MECCANO® Magazine

AUGUST 1972 VOLUME 57 NUMBER 8

Meccano Magazine, founded 1916

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MAP **HOBBY MAGAZINE**

ABC

FRONT COVER

A clever traction engine by M. A. Stoodley of Palmerston North, New Zealand, basically following that published in August 1970 M.M. but with extras copied from full-size engines. Length is 20 in. and weight 18 lb., drive by a 3v motor in the dynamo case belt-driving the flywheel; has working governor, brakes, steering, and winch.

NEXT MONTH

Radio-controlled land yachts, the proposed Morecambe Bay barrage, Koala bears, and full-size plans for another model are among features in preparation for the next issue.

Advertisements and Subscription Offices: Model & Allied Publications Ltd., 13-35 Bridge Street, Hemel Hempstead, Hertfordshire. Tel.: Hemel Hempstead 2501-2-3.

Second class postage rates paid at New York, N.Y. Registered at the G.P.O. for transmission by Canadian Post. American enquiries regarding news stand sales should be sent to MECCANO MAGAZINE, Eastern News Distributors Inc., 155 West 15th Street, New York, N.Y. 10011, U.S.A. U.S.A. and Canada direct subscription rates $6 including index.

Publishers of Aeromodeller, Model Boats, Model Cars, Model Engineer, Radio Control Models, Model Railways, Scale Models, Woodworker, Military Modelling.

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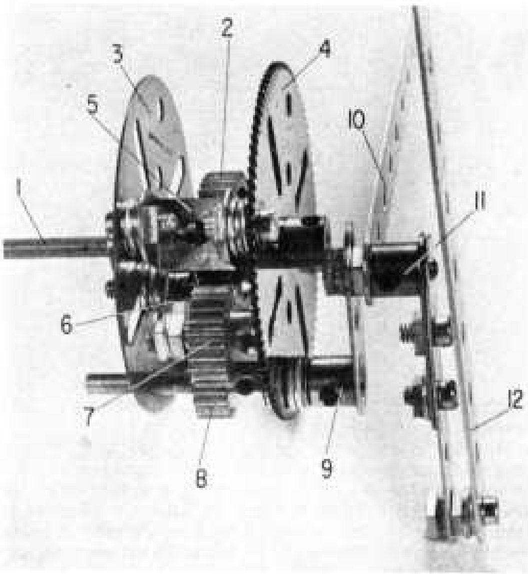
MODEL & ALLIED PUBLICATIONS LTD.
13-35 BRIDGE STREET, HEMEL HEMPSTEAD, HERTFORDSHIRE

Below, working on the planetary gear principle, this interesting mechanism designed by Mr. Colin Spence of Edinburgh, converts rotary motion into linear motion. Right, young Alan Maslen of Bowdon, Cheshire, puts the finishing touches to the weight-driven clock built from the new No. 1 Meccano Clock Kit.



Among the Model-Builders with 'Spanner'

Planetary Motion-Converter

The title "Motion-Converter" has a good mechanical ring to it. It conjures up mental pictures of a sophisticated piece of complex machinery whirring merrily away as it performs all sorts of intricate tasks; a kind of engineering masterpiece, you could imagine. In fact, of course, a Motion-Converter need be nothing so exotic—and usually isn't! More often than not it is something perfectly simple in both principle and operation—witness that most common of all motion-converters, the straightforward crank. This, by converting rotary motion into reciprocating motion, qualifies as a motion-converter in every sense, yet it could not be described as complex by any stretch of the imagination.

Having said this, however, I would now like to look at a rotary-to-reciprocating converter which is considerably more complex—and far more interesting—than the common crank. Illustrated on this page, we have a rather unique unit, designed by Mr. Colin Spence of Edinburgh, which performs its intended job in a fascinating way, working on a planetary gear principle. Mr. Spence himself gives the best explanation of the mechanism.

"When a small wheel is rolled round the inside of a large one," he says, "Any chosen spot on the circumference of the small wheel may be expected to follow an irregular, curly path. However, if the diameter of the smaller wheel is exactly half that of the larger one, the path traced is a straight line. Thus, by rolling a gear wheel within a ring having twice as many teeth, rotary motion can be converted into linear motion.

"The Meccano Gear Ring, however, having an odd number of internal teeth, cannot be used to demonstrate this fact, but the same effect can be obtained by rotating a small gear round one of twice the diameter. These two gears should not mesh with each other directly, but each with a third, intermediate gear to maintain the correct direction of rotation."

