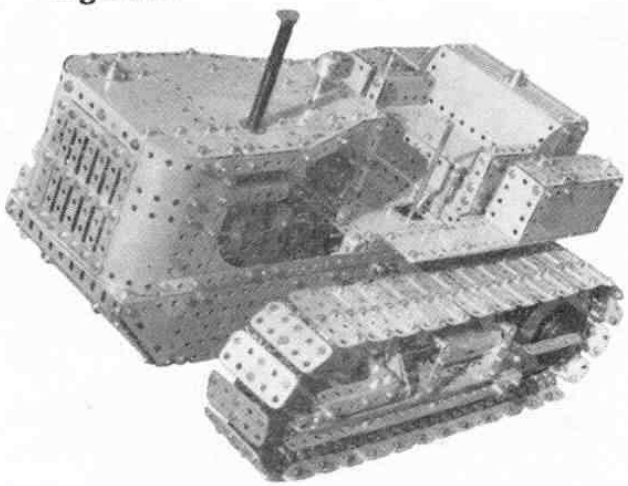


MASTERPIECE

Although its complexity prevents us from giving detailed building instructions, we just had to show you this marvellous Heavy-duty Crawler Tractor built by ERIC TAYLOR of Nuneaton, Warwickshire. BERT LOVE of Birmingham took the photographs and supplied the following general description based on Eric's original notes

ILLUSTRATED IN the accompanying pictures is a model Crawler Tractor that serves as an outstanding example of the combination of the versatility of the Meccano system and the application of sound engineering practice in model building. Strangely enough it evolved from a challenge arising out of the Inaugural Meeting of the Midlands Meccano Guild when Members voiced the opinion that they had never seen a published Meccano model which had really rugged and satisfactory caterpillar tracks. Eric Taylor, one of the Guild's leading modellers, took this challenge to heart and finished the design stages very shortly after the first meeting. He proceeded with its construction and completed it in good time for the second Guild Meeting where it proved a star attraction.

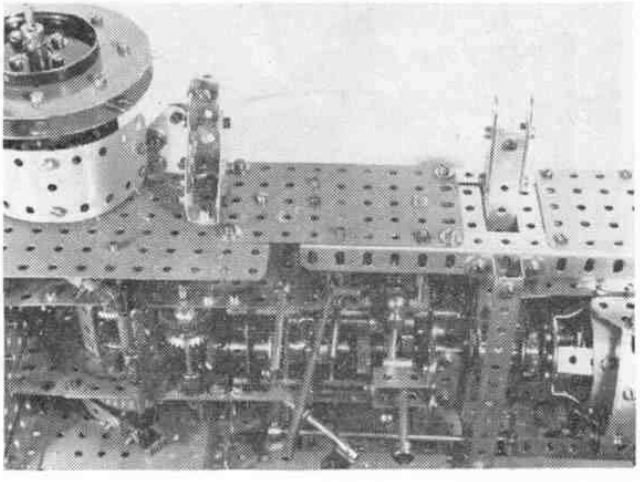
The type of crawler represented is found wherever large civil engineering works, road building or heavy pulling and pushing jobs are required and is a true "Maid of All Work" for the site engineer. Equipped with an angled dozing blade, the full-sized tractor sweeps all before it and the model illustrated was designed and fitted for such an attachment, the "U" frame pivots being provided at the rear of the track frames and the control gear in a 'tank' conveniently placed to the right hand side of the driving seat. Design of the model is not based on one particular type although the general outlines are similar to those of a famous American caterpillar tractor. The model weighs over 30 lb., but is adequately powered at all speeds by a single Power Drive Unit, running from a 12 volt D.C. supply, the motor being mounted in the appropriate place, i.e., inside the engine housing.

Particular attention has been given to main frame rigidity and the accurate alignment of transmission bearings in order to reduce friction to a minimum. To this end the main 'hull' of the model follows the design of the largest British-made crawler tractor as do the three-point suspension arrangements of the track frames. These completely relieve the hull of torsional stresses which would otherwise cause bearing misalignment and related friction over uneven ground. The final drive and steering arrangement is also of British design, having been developed in wartime for tank production, and was selected for the model owing to its simplicity, reliability and compactness.

