MECCANO-BUILT RADAR TOWER

EVER since it was invented during the last war, the importance and use of radar has increased tremendously until, today, radar aerials are a very common sight indeed. Here we have a novel replica of the familiar "dish" and its mounting which performs all the movements of a prototype. A handle in the mounting turns the "dish" through 360 deg. in the horizontal plane whilst another handle turns it through 180 deg. in the vertical plane so that, with careful manipulation of both handles, the aerial can be trained on any point above the ground in any direction.

By

SPANNER

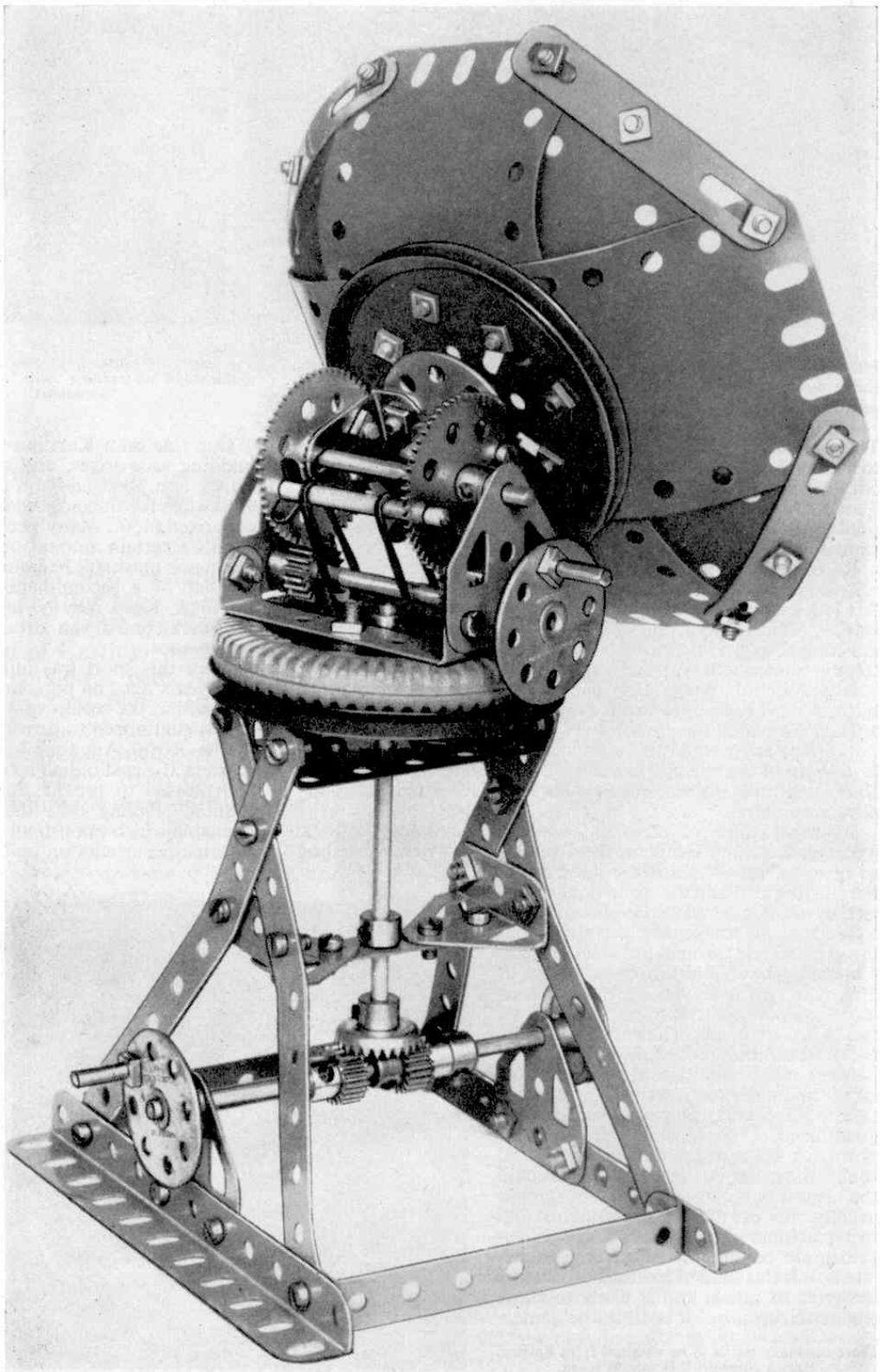
The model is illustrated in a similar manner to those in the current Instruction Manuals, except that black is used throughout, instead of the Manuals' two-colour scheme of red and black; and no written text is necessary.