The mechanism illustrated was built from Mr. Spence's original specifications and I can confirm that it works exactly as claimed. An axle 1, rigidly held in a suitable support, is fitted with a 1 in. Gear Wheel 2, secured near one end. Free to rotate on the axle is a "cage" constructed from a Face Plate 3 and a 2½ in. Gear Wheel 4 connected together by two Double Brackets 5 with additional spacing being provided by three Washers on the shank of each securing ⅜ in. Bolt. Fixed to the Face Plate inside the cage, but spaced from it by four Washers, is a Fishplate 6, the securing Bolt passing through the slotted hole in the Fishplate and one slotted hole in the Face Plate. A Threaded Pin, on which a ¾ in. Pinion 7 is free to revolve, is fixed in the circular hole in the Fishplate.

Journalled in corresponding outer holes in the Face Plate and 2½ in. Gear is a smaller Rod, on which a ½ in. Pinion 8 is mounted inside the cage and a built-up two-throw crank outside the cage on the end of the Rod. Fishplate 6 is then adjusted so that Pinion 7 meshes with both Pinion 8 and Gear Wheel 2. The two-throw crank, spaced from Gear Wheel 4 by three Washers, is built up from a Crank 9, to the arm of which a Threaded Pin is fixed. Free on this Pin is a pushrod 10 (a suitable Strip), while another Crank 11 is secured on the Pin. The arm of this second Crank is extended two holes by an overlying 2½ in. Strip, to the end of which a second pushrod 12 is pivotally connected. The mechanism is driven by a suitable Pinion meshing with Gear Wheel 4.

"When the 2½ in. Gear is rotated one way," writes Mr. Spence, "The centre of the crankshaft is carried in a circle of 1 in. radius in that direction, but the crankshaft rotates about its own axis in the opposite direction at the same speed. The result is that one crankpin moves in a straight line of 4 in. to and fro, while the other works similarly at 90 deg. to it—a most fascinating movement to watch! The crankpins can be connected directly to the piston rods of a 90 deg. V-twin engine, or pump, with a 4 in. stroke without using connecting rods as there is no angularity to compensate for. The number and angular settings of the crank webs can be varied to suit requirements."

An intriguing mechanism, Mr. Spence!

PARTS REQUIRED

PARTS LIST

*2—1	*1—15a	1—27c	24—38
1—5	1—17	1—31	2—62
1—10	1—25	13—37a	1—109
2—11	1—26	2—37b	1—111a
			5—111c
			2—115

*Dependent on the model with which the mechanism is used.

Variable Speed Mechanism

Moving on to a different subject, now, Mr. E. R. W. Schoolar of Rusthall, Tunbridge Wells, Kent has supplied me with details of the accompanying Variable Speed Mechanism which he built after seeing a similar mechanism in the April 1971 issue of Meccano Magazine. The original unit was built by Mr. Colin Hoare of Beaconsfield, Quebec, Canada, but, as Mr. Hoare himself pointed out at the time, it had the disadvantage of requiring a large amount of space to operate. By employing a rather ingenious differential link, Mr. Schoolar has managed to produce a considerably more compact unit, although, as he rightly points out, "On my model, the total output direction is opposite to that of the input shaft." I know Mr. Hoare will be the first to congratulate Mr. Schoolar on his improvement.

As regards construction, two 2 in. Strips 1 and two Corner Gussets 2 are bolted, one each to each side flange of a 5½ × 2½ in. Flanged Plate, the upper end of each Strip and Gusset being connected by a 5½ in. Strip 3. Journalled in Strips 3 is the input shaft, supplied by a 3½ in. Rod and held in place by a ¾ in. Sprocket Wheel 4 and a 1 in. Sprocket Wheel 5. A Triple-throw Eccentric 6 is mounted on the Rod, as shown.

A differential is next built up from two 8-hole Bush Wheels 7, connected together by two 1½ × ½ in. Double Angle Strips, the securing Bolts at one side fixing a 2 in. Strip 8 across the face of one Bush Wheel to project one hole outwards. Journalled free in the bosses of the Bush Wheels and in Strips 3 are the half-shafts—1½ in. Rods—each carrying a ½ in. Pinion 9 fixed on the inside end and spaced from the Bush Wheel by a Washer.

In constant mesh with the Pinions are two ¾ in. Contrate Wheels, one fixed and one loose on a 2 in. Rod journalled in the centre holes of the Double Angle Strip. Again, a Washer spaces each Contrate from the nearby Double Angle Strip, but note that each Bush Wheel is spaced from nearby Strip 3 by two Washers. A ¾ in. Sprocket Wheel 10 is fixed on the outside end of one half-shaft, while a 1 in. Sprocket is fixed on the outside end of the other half-shaft, the latter Sprocket being connected by Chain to Sprocket Wheel 5. The arm of Eccentric 6 is then finally lock-nutted to the protruding end of Strip 8 to complete the mechanism. Input drive is taken to Sprocket 4, with Sprocket 10 providing the output take-off point.

