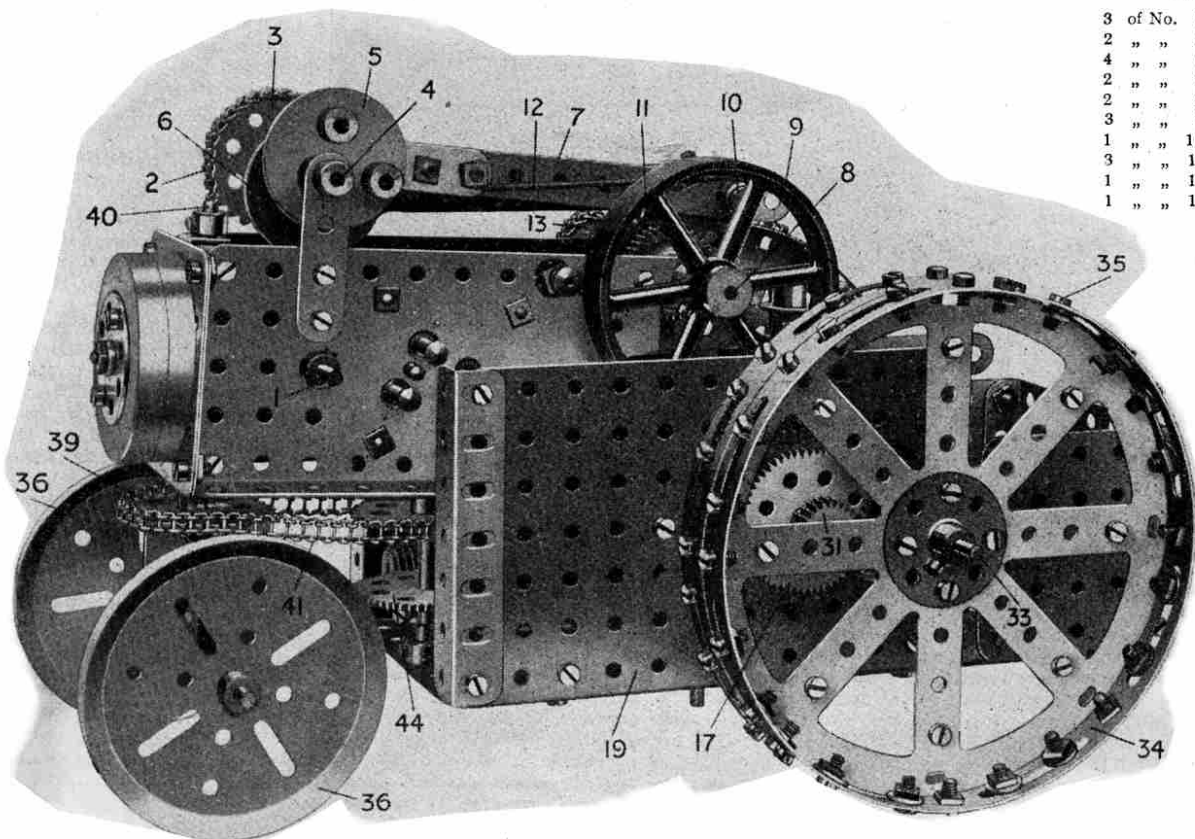


A NEW MECCANO MODEL

Electrically-Driven Traction Engine



Parts required :

3 of No. 2A	3 of No. 15
2 " " 6	1 " " 15A
4 " " 6A	3 " " 16
2 " " 8B	2 " " 16B
2 " " 9B	1 " " 17
3 " " 9C	2 " " 19B
1 " " 11	2 " " 21
3 " " 12A	5 " " 24
1 " " 13A	2 " " 25
1 " " 14	6 " " 26
	2 " " 27
	4 " " 27A
	2 " " 30
	2 " " 31
	1 " " 32
	2 " " 33
	2 " " 33A
	180 " " 37
	60 " " 38
	1 " " 47
	1 " " 48
	2 " " 48D
	1 " " 50
	2 " " 53
	20 " " 59
	1 " " 62
	2 " " 63
	4 " " 70
	4 " " 72
	1 length 94
	4 of No. 95A
	2 " " 96A
	2 " " 103H
	2 " " 115
	4 " " 118
	2 " " 130
	1 " " 132
	2 " " 137
	1 Electric Motor 4-volt

TRACTION ENGINES have been familiar features on our roads for many years, and in spite of the invasion by petrol-driven vehicles they continue in evidence.