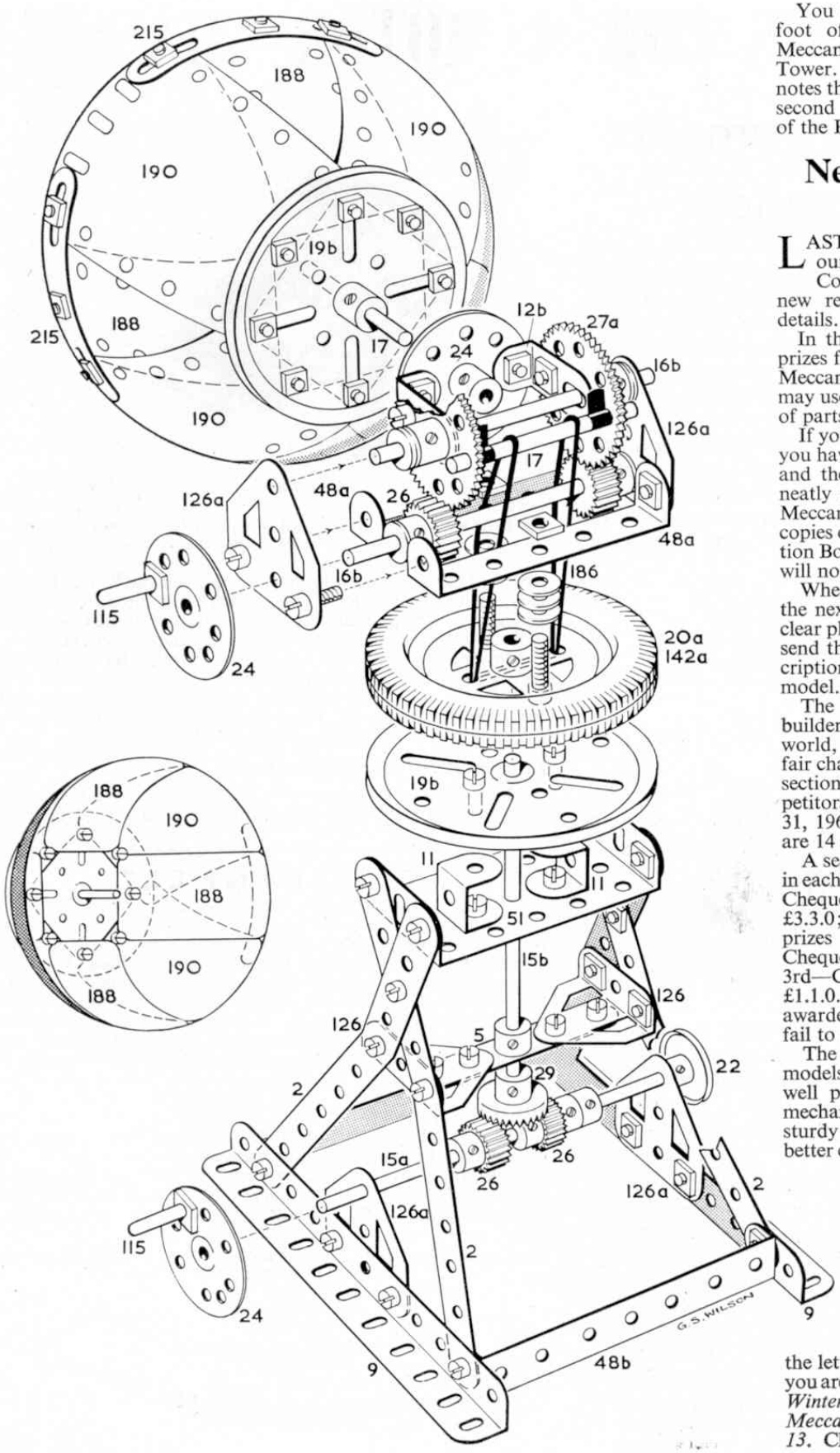
Although the small diagrammatical illustration of the "dish" does not show the use of Washers beneath the boltheads, since this is really an optional matter, my own suggestion is that Washers are advisable whenever bolts pass through elongated holes. They not only protect the slotted holes in the Plates, but also help to keep the Plates flat against the 3" Pulley.

