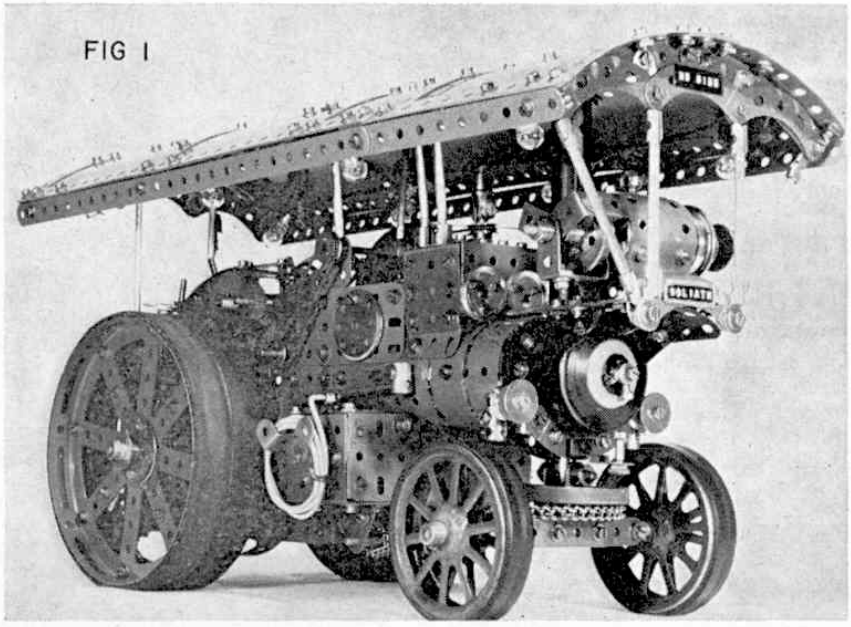


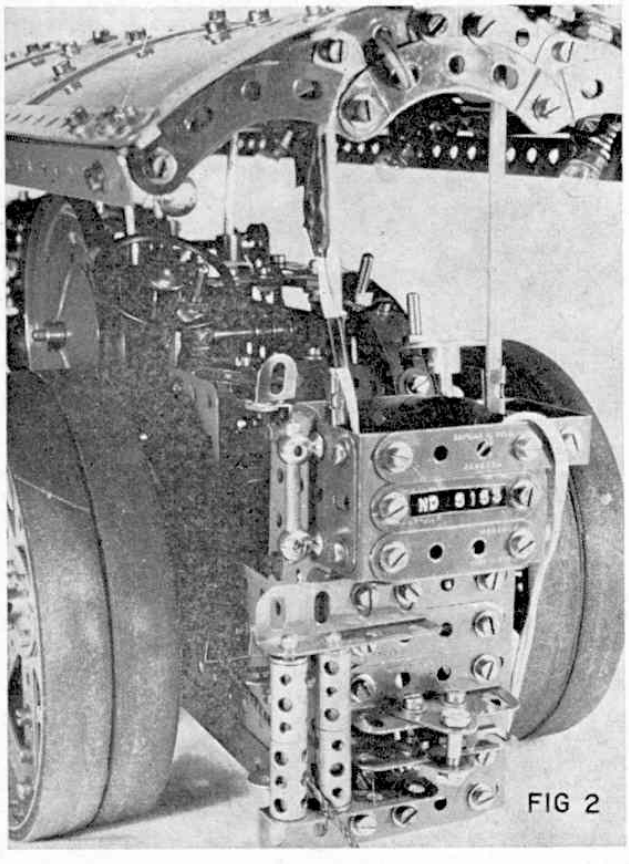
MECCANO CONSTRUCTORS GUIDE

by B. N. LOVE

Part 8: Traction Engine details and mechanisms

JUDGING BY THE roaring success of Traction Engine Rallies held all over the country and the high prices paid for derelict engines which are subsequently restored to their former glory with loving care by devoted enthusiasts, the popularity of these ancient juggernauts seems eternal. As a Meccano modelling subject, the Traction Engine has never really lost its popularity and was familiar as a Super Model Leaflet more than forty years ago. Those readers who can go back that far in time, or who have copies of the original Leaflet, will be able to make comparisons with a very recent model shown in Fig. 1. The basic dimensions of the original model produced a pleasing scale, but there were several drawbacks in the original design. A number of experienced constructors have given a great deal of thought to the improvements required and they are featured in this part of the Guide.

