

# MECCANO STANDARD MECHANISMS

## Section V. Clutches, Reversing and Drive-Changing Mechanism

*This article is the sixth of a series explaining some new and interesting aspects of Meccano model-building practice. Gear Ratios, Belt and Rope Mechanism, Pulleys, and Levers have been dealt with already, and the following article describes some simple examples of Meccano Clutches and Drive-changing Mechanism. These movements may be adapted with advantage to numerous Meccano models, and will enhance both their appearance and efficiency in operation.*

THE Meccano Dog Clutch (Part No. 144) lends itself to a number of useful movements, and forms an excellent method by which the driving power of a model may quickly be thrown in or out of gear with the driven mechanism while it is in motion.

Examples of its use are given in Standard Mechanisms Nos. 61 and 63.

In S.M. 61 the jaws of the Dog Clutch 3, carried on the ends of the two Axle Rods 1 and 2, are brought into engagement on operation of a lever 4, which is pivotally mounted on a short Rod 5 secured in a Crank 5A.

The lever rests between two Collars 6 mounted on the shaft 1. This shaft slides in its bearings,

S.M. 61

and its movement, in addition to combining the clutch members 3, throws a Bevel Wheel 7 in or out of gear with a similar wheel 8.

### S.M. 62—Clutch

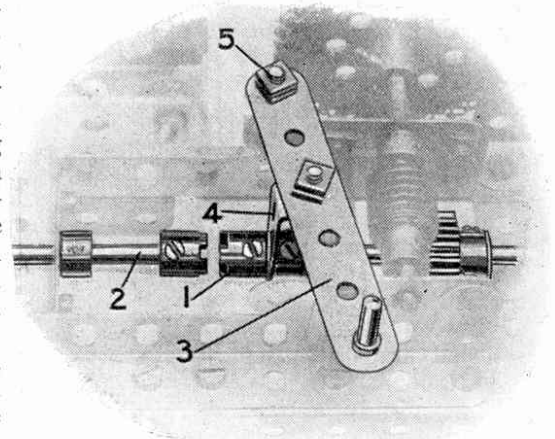
This type of clutch is shown fitted to the Meccano Chassis. The clutch is operated by means of the foot pedal 6 pivoted on the shaft 5, which on being pressed down, slides the Rod 2, to which it is connected by the Double Bracket 7 journalled between the Collar and set-screw 8 and the boss of the Bush Wheel 9.

As the Rod 2 slides in its bearings the Threaded Pins 10 bolted to the Bush Wheel 9 are thrust further into the holes of the  $1\frac{1}{2}$ " Pulley 11, and at the same time the Bevel Wheel 4 is drawn out of gear with a second Bevel Wheel 3 on the driving shaft 1. This allows the

engine to revolve freely, while the chassis remains stationary. Immediately the pressure relaxes on the pedal 6 however, the counter-shaft 2 is pushed back into its former position by the springs 12 (extracted from the Meccano Spring Buffers), and the bevel drive 3 and 4 is brought into gear again.

### S.M. 63—Dog Clutch

This standard mechanism provides another illustration of Dog Clutch mechanism. The clutch member 1, carried on a short Rod which slides in suitable bearings, is brought into engagement with the clutch jaws mounted on a further Rod 2, by means of a lever 3. The latter is pivoted



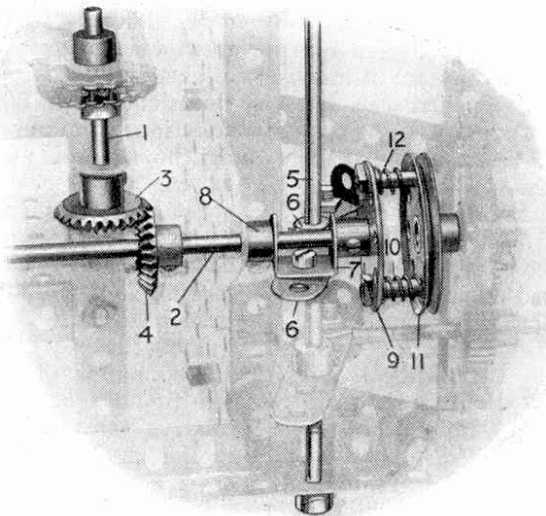
S.M. 63

engagement with the clutch jaws mounted on a further Rod 2, by means of a lever 3. The latter is pivoted (by bolt and lock-nuts) to an Angle Bracket at 5, and also to a Single Bent Strip 4 loosely held between the clutch segment 1 and a Collar and set screw.