PARTS LIST

4—2	2—35
1—5	56—37a
2—9	54—37b
2—11	32—38
2—12b	2—48a
1—15a	2—48b
1—15b	1—51
2—16b	3—59
2—17	2—111a
2—19b	2—115
1—20a	2—126
1—22	4—126a
3—24	1—142a
4—26	1—186
2—27a	4—188
1—29	4—190

4—215





You will have noticed the panel at the foot of the previous page listing the Meccano Parts required to build the Radar Tower. The figure in the first column denotes the quantity required and that in the second column is the catalogue number of the Part.

New Model-Building Competition

LAST month we announced the first of our series of Winter Model-Building Competitions, and for the benefit of new readers we repeat here the main details.

In these contests we are offering cash prizes for the most original and best-built Meccano models of any kind. Competitors may use any size of Outfit or any quantity of parts in building them.

If you wish to enter this competition all you have to do is to think of a new model and then set to work to construct it as neatly and realistically as possible, from Meccano Parts. Models that are merely copies of those shown in Meccano Instruction Books or other Meccano publications will not, of course, be eligible.

When you have completed your model, the next thing is to obtain either a good clear photograph or good sketch of it, and send this to us together with a short description of the main features of your model. *The actual model must not be sent.*

The competition is open to model-builders of all ages living anywhere in the world, and in order that everyone has a fair chance entries will be divided into two sections A and B. Section A is for competitors under 14 years of age on January 31, 1964, and Section B is for those who are 14 or older on that date.

A separate set of prizes will be awarded in each Section as follows: Section A: 1st—Cheque for £5.5.0; 2nd—Cheque for £3.3.0; 3rd—Cheque for £2.2.0. Ten prizes each of 10/6d. Section B: 1st—Cheque £7.7.0; 2nd—Cheque for £5.5.0; 3rd—Cheque for £3.3.0; Ten prizes of £1.1.0. Certificates of Merit will be awarded in Section A to those who just fail to reach prize-winning standard.

The judges will award the prizes for models that are most original in subject, well proportioned and built on correct mechanical principles. A small, well built, sturdy and original model will have a far better chance than a large and complicated structure that is rickety in construction and poor in design, and which does not show much originality in its subject. It will help you on the way to success if you choose a model that "works".

Before posting your entry, be sure to write your name, address and age on the backs of the photograph or drawings, together with the letter A or B indicating which Section you are entering. Address your envelope to *Winter Model-Building Competition No. 1, Meccano Limited, Binns Road, Liverpool 13.* Closing date: January 31, 1964.

