

# SOME USEFUL MECHANISMS FOR MECCANO MODELS

AS LONG as a Meccano model-builder occupies himself merely by building the hundreds of models shown in the Instructions Books the work of construction is delightfully simple and easy and no undue brain work is necessary. However, no keen Meccano boy, or girl for that matter, is content to build only the models described and illustrated in the Instruction Books. Sooner or later he desires to branch out into inventing and constructing models based on his own ideas and, with this in mind, we have designed many different kinds of mechanisms especially so that they may be applied to more than one type of model – in many cases without any alteration from our standard pattern – although in some few instances slight modifications may be required. Those boys who like designing and inventing their own models will find these movements very helpful especially as they appear from time to time in Meccano Magazine models.

One of the most popular subjects for Meccano models is the wide range of cranes and the first of the mechanisms we are describing is a useful Automatic Grab device that can be fitted to several different kinds of cranes of the larger type. It is what is known as a single suspension grab and it is shown in Figs. 1 and 2. The grabbing mechanism is very efficient and an important feature is that the trip

device that operates the grab is remarkably easy to adjust.

The jaws of the grab are made by bolting  $2\frac{1}{2}$  x  $1\frac{1}{2}$  in. Triangular Flexible Plates to the flanges of  $2\frac{1}{2}$  x  $1\frac{1}{2}$  in. Flanged Plates, the Triangular Flexible Plates being strengthened by  $2\frac{1}{2}$  in. Strips and  $2\frac{1}{2}$  in. Curved Strips joined at their upper ends by Fishplates. A 1 in. Triangular Plate 1 is lock-nutted to the jaws on each side and a  $2\frac{1}{2}$  x  $\frac{1}{2}$  in. Double Angle Strip 2 is bolted between the upper ends of the Curved Strips. A  $1\frac{1}{16}$  in. radius Curved Plate is clamped between this Double Angle Strip and a  $1\frac{1}{2}$  x  $\frac{1}{2}$  in. Double Angle Strip 3, the lower corners of the Curved Plate being connected to the Flanged Plate by Angle Brackets.

A Coupling is fixed by a Nut on a  $\frac{3}{4}$  in. Bolt passed through each Triangular Plate 1, the two Couplings then being connected by a 2 in. Rod. Each Coupling supports a  $4\frac{1}{2}$  in. Rod 4, on which another Coupling 5 is free to slide. Couplings 5 are connected by two  $2\frac{1}{2}$  in. Rods, each of which carries a further Coupling 6, placed centrally on the Rod. Four  $2\frac{1}{2}$  in. Strips are passed over the ends of the  $2\frac{1}{2}$  in. Rods and over 2 in. Rods supported in Double Angle Strips 3, to be held on the Rods by Spring Clips.

Each Rod 4 carries at its upper end a Handrail Coupling in which a Pivot Bolt is free to turn. A 2 in. Strip 7 is placed on the Pivot Bolt along

