

# Among the Model-Builders

By "Spanner"

## Two-Speed and Reverse Gear-Box

The gear-box shown in Figs. 1 and 2 is simple in design and easy to assemble. It provides two forward speeds and a single reverse speed, and is suitable for use in quite small vehicles.

The framework for the gear-box housing consists of two  $2\frac{1}{2}'' \times 1\frac{1}{2}''$  Double Angle Strips arranged with their lugs overlapping. A  $1\frac{1}{2}''$  Flat Girder is bolted to each end of the frame by its slotted holes, and is adjusted so that

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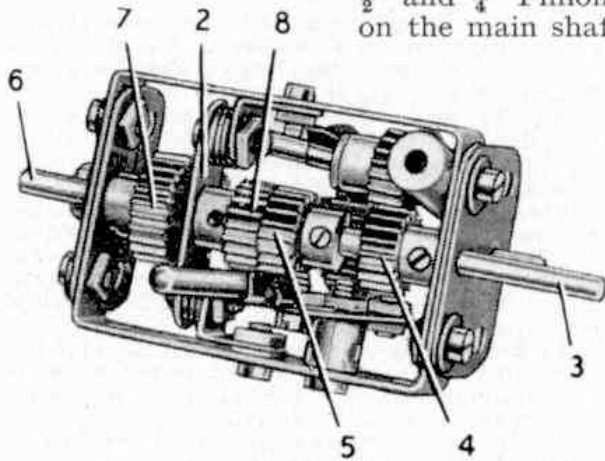


Fig. 1. A compact two-speed and reverse gear-box suitable for model vehicles.

and the layshaft will mesh accurately. At one end of the frame a bolt is screwed tightly into a centre threaded hole of a Coupling 1. A  $1\frac{1}{2}''$  Strip 2 is spaced from two Angle Brackets by four Washers on each of the  $\frac{3}{8}''$  Bolts that hold it in place. The Angle Brackets are fixed to the sides of the frame.

The driving shaft is numbered three in the illustrations and it carries two  $\frac{1}{2}''$  Pinions 4 and 5, but it should be noted that it projects only halfway into the bore of Pinion 5. The output shaft 6 is mounted as shown and is fitted with a  $\frac{3}{4}''$  Pinion 7 and a  $\frac{1}{2}''$  Pinion 8. Rod 6 extends into the free portion of the bore of Pinion 5. The layshaft 9 carries a Collar 10, two Washers, a  $\frac{3}{4}''$  Pinion 11, a  $\frac{1}{2}''$  Pinion 12 and a second Collar. A reverse  $\frac{1}{2}''$  Pinion 13 is mounted freely on a  $1\frac{1}{2}''$  Rod fixed in the Coupling 1, and is held on the Rod by a Spring Clip.

The gear ratios are obtained by sliding the layshaft in its bearings. When the shaft is at the extreme right (Fig. 1), Pinion 11 meshes with Pinion 13, which is in constant

mesh with Pinion 4. The Pinion 12 engages the Pinion 7, and so provides the reverse drive. When the layshaft is moved to the left (Fig. 2), Pinion 11 disengages Pinion 13 and neutral gear is obtained.

Further movement of the layshaft to the left brings Pinion 11 into mesh with Pinion 5, but Pinion 12 still engages Pinion 7. This provides first or low gear. When the layshaft is moved to the extreme left Pinion 12 slides out of mesh with Pinion 7 and Pinion 11 engages both the Pinions 5 and 8. Thus a direct drive is obtained to give top or high gear.

The sliding movement of the layshaft is controlled by a Rod held in a Rod and Strip Connector bolted to a Double Arm Crank. The Double Arm Crank is held by a nut on a Pivot Bolt in one side of the frame. A  $\frac{3}{8}''$  Bolt in the free arm of the Double Arm Crank engages between the Collar 10 and the Washers placed next to Pinion 11.