MECHANISMS FOR A MOTOR CHASSIS

Useful Arrangements In Meccano

JUDGING from the correspondence we receive at Meccano—and my own experience verifies this—one of the most popular models built with our constructional Outfits is the detailed motor vehicle chassis. This does not mean the basic girder framework, which is comparatively easy to construct, but all the intricate working mechanisms incorporated in a chassis. Mechanisms such as gear-boxes, differentials, brakes, steering gear, etc. are the sort of things I have in mind and genuine working replicas of all of these can be produced in Meccano. Indeed, many examples have appeared in past issues of the *M.M.*, but they have

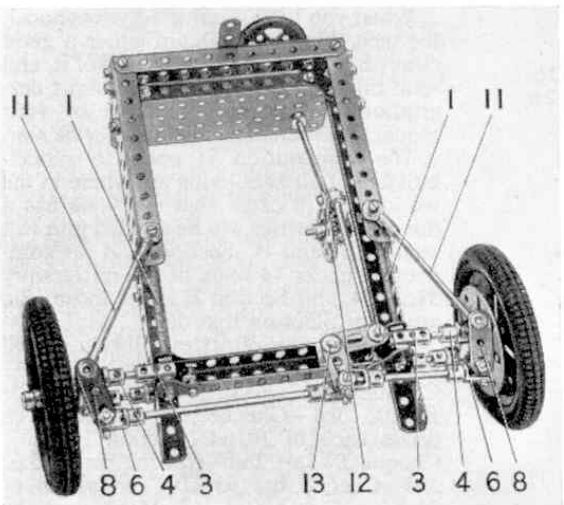


Fig. 2. The torsion bar suspension, viewed from beneath.

all been isolated cases. Here, therefore, I present a number of useful arrangements, each of which can be used in a motor chassis. Space this month will allow the inclusion of only four of the seven I wish to describe, but I will complete the set in next month's Magazine.

STEERING AND INDEPENDENT SUSPENSION

Figures 1 and 2 on this page show a steering gear with independent or torsion bar suspension, originally designed by Mr. W. Johnstone of Liverpool. An 8" Screwed Rod 1 is fixed firmly to the chassis by two Threaded Bosses 2 which are attached to the chassis by bolts spaced by Washers. The nuts must be tight enough to prevent the Screwed Rod from turning.

The opposite end of the Screwed Rod is mounted in two 1" Corner Brackets, and carries a Coupling 3. The Coupling is also fixed on the Screwed Rod by nuts, and it carries a 1" Rod fitted with a Swivel Bearing 4. A second 1" Rod fixed in a Coupling 5 is free to turn in the "spider" of the Swivel Bearing, and is fitted with a Crank 8. The Coupling 5 carries also a further 1" Rod that is free to turn in the "spider" of a Swivel Bearing 9.

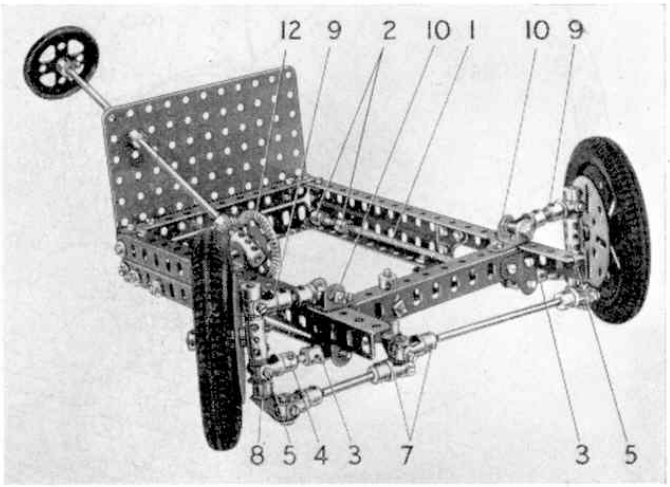


Fig. 1. An independent suspension unit, working on the torsion bar system, which includes an effective steering arrangement.

The Rod is held in position by a Collar, and the Swivel Bearing is connected by a 1" Rod and a Small Fork Piece to a Double Bracket 10. The stub axles are $1\frac{1}{2}$" Rods fixed in the Coupling 5 and the links on each side are braced by radius rods 11.

Movement of the road wheels is controlled by a drop arm consisting of a Fishplate bolted to a $1\frac{1}{2}$" Bevel Gear 12. The Fishplate is connected by a Rod and Collars to one arm of a Bell Crank with boss 13. The other arm is linked to the Cranks 8 by Rods and Swivel Bearings 6 and 7.