Primarily, traction engines were intended for hauling heavy loads for long distances on roads, and were designed to travel at a low speed. Instead of the driving wheels being directly driven from the piston rod, as in the case of a locomotive, power is transmitted by a system of spur gearing. The effect of this is to develop a much greater tractive force for each h.p. of the engine.

The driving wheels of a traction engine form the rear pair and are usually of large diameter. The leading pair of wheels are considerably smaller, and their axle is capable of being turned about a central pivot, by which means the engine is steered.

Compound Traction Engines

Small traction engines are generally driven from a single cylinder, but large engines intended for heavy work are of the compound type with two cylinders, high and low-pressure. Traction engines of this type show several advantages over the single cylinder type. For example, with compound cylinders the full expansive force of high-pressure steam is utilised, effecting a saving in fuel and water of from 20 to 30 per cent., with a corresponding saving in the life of the firebox and boiler. This economy in fuel and water consumption

is of great importance, apart from the reduced working costs, for often traction engines are required to travel considerable distances, and fuel and water are not always available at all points on their journey.

A further advantage of the compound type is the fact that high-pressure steam can be admitted momentarily into the low-pressure steam-chest by means of a self-closing starting valve, the power of the engine being thus increased and starting facilitated. There is also less risk than with single cylinder engines of sparks being thrown out of the chimney. Yet another advantage is that there is less noise, due to the low pressure of the exhaust steam.

Straw Used as Fuel

Although the standard traction engine is designed for burning coal fuel, almost any kind of fuel may be used, providing a suitable firebox and fire bars are fitted. In large grain growing countries such as Canada and the Argentine, straw is used very successfully as fuel. In this case special boilers and extra large fireboxes are needed, together with a special form of grate, spark-arresting chimneys and straw-feeding apparatus. Wood also may be burned and almost any kind of liquid fuel may be employed.

The value of such engines for heavy haulage work is obvious, but there are also other purposes for which engines of this type may be employed, notably in

agriculture on a large scale. Heavy traction engines are not able to traverse the land to be cultivated so as to haul ploughs or other implements, but they are made to do the work indirectly.

Traction Engines on the Farm

The hauling is done by means of a cable system, which does away with the necessity for the engines passing over the cultivated area. For this purpose, two engines are required, each being fitted with a large winding drum around which passes a cable. The engines are placed one at each side of the field and the plough or other implement is attached to the cable. One engine hauls the plough across the field by winding the cable on to its winding drum, after which the second engine hauls the plough back again by the same means. As the engines remain stationary while pulling the plough they are able to exert their full power on the cable. At the end of each "bout" the first engine moves forward a few yards—while the second engine is pulling the plough across the field—and is ready to pull the plough back again as soon as the second engine has completed its "bout." This operation is continued until the field is completely covered.

All types of ploughs may be used with cable haulage—paring ploughs for light stubble skimming and paring, where land has been previously cultivated; topsoil ploughs for cereal and root crop cultivation; subsoil ploughs for deep cultivation for potatoes, sugar-beet, and other root crops; breaking ploughs for ploughing land not previously cultivated and so on. In addition to ploughs, almost all agricultural implements may be operated in the same manner, including harrows, rollers, cultivators, ditching machines, etc.

The value of the traction engine on a farm is by no means confined to this kind of work, for the same engine will successfully operate any kind of farm machinery, being specially useful for threshing and similar purposes.

Light Steam Tractors

Among the many interesting applications of the traction engine, apart from agriculture, is that of supplying the needs of the travelling showman. Such engines haul his caravans and apparatus from one fair-ground to another, and during the "show" they are an economical and reliable source of power for running roundabouts of all kinds and driving dynamos for supplying electric light to the circus tents, stalls, etc.