## Meccano Helps a Convalescent

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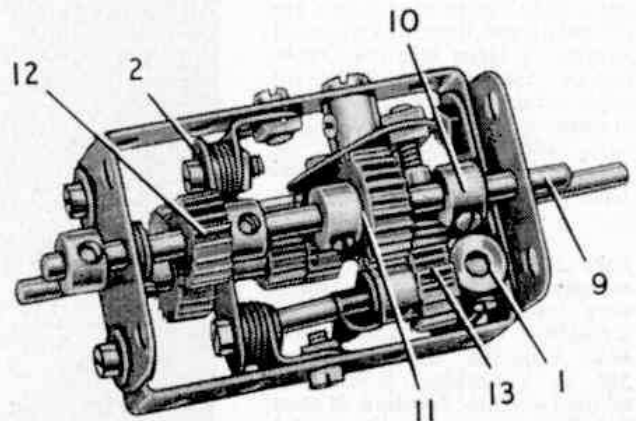


Fig. 2. An underneath view of the gear-box showing the sliding layshaft and the reverse pinion.



Edgard Lefevre, Brussels, is one of many Belgian Meccano boys who submit entries for M.M. Competitions. Edgard is only ten years of age and already his name has appeared in our prize lists.

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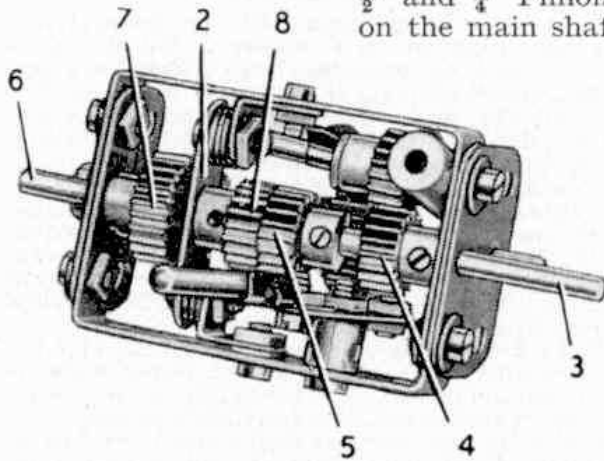


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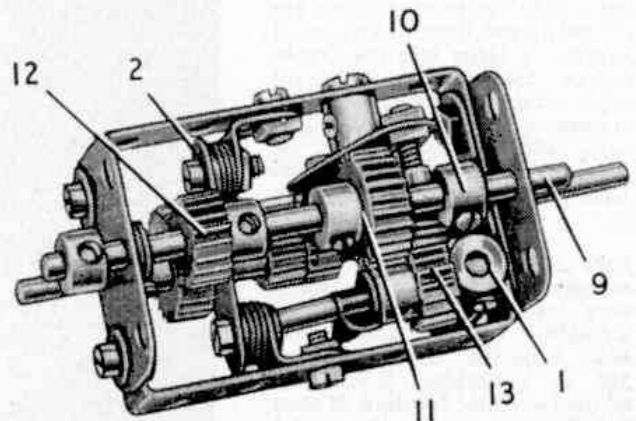


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## A CASH REGISTER BUILT IN MECCANO

One of the most interesting and "off the beaten track" models that has come to my notice for some time is seen in the illustration on the right. It is a reproduction of a National Cash Register, and was built by Anthony Boyer, Guildford. The model was greatly admired by executives of the National Cash Register Company Ltd., London, and Boyer was invited to visit the Company's Offices with his model. The photograph reproduced on this page was taken on the occasion of his visit.

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

Motor vehicles are among the most popular subjects for Meccano models, and I receive many letters from readers seeking help in designing gear-boxes suitable for cars and lorries of various kinds.

One of the most important points in any mechanism designed for a model vehicle is that it should be as compact as possible, and the three-speed and reverse gear-box I am describing this month has been designed with this in mind. The gear selector mechanism of the gear-box is a particularly attractive feature that follows closely actual practice and permits a quick and positive gear change.

The complete gear-box is shown in Fig. 1, and an "exploded" drawing showing the arrangement of the shafts and the positions of the gears, is reproduced as Fig. 2.