A considerable improvement is effected by connecting a Spring to the lever 3, in such a manner that it normally holds the clutch members together. This Spring re-engages the shaft 2 immediately pressure is relaxed on the lever 3.

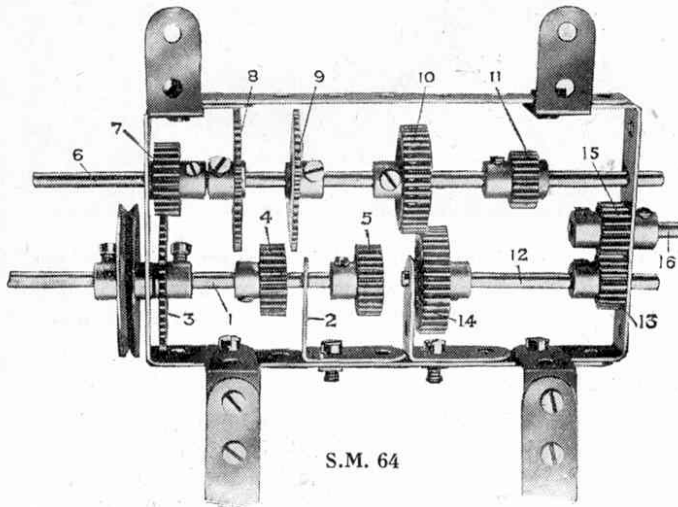
### S.M. 64—Drive-Changing and Reversing Gear

S.M. 64 illustrates a compact example of gear box, which provides two speeds and a reverse gear. The model serves well in demonstrating the type of gear box usually fitted to automobiles.



S.M. 62

The shaft 1 takes up the drive from the engine. This shaft, which is journalled through one end of the gear box and further supported by a 1"×1" Angle Bracket 2, carries a 50-teeth Gear Wheel 3 and two  $\frac{3}{4}$ " Pinions 4 and 5. A secondary shaft 6 is also inserted in the gear box and carries one  $\frac{3}{4}$ " Pinion 7, two 50-teeth Gear Wheels 8 and 9, one 1" Gear Wheel 10 and one  $\frac{1}{2}$ " Pinion 11. A further shaft 12 is next mounted in position, and its outer end carries the drive to the road wheels. The Rod 12 carries a  $\frac{1}{2}$ "



S.M. 64

Pinion 13 and a 1" Gear Wheel 14. A  $\frac{1}{2}$ " Pinion 15 secured to a 1" Rod 16 gears with the Pinion 13.

A lever should be next assembled, and serves to slide the shaft 6 in its bearings. A suitable lever for this purpose will be found in S.M. 52 (see last month's "M.M.") and on reference to this detail it will be seen that the Rod A, connected at right angles to the lever by means of a Coupling, may readily be mounted so as to lie transversely across the shaft 6, with its Collar engaging between the Gear Wheels 8 and 9. A movement of the lever will then push the Rod 6 in either direction as required.

The first position of the Rod 6 provides for a "top" speed, and in this position the Pinion 7 is in engagement with the Gear Wheel 3, Gear Wheels 10 and 14 are in engagement, while the Gears 8, 9 and 11 are all free. In this manner the Gear 3 causes the Pinion 7 on the secondary Rod 6 to revolve twice as fast as the primary Rod 1, and the propeller shaft 12 rotates at the same speed as the shaft 6, since it is driven from that shaft through the one-to-one gear 10 and 14. The Pinion 15 revolves idly in this position.