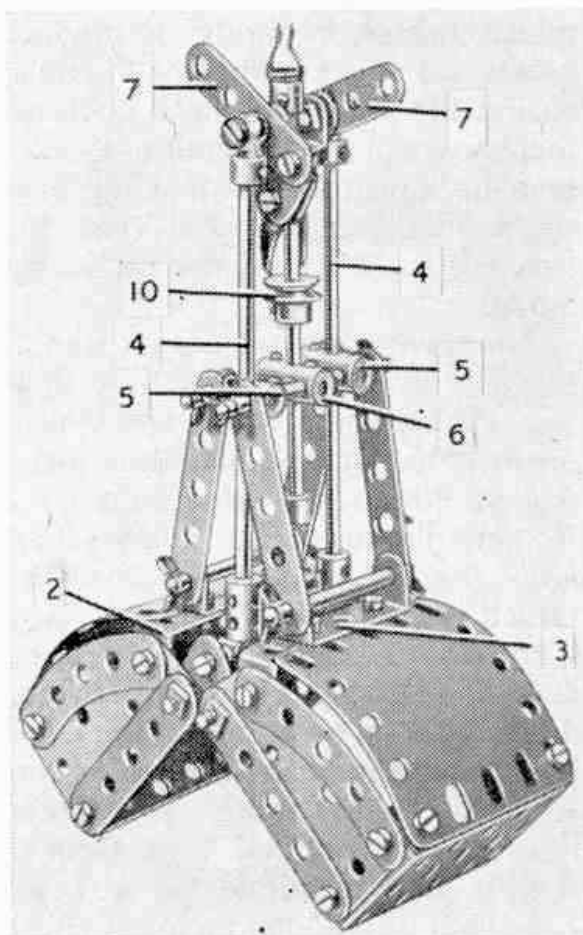
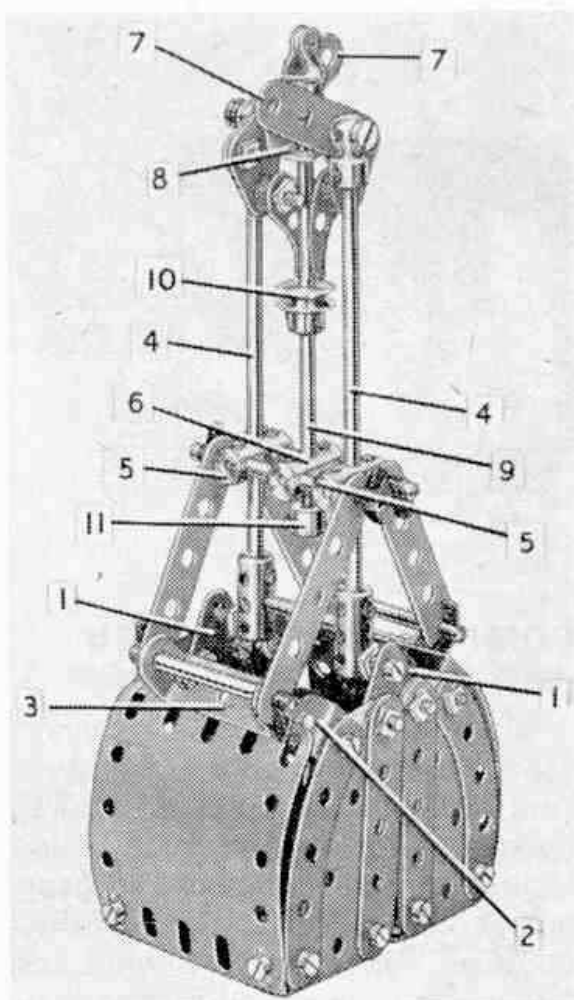
with a 1 in. Corner Bracket that is bolted to one end of the Strip. The Pivot Bolt is then fixed by its Nuts in a Double Bracket 8. A Pawl without boss is attached to each Corner Bracket by a  $\frac{1}{2}$  in. Bolt, but is spaced from it by five Washers on the shank of the Bolt.

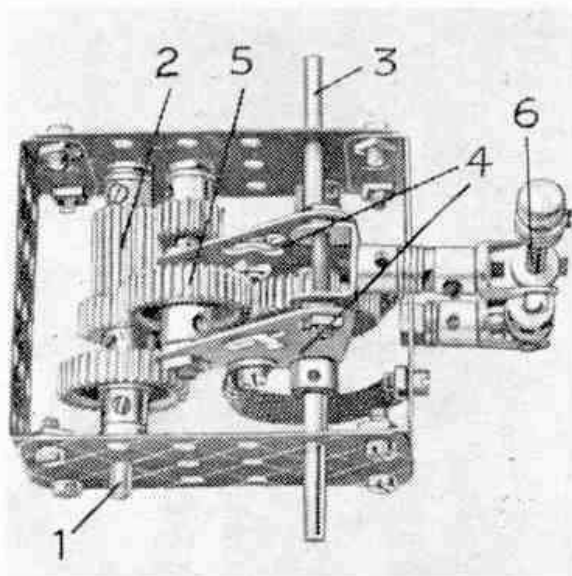
A  $4\frac{1}{2}$  in. Rod 9 is now passed through Double Bracket 8 and a  $\frac{1}{2}$  in. Pulley 10 is fixed on the Rod. The Rod is then passed through Coupling 6 and a Collar 11 is fixed on its lower end. An End Bearing placed at the upper end of Rod 9 serves to attach the grab to the crane hook.