The base of the housing consists of a  $2\frac{1}{2} \times 1\frac{1}{2}$ " Flanged Plate, fitted along its sides with  $4\frac{1}{2}$ " Angle Girders that are used to attach the gear-box to the engine unit. The bearings for the shafts at each end are provided by two  $1\frac{1}{2}$ " Flat Girders bolted to the flanges of the Flanged Plate. Each set of Flat Girders is arranged so that the round holes overlap, and a Fishplate 1 is bolted to each of the lower corners. The angles of the Fishplates are adjusted so that a  $\frac{3}{4}$ " Pinion placed on a Rod mounted in them will mesh accurately with a  $\frac{1}{2}$ " Pinion on a Rod passed through the centre holes of the Flat Girders. A centre bearing consisting of a  $1\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strip 2 bolted to the Flanged Plate, is provided for the main shaft.

The primary shaft 3 is passed through the centre of the front set of Flat Girders, and it carries a  $\frac{1}{2}$ " Pinion 4 and a  $\frac{3}{4}$ " Pinion 5. The mainshaft is mounted in the centre of the rear Flat Girders and in the



Mr. P. A. Brown, Assistant Manager of the National Cash Register Company Ltd., London, admires an ingeniously constructed Cash Register that 13-year-old Anthony Boyer, of Guildford, Surrey, built from Meccano parts.

Double Angle Strip 2, and it is fitted with a  $\frac{3}{4}$ " Pinion 7, a  $\frac{1}{2}$ " Pinion 8 and four Washers. The mainshaft projects about  $\frac{1}{4}$ " beyond Pinion 7, through Double Angle Strip 2 and into the bore of Pinion 5, so that it serves as an inner support for the primary shaft.

The layshaft providing "top" and "second" gears is a 3" Rod 9 fitted with a Collar, a  $\frac{1}{2}$ " Pinion 10, a Coupling 11, a second Collar and a  $\frac{3}{4}$ " Pinion 12. The "bottom" and "reverse" gears layshaft is a 3" Rod 13, and it carries a  $\frac{3}{4}$ " Pinion 14, five Washers, a Coupling 15, a  $\frac{1}{2}$ " Pinion 16 and a Collar. The Couplings 11 and 15 are loose on their shafts, but they are held in place between the Pinions and Collars.

The reverse pinion is a  $\frac{1}{2}$ " Pinion 17, which is free to turn on a  $1\frac{1}{2}$ " Rod and is held in place by a Spring Clip. The  $1\frac{1}{2}$ " Rod is gripped in the centre cross hole of a Coupling 18, which is screwed tightly to one flange of the Flanged Plate by a bolt that is used also to fix one of the Flat Girders in position.

The selector bars are 3" Rods 19, and each is gripped in one of the Couplings 11 and 15, but is free to slide in the slotted holes of the  $1\frac{1}{2}$ " Flat Girders.

A bolt 20 is fixed by a nut in each Coupling, and a Driving Band is passed through the base of the gear-box and is looped round the bolts so that the tension of the Band tends to pull the Rods 19 against the outer edges of the slotted holes in the Flat Girders. Four Collars 21, each fitted with a  $7/32$ " Bolt, are fixed as shown in Fig. 1 on the Rods 19.

The top of the housing consists of two  $2\frac{1}{2}$ " Angle Girders connected by two  $1\frac{1}{2}$ " Flat Girders, and it is fitted at one end with two Corner Angle Brackets 22. The gear-change lever, which is a  $1\frac{1}{2}$ " Rod held in a