Fig. 2: Rear proportions of a Traction Engine are as important as those at the front. The slim coal compartment tow-bar and Winch Roller brackets complement the Boiler diameter. on which the scaling is based.



The Meccano Boiler, Part No. 162, sets a suitable scale for a model, but it is important to ensure that the tail-end of the engine has the same narrow proportions if the overall width of the model is to be kept in similar proportions to the prototype. Due to the width of the early Meccano Electric Motors, the fire-box ends of traction engines tended to be far too wide, but the introduction of the slim combined motor and 6-speed gearbox units enables the constructor to improve the appearance at the rear in a striking fashion, as shown in Fig. 2. Bearing in mind that space is required for a winch drum on one side of the rear axle and a heavy differential gear on the other, the driver's compartment must be reduced to an overall width of 2 in. for good proportions.

At this stage it is probably as well to affirm that the Meccano modeller is not working in the same sphere, or with the same materials, as the scale modeller and he should certainly not attempt to follow scale in a slavish fashion—a sure road to frustration and disappointment. If an appropriate scale to the half-inch spacing of Meccano parts presents itself, so much the better, but general appearance with satisfactory proportions is a reasonable aim.

Terminology for traction engines is a study of its own, but basically there are three types, as follows:

(a) Agricultural Engines—usually fitted with all-metal wheels and tyres, " spuds " being available for fitting to perforations in the rim of the rear wheels for extra grip. These engines were commonly single-cylinder machines with no canopies and included ploughing engines and other special-purpose farming engines.

(b) Road Locomotives—usually fitted with heavy solid rubber shod wheels of broad face at the rear, and of compound (twin-cylinder) engine type. A rear canopy was fitted for the protection of the driver.

Used for heavy haulage on well-made roads and frequently fitted with two gears only, reverse being operated by steam valves.

(c) Showman's Engines—usually compound engines as in (b), but frequently fitted with an extra top gear for fast, light running. Canopy covering full length of engine, plus dynamo on extended bracket. Winching and derricking gear was normally fitted and the decoration was always very artistic and ornate.

The latter category gives, perhaps, the greatest scope to the Meccano enthusiast and Fig. 3 shows some of the extra features which can add realism to a showman's engine. The boiler is, again, Part No. 162, but in the model shown, it is clad in $2\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plates secured by Narrow Strips which extend its length into the firebox region. The cantilever dynamo bracket is made from $2\frac{1}{2} \times 1\frac{1}{2}$ in. Triangular Plates supporting a pair of $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plates which form the dynamo platform. A pair of tweezers is indispensable for boiler work as a long reach inside is required to secure the Boiler End, dynamo bracket, etc. with internal Nuts. Care and patience at this stage will, however, produce the desired effect. Fig. 3 shows a dynamo at the front driving a " field exciter " at the rear of the chimney. The exciter, in turn, feeds back a regulated current to the field coils of the main dynamo, thus reducing the size of the dynamo to manageable proportions, while enabling it to cope with a wide range of electrical loads in driving the various items of fairground electrical equipment. Brass Wheel Discs form the body of the field exciter, while $1\frac{1}{2}$ in. Pulleys and large Flanged Wheels form the end casings and bearings.