In addition to the grab a suspender or trigger ring is required. This can take any convenient form, such as a Cylinder or a ring of Curved Strips, and it should be suspended from the crane jib at the height at which it is required to discharge the grab. The hoisting Cord should pass freely through the centre of the ring, which should be weighted sufficiently to depress the Strips 7 of the grab when these engage the ring as the grab is raised.

The sequence of operations is as follows: assuming the grab to be on the ground with the jaws open (Fig. 2), when the hoisting Cord is raised, Pulley 10 engages the Pawls, which lift Rods 4 and thus close the jaws. The grab can now be lifted, until the Strips 7 engage the suspender ring and, as the Strips are depressed, they move the Pawls clear of Pulley 10. The Rods 4 are then released and the jaws open to discharge the contents of the grab.

**Top, fig. 1:** a particularly useful mechanism for advanced crane-model builders is this Single Suspension Grab fitted with an automatic discharge unit. **Right, fig. 2:** another view of the grab in the open position. Note the change in the automatic discharge unit.





### COMPACT THREE-SPEED AND REVERSE GEAR-BOX

Many kinds of models require a variable-speed gearbox of some kind and model-builders finding themselves in need of such a unit should consider whether the gearbox shown in Fig. 3 will meet their purpose. This gives 3-forward and one reverse speed and it is particularly interesting for its compactness which makes it handy in models where space is confined. A suitable casing for the mechanism, such as that shown in the illustration, should first be constructed, making any slight modifications that may be required to fit it into the particular model.

The driving shaft is a 3 in. Rod 1 that carries a  $\frac{1}{2} \times \frac{3}{4}$  in. Pinion 2, a  $\frac{3}{4}$  in. Pinion and a 1 in. Gear, which are fixed to it in the positions shown. A  $\frac{1}{2}$  in. Pinion is pivoted on a  $\frac{3}{4}$  in. Bolt fixed to the casing, and meshes with the Pinion 2. The layshaft, which is also the driven shaft, is a 4 in. Rod 3, and it carries a 1 in. Gear and two  $1\frac{1}{2}$  in. Corner Brackets 4 spaced from each side of the Gear by Washers and held in place on the Rod by two Collars. This Gear meshes with another 1 in. Gear 5 that is free to rotate on a 1 in. Screwed Rod held in Corner

Fig. 3: this compact Three-speed and Reverse Gearbox has the advantages over the more usual types of silent gear-change at any speed and less wear on the teeth of the component gears.

Brackets. Two Springs bolted to the Corner Brackets pass around Rod 3 and are then attached to the gearbox casing.

Corner Brackets 4 are also attached to a 1 in. Screwed Rod on which is mounted a Large Fork Piece that is lock-nutted by means of a  $1\frac{1}{4}$  in. Bolt and Nuts to the boss of a Swivel Bearing. The Swivel Bearing is attached to the gear selector Rod 6, the lower end of which is inserted in a Universal Coupling fixed to the casing by a Threaded Pin.

To engage a particular gear train the selector Rod 6 is first moved to the right, as seen in the photograph thus releasing gear 5 from engagement. For a lower gear or for reverse ratio the selector is then moved away from the operator, while, for a higher gear ratio, it is pulled towards him.