LEAF-SPRING SUSPENSION

Many vehicles equipped with independent front suspension have ordinary leaf-spring suspension at the rear. Figure 3 gives

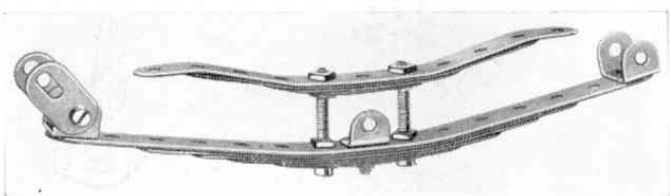
By "SPANNER"

a useful example of the latter which, in this case, is a Semi-elliptic and Helper Spring. Construction is evident from the illustration, the Angle Bracket in the centre forming one bearing for the rear axle. The bearing can, of course, be modified to suit the rear axle being employed. It is obvious, for example, that a rear axle-casing of the type seen in Figure 4 would not make use of the Angle Bracket but would be affixed to the spring by different means.

DIFFERENTIAL

The rear axle illustrated includes a compact but very efficient differential. Each half of the axle-casing consists of two $1\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips bolted between a Wheel Disc and a Bush Wheel. A $2\frac{1}{2}$" Strip 1 is bolted across each Wheel Disc and they are connected by $1\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips. The left-hand

Fig. 3. This leaf spring suspension unit is composed of a basic leaf arrangement, strengthened by a small "helper" spring.



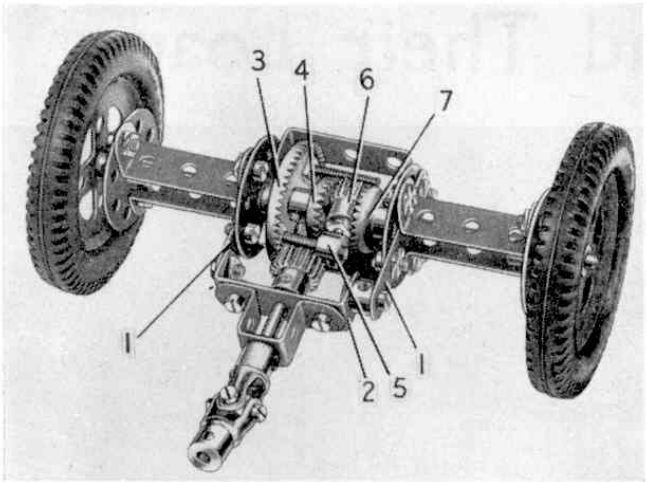


Fig. 4. A sturdy rear-axle incorporating a compact differential drive that makes use of Contrate Wheels and Pinions.

Disc is spaced from these Double Angle Strips by two Washers on each bolt. Another $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 2, fitted with a Double Bent Strip, is fixed between Strips 1, but is spaced from one of them by a Collar on a $\frac{3}{8}''$ Bolt. The left-hand axle is passed through the casing and carries a $1\frac{1}{2}''$ Contrate 3 and a $\frac{3}{4}''$ Contrate 4. Two 1″ Screwed Rods are held in the Contrate 3 by nuts and a Collar 5 is fixed on one of them. A Threaded Pin is screwed tightly into this Collar. The Contrate 3 is free on the axle, but Contrate 4 is fixed in place and meshes with a $\frac{7}{16}''$ diam. Pinion 6. This Pinion is loosely mounted on the Threaded Pin and is retained on it by the second Screwed Rod. A $\frac{3}{4}''$ Contrate 7 is fixed on the right-hand axle, and a $\frac{1}{2}''$ Pinion on the driving shaft is meshed with Contrate 3.

The driving shaft is mounted in the Double Angle Strip 2 and in the Double Bent Strip, and should be connected to the gear-box output shaft.