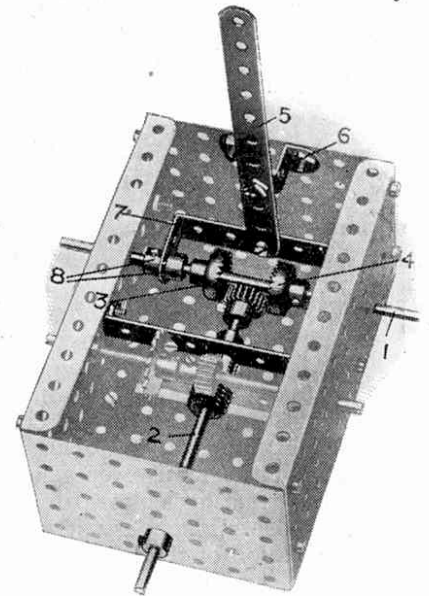
For slow speed the shaft 6 is moved along until the Pinion 7 is out of engagement with the Gear Wheel 3 and the Gear 8 meshes with the Pinion 4, while Gear Wheels 10 and 14 are still engaged. With this arrangement the driving shaft 1 will revolve twice as fast as the driven shaft 12.

A reverse gear is obtained by sliding the Rod 6 still further, until the Gear Wheel 9 is in engagement with the Pinion 5 and

the Pinions 11, 15 and 13 are all in mesh.

S.M. 65—Drive-Changing and Reversing Gear

A Crank 1, secured to the vertical shaft 2, carries a short Rod 3 loosely journalled in a Coupling 4 also secured to the shaft 2. The short Rod 3 protrudes slightly from the lower Collar 5 and enters a hole in the Bush Wheel 6 bolted to the Plate 7. The Rod 2 is loosely journalled through this Bush Wheel 6 and engages, by means of the Pinion and 57-teeth Gear Wheel 8 and 9, a further Rod 10. The latter carries in a Coupling 11 a short Rod 12 which engages between two Collars 13 on an intermediate driving shaft 14. This shaft 14 is thus moved to and fro in its bearings by lifting the Collar 15 and moving the Crank 1 to left or right until the Rod 3, actuated by a small spring 16 (extracted from the Meccano Spring Buffer, Part No. 120A), snaps home into the next hole of the Bush Wheel 6. The central position of the Rod 3 enables the shaft 14 to revolve freely, but the movement of the Rod to the next hole in the Bush Wheel brings the Pinion 17 into gear with another Pinion 18, whilst a move of one hole in the opposite direction brings further Pinions (not shown in the photograph) secured to shaft 14 into engagement with Gear Wheels carried on a further driven shaft (also not shown).



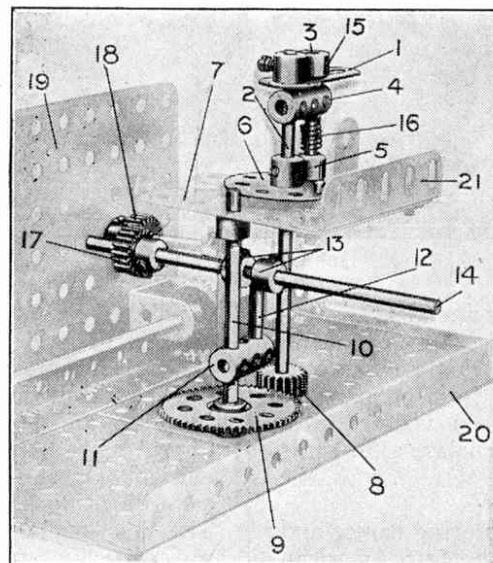
S.M. 66

Thus this movement may be utilised (a) to throw the Motor out of gear with—say—the road wheels of a tractor, (b) to drive the same forward at reduced speed, and (c) to reverse the direction of their rotation.