The drive may be transmitted from the driven shaft 3, to the model in which the mechanism is incorporated by meshing a  $\frac{1}{2} \times \frac{3}{4}$  in. Pinion, mounted on the Rod with a similar Pinion fixed on a Rod journalled at one of its ends in the gearbox casing.

The advantages of this type of gearbox over the usual kinds are that the gear changing is silent while working at any speed, and there is less wear of the teeth of the gears than in the more conventional types where the gears are slid into mesh while rotating.

### DIFFERENTIAL MECHANISM FOR A MODEL CAR

Another useful mechanism — shown in Fig. 4 — is a Differential designed for use in a model car or lorry where the usual shaft drive has



been dispensed with and Sprocket Chain substituted.

To construct it, a 2 in. Sprocket Wheel 1 is secured to a Bush Wheel 2 by means of two  $1\frac{1}{2} \times \frac{1}{2}$  in. Double Angle Strips, each of the four Bolts fixing these carrying two Washers for spacing purposes. A Rod of sufficient length to reach one of the road wheels is now passed through the boss of the Sprocket Wheel and fitted with a  $\frac{3}{4}$  in. Contrate Wheel 3. Sufficient length of the Rod is left projecting in order to allow it to pass into the longitudinal bore of a Coupling 4, then a second Rod, passing through the Bush Wheel, is fitted with a  $\frac{3}{4}$  in. Contrate Wheel 5 and inserted in the other end of the Coupling.

The transverse bore of the Coupling is fitted with a 2 in. Rod that is secured in place by a Grub Screw. This Rod forms a bearing for two  $\frac{3}{4}$  in. Pinions 6 that are each spaced away from the Coupling by means of two Washers, so that the Pinions fit snugly against the Double Angle

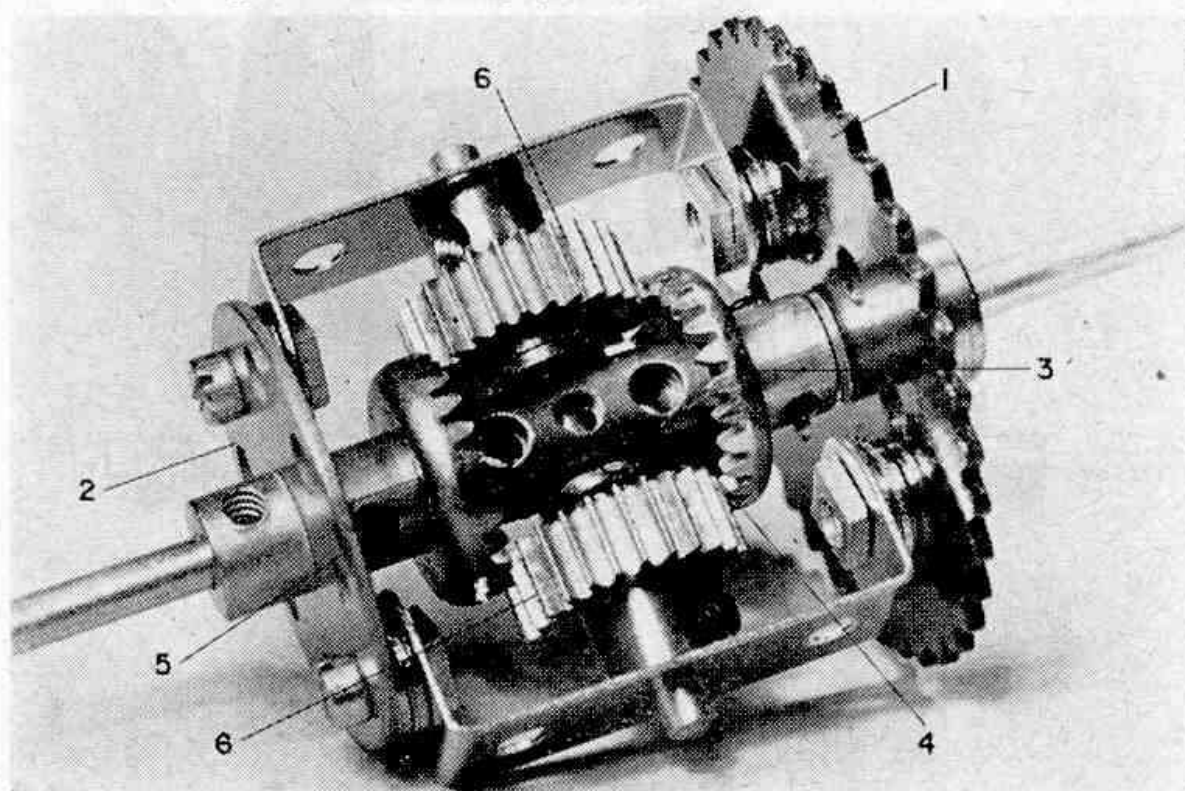
Strips forming the frame of the mechanism. The rear road wheels of the car or lorry are fitted on to the ends of the Rods journalled in Bush Wheel 2 and Sprocket Wheel 1 respectively and, when installed in the model, the drive from the Electric Motor or other power unit is taken by Sprocket Chain to 2 in. Sprocket 1.