For certain purposes the heavy traction engine is unsuitable, and a smaller and lighter tractor is substituted with great success. This is particularly the case where

soft ground has to be traversed, on which there would be a possibility of a heavier vehicle sticking fast. These light steam tractors have great hauling power, although not so great as that of the bigger type, and they have the compensating advantage that they are able to travel considerably faster.

When a tractor is not required for road haulage work it may be used for almost any purpose for which a stationary engine is suitable, including the driving of dynamos, circular saws, pumps and similar machinery. For work of this kind the steam tractor indeed has a very valuable advantage over the stationary engine in that it can go anywhere where work has to be done, and that it can be quickly and easily moved about to the best position for exerting its maximum power.

The Meccano Traction Engine

One of the most interesting features of this model is the transmission, which is by eccentrics and pawl and ratchet gearing to the road-wheels. This is a similar form of transmission to that used in the Meccano model of the Constantinesco gear, fitted to the Meccano Chassis and described in our issue of April last.

To deal first with the transmission it may be pointed out that the driven spindle (1) of the Electric Motor carries a $\frac{3}{4}$ " Sprocket Wheel, which is coupled by a Chain (2) to a $1\frac{1}{2}$ " Sprocket Wheel

(3) on the Rod (4).

Secured on this Rod are two Eccentrics (5 and 6) connected by $4\frac{1}{2}$ " Strips (7) to Pivot Bolts (10 Fig. C). These are secured to $1\frac{1}{2}$ " Flat Girders (10a) pivoting about a Rod (8) carrying the Fly Wheel (9). On the Pivot Bolts (10) are pivoted double Pawls, which engage two 1" Gear Wheels (11) secured on the Rod (8). Spring cord (12) connected to the screws (11b) keep the Pawls in engagement with the Gear Wheels (11).

Details of Transmission

Consequently, when the motor is running, the Eccentrics (5 and 6) cause the Pawls to rock to and fro about the Rod (8) and so rotate the Gear Wheels (11) and the Rod (8) to which the wheels are secured. A $\frac{3}{4}$ "

(Continued on page 61)