A FIRST-CLASS GEAR-BOX

What motor chassis would be complete without a working gear-box? The one shown in Figures 5 and 6 was designed a number of years ago by N. Gottlob of Hjortekaer, Denmark and incorporates three forward and one reverse gear. The mounting is a Face Plate 19 supporting a $3\frac{1}{2}''$ Screwed Rod 17 on which a nut is positioned about $\frac{1}{2}''$ from one end. A Washer is placed next to the nut, and the Screwed Rod is passed through one of the slotted holes in the Face Plate. Six Washers and a $1\frac{1}{2}''$ Double Angle Strip 13 are then placed on the Screwed Rod, and two Fishplates are bolted to the Double Angle Strip so that they project as little as possible beyond its ends. Two Washers are placed on the Screwed Rod, and a "spider" 25 from a Swivel Bearing serves as a nut to lock the assembly together. The centre bore of the "spider" must be exactly in line with the holes in the lugs of the Double Angle Strip. The Screwed Rod is fixed as near as possible to the centre of the Face Plate to provide bearings for the layshafts.

The bearing member of the other end of the mechanism consists of a Double Arm Crank 15, two $1\frac{1}{2}''$ Strips and two Fishplates arranged as shown. The assembly is attached by nuts to the Screwed Rod 17 and a $3\frac{1}{2}''$ Screwed Rod 18.

The input shaft is a $2\frac{1}{2}''$ Rod mounted in the boss of the Face Plate. It carries a Pinion 26 from a No. 1 Clockwork Motor, and a $\frac{1}{2}''$ Pinion arranged about $\frac{3}{4}''$ from the Face Plate. The input shaft extends only half way into the bore of the $\frac{1}{2}''$ Pinion, and the other half of the bore supports the inner end of the output shaft 4, which is a $2\frac{1}{2}''$ Rod. The output shaft carries a $\frac{1}{2}''$ Pinion placed next to the $\frac{1}{2}''$ Pinion on the input shaft, a $\frac{3}{4}''$ Pinion and two Washers.

A 4″ Rod 3 carrying a Collar, a $\frac{3}{4}''$ Pinion and a $\frac{1}{2}''$ Pinion are arranged as shown. This Rod when moved to the left (Fig. 6) engages second gear, and when it is moved to the right, top gear is obtained. The 4″ Rod 3a carries a $\frac{3}{4}''$ Pinion and a $\frac{1}{2}''$ Pinion as shown, and when it is moved to the right (Fig. 5) first gear is engaged.

A reverse $\frac{1}{2}''$ Pinion is fixed on a $1\frac{1}{2}''$ Rod 5, which is supported in two Fishplates 2 fixed between nuts on Rod 18. The angle of the Fishplates is adjusted so that the Pinion on Rod 5 can be meshed with both the $\frac{3}{4}''$ Pinion on the output shaft and the $\frac{1}{2}''$ Pinion on Rod 3a.

Rods 3 and 3a are each fitted with two Collars arranged so that a nut on a Bolt 20 engages between them. *Two Washers are placed between the inner Collar and the Face Plate.* The Bolts 20 are fixed by nuts in Collars mounted on 1″ Rods supported in the lugs of Double Angle Strip 13 and in the "spider" 25. Spring Clips are placed on the ends of the 1″ Rods, and are prevented from turning by bolts fixed in the Fishplates attached to Double Angle Strip 13. The two Collars are fixed on the 1″ Rods by ordinary bolts and the "spider" 25 is fitted with one of the special bolts from a Swivel Bearing. The special bolt must not grip the 1″ Rods.

The gear change lever is a Rod held in a Small Fork Piece 23, which pivots on Set Screws 16 passed through a Large Fork Piece 22. The Large Fork Piece pivots on a Threaded Pin passed through a Fishplate bolted to the Face Plate.

This, then concludes the first four mechanisms. Next month I will give details of a heavy duty clutch, a disc brake, and a very useful twin rear-axle drive unit, so try not to miss the January 1964 issue of the *Meccano Magazine*.

Figs. 5 and 6. Two views of an excellent 3-speed and reverse gear-box that is highly suitable for use in a motor car chassis.