear for second gear and the two new gears for first or bottom gear. The new Pinion and the Gear will mesh with other Pinions and Gears in the range, provided that bearings at correct centres are arranged.

Part No. 173a, Adaptor for Screwed Rod, is shown in use in Fig. 4. This part is somewhat similar to the existing Rod Socket, but the hole in its boss is threaded to take a standard Screwed Rod, and it has a plain shank of the same diameter as a standard Axle Rod. The primary purpose of the Screwed Rod Adaptor is to provide a means of mounting Screwed Rods in bearings without danger of damaging their threads. In use a Screwed Rod Adaptor can be fitted to each end of a Screwed Rod and fixed in place by a nut. The plain shanks of the Adaptors then provide the equivalent of a section of standard Rod at each end of the Screwed Rod, and allow it to be journalled in the holes in Strips or Angle Girders just like an ordinary Rod.

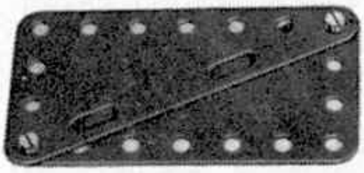
The Right-Angle Rod and Strip Connector, Part No. 212a, resembles one half of a Meccano Hinge without the hinge pin. It is provided with a hole that allow it to be bolted to other parts, and it has a rolled over tube-like end, of such a diameter that a Rod pushed into it is held tightly in place. The Right-Angle Rod and Strip Connector can be used for supporting handrails or for pivotally attaching Strips or Plates to a Rod. A typical example of its use for the latter purpose is in the hinged tailboard of a model lorry. The part has other uses of course which will become apparent in the course of model-building.

Last but by no means least in the list of new parts now available is the splendid range of Triangular Flexible Plates, Parts Nos. 221 to 226. These are available in six sizes as follows: $2\frac{1}{2}'' \times 1\frac{1}{2}''$, $2\frac{1}{2}'' \times 2''$, $2\frac{1}{2}'' \times 2\frac{1}{2}''$, $3\frac{1}{2}'' \times 1\frac{1}{2}''$, $3\frac{1}{2}'' \times 2''$ and $3\frac{1}{2}'' \times 2\frac{1}{2}''$. Together these parts give a considerable boost to the Meccano system, for they are extremely useful in modelling rounded and curved structures such as are so often required in reproducing the graceful curved outlines of modern machines and vehicles. They will deal adequately with the awkward spots in vehicle bodies where the ordinary rectangular Flexible Plates cannot be used successfully, and are ideal for filling wheel arches or edging off the mudguards of a car.

They are made of material similar to that from which the Flexible Plates are made, so that they can readily be pressed into curved form and just as readily flattened out again after use.

Another application for the Triangular Flexible Plates that may not be so obvious, however, is in making the flat plates of non-standard sizes. For instance in Fig. 5, two $3\frac{1}{2}'' \times 2''$ Triangular Flexible Plates are used to form a $3\frac{1}{2}'' \times 2''$ flat plate by bolting them together with their diagonal edges overlapped. Formerly it was necessary to use four $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates to give the same result.

Fig. 5. (Below) Two Triangular Flexible Plates used to form a rectangular flat plate of non-standard dimensions.