Chimney details are achieved by Sleeve Pieces, small

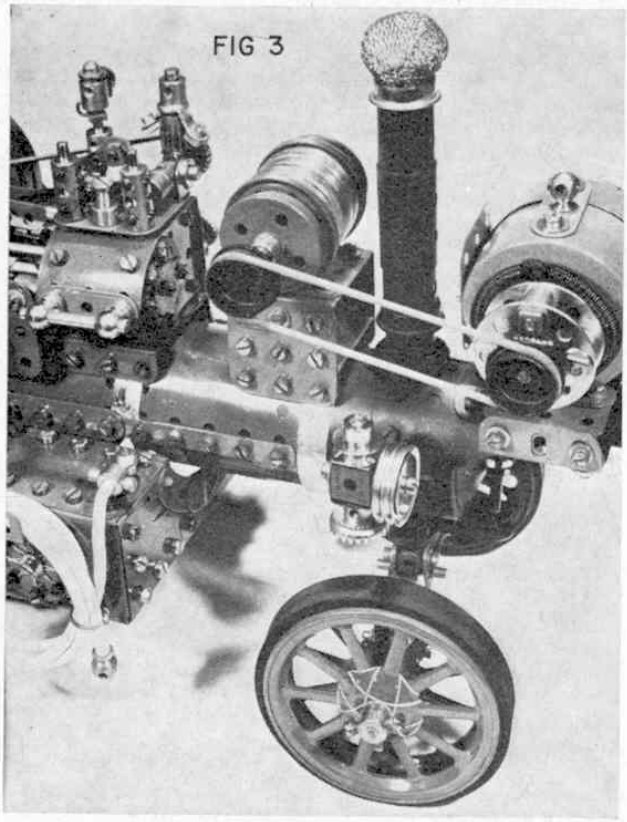


Fig. 3. Forward end of a Showman's Loco showing Cantilever Dynamo bracket protruding over the smokebox. The machine mounted behind the chimney is a " field exciter " which feeds current back to the main dynamo in the prototype. Note steam chest details, water hose, ornamental lamp, twin front wheels and chimney spark arrestor.

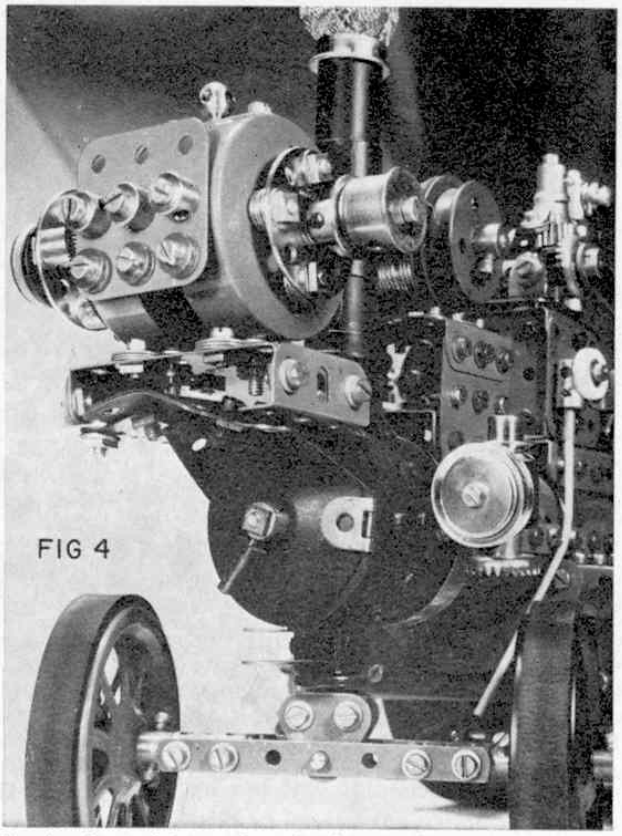


Fig. 4: General front view showing details of main dynamo, double flanged pulley wheel, smokebox door and slim, floating front axle.

Flanged Wheels, Chimney Adaptors and a $\frac{3}{4}$ in. Dinky Toy tyre which gives a smooth moulding to the boiler contour. The chimney is locked in postition by a Screwed Rod running from the upper Flanged Wheel to the inside of the boiler, the final touch of realism being added by a spark arrestor—an unmodified kettle scourer !—which is held in place by a Washer and Nut at the end of the Screwed Rod, the open weave of the kettle scourer being amenable to penetration by tweezers. Water pick-up hose is by courtesy of spring curtain wire, (plastic covered) which enters a Handrail Coupling on top of the water tank and admits a Handrail Support at the " business end " as a filter. Oil lamps are provided by 1 in. loose Pulleys, small Contrates and fixed $\frac{1}{2}$ in. Pulleys secured to three $\frac{1}{2}$ in. Double Brackets. A right-angled Rod and Strip Connector bolted to the back of the lamp carries a 1 in. Rod which drops into a Handrail Support fitted to either side of the Boiler.