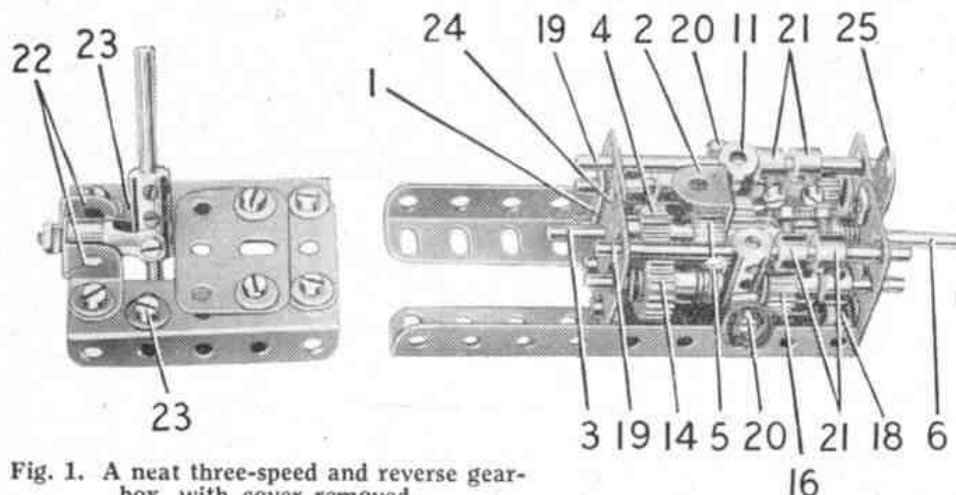
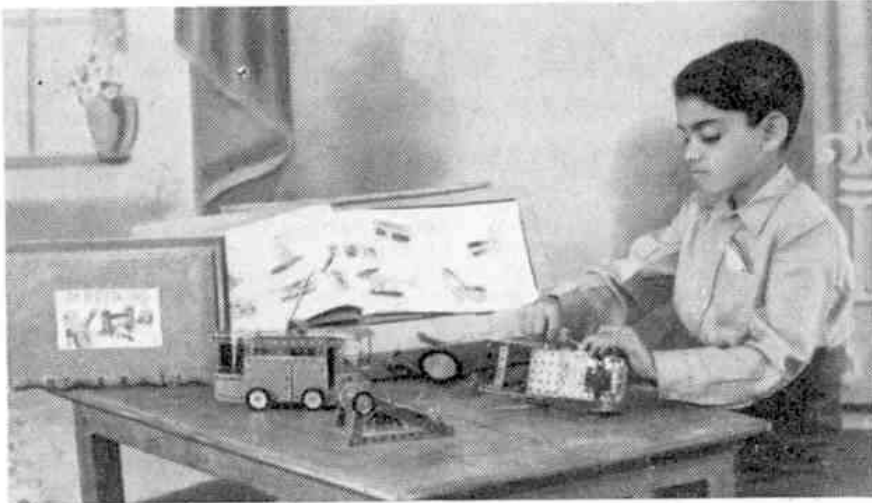


Fig. 1. A neat three-speed and reverse gear-box, with cover removed.



Ishwar Prasad Arundale, Baroda, India, is only eight years of age, but already he is a keen and successful model-builder. He is seen here at work on a model.

Coupling, is pivoted in the arms of a small Fork Piece. A Pivot Bolt is passed through the boss of the Fork Piece and the Corner Angle Brackets, and is fitted with lock-nuts. A Centre Fork gripped in the Coupling is arranged so that when the housing is in position its teeth engage between the Bolts in the Collars 21. Two  $\frac{1}{4}$ " Bolts 23 are fixed in the  $2\frac{1}{2}$ " Angle Girders, and the shanks of these Bolts engage in the gaps between the Collars 21 when each layshaft is in neutral.

The top of the housing is fixed in place by a bolt screwed into a Threaded Boss, held by a second Bolt passed through the Flat Girders at a point marked 24. The gear-change lever Pivot Bolt is passed through a Fishplate 25 before it is fitted with lock-nuts.

Bottom gear is engaged by sliding Rod 13 to the left (Fig. 2) so that Pinion 16 meshes with Pinion 7. Reverse is obtained by sliding Pinion 16 into mesh with Pinion 17, which is in constant mesh with Pinion 8. Second gear is obtained by sliding Rod 9 to the right, so that Pinion 10 engages both Pinions 5 and 7. When Rod 9 is moved to the left Pinion 12 is meshed with Pinion 8 to provide top gear.