During operation, the Eccentric moves the differential backwards and forwards which alternately speeds up and slows down the output shaft. The amount of variation may be adjusted by using different throws of the Eccentric and by replacing the 1 in. Sprockets with those of other diameters.

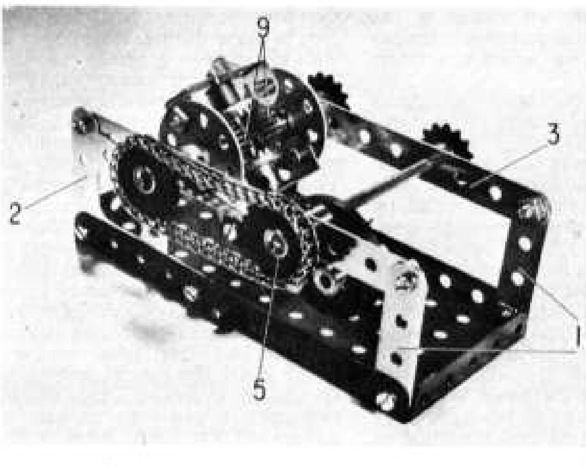
On the subject of the Eccentric, Mr. Schoolar gives a final word of advice. "If the 1 in. throw is used," he says, "It is advisable to fit a 6 in. Driving Band over an axle (11) secured by Spring Clips in the Flanged Plate, pass it through a hole in one of the differential Double Angle Strips, then take it back and on to the axle again. If this precaution is not taken, the Eccentric arm will be able to rise and the result will be a variable and *unpredictable* drive!"

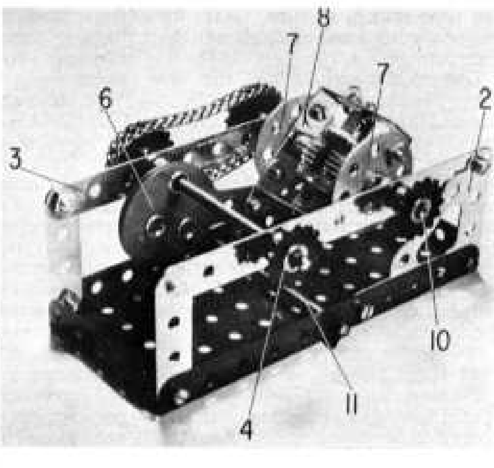
PARTS REQUIRED

2—2	2—18a	16—37a	1—94
3—6	2—24	15—37b	2—96
1—16	2—26	8—38	2—96a
(1—16b)	2—29	2—48	2—108
1—17	(2—35)	1—52	1—130
			(1—186a)

Meccano Clock Kit

Thanks to a number of advertisements in recent issues, regular M.M.





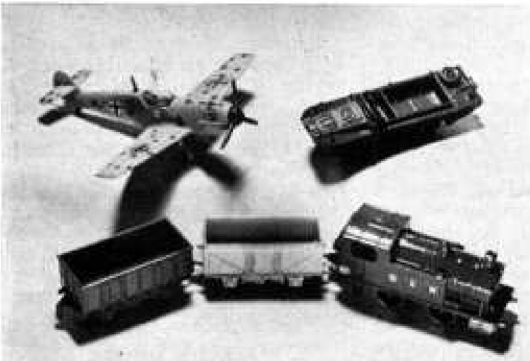
Two opposing views of a Variable Speed Mechanism designed by Mr. E. R. W. Schoolar of Rusthall, Tunbridge Wells, Kent.

readers will be aware of the very latest products from Meccano (1971) Limited—the Meccano Clock Kits, pre-production samples of which were shown for the first time at the Brighton Toy Fair earlier this year. Two Kits are planned, the basic No. 1 Kit and the more advanced No. 2 Kit with a built-in hourly chiming device. I am pleased to report that the No. 1 Kit is now in full production and should be readily available by the time this magazine appears.

The Kit contains all the components needed to build up into a real, working wall clock—weight-driven and keeping accurate time (if correctly adjusted, of course). It makes a comprehensive timepiece, complete with a blue-tinted circular clock face and an attention-drawing revolving disc arrangement which gives the impression of coloured droplets "exploding" outwards as it revolves. Full assembly plans are supplied and—most important—you don't need to be a Meccano expert to build it. Anyone with average do-it-yourself ability can successfully complete it.