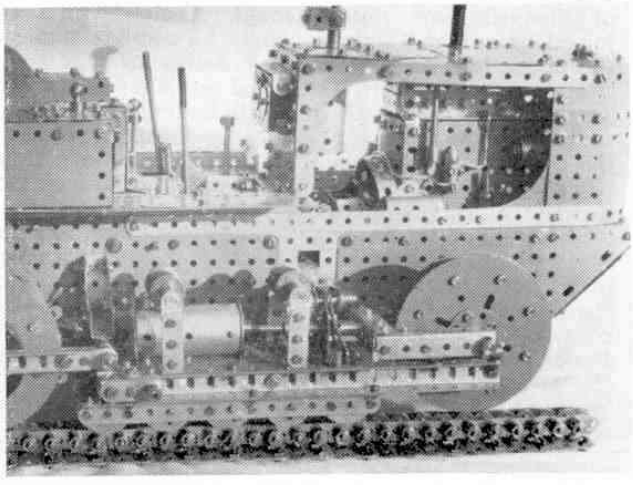
The "Engine" simulates a fan-assisted, water-cooled 6-cylinder diesel unit of approximately 150 B.H.P. with electric starter motor. The cylinder block is fitted with fuel pump, centrifugal governor and injectors on its right hand side. Above this is the exhaust manifold built up from fibre Elektrikit Strips or Fishplates surmounted by an Elektrikit Magnet Holder which conveys the exhaust fumes up the 'pipe' of Elektrikit Insulating Spacers to the rain flap at the top of the pipe. Similar detail is built onto the far side of the engine where fuel lines are run in transparent plastic-covered wire to simulate the prototype. Starter motor, generator, water pump and fan are also included.

In accordance with modern design, the bonnet tapers towards the driver so that the leading portion of each track and a large portion of the angled dozing blade are clearly visible in his line of vision. The taper finishes at the width of the instrument panel which

An upper view of the "hull" showing the gearbox and transmission to the driving shaft.



In this side view of the model, construction of the track frame is clearly shown.



carries the all important, water temperature, oil pressure and ampmeter gauges. The tapered end of the bonnet also covers a large vertical cylindrical centrifugal air filter, the intake for which is situated above the rear of the bonnet to be as free from ground dust as possible. The radiator filler cap is offset to one side so that the driver may inspect the water level by standing on the offside track. From this position the driver may also inspect the dipstick and oil filling cap.

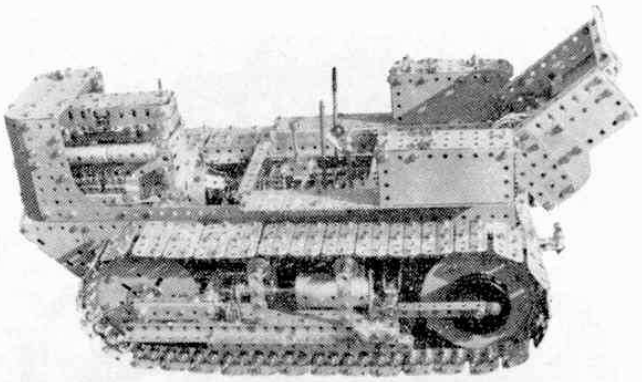
A heavy duty Single Dry Plate pedal-controlled clutch is provided and incorporates an automatic brake which eliminates 'spin' and permits the quick and easy changing of gears. A roller type of release bearing, shown at the rear of the clutch bell housing, is provided to take up operational pressure and a small ball race inside the clutch prevents friction between the clutch shaft and the engine main crankshaft when the clutch is disengaged. A similar thrust bearing is provided at the forward end of the crank shaft to take up the thrust when operating the clutch. With the Power Drive Unit set on the 16 : 1 gear ratio, a designed clutch speed of 360 r.p.m. is obtained and this is variable, by operation of the electrical speed controller, right down to 'tick-over' revs without stalling, thanks to the thrust bearings which also greatly reduce power losses when the drive is being taken up by the clutch.

The four-speed gear box, of orthodox Meccano design, is fitted with a four-position gate change for selection of ratios only. Forward and reverse are selected by an independent gear lever, situated conveniently at the driver's left hand so that he can reverse the tractor in any of the four speeds—a very useful time-saving function when the machine is making swift return movements from bull-dozing runs. The reversing gear consists of a sliding shaft carrying 1 in. and ½ in. Pinions which either mesh respectively with a 1 in. Pinion or two ½ in. Pinions in "series" the lower of these ½ in. Pinions being the gear which operates directly on to the differential crown wheel. The differential half shafts are fitted with supplementary reduction boxes each half shaft also being fitted with a rubber-shod brake disc around which an external contracting brake strap is fitted to effect track steering. Each band brake is linked to a steering stick at either side of the driver and brake tension is adjustable by screw from below the crawler. A 'kick-proof' locking device is fitted to the left hand brake to lock the left hand track when the tractor is parked on a gradient.