Fig. 4 shows further details at the front end of the model, the smoke-box door being a Conical Disc, Part No. 187a, locked on from inside the boiler by a $\frac{1}{2}$ in. Bolt which is first secured to the Boiler End by a lock-nut. The Collar, carrying a short Threaded Pin, is secured by the outside Nut, and the Hinge, Part No. 114, is sandwiched between the Disc and Boiler End at the same time.

Construction of the dynamo begins with the attachment of a $\frac{1}{2}$ in. Bolt in one rim hole of a pair of Boiler Ends by means of lock-nuts. Two $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plates or Plastic Plates are then secured inside the Boiler Ends by a $1\frac{1}{2}$ in. Strip (see Fig. 3) at the top of the dynamo, a Handrail Support, with a Washer packed below the Strip, completing this section. The instrument board is a $1\frac{1}{2} \times 1\frac{1}{2}$ in. Flat Plate carrying three

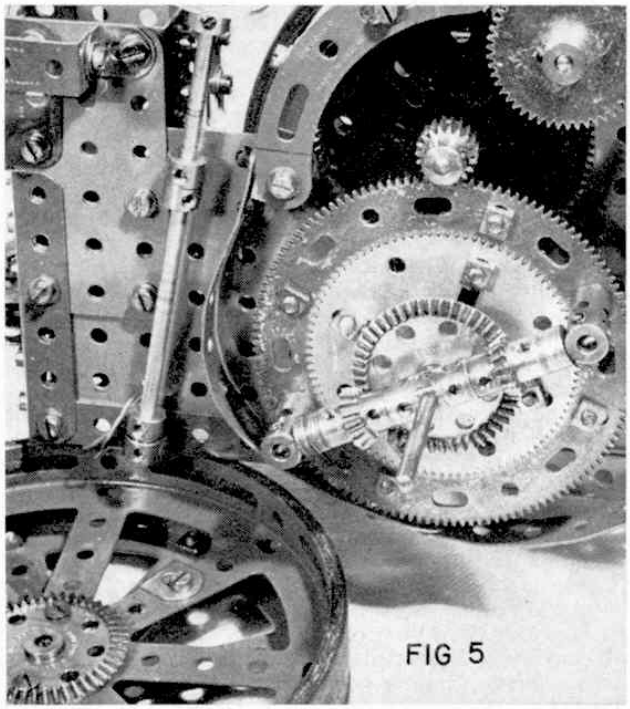


Fig. 5: The all-important differential gear which allows the traction engine to steer and perform winch operations.

Collars on ½ in. Bolts which secure the internal Flexible Plates at the front of the dynamo. A heat reflector plate, of similar construction, is attached with standard Bolts to the rear of the dynamo, embellishments at either side of the dynamo being supplied by brass Wheel Discs. Tension Springs, etc. are held in place by Screwed Rods passing through the dynamo case from side to side. The central shaft must be free to spin, as this carries the drive by belt from the Flywheel.

A double flange dynamo pulley is made as follows: the dynamo shaft carries a Rod Socket, Part No. 179, to which a ¾ in. Washer and Chimney Adaptor are locked by a Threaded Boss. The outside ¾ in. Washer is then bolted to the other end of the Threaded Boss to complete the pulley.

Front axle mounting is important and it is a mistake to use a ball race at this point or to use a fixed swivel which will not allow the front axle to " float ". It must be able to ride over bumps without tilting the engine. Fig. 4 gives one solution with double thickness of Narrow Strips bolted to Couplings to form independent axle journals. If double wheels are used to improve the appearance and rugged qualities of the front end of the traction engine, they must be locked to stub axles which must be free to revolve independently if the model is to steer properly. Collars fitted with 7/64 in. Grub Screws, Part No. 69c, are fixed to the inside ends of the stub axles running in the Couplings. The axle pivot is provided by a pair of 1 in. Triangular Plates bolted to a Coupling carried on a Long Threaded Pin which passes up through the Double Bent Strip and is secured inside the boiler with a Collar. The Double Bent Strip is bolted directly to the boiler and carries a ½ in. Double Bracket fitted with a Single Bent Strip, Part No. 102, as a towing bracket. Several ¾ in. Washers give the necessary height adjustment and swivelling pad.