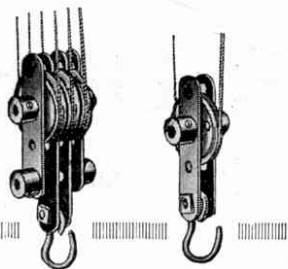
It should be noted that in our illustration a side plate corresponding to that shown at 19 has been removed in order to disclose the mechanism. Normally this plate is bolted to the Girders 20 and 21 and so forms a bearing for the shaft 14.

S.M. 66—Reversing Gear

The driving shaft 1 is caused to engage a  $\frac{1}{2}$ " Pinion on the secondary shaft 2 through one or other of the  $\frac{3}{4}$ " Contrate Wheels 3 and 4. The change is effected by a lever 5 pivoted to a Double Bent Strip 6 and carrying a  $2\frac{1}{2}$ "×1" Double Angle Strip 7, through which the driving shaft 1 is journalled. The Double Angle Strip is held in place on the Rod 1 by means of Collars and set-screws 8. The direction of rotation of the Rod 2 varies according to the Contrate Wheel which drives it.



S.M. 65



Meccano Pulley Blocks

# Suggestions Section

Edited by "Spanner"

## (29)—Meccano Automatic Speed Governor

Fig. 29 shows a speed regulating device that may be used with advantage in connection with the Meccano Clockwork Motor. It is based upon the centrifugal principle, and the apparatus is so arranged that the revolving weights, tending to fly outward, are brought to bear upon the inner surface of a Wheel Flange, the friction so produced checking the speed of the Motor. Incidentally, this type of governor is similar to that already fitted to Meccano Clockwork Motors and Hornby Trains, although built on a much larger scale.

Actual tests carried out with the governor fitted to a Clockwork Motor yield varying results, since the period during which a Motor will continue to operate at a single winding largely depends upon the amount of service that it has given, for a Meccano Clockwork Motor will run longer and more freely after it has been in use for some time. However, it is safe to say that the governor will increase the running time of the Motor by 25% or 33½% with very little waste of power. The advantages obtainable from such an arrangement applied to any model where it is desired to overcome a tendency to "race" are obvious.

### Details of Construction

Its construction is quite simple, as will be seen. A Bush Wheel 1 (Figs. 29 and 29a) is secured to a shaft 2, which is driven from the main Motor spindle by means of the 57-teeth Gear Wheel and ¼" Pinion shown. Two 1½" Strips 3 are mounted on Pivot Bolts secured in opposite holes of the Bush Wheel, and are spaced at the correct distance from the wheel by means of a Collar (without set screw) and Washer placed on each bolt.

The weights consist of two ½" Pulleys 5 secured by their set-screws to the shanks of ⅛" Bolts passed through the outer ends of the Strips 3, sufficient play being allowed to permit of their free rotation.

When stationary, the 1½" Strips are drawn together by a small piece of Spring Cord 4 (Fig. 29a) secured to the centre of each by a nut and bolt. A Wheel Flange 6, bolted to a Bush Wheel mounted on a shaft 7, is placed in position so that its flange encompasses the weights 5. The shaft 7 is held rigidly in position by the set-screw of a Crank 8, which may be bolted to any

suitable framework 9. Washers are placed beneath the heads of the two bolts securing the Wheel Flange to the Bush Wheel, to prevent their shanks protruding too far in the interior of the Wheel Flange.

On the speed of the Motor exceeding a

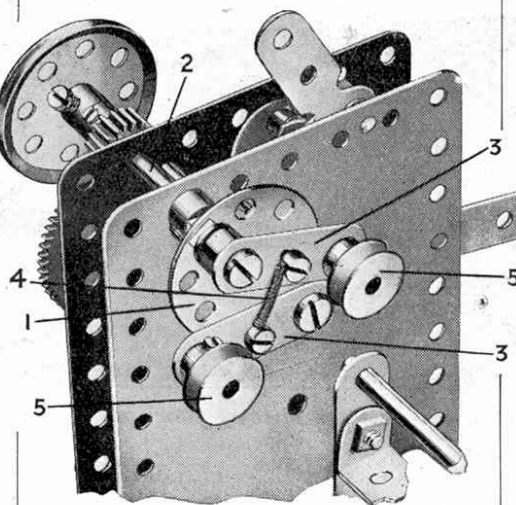


Fig. 29a

certain limit, the centrifugal force exerted by the weights 5 overcomes the Spring Cord 4 and the Pulleys move outward until they make contact with the inner surface of the Wheel Flange 6. This results in the retarding effect already mentioned.