Placing the brakes in this part of the transmission reduces proportionately the torque required from the differential and the retardation required from the brakes for steering purposes.

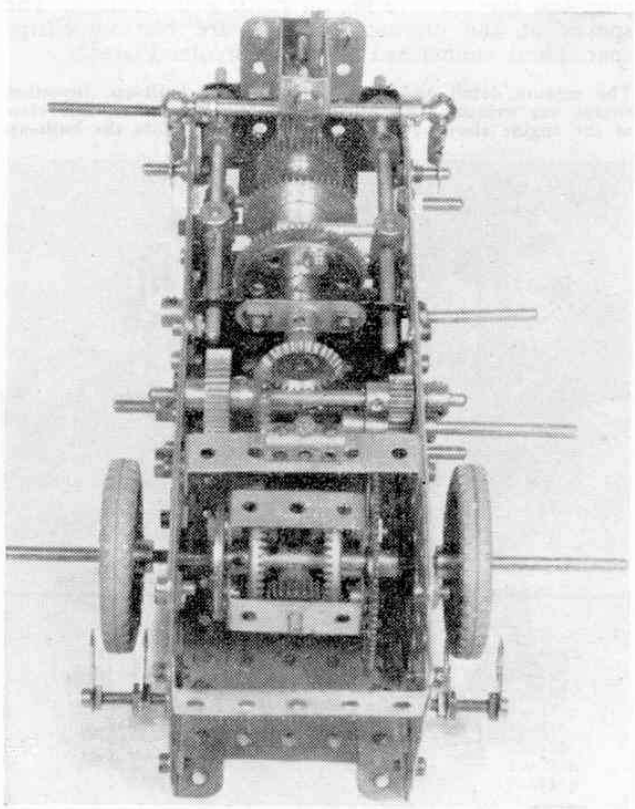
Final drive to the rear track Sprockets is via a 9 : 1 reduction from the differential, positive spur gearing relieving any final axle torque. These track Sprockets are journalled on dead axles, braced at their extremities against track tension and recoil by brace links incorporated in the dust covers on the outer face of each Sprocket. This arrangement prevents sprocket shaft deflection with resultant misalignment of track links and related components.

To ensure that the drive (and idler) Sprockets are not unduly loaded by tractor weight, they are mounted to clear the surface of the ground and the main frames carrying the tractor weight are carried on a series of track rollers, of which there are five on each side of the model, set up in heavy bearings. Each of the front

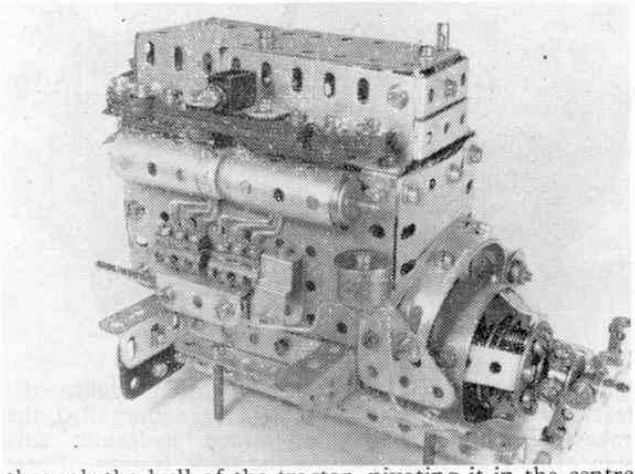


idler Sprockets is maintained in tension against the track by sliding yokes in which they are journalled, the yokes being attached to spring-loaded 'hydraulic' tension cylinders mounted inside the track frames. These cylinders maintain track tension and absorb undue track pressures arising from sharp rocks and similar obstacles. Each track frame is pivoted at its rear end on a strongly-braced axle mounted immediately in front of its respective drive Sprocket.

It is important to arrange for the crawler to ride over uneven ground while keeping the hull as steady as possible. This is done by arranging for each track frame to pivot in such a way that a rise in one track will cause a drop in the other of the same magnitude so that the hull remains upright when travelling over 'average' rough ground. In the prototype, a very heavy axle is journalled through the hull and is fitted at each end with opposing cranks, linked to the track frames. A rise in one track frame will therefore cause a proportionate fall in the other, and vice versa. Eric Taylor produced a solution in his model by fitting a compensating beam, made from Angle Girders, right



A close-up view of the gearbox and differential removed from the model. Note the rubber-tyred brake discs. Above: A general view of the Tractor with the bonnet removed and the driver's seat hinged rearwards.