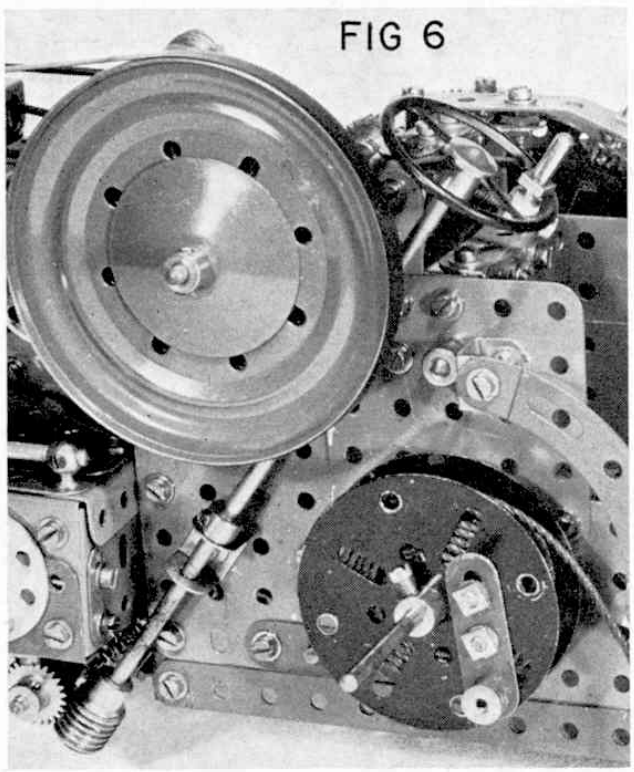


Fig. 6: The winch side of the rear axle. Note the Threaded Crank bolted to the winch drum. This forms the locking point for the drive pin passing through the rear wheel boss.

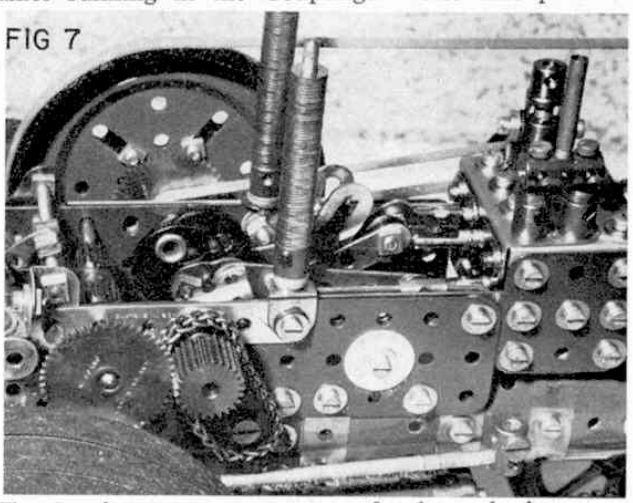


Fig. 7: A compact arrangement of valve and piston connecting rods. Note the Slotted Strips simulating reversing slides. These oscillate in opposition to the valve gear with great realism.

Fig. 1 shows alternative axle arrangements, retaining the " spud " pan as a carry-over from solid-wheel days by certain manufacturers. A 2 in. Sprocket Wheel receives the chain steering, but, again, the front axle is free to pivot universally. Prototype road locomotives had a short, but heavy transverse leaf spring across the front axle to smooth the ride and to give some stability to the front end of the engine.