The assembly components consist almost entirely of standard Meccano parts, although one or two Plastic Meccano parts are used, together with some special components—Pallet Pins, clock face, numbers, "exploding" discs, pendulum rods, etc. Of these, the Pallet Pin is the most interesting from a Meccano point of view, being best described as a "headless" Pivot Bolt with a slot for a screwdriver being cut in the end of the shank. I use this purely as a description, however, because the Pin *is* a new part (No. 251) and is not actually made from the existing Pivot Bolt. When built, the Clock is a genuine timepiece which keeps good time and it's the sort of thing which one would not normally dismantle. If it should be dismantled, though, the parts could always be added to existing Meccano collections—after all, they are mainly standard! (I like the assembled Clock, myself).

The No. 2 Kit will not be available until later, but I will report on it as soon as it is released.



DINKY TOY NEWS

THE TERRIFIC TRIO

By Mike Peddie

ONE of Meccano's primary aims is to please the public, and to satisfy public demand. With their Dinky Toys they try—with undoubted success—to please as many people as possible by bringing out new and different models at very regular intervals. This results of course in a remarkably wide range of Dinky Toys on the market at any one time which, in turn, caters for the greatest cross-section of the community.

Last month, apart from the Sea King Helicopter Kit, Dinky Toys released only one new model, namely the Duple Viceroy Luxury Coach. This month by way of contrast they have released not one, not even two, but three new models, all of which are terrific in their own right—a D.U.K.W. Amphibian (a "must" for military vehicle collectors), a Messerschmitt Bf 109E, and last, but certainly not least, a Goods Train Set.

War-time Fame

During the long, hard years of World War 2, few military vehicles proved their worth more than the D.U.K.W. Amphibian (pronounced "duck" incidentally). Its amazing versatility proved legendary and it probably came second only to the famous Jeep for world renown. As the pronunciation of its name suggests, the D.U.K.W. is as much at home on water as it is on land and, during the war, it was frequently used to carry troops from ship to shore and then on inland to the "action", any intervening stretches of water proving no obstacle whatsoever.

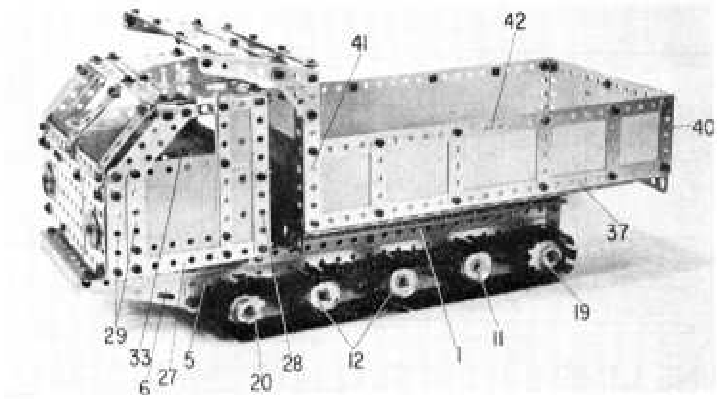
In miniature form, the Dinky Toy D.U.K.W., although not amphibious, is an excellent representation built round a finely detailed casting which captures the true character of the real thing. Casting detail really is outstanding—seats, hatch-covers, tools, a spare wheel representation, and even deck riveting are all clearly visible. Finished in olive green, the model runs on no less than six Speedwheels fitted in the correct two-front/four-rear arrangement.

I can foresee this model being very popular, particularly among military vehicle collectors, and especially as it is a "traditional" die-cast Dinky with no unwieldy features. Marketed under Sales No. 681, the D.U.K.W. Amphibian is excellent value at the amazingly low recommended U.K. Retail Price of 32p.

German Fighter

Continuing with the military theme, Dinky's second "offering", the Messerschmitt Bf 109E, also rose to fame during World War 2. This aircraft was generally regarded as the German counterpart of Britain's Spitfire, and it undoubtedly proved roughly equal to it—in fact, the Messerschmitt was superior in some respects. Between 12,000 and 17,000 ft. there was little to choose between them, but at altitudes of 20,000 ft. and above, the Messerschmitt was considered by pilots of the day to be a somewhat better aircraft. It was powered by a Daimler-Benz, 12 cylinder inverted-vee liquid-cooled engine, which produced 1150 H.P. at 2,400 revs., and which made the aircraft capable of speeds in excess of 350 m.p.h., although it generally cruised at around the 300 m.p.h. mark.

A caterpillar-track cross-country vehicle based on the full-size Flextrac-Nodwell FN110



Making use of the Meccano Caterpillar Track Pack, this ruggedly appealing model follows the layout of the Flextrac Nodwell type FN110 vehicle, which can take almost any surface in its stride.