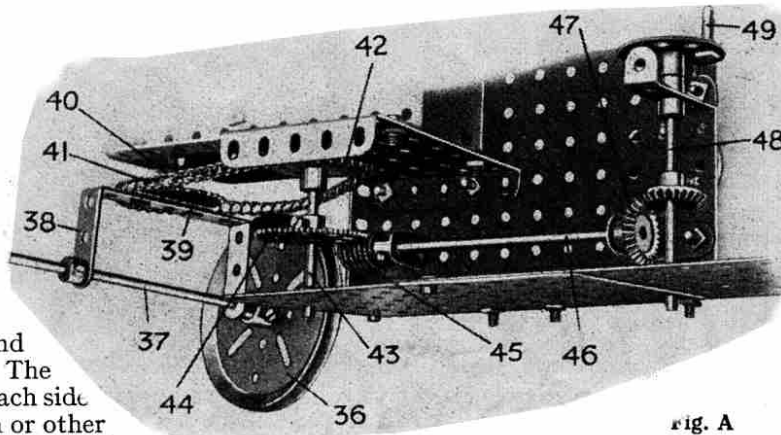


Fig. A

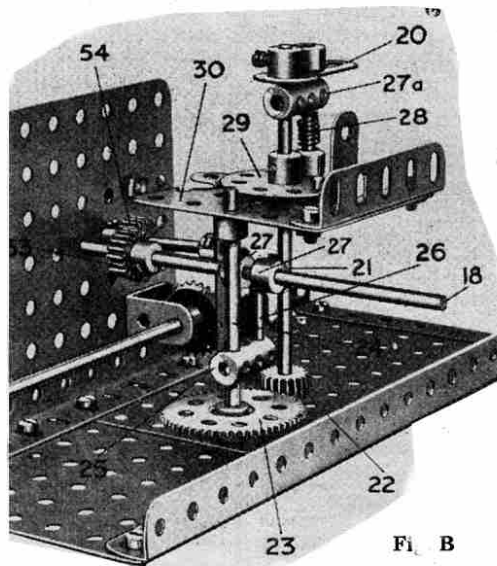


Fig. B

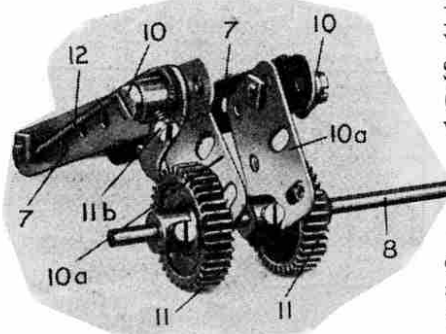


Fig. C

The Meccano Traction Engine—*(continued from page 59)*

Sprocket Wheel (13) on the end of the Rod (8) is coupled by a chain to a $1\frac{1}{2}$ " Sprocket Wheel (14 Fig. D) on a Rod (15). This Rod carries at its other end a $\frac{1}{2}$ " Pinion (16) engaging a 57-toothed Gear Wheel (17) on a Rod (18), which is mounted to slide in the Rectangular Plates (19) forming the sides of the Tractor.

The Rod (18) is caused to slide by turning the Crank (20 Figs. B and D), which in turn is secured on a Rod (21) carrying a $\frac{1}{2}$ " Pinion (22) engaging a 57-toothed Gear Wheel (23) on another Rod (24). This latter Rod carries a Coupling (25) in which is secured a short Rod (26) engaging between two Collars (27) on the Rod (18).

Below the Crank (20) is fixed a Coupling (27a). A spring-controlled short Rod (28) slides in the Crank (20) and Coupling (27a) so that this Rod (28) may be lifted against the Spring. The action causes its lower end to engage with one or other of the holes in a Bush Wheel (29), secured to the Rectangular Plate (30).

On the Rod (18) is a $\frac{1}{2}$ " Pinion (53), and when the Rod slides, this is adapted to engage an idle $\frac{1}{2}$ " Pinion (54). This Pinion (54) is mounted on a short rod and permanently in engagement with another Pinion (55) on the Rod (33), upon which are fixed the Travelling Wheels (34).

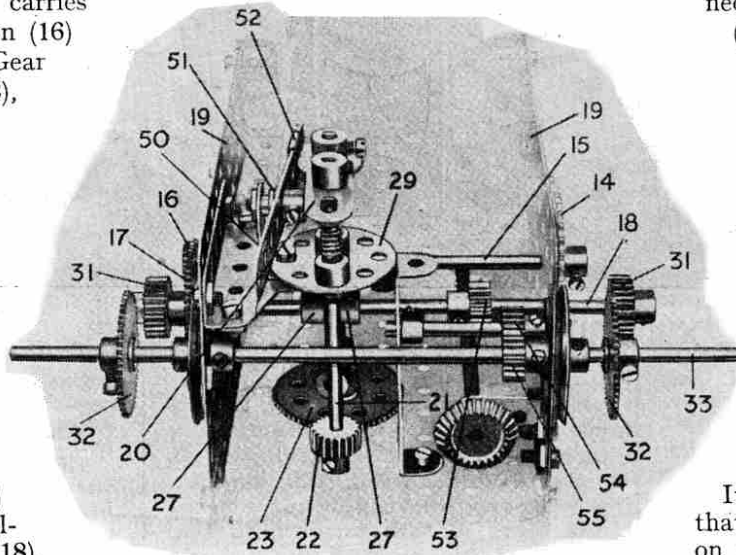
Reversing Gear

The Rod (33) also carries two 50-toothed Gear Wheels (32). Pinions (31) on the Rod (18) are adapted to be engaged with these 50-toothed Gear Wheels when the Pinion (53) is out of engagement with the Pinion (54), and vice versa. In this manner the Pinions (53, 54 and 55) form a reversing gear, and by moving the Rod (18) by the Crank Handle (20) a forward or reverse drive of the tractor may be obtained. After being moved, the rod (18) is locked in position by the Short Rod (28) engaging one of the holes in the Bush Wheel (29).

The small compression-spring extracted from the Meccano Spring Buffer (part No. 120a) will serve

admirably in exerting the necessary pressure on the Rod (28).

Each of the road-wheels (34) is made up of two hub discs bolted back to back, a number of Bolts

**Fig. D**

(35) being secured round the flanges to enable the wheels to obtain a grip on the ground.