As in any vehicle, change of direction always means a change in speed between the back wheels as one has to cover a greater turning circle than the other, particularly on sharp turns. The traction engine is no exception and an excellent differential gear, suitable to the scale under discussion, is shown in Fig. 5. It needs careful assembly, adjustment and packing with selected Washers, including electrical Thin brass Washers, but, when driven by the combined motor and gearbox unit, it is very effective indeed. Basically, a

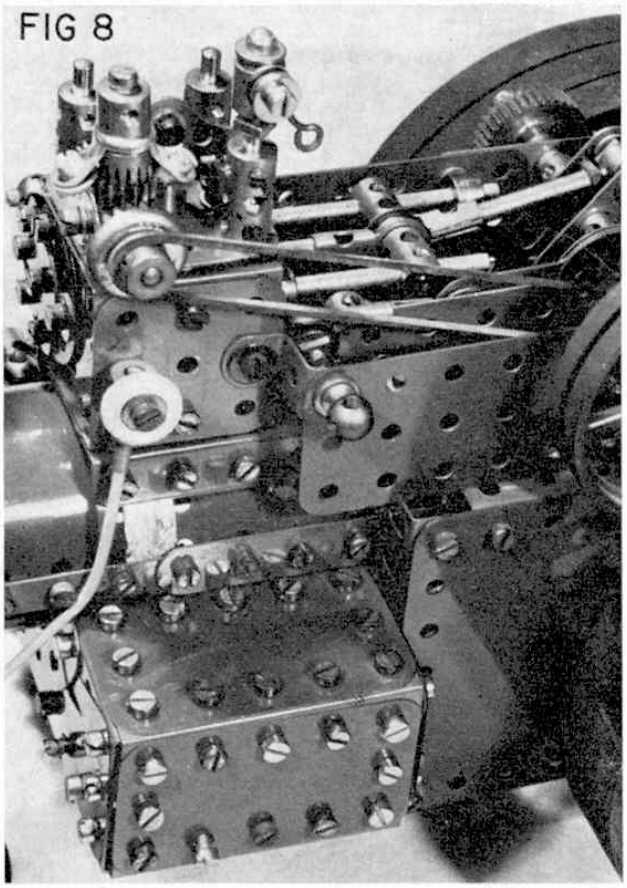


Fig. 8: A single-cylinder engine with double cross-head slide and eccentric valve. Note the belt drive to the boss of the contrate governor gear and bleed valve on the side of the steam chest made from a Dinky Toy tyre, electrical Thin Washer, Short Coupling and Spring Cord.

differential gear must be capable of passing on the transmission to both rear wheels at all times when the vehicle is in motion, despite differences in speed between the wheels. The 3½ in. Gear Ring shown in Fig. 5 has the advantage of peripheral holes which will accept the Threaded Couplings shown and will also allow the Gear Ring to be bolted to a 2½ in. Gear Wheel, which, of course, centres the Gear Ring accurately. The Threaded Couplings hold fixed stub axles on which ½ in. Bevel Gears are free to rotate. The central Coupling is free to spin on the rear axle which passes right through the model, the Coupling maintaining alignment of the stub axles and centralising the radial distance of the small Bevels. Care and patience in critical Washer spacing pays dividends at this stage.

The 1½ in. Bevel Gear lying between the Coupling and the 2½ in. Gear Wheel must also be critically spaced with packing Washers so that it meshes cleanly with the small Bevels without binding. The large Bevel is then locked firmly to the rear axle with double Set Screws, while the outer 1½ in. Bevel Gear is bolted directly to the Hub Disc forming the inner part of the rear wheel, its boss projecting through the large hole in the centre. Again, critical packing Washers are placed on the rear axle prior to putting the rear wheel in place, where it is held in position by a Collar at the outside end of the rear axle. This second large Bevel carries no Set Screws as it receives its motion directly from the differential gears. The near side of the rear axle carries a winch drum made from Face Plates locked to the rear axle and this means that the winch is always turning if the back axle is in motion. A Threaded Crank, Fig. 6, bolted to the winch drum, receives a long Bolt passing right through the rear near-side wheel which is withdrawn when winching operation take place. When in place, the Bolt couples the winch drum to the wheel for travelling.