Tracked for Tough Terrain

SAYS 'SPANNER' OF THIS ADVANCED MODEL

SLEEK, intricate and streamlined models are very appealing in their place, and I am among the first to appreciate them, but now and again I really do like to see a big, chunky, "monster". Some people might regard such models as ugly, yet I often think they have their own particular beauty—in an aura of brute strength and power!

Featured here is a model which undoubtedly falls into the latter category. Tracked for tough terrain, it is based on a Flextrac-Nodwell type FN110—a rugged cross-country vehicle designed to carry loads over the worst kind of ground from rocky wastelands to muddy swamps, or treacherous ice-fields. The real thing, in fact, will climb gradients in excess of 60 degrees and can manage a 30 degree side-tilt without any trouble. It can be fitted with various tracks to meet "any conditions" and already has an impressive record of operational successes in many countries behind it to prove its capabilities.

From the Meccano modeller's point of view it is an ideal vehicle, not only because its rugged shape lends itself perfectly to reproduction in Meccano, but also because its tracked characteristic offers an excellent opportunity for using Meccano Caterpillar Track Pack. Needless to say, this is what our model-builder has done—with very realistic results. The model runs well and also incorporates working steering, controlled by a steering wheel instead of the more usual lever-steering found on most tracked vehicles. We do not know the system used on the real FN110, by the way, but the average tracked vehicle is steered by braking one or other track, while allowing the non-braked track to drive the vehicle round. Our system relies on a simple but effective gearing system, as will be seen.

Chassis

The chassis is built up from two 15½ in. compound angle girders 1, each consisting of a 12½ in. and a 4½ in. Angle Girder. These compound girders are connected together at their forward ends by a 4½ in. Angle Girder and, at their rear ends, by a 3½ × 2 in. Double Angle Strip 2, each securing Bolt in the latter case also holding a 1½ in. Strip 3 in position. Bolted between Strips 3 at each side are two further 3½ × ½ in. Double Angle Strips 4, the securing Bolts also fixing a 12½ in. Flat Girder 5 in place. The forward ends of Girders 5 are connected by another 3½ × ½ in. Double Angle Strip, each securing Bolt in this case helping to hold in place a 3½ × 1½ in. Triangular Flexible Plate 6 which is also bolted to compound girder 1. Counting from the rear end, Flat Girders 5 are further connected through their sixth, ninth, fourteenth and sixteenth holes by four more 3½ × ½ in. Double Angle Strips, arranged as shown and numbered 7, 8, 9 and 10 respectively. Note that the Bolts fixing Double Angle Strips 7 and 8 in place also fix a Double Bent Strip to the outside of each Flat Girder, while the Bolts securing Double Angle Strip 9 help to fix a strengthening 1½ in. Strip between the insides of the Flat Girder and compound girder 1 at each side. Held by Collars in the Double Bent Strip and the Flat Girder is a free-turning 2 in. Rod carrying a 1 in. Pulley 11 which will serve as an "idler" wheel for the tracks. Further idlers are provided by additional 1 in. Pulleys 12, fixed on two 6 in. Rods journalled in Flat Girders 5.

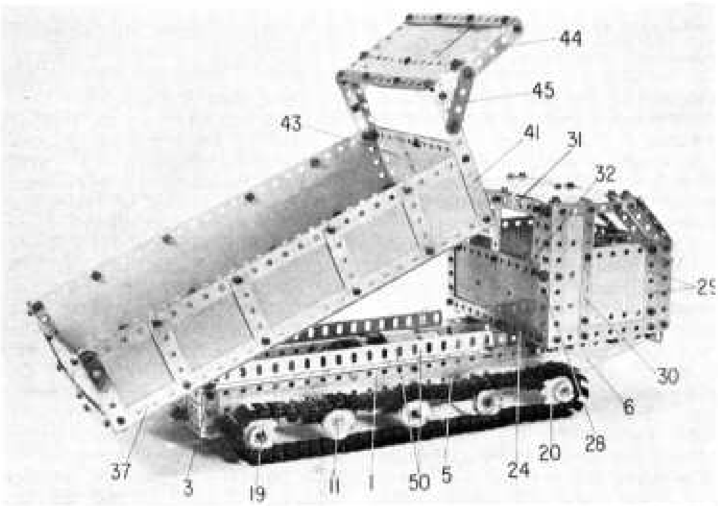
Now bolted to Double Angle Strips 9 and 10 is a Motor-with-Gearbox, output shaft rearwards and set in the 60:1 ratio. A 1½ in. Strip 13 is added to the shaft, followed by a ¾ × ¾ in. Pinion. This Pinion is in constant mesh with a 50-teeth Gear Wheel 14 fixed on a 6½ in. Rod, free to slide in the centre holes of Double Angle Strips 7 and 8 and lower Double Angle Strip 4, as well as in the lower hole in Strip 13. Stops to prevent the Rod sliding so much that Gear 14 disengages with the ¾ × ¾ in. Pinion are supplied by two Collars, one fixed on the rear end of the rod and the other between Double