Steering Mechanism

Fig. A shows details of the steering mechanism. The Steering Wheels (36) are carried on the Rod (37) journaled in a $3" \times 1\frac{1}{2}"$ Double Angle Strip (38), which is bolted to a $1\frac{1}{2}"$ Sprocket Wheel (39) secured on a Rod (40).

The Sprocket Wheel (39) is coupled by Sprocket Chain (41) to another

$1\frac{1}{2}"$ Sprocket Wheel (42) secured on a Rod (43). On this Rod is a 57-toothed Gear Wheel (44) engaged by a Worm (45) secured on a Rod (46). This is connected by the Bevel Wheels (47) to a vertical Rod (48), on which is secured the Steering Handle (49).

Consequently, by turning the Handle (49) the Worm (45) rotates the Gear Wheel (44) and its Rod (43), the Chain (41) moving the Steering Wheels (36) as required.

The switching of the motor on or off is controlled by the Strip (50 Fig. D) pivoted at (51) and connected to the control lever of the motor by an Eye Piece (52).

It will therefore be seen that if the motor is switched on and the clutch (formed by the Pinions 31) be placed in gear, the drive from the motor to the wheels (34) will be effected through the Eccentrics (5 and 6), Gear Wheels (11) and Gear Train (16, 17, 31 and 32) to the Rod (33) carrying the Wheels (34). While the motor is still running the drive may be de-clutched by operating the Crank Handle (20).

It should be noted that the Eccentrics (5 and 6) are opposed to one another when secured to the Rod (4). In this way they alternately impart the thrust, or driving motion, to the Rod (8).



These columns are reserved for dealing with suggestions sent in by Meccano users for new parts, new models, and new ways of making Meccano model-building attractive. We are always pleased to hear from any Meccano boy who has an idea which he considers will be useful in the Meccano system.

F. Morris (Upton).—We are afraid that the present design of clockwork motor is not adaptable to a speed regulation. Its power is limited, and any check put upon the spring would decrease the efficiency of the motor.

F. Rimmer (Sydney, N.S.W.).—No 7 Outfit builds all the models in the complete Manual and many hundreds of others. Save up your pocket-money, Frank: and by means of accessory Outfits you should soon be able to build up your present No. 4 into a No. 7, and thus realise your ambition!

Edward Cooper (Acton, W.).—By giving the cord two laps round the crank handle and then fastening with two ordinary half hitches a firm grip is obtained.

E. W. Byles (Dovercourt, Essex).—We have a number of further additions to the Hornby train in contemplation. We appreciate the need of a large type bogie passenger carriage.

J. Schofield (London).—As an alternative to using a strip as a connecting rod you could employ a rod with a coupling at either end, connection being made horizontally through the end hole in the coupling by means of a $\frac{1}{2}"$ bolt. One or two spacing washers on the bolt would ensure free action. This is an instance in which existing Meccano parts are adaptable where they obviate the introduction of special parts.

A. Dakin (Bradford).—A suitable means of connection between Strip and Rod is exercising our attention. Thanks for your suggestion in this direction.

S. Olszewski (London).—Additions to the Hornby Trains are continually being made. Your suggestions for new items have been duly noted.

Ralph J. B. Marsden (Tarver, Lancs.).—(1) We think that a hinge with two hole ends might be a little on the large side. We shall go into the matter. (2) We doubt whether a motor train set would be popular. There are at present no indication of any demand for this particular type of rolling stock.

E. T. Ratcliffe (Faversham).—We fear that the space in our locos is rather too confined for the fitting of a speed controller, although possibly something on the lines of a gramophone controller might be feasible on the larger type. We appreciate very much your keen interest in Meccano, and are always glad to hear from our enthusiastic friends.

Evan Davies (Llanrhystyd).—Your suggested reversed crank can be effected by existing parts, i.e., by employing two ordinary Cranks fastened together. Unnecessary duplication of parts is a thing we try to avoid.

L. Chivers (Norwich).—Our present Corner Bracket will take care of the functions of your suggested $\frac{1}{4}"$ flat angle strip. The latter is certainly neater, but it would duplicate the other. (2) Although we have not shortened the Crank piece we have made a uniform width of $\frac{1}{4}"$ over all. We scarcely think that any improvement would be gained by shortening it.