Also illustrated in Fig. 6 is the steering column and worm drive steering mechanism, and the flywheel, the latter made from a pair of Ball Thrust Race Flanged Discs. Careful assembly of these Discs on a Bush Wheel or Gear Wheel incorporated in the main gearing will ensure the concentric running which is essential for trouble-free dynamo drive. Once set up accurately, the dynamo drive will run continuously, belts being supplied by elastic, thin leather or P.V.C. strip.

Valve gear and piston rod motion present quite a challenge in the confined spaces available in models of the type described here, but Fig. 7 shows a very compact assembly embodying two eccentrics and a crank in a very confined space—a feat which requires the art of the experienced constructor. Fig. 8 shows a simpler motion with single crank, double cross-slide and single eccentric.

Steam chests can be moulded from small Flexible Plates, Threaded Bosses being a great asset inside the chest, where they become versatile " nuts " to which external Bolts, Threaded Pins, etc. can be easily attached. Steam whistles, etc. are easily modelled from Threaded Bosses, Contact Screws, Washers and small Wire

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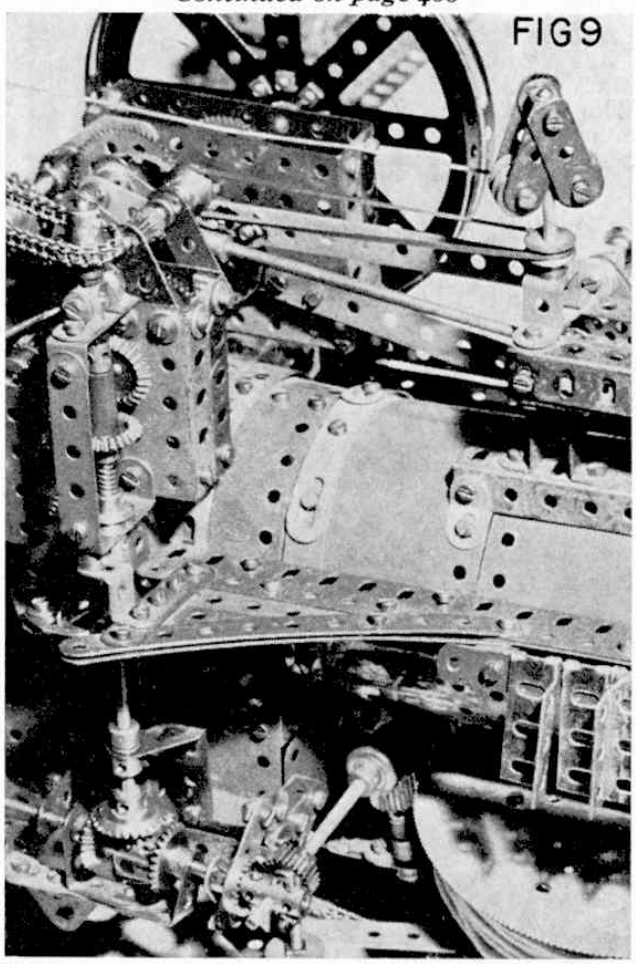

Fig. 9: A larger scale traction engine with ample room for valve gear and pistons. Note power take-off for ploughing winch via screw-operated spring-loaded clutch.

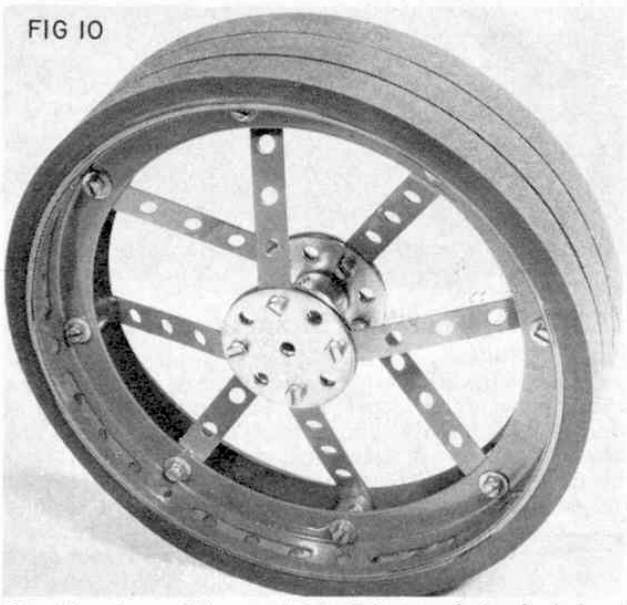

Fig. 10: A partially-completed dished spoked wheel for a traction engine using 2½ in. Narrow Strips for spokes. Eight-hole Wheel Discs are used to " sandwich " the spokes.