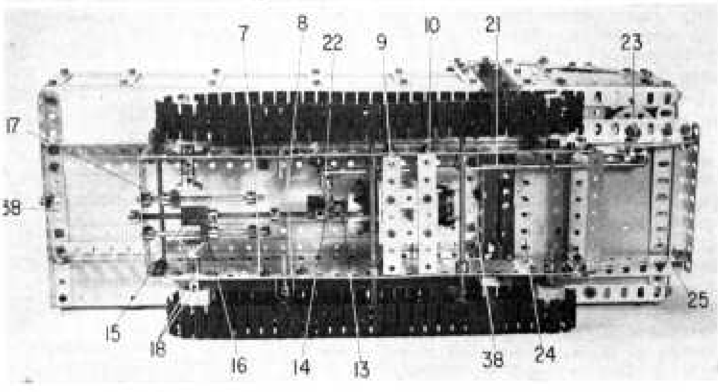
Angle Strips 7 and 8. Also fixed on the Rod in the position shown is ½ × ¾ in. Pinion 15.

Two 3½ in. Rods are next held by Collars in lower Double Angle Strip 4 and Double Angle Strip 7 one each side of the 6½ in. Rod. Two ½ in. Pinions 16 and 17 are secured one on each of these Rods, care being taken with their positioning. They should be staggered in relation to each other so that with the 6½ in. Rod in its forward position, Pinion 15 meshes only with Pinion 16. As the Rod moves rearward to the centre position, however, Pinion 15, remaining in mesh with Pinion 16, should also mesh with Pinion 17. As the Rod moves further back to its rear position, Pinion 15 should disengage Pinion 16 and mesh only with Pinion 17. Pinions 16 and 17 each mesh with a ¾ in. Contrate Wheel fixed on a 2½ in. Rod journalled in the bosses of two Double Arm Cranks 18 bolted one to the inside and one to the outside of Flat Girder 5. Packing Washers are added as necessary. Mounted on the Rod is a Coupling on which a Plastic Meccano 10-teeth Sprocket Wheel 19 from the Track Pack, is secured. A similar Sprocket 20 is fixed on another Coupling mounted on a 2 in. Rod journalled in one Double Arm Crank bolted towards the opposite end of Flat Girder 5 and held in place by a Collar.

Lengths of caterpillar track will of course be carried on the Plastic Meccano Sprockets but before fitting them it is advisable to complete the steering linkage. Turning freely on a Pivot Bolt locked in the tenth hole of compound girder 1 is a Crank to the lower end of the arm of which a 9½ in. Strip 21 is pivotally attached by a ½ in. Bolt. Fixed on the shank of this Bolt is an End Bearing 22, the arms of which locate over the face of Gear Wheel 14, but note that the arms must not grip the Gear, or hinder its turning movement in any way. The forward end of Strip 21 is lock-nutted to an Angle Bracket which is in turn lock-nutted to an 8-hole Bush Wheel 23 fixed on the steering column. This column is supplied by a 3½ in. Rod journalled in the fourth hole of compound girder 1 and—later—in a journal mounted inside the cab. When the steering wheel is turned, it causes End Bearing 22 to act on Gear 14 moving it and its supporting Rod backwards or forwards which, of course, controls the meshing of Pinions 15, 16 and 17. This, in turn, causes the model to steer in the chosen direction.

The two crawler tracks can be positioned as soon as the control linkage has been completed. Each track consists of 63 Track Links, which is just right to ensure sufficient slack for easy running without being so loose that the track is easily "thrown".