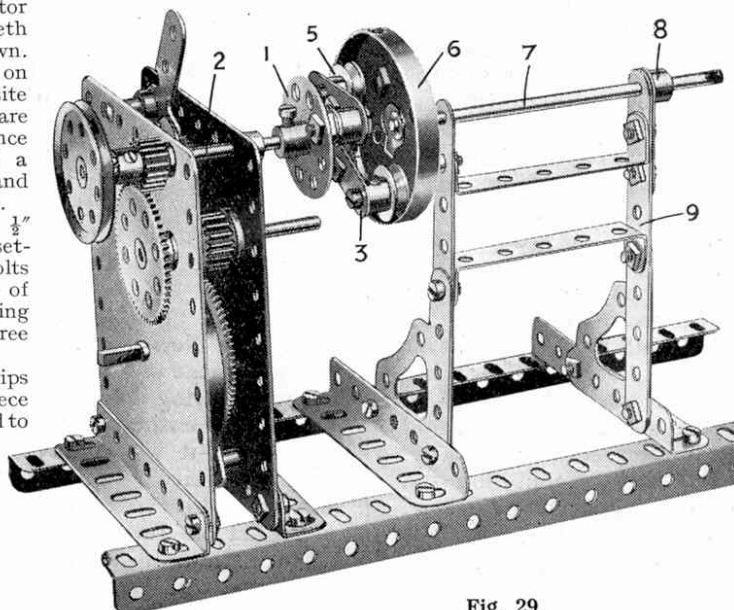


Fig. 29

## (30)—Meccano Cramp

(G. S. Marsh, Blackpool)

Further to the several Meccano "tools" that have already been described in this Section, we are able now to reproduce an ingenious Meccano Cramp (Fig. 30).

Our contributor used this device in connection with Meccano model-building as well as for fretwork purposes. For example, in building the Stiff-Leg Derrick, he was able to dispense with the necessity of screwing the model to a wooden base by anchoring it to the edge of a table with two of these cramps. Again, often it is found advantageous to secure portions of a large model during construction to the table or bench at which one is working, and this is another purpose for which the cramp will be found extremely useful.

The model consists of a Threaded Rod (1) engaging the bore of a Threaded Crank (2) bolted to a 2½" x 1½" Double Angle Strip 3. A Threaded Boss 4 is mounted on the end of the Rod 1 and locked in position by a nut 5. A 1½" Contrate Wheel, with set-screw removed, is inserted on the small portion of the Threaded Rod protruding through the Boss 4; the teeth of the wheel grip the bench when the Threaded Rod is rotated. A second Threaded Crank 6, bolted to a 2½" Strip to form a handle, is mounted on the other end of the Threaded Rod 1, and is locked in position by a nut on either side.

For heavier work, it may be found advisable to substitute a frame built up from short Angle Girders in place of the Double Angle Strip, for a more secure grip could then be obtained.

## (31)—Brake Attachment for Hornby Rails

(H. R. Hadden, West Moors, Dorset, and J. Hardy, Burnley)

Two competitors have submitted suggestions for a simple brake-rail for use with Hornby Trains. It consists of an Angle Bracket loosely bolted to the hole in the centre of one of the rail sleepers (Fig. 31).

The Angle Bracket should be bolted with its longest arm in a vertical position, ready to engage the small projecting lever on the Hornby loco which brings the brake into operation. The train may be allowed to pass unaffected by turning the bracket sideways—that is, with its edge towards the locomotive.

