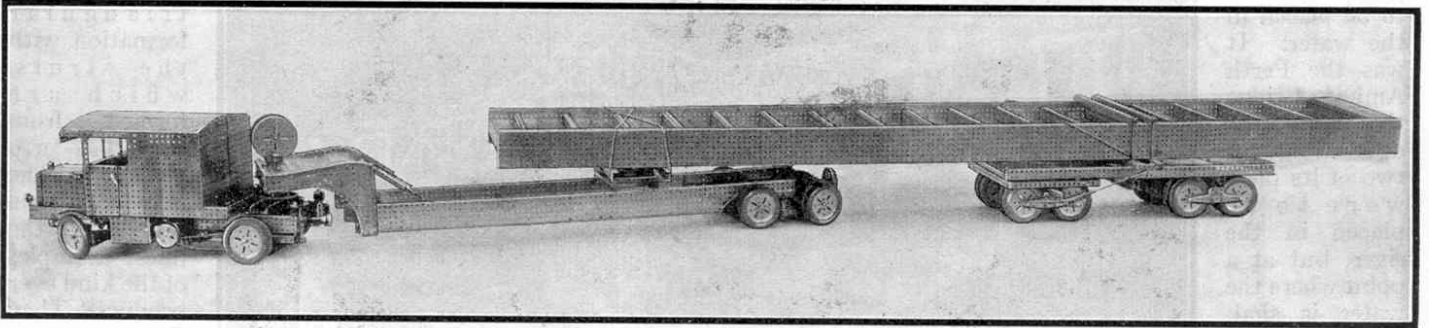


Giant Meccano Lorry with Trailer

Model that Carries Load of Nearly Six Cwt.



ON page 184 of the "M.M." for March, 1932, a brief description was given of a remarkable Meccano model of the M.R.S. 100-ton lorry, and 16-wheeled trailer that recently was employed for the transport of a girder 68 ft. in length and weighing practically 100 tons from Marylebone goods station to the site of a hotel now being erected near the Marble Arch, London. The model is illustrated on this page and is an exact reproduction in miniature of its original, including the load. Although built to the scale of $1\frac{1}{4}$ in. to 1 ft., it is 11 ft. 6 in. in length from the head lamps to the rear of the girder, which overhangs the trailer, and weighs $1\frac{1}{2}$ cwt. The girder itself accounts for nearly half of this great weight, to which the 5,000 nuts and bolts used in constructing the model make a substantial contribution!

This remarkable model is fitted with a Meccano E.1 Electric Motor and easily carries not only the heavy girder, but also a weight of five cwt. placed on top of the load. It faithfully reproduces every movement of its prototype and is an outstanding example of the capabilities of the Meccano system.

The features of the construction of this magnificent model will be full of interest to Meccano enthusiasts, many of whom will desire to reproduce it, or to make use in models of their own design of the special mechanisms incorporated in it. In the present article, therefore, we describe the building of the more important parts, such as the differentials, the rear wheel assemblies and the gear box, in order to show how the movements required may be effected.

The differentials included in the model are of special interest, for three of these mechanisms are provided in order to enable the drive of the lorry to be transmitted to four double wheels that act independently when turning corners. The main differential, Fig. 2, is exceptionally neat and compact and is built up as follows. The crown wheel, a $1\frac{1}{2}$ " Bevel Gear, carries two Pole

Pieces 1, which form a rigid connection between the crown wheel and the frame 2. This frame is constructed from four 1" Corner Brackets bolted together at their outside corners and carrying at two of the opposite corners two $1" \times \frac{1}{2}"$ Angle Brackets. Each of the slotted holes of the Brackets is fitted with a $\frac{1}{2}"$ Bolt on which a $\frac{3}{4}"$ Contrate is free to rotate. These Contrates mesh with two $\frac{1}{2}"$ Pinions 3 and 4 mounted on $6\frac{1}{2}"$ Rods that are journaled at their inner ends in the Collar 5.

The differential casing consists of two Face Plates, passed over the $6\frac{1}{2}"$ Rods of the differential, and connected together by 2" Strips. Each side of the front of the casing is fitted with a Crank 12 (Fig. 3), and a $1\frac{1}{2}"$ Strip 13. The Crank shown in Fig. 3 carries a $1\frac{1}{2}"$ Rod, to the inner end of which is secured a Coupling. This Coupling, that is also secured to the Crank opposite 13 by a 1" Rod, supports, in its centre tapped hole, a $1\frac{1}{2}"$ Rod. The Bush Wheel 14 is mounted on the outer end of this

Rod and the inner end carries a $\frac{1}{2}"$ Bevel Gear

that meshes with the crown wheel of the differential. The 2" Strips mentioned earlier are attached to the Face Plates by $\frac{1}{2}" \times \frac{1}{2}"$ Angle Brackets and the space between every two Strips is filled by a further 2" Strip secured to its neighbour by means of two Flat Brackets. The inspection cover 6 (Fig. 2) is constructed from two $2\frac{1}{2}"$ and five 2" Strips and the complete cover is secured to the differential casing by means of two Hinges. The casing is also fitted with two $\frac{3}{4}"$ Bolts 10, the use of which will be described later.