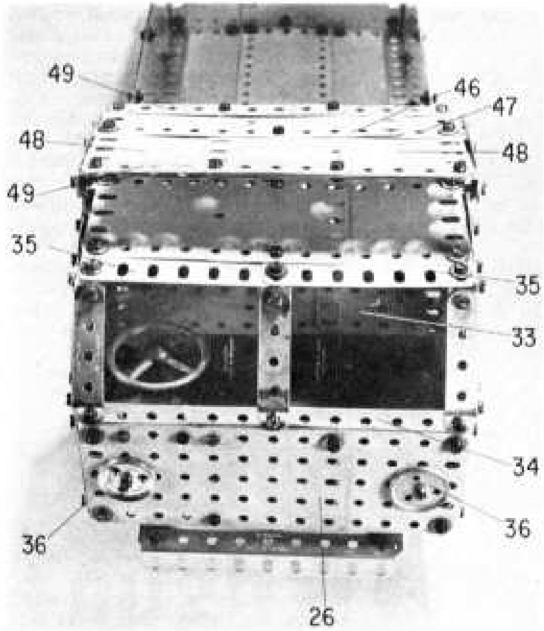


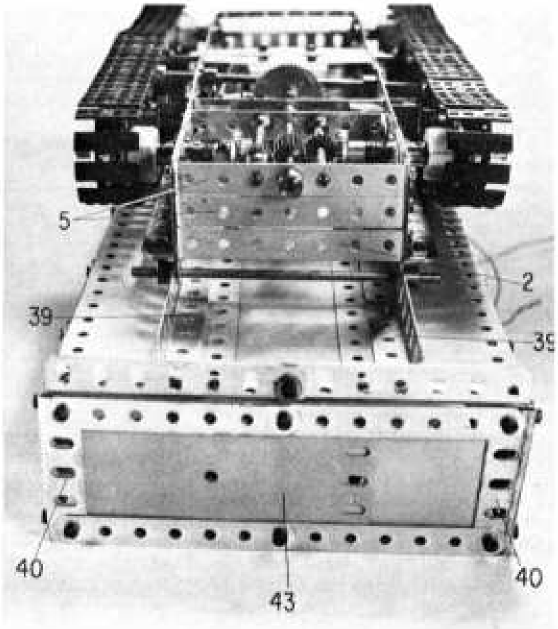
Top, a general three-quarter rear view of the model, with the load body in the raised position. Left, an underside view of the model showing the drive to the tracks.

Cab

We come next to the cab which should not present any great constructional difficulties. A 6½ in. compound angle girder 24 (built up from one 4½ in. and one 3½ in. Angle Girder) and a 5½ in. Angle Girder 25 are attached to compound girders 1, being spaced from the girders by two Washers and a Nut on each securing ½ in. Bolt. A 6½ × 2½ in. compound flat plate 26 built up from two 4½ × 2½ in. Flat Plates and edged by 2½ in. Angle Girders is bolted to the vertical flange of Girder 25. The lower end of each 2½ in. Girder is then connected to the end of compound girder 24 by a 4½ in. Angle Girder 27, a rear vertical corner post being provided by another 4½ in. Angle Girder 28. Two 3 in. Strips 29, extended upwards and rearwards by 2½ in. Narrow Strips, are bolted to the forward end of Girder 27, the upper ends of the Narrow Strips being connected to the top of Girder 28 by a 3 in. Narrow Strip. The end securing Bolts also hold two Angle Brackets in place. A 4½ in. Narrow Strip 30 is bolted between the 3 in. Narrow Strip and Angle Girder 27, then the cab side is completed by a 4½ × 2½ in. and two 2½ × 1½ in. Flexible Plates arranged as shown to leave a gap for the side window.

At the back of the cab, a 2½ in.





Left, a high frontal view of the cab, in close-up. Right, in this close-up underside rear view of the model, the Double Angle Strip connections between the sides of the chassis are clearly shown.

Flat Girder is bolted to the upper half of each Girder 28, these Flat Girders being connected at the top by a 5½ in. Strip 31 and, at the bottom, by a 5½ in. Angle Girder, the securing Bolts in the latter case helping to fix a 6½ × 2½ in. compound flexible plate 32 between Angle Girders 28. The centre of the Angle Girder is connected to the centre of Strip 31 by a 2½ in. Strip, while a 5½ × 1½ in. Flexible Plate 33, extended two holes by a 2½ × 1½ in. Flexible Plate is bolted to the horizontal flange of the Girder to represent the seat.

A 6½ in. compound strip 34, built up from two 3½ in. Strips, is attached by Fishplates to compound plate 26, at the same time fixing in position two 3½ × 2½ in. Transparent Plastic Plates overlaid by three 2½ in. Strips to serve as the windscreen. The Strips and Plates are carefully bent to the required shape, then the roof is added, this consisting of two 4½ × 2½ in. Flexible Plates, overlapped five holes, and two 3½ in. Flat Girders 35. The roof as a whole is attached to the sides by the earlier-mentioned Angle Brackets with the windscreen being secured to Flat Girders 35, by Angle Brackets.

A Trunnion is bolted to the inside top edge of compound plate 26, the apex of this Trunnion being extended one hole by a 1½ in. Strip. The end hole of this Strip provides the upper journal for the steering column.

The cab is completed with two 1 in. Pulleys without boss 36, bolted to the front of plate 26 to serve as headlamps.