**A NEW USE FOR SPRING CLIPS**

A fundamental feature of the Meccano model-building system is the adaptability of its various parts. Many readers have written to tell me of new and ingenious

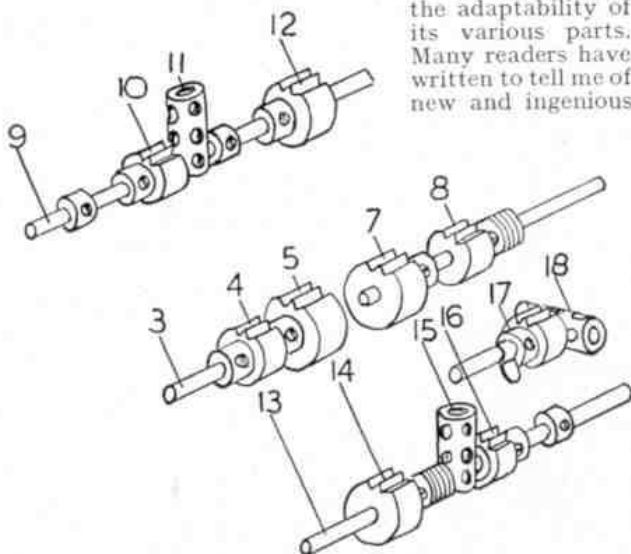


Fig. 2. These drawings show the arrangement of the gears and shafts in the three-speed and reverse gearbox seen in Fig. 1.

applications they have found for even the most simple parts, which at first glance might seem to have only a few obvious uses. A good example of this adaptability was brought to my notice recently by David de Wit, Blackburn, who sent details of a very neat independent suspension unit he has designed for the front wheels of a model vehicle. The main feature of the unit, which is shown in Fig. 3, lies in the novel use de Wit has found for Spring Clips.

The suspension unit for each wheel is assembled between two Flat Trunnions. In Fig. 3 one of the Flat Trunnions is omitted in order to show the details of the device clearly.

The Coupling 1 is fixed tightly to the Flat Trunnion by a bolt, and a Collar 2 is pivoted on a bolt passed through the apex hole of the Flat Trunnion. A  $2$ " Rod is gripped in the Collar,

and carries a Coupling 3 fixed to it as shown. Two Spring Clips are arranged with their lugs inserted in holes in Couplings 1 and 3, and a  $\frac{1}{4}$ " Bolt 4 serves to compress the Clips slightly and so hold them in position. The road wheel is free to turn on a Pivot Bolt screwed into Coupling 3. It is important to ensure that the Collar 2 pivots freely so that a smooth springing action is obtained.

When the essential working parts are in position the second Flat Trunnion can be added. It is held between two nuts on Bolt 4, and also by a bolt screwed into the Collar 2. A Threaded Pin 5 is passed through the Flat Trunnion and screwed tightly into the Coupling 1. This Threaded Pin is used to attach the assembly to a suitable swivel mechanism connected to the steering wheel, and it serves as the connecting link between the spring unit and the chassis. The Threaded Pin should be fixed as tightly as possible in the Coupling.

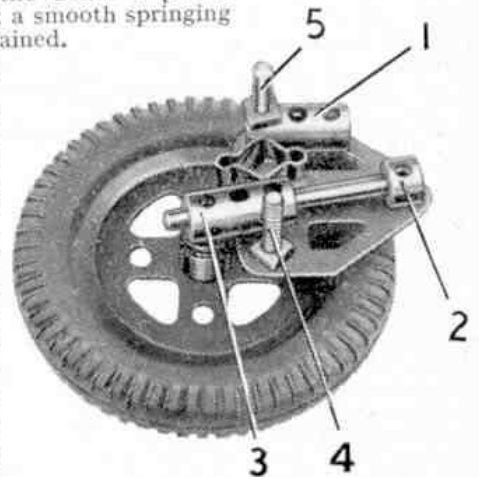


Fig. 3. A new use for Spring Clips is shown in this novel suspension unit for a car.

New and ingenious uses of this kind are of exceptional interest, and I am sure that most model-builders have discovered at least one example at some time during their activities. I am certain that these ideas would be helpful to other Meccano enthusiasts, and I hope that many readers will follow de Wit's example and send me details of their suggestions.

**REMOVING ROD AND STRIP CONNECTORS**

The Meccano Rod and Strip Connector enables a neat connection to be made between a Strip and a Rod, and it is especially useful when a pivoted joint is required. The part is made so that when it is pushed on to a Rod, it grips the Rod tightly. To remove the Connector after use it is a good plan to fix a Pulley or a Road Wheel on the Rod to provide a good hold. It is then quite easy to twist the parts until the Rod and Strip Connector slides off the Rod.