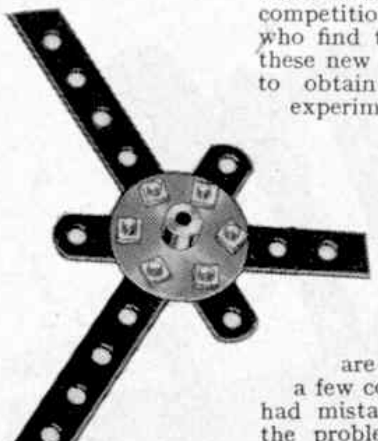
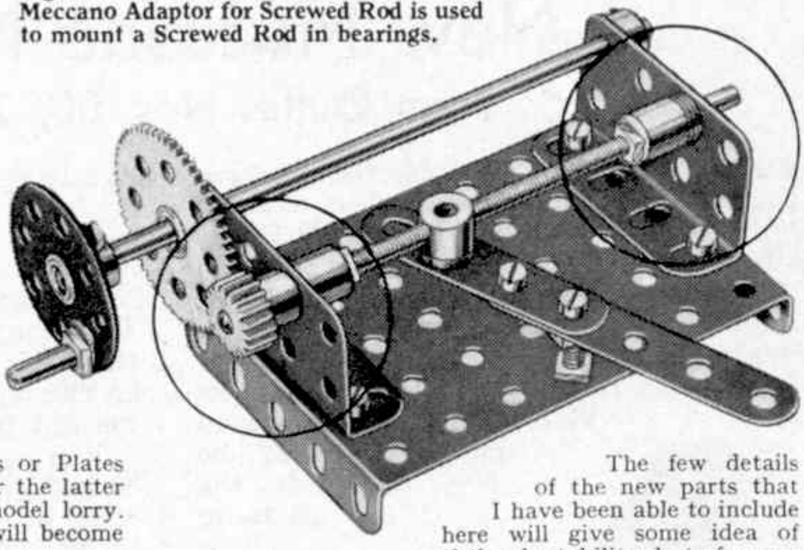


Fig. 6. (Right) The new Bush Wheel, with six holes, (Part No. 24b), used to form the hub of a three-bladed helicopter rotor.

Fig. 4. This illustration shows how the new Meccano Adaptor for Screwed Rod is used to mount a Screwed Rod in bearings.



The few details of the new parts that I have been able to include here will give some idea of their adaptability, but of course the applications I have mentioned by no means exhaust the possibilities of these parts in general model-building. Later on I hope to organise a competition in which prizes will be offered to readers who find the most novel and useful applications for these new parts. So it would be a good idea for you to obtain some of them right now and start experimenting on your own account!

MECCANO BRAIN TEASER (July *M.M.*)

The Prize-Winning Solution

The Meccano "Brain Teaser," of which I gave details in the *Among the Model-Builders* pages of the July *M.M.*, evidently appealed to model-builders, judging from the many letters I received containing suggestions for solving the problem. Some of the methods suggested are most ingenious, but I am sorry to say that a few competitors sent in entries showing that they had mistaken the type of mechanism called for in the problem, for their solutions did not fulfil the functions required.

The judges decided that an entry received from L. Holman, Redruth, Cornwall, was the most skilfully devised and original, and they awarded the prize of One Guinea to this competitor. Holman's mechanism is shown in Fig. 7 on this page. His solution is based on the opposed crank principle, making use of a double crank to overcome the dead-centre difficulty.

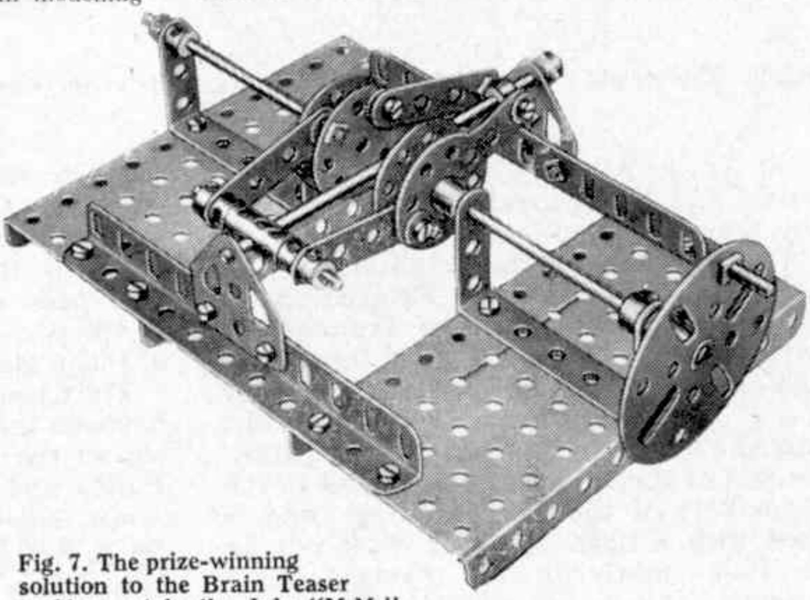


Fig. 7. The prize-winning solution to the Brain Teaser problem set in the July "M.M."