Fig. 11: A completed 16-spoke dished wheel for a Showman's Road Locomotive. The outer rim of the wheel is made from 5½ × 1½ in. Flexible or Plastic Plates trapped by rubber tyres or bands.

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Hooks, while governors made from Small Fork Pieces can be authentically driven by Contrate gearing, the boss of the Contrate acting as its own pulley. Gear drives are very simple in traction engines, a sliding gear rod carrying two or three change speed gears or Pinions on horizontal bearings to mesh with the crankshaft gear, as shown in Fig. 7. In some cases, as in Fig. 9, auxiliary gearing is required from the main motion to drive a ploughing winch drum, giving the modeller excellent scope to extend the mechanisms.

Wheel construction is a problem with realism in mind. Hub Discs are commonly used and, when staggered by Reversed Angle Brackets as shown in Fig. 1, a fair likeness is achieved. However, spoked and dished wheels can be neatly assembled from Circular Girders and Narrow Strips, as shown in Figs. 10 and 11. No Bolts protrude through the rims, Plastic or Flexible 1½ in. Plates being used for the rim construction. These Plates are simply held in place by the elastic properties of Meccano heavy-duty Driving Bands placed on in layers, or by the use of commercial rubber rings, or vacuum cleaner driving belts. As a last resort, black fabric insulating tape can be wound on to make very effective-looking traction engine " tyres ". Agricultural engines can be left, with advantage, with the " bare " look.

Many enthusiasts prefer to model on a larger scale, using the 9 in. Flanged Ring, Part No. 167b, as a standard for their rear wheels as this size gives easier scope for detail work. As an alternative, however, satisfactory wheels for this larger scale can be based on rings of 4½ in. Curved Strips, as shown in Fig. 12, and these have the advantage of multiple perforations for spoke attachments, etc. Hub details can then be built in to give the detailed finish.

One thing is certain: provided care is taken with construction and attention is paid to detail, traction engines can be built with great success in the medium of Meccano.

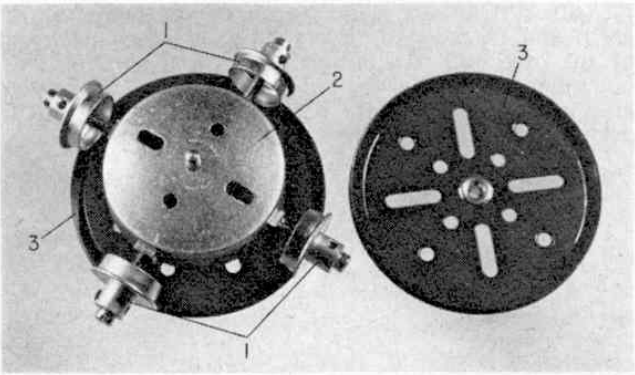
AMONG THE MODEL BUILDERS *Continued from page 439*

Simple Roller Race

As a parting shot, this month, I leave you with yet another simple Roller Race (we've had quite a lot of them, recently!) this particular example coming from Mr. G. Relins of Leamington Spa, Warwickshire. Free-running ¾ in. Flanged Wheels 1 are mounted, boss outwards, on 1⅛ in. Bolts locked by Nuts in the flange of a Boiler End 2. The Flanged Wheels run on the lips of two 3 in. Pulleys 3, the whole unit being centralised by a Rod journalled in the bosses of the Pulleys and passed through the centre hole in the Boiler End. As I say, it's simple, but useful for larger models.

PARTS REQUIRED

1—18a	4—20b	4—111d
2—19b	8—37a	1—162a



This simple Roller Race, suitable for larger models, was designed by Mr. G. Relins of Leamington Spa, Warwickshire.