The purpose of the differential mechanism is to allow the inner of the two rear wheels of the vehicle when turning a corner, to rotate more slowly than the outer wheel while still allowing the drive to be transmitted to both wheels.

### A MECHANISM FOR CRANE BUILDERS

For use in model cranes of the larger and more ambitious types and in certain other kinds of models where a drive of different speeds and capable of being reversed is required, we have designed the comparatively simple but efficient mechanism shown in Fig. 5. This

Fig. 4: a mechanism that can be fitted to many models is this simple but highly effective Differential designed to be driven by Sprocket Chain instead of the usual shaft drive.



does not require many parts and the framework in which it is housed can of course be modified as required to enable it to be fitted into a particular model. The mechanism is designed to give a slow speed in one direction and a rapid speed in reverse, and either Rod 5 or Rod 8 may be used as the driving or input shaft.

Rod 8 is capable of sliding in its bearings and is controlled by a suitable hand lever 12. This Rod carries two Contrate Wheels 9 and 10, which are  $\frac{3}{4}$  in. and  $1\frac{1}{2}$  in. in diameter respectively, and on operation of the lever 12 one of them is brought into engagement with one of two  $\frac{1}{2}$  in. Pinions secured to the Rod 5. Hence if the Rod 8 is used as the driving shaft and the large Contrate Wheel is thrown into gear with its respective  $\frac{1}{2}$  in. Pinion, the Rod 5 is driven nearly 3 times as fast as the Rod 8. This is because the gear ratio between a  $\frac{1}{2}$  in.

Pinion and a  $1\frac{1}{2}$  in. Contrate Wheel is approximately  $2\frac{2}{3}:1$ .

Alternatively, if the small Contrate Wheel 9 is thrown into engagement, the Rod 5 revolves only a little faster than the driving Rod, the approximate ratio between the two being  $1\frac{1}{3}:1$ .

If the sliding Rod 8 is required to remain in constant gear with toothed wheels on a further driving Rod, this can be arranged by placing  $\frac{1}{2}$  in. Pinions end to end on the Rod 8, making sure that the teeth of the two Pinions line up accurately with each other. These Pinions act as a single toothed unit that may be engaged by a Gear Wheel on the further driving shaft, and the extra width provided by the butted Pinions allows for the longitudinal sliding movement.

Alternatively if a  $\frac{1}{2} \times \frac{3}{4}$  in. Pinion is available this may be used in place of the two separate  $\frac{1}{2}$  in. Pinions.

**Fig. 5: a mechanism that is of particular use to crane builders is this Two-speed Reverse Gearbox in which either shaft 5 or shaft 8 will serve as the input or output shaft, as required.**