Each secondary differential casing is constructed from $1\frac{1}{2}"$ Angle Girders and $1\frac{1}{2}"$ Flat Girders and Strips and is attached to the main differential casing by means of four $1\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips. The top edges of these casings are fitted with Flat Trunnions and at the outer ends of each are four Double Brackets, arranged in a similar manner to the Double Angle Strips forming the connection between each differential casing. The upper and lower Double Brackets carry a $1\frac{1}{2}"$ Strip 7 and the

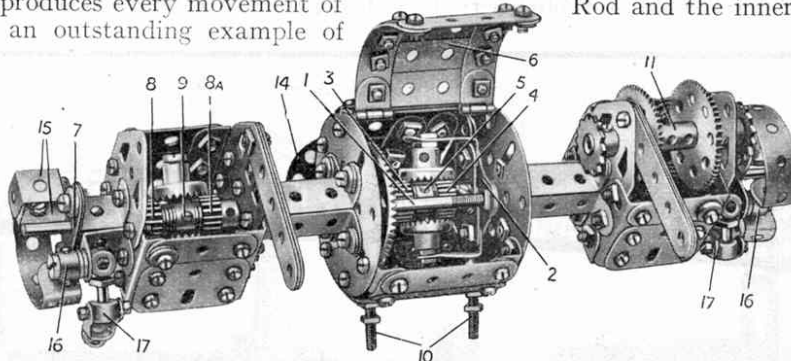


Fig. 1. The complete Lorry and Trailer, with the load in position, is seen in the upper illustration on this page. Fig. 2. The lower illustration shows the three differentials that enable the four driving wheels to operate independently when turning a corner.

two $1\frac{1}{2}$ " Strips at the outer ends of the assembly carry the ends of the $6\frac{1}{2}$ " Rods of the main differential.

Each secondary differential consists of two idle $\frac{1}{2}$ " Pinions 8 and 8a, which are spaced apart from a central "spider" Collar 9 by the requisite number of Washers. On its inner face the Pinion 8a bears against a Flat Bracket and the Pinion 8 bears against a Collar on its outer face. The "spider" 9 is secured by two Grub Screws to its Rod, the Grub Screws being in opposite holes, and each of the two remaining holes carries a Pivot Bolt on which a $\frac{3}{4}$ " Contrate is free to rotate. The Bolts are locked in the threaded holes of the "spider" by means of Nuts. The Pinions 8 and 8a mesh with 57-teeth Gears that are secured on 1" Rods journaled at their outer ends in the centre

$\frac{3}{4}$ " Bolts 10. The two $4\frac{1}{2}$ " Angle Girders are then bolted to two further $4\frac{1}{2}$ " Angle Girders 20 overlapping five holes, and these are secured to the main frames of the lorry. Each of the main frames consists of a $24\frac{1}{2}$ " Angle Girder 21, the front portion of which is strengthened by a $12\frac{1}{2}$ " Flat Girder and Angle Girder. The rear portion, a section of which is shown in Figs. 1 and 3, is strengthened by means of three $3" \times 1\frac{1}{2}"$ Flat Plates and a $9\frac{1}{2}"$ Angle Girder. The spaces between the ends of the $12\frac{1}{2}"$ Angle Girders and the inner edges of the $3" \times 1\frac{1}{2}"$ Flat Plates accommodate the differential unit, and this may be fitted immediately the two sides of the lorry frames are completed. The two $4\frac{1}{2}"$ Angle Girders 20 are bolted in place thirteen holes from the rear of the $4\frac{1}{2}"$ Girders 21.

Two sets of stays 22 and 38 are provided in order to strengthen the fitting of the differential unit. The front portions of the lorry frames are connected together by a $5\frac{1}{2}"$ Angle Girder and the rear portions by two $7\frac{1}{2}"$ Angle Girders, bolted together to form a channel section girder.

An E1 Electric Motor provides the motive power for the model and the drive is transmitted from this through a compact single plate clutch to the gear-box, which provides four forward speeds and one reverse, the gear ratios being 9:1, 6:1, 4:1, and 2:1 forward and 3:1 reverse. The construction of the gear box framework and the position of the gears will be seen clearly from Fig. 3. It should be noted, however, that only half of the boss of the 1" Gear

Wheel, situated immediately behind the 57-teeth Gear 23, is occupied by the end of the Rod 24, the remaining space being taken up by the Rod 25. Thus the Gear Wheel supports both lay-shafts and the space taken up by an extra bearing is saved. The connection between the gear-box and the differential unit is formed from two Bush Wheels one of which is seen at 14. Four Bolts are secured in the holes of one Bush Wheel and the shanks of these engage opposite holes in the Wheel 14.