Our contributors claim that the chief advantage to be obtained from this idea is the fact that it may be fixed easily and quickly in any desired position in the layout, such as before points, signals, platforms, etc. A few trials should be carried out to test the efficiency of the attachment and it will probably be found that improved working is obtained by bending the bracket so that it presents an obtuse angle to the locomotive.

### (32)—Automatic Train Indicator

(L. Driscoll and D. Currie, Manchester)

We have received from the above contributors two similar suggestions for an arrangement by which a station-bell, fog-signal, or like device, may be set in motion, or lamps lit, when a Hornby Train passes some predetermined spot in the track layout. The device is operated by an electric battery or accumulator and the simple connections required are as follows.

A wire connects one battery terminal to one terminal of the bell, buzzer or whatever apparatus is used. The second terminal on the latter is connected to a wire making contact with the metal rails, whilst a wire from the other battery terminal passes under one of the sleepers in the track, and its end, stripped bare, projects upward between the rails. It is important to see that this wire does not make electrical contact with the rail. The train brushes against the bare wire in passing and the circuit is completed, since the current passes through the train to the rails.

Many other suggestions are to hand concerning electrical signalling systems and these will be carefully examined and published, if suitable, in this section.

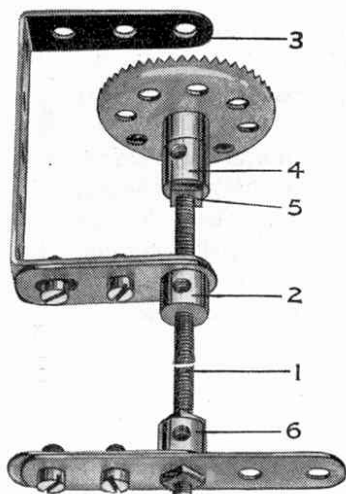


Fig. 30

whatever apparatus is used. The second terminal on the latter is connected to a wire making contact with the metal rails, whilst a wire from the other battery terminal passes under one of the sleepers in the track, and its end, stripped bare, projects upward between the rails. It is important to see that this wire does not make electrical contact with the rail. The train brushes against the bare wire in passing and the circuit is completed, since the current passes through the train to the rails.

Many other suggestions are to hand concerning electrical signalling systems and these will be carefully examined and published, if suitable, in this section.

### (33)—Small Rubber Tyres

(H. Witherall, Weston-super-Mare)

In several models of motor-cars, etc., built with Outfits Nos. 2 and 3, Flanged Wheels are employed for the road wheels, and our contributor points out that the small rubber rings found on sewing machines form very satisfactory "tyres" for use in connection with these models.

The rings are placed on the wheel flanges and held in position by 1½" Strips mounted on the axle and pressed tightly against the wheels by means of Collars and set-screws. The rings may be obtained for a few pence each at all sewing machine depots.

### (34)—Anchorage for Telpher Span

(H. Harris, Birtley, Co. Durham)

Many of our readers whilst constructing the Telpher Span (see Models Nos. 36 and 108 in the complete Manual), probably have experienced some difficulty in finding a suitable point at which to secure the pulley bracket and end of the guiding

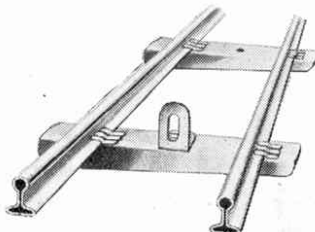


Fig. 31

cord in this model, for it is not always an easy matter to obtain permission to screw them in the middle of a nicely decorated wall! Master Harris has solved this little problem in a most interesting manner, however, and at the same time has evolved a method that enables one to assemble or dismantle the model in the space of a few moments.