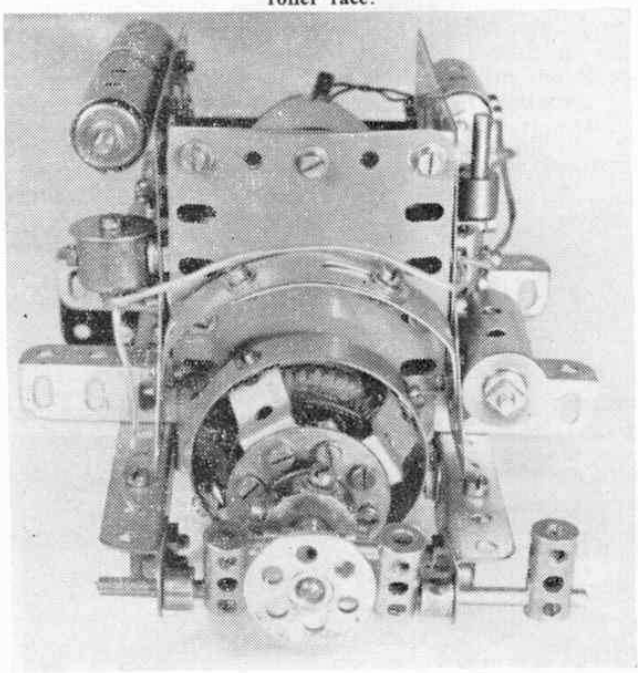


through the hull of the tractor, pivoting it in the centre of the hull, just below the flexible coupling shown in the transmission. At either end of the beam, flexible links connect it to the track frames so that a see-saw effect is produced which provides adequate and realistic compensation in the model.

In order to maintain 'centre point' steering in a crawler tractor which is towing, it is important that the drawbar be pivoted under the tractor at the theoretical centre of weight, thus allowing the tractor to be steered about the centre of 'drag.' In the model, the drawbar pivots just forward of the compensating beam and can either be left in free pivot when towing or locked into any of the holes in the radial frame at the rear of the tractor.

The tracks are made from Flat Girders, with Strips over their elongated holes, each track link being hinged by Fishplates supported against Double Brackets bolted to the Flat Girders. One-inch bolts act as hinge pins and these are locked in place with Collars. The spokes of the driving Sprocket are Narrow Strips spaced and sandwiched between Circular Plates.

The minute detail and proportions of the built-up, imitation engine are evident from picture above. Below: an end view of the engine showing the clutch assembly. Note the built-up roller race.



TWO DOG POWER CARRIAGE

Spanner describes a delightful little model accurately based on a Dog Carriage used in the early 19th century.

YOU'VE HEARD of horseless carriages—the original name for the motor car—and you'll certainly know something about horse-drawn carriages, but did you know that there used to be such things as dog carriages ? These were usually small, light-weight vehicles drawn, as the name suggests, by large dogs. Prior to 1840 they were not uncommon sights in Britain and I understand that even today they can occasionally be seen in out-of-the-way places in some Continental countries such as Belgium and Switzerland.

As far as we are concerned dog carriages are now part of our history, but we at least have the advantage of being able to re-create history in model form, thanks to Meccano. Illustrated on this page is a simple model based on an early dog carriage preserved in Guildford Museum, Surrey.

Construction is quite straightforward. Two combined chassis members and springs are each built up from a 4½ in. Narrow Strip 1 to each end of which another, shaped, 4½ in. Narrow Strip is bolted. Of these, Strip 2 at the front overlaps Strip 1 four holes, while Strip 3 at the rear overlaps Strip 1 only two holes.

A split rear axle is next built up from two 2 in. Rods, each fixed in one transverse bore of a Short Coupling 4 and joined together by an ordinary Coupling 5. Note that these Rods must not foul the centre transverse bore of the Coupling as, fixed in this, is a 2 in. Rod 6 on each end of which another Coupling 7 is mounted. Two Threaded Couplings 8 are then secured one each on the ends of two 1 in. Rods fixed in the longitudinal bores of Short Couplings 4, the Threaded Couplings being joined by a 2½ in. Rod 9 fixed in rear Coupling 7. Strips 3 are bolted to Threaded Coupling 8 as shown. The rear road wheels are free-running 3 in. Spoked Wheels held on the rear axle by Collars.

In the case of the front axle assembly, two Double Brackets 10 are joined by a 2½ in. Strip to the centre of which an 8-hole Bush Wheel 11, boss uppermost, is bolted. Loose in the boss of this Bush Wheel is a 1½ in. Rod held in place by a Collar above the Bush Wheel and a Double Arm Crank spaced by two Washers below it. Bolted to the underside of this Double Arm