The construction of the front axle and springs is shown clearly in Fig. 3. The steering is operated on the worm and nut principle, and is an excellent example of the heavier type of Ackermann's Steering Gear. The steering column, a $6\frac{1}{2}"$ Rod, is fitted at its lower end with a 2" Screwed Rod, the necessary connection being made by means of a Threaded Coupling. The Screwed Rod operates a Threaded Boss that is pivotally attached to one end of a built-up bell crank. Four Simple Bell Cranks clamped together form this crank and it is pivotally attached by a Pivot Bolt to a $1\frac{1}{2}"$ Angle Girder on the frame of the lorry. The lower end of the crank carries a Swivel Bearing and this is fitted with a $1\frac{1}{2}"$ Rod 26. The free end of this Rod is secured by a second Swivel Bearing 27 to a Crank 28 that is fixed on a vertical $1\frac{1}{2}"$ Rod, a portion of which is shown at 29. This Rod carries a Coupling which in turn supports a $1\frac{1}{2}"$ Rod carrying a Threaded Coupling 30. The lower end of this Coupling carries the track rod 31 and this operates the inside wheel of the lorry. Each front wheel is carried on a 1" Rod supported in the longitudinal bore of a Coupling which, as described earlier, carries the Rod and Threaded Coupling 30.

holes of the Flat Trunnions, previously mentioned. The inner ends of these Rods are carried in Couplings, one of which is shown at 11, and the extreme outer ends are fitted with $\frac{3}{4}"$ Sprocket Wheels.

The outer ends of the $6\frac{1}{2}"$ Rods of the main differential are fitted with internal expanding brakes, one of which is shown partly dismantled to the left-hand side of Fig. 2. Each brake shoe consists of a $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strip, the long side of which is curved to the inside diameter of a Boiler End. One end of these shoes is bolted securely to two Double Brackets 15 that are pivotally attached to one of the Double Brackets on the end of the secondary differential casing. The operating cam 16, a Collar fitted with two Grub Screws, is gripped on the shank of a Pivot Bolt. This Bolt passes through the Double Bracket, shown in the illustration, and carries a "spider" collar on its threaded portion. This Collar carries a Threaded Pin, as shown, which in turn carries a Swivel Bearing 17 and this will be used later for connection to the brake pedal. It will be seen that on operating the Swivel Bearing the Grub Screws of the Collar 16 force the brake shoes outward to press against the inner face of the Boiler End 18, Fig. 3. When the pressure on the brake is released the shoes contract under the influence of a short length of Spring Cord stretched between the two brake shoes.

When the differential and brake unit is completed it is secured to two $4\frac{1}{2}"$ Angle Girders 19 by means of the two

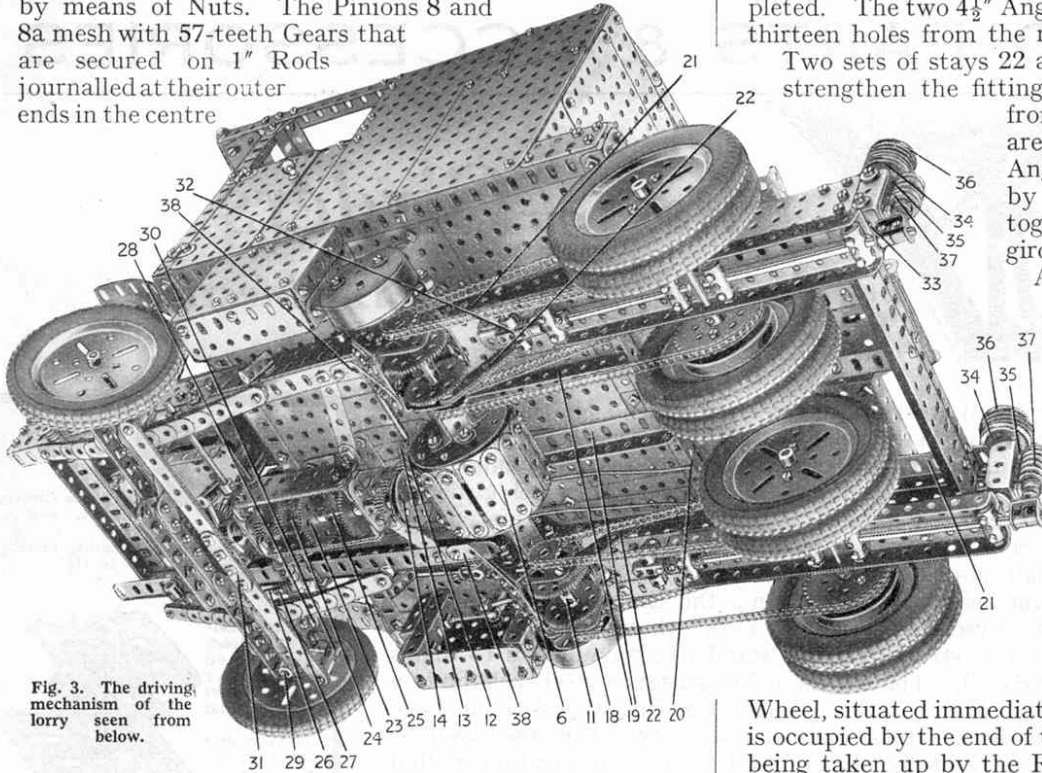


Fig. 3. The driving mechanism of the lorry seen from below.