The device consists of an Axle Rod 1 passed through the keyhole in the lock of door, as shown in the diagram, Fig. 34, and clamped tightly in position by a Bush Wheel 2 on one side of the door and a 1" Pulley with set-screw 3 on the other. The guiding cord, on which the trolley or travelling bucket runs, is tied to an Angle Bracket 4 bolted in the lower hole of the Bush Wheel, while the operating cord is led round a 1" Pulley 5 mounted on a short Rod journalled in the Cranked Bent Strip 6. The latter is secured very rigidly to the Bush Wheel.

The main portion of the model should be screwed, if possible, to the floor or table, or heavily weighted in order to withstand the strain on the cords.

### (35)—Right-Angle Drive

(G. Wilcox, Broadstone)

George Wilcox suggests that shafts rotating at right-angles to one another may be coupled together by means of two Bush Wheels and a few nuts and bolts. The latter are bolted to the Bush Wheels, one in every hole, and the wheels are mounted on the shafts so that the shanks of the bolts intermesh. In several cases this contrivance may be used in place of Bevel Gears.

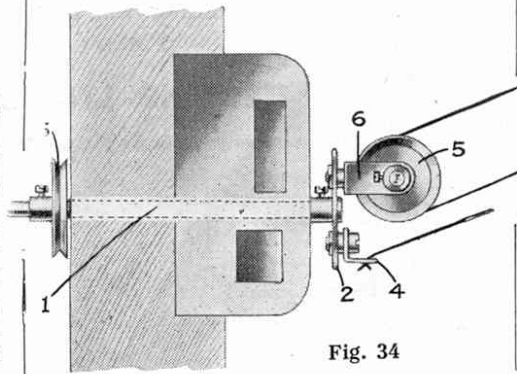


Fig. 34

### (36)—Accumulator Carrier made with Meccano

(J. Heap, Heywood, Lancs., and C. F. Chell, Wolverhampton)

An accumulator has always proved a troublesome article to carry, on account of its weight and the danger of spilling acid upon one's clothes. Two contributors submit ideas for an easily made device, however, that will overcome these difficulties to a large extent.

The apparatus consists of a base built up from short Angle Girders, or other parts, to the necessary size. Strips 2 are pivotly mounted at each corner on Axle Rods passed through the base, and are connected to the upper Strips 3, the joints consisting of Rods 4. The length of the Strips 2 and 3 depends upon the size of the accumulator to be accommodated.

The handles are formed by Axle Rods 5 passed through the ends of the Strips. A more comfortable grip will be obtained by placing lengths of rubber tubing 6 on the Rods, or better still, by using round wooden pegs in their place.

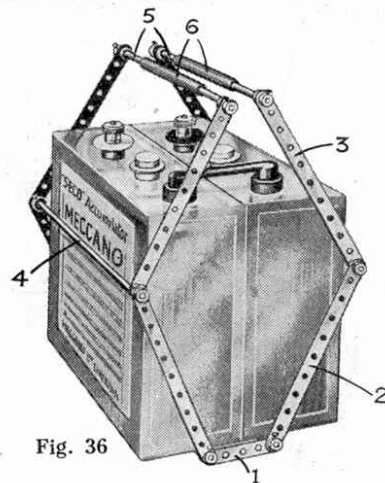


Fig. 36

It is interesting to note that Mr. Heap was awarded first prize for his idea in a "Wireless Accessories" Competition in the "Manchester Evening Chronicle."

### (37)—Miniature Concrete Blocks

(R. H. Tresise, Burton-on-Trent)

Miniature concrete blocks will add considerably to the fun that may be obtained from such models as "Titan" cranes, and will serve admirably as ballast in loading Hornby goods wagons. They may be made by mixing together a little sand, cement, and water, and moulding in tins or match-boxes.

### This Month's Awards

Five shillings will be awarded to each of the contributors concerned for Suggestions Nos. 30, 34, and 36 (two awards); whilst the senders of Nos. 31, 32, 33, 35, and 37 will each be presented with a Certificate of Merit, together with a complimentary copy of "Meccano Standard Mechanisms."

Replies to suggestions concerning Meccano and Hornby Train improvements appear on page 263.