This leaves only the load body to be produced. Two 12½ in. Angle Girders 37 are connected together at the ends by two 6½ in. compound angle girders 38 (each built up from two 3½ in. Angle Girders), the intervening space being enclosed by three 12½ × 2½ in. Strip Plates forming the lorry bed. Two more 12½ in. Angle Girders 39, separated by a distance of five clear holes, are bolted between compound girders 38 beneath the Strip Plates, then attached to the rear corners of the bed are two 2½ in. Angle Girders 40, while two 4½ in. Angle Girders 41 are attached to the forward corners. Bolted to Girders 37, 40 and 41 at each side is another 12½ × 2½ in. Strip Plate, serving as the body side and edged along the top by a 12½ in. Strip 42. This Strip is connected to Girder 37 by four 2½ in. Strips spaced as shown. The back and front are both enclosed by a 6½ × 2½ in. compound flexible Plate 43, built up from two 4½ × 2½ in. Flexible Plates and edged along the top and bottom by 6½ in. compound strips, each supplied by two 3½ in. Strips. .

At the front of the body a 3½ in. Strip 44, braced by a 2 in. Strip 45, is bolted to the upper end of each Girder 41. Attached by Angle Brackets to Strips 44 is an overhanging 6½ × 3½ in. extension, built up from one 5½ × 1½ in Flexible Plate 46, one 2½ × 1½ in. Flexible Plate 47 and two 4½ × 2½ in. Flexible Plates 48, the whole arrangement being edged at front and rear by two 6½ in. compound Strip 49, each supplied by two overlapping 4½ in. Strips. The completed body is finally pivotally attached to two 9½ in. Angle Girders 50—bolted to compound girders 1 in the chassis—by means of a 5 in. Rod passed through the seventh holes of Girders 39 and the end holes of Girders 50. It is held in place by Collars.

PARTS REQUIRED

1—1a	3—12c	2—29	5—111a
1—2a	1—14	211—37a	1—126
4—2a	2—14a	191—37b	1—147b
10—3	1—15	60—38	1—166
4—4	1—15b	2—45	1—185
12—5	2—16	9—48b	6—188
2—6	2—16a	2—53a	2—189
6—6a	4—17	19—59	2—190a
6—8	6—22	1—62	13—191
2—8a	2—22a	6—22b	2—193b
2—9	1—24	4—63	5—197
10—9a	1—25b	10—69c	2—224
5—9b	2—26	2—103b	4—235
4—9d	1—26b	4—103d	2—235a
9—12	1—27	2—103f	2—235d

4—10-teeth Sprockets (Plastic Part No. P1)
126—Track Links
1—3-12 volt Motor-with-gearbox.

Photographed in Fig. 3 is a simple practice assembly to show the principles of sprocket drive, shaft adjustment, etc.

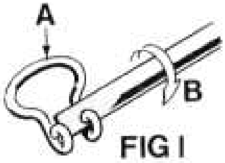


FIG I

FIG 2

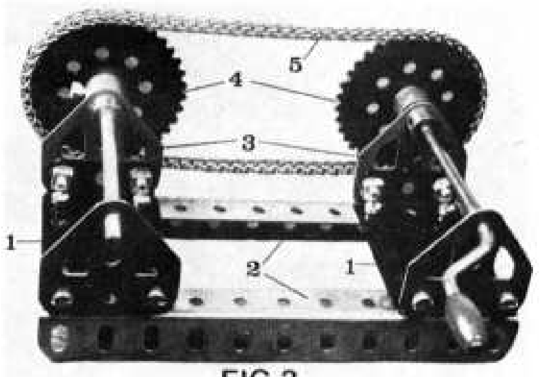


FIG 3

Meccano Parts and How to Use Them

PART 8 **BY B. N. LOVE**

SPROCKET CHAIN AND SPROCKET DRIVES

THERE are many occasions in mechanics where a chain drive is the most acceptable method of passing on a drive from one shaft to another. This may be occasioned by a wide spacing between shafts which would make gear drives, with their extended shafting, too cumbersome or too expensive, or by high speed requirements where low noise and wear are important. Roller chain, which every boy knows as the type used on his bicycle, is also very successfully used in high speed motor car engines for operating the cam shaft which opens and closes the engine valves many times per second. Chain is also capable of transmitting very high torque via sprocket wheels which are relatively simple to produce and do not require the same degree of precision as is required in spur gears when it comes to forming the teeth.

Meccano Sprocket Chain (Part No. 94) is of the simple link type but, when properly applied, it will serve in the same way as roller chain, enabling models to be motivated with great realism. The machine in the Binns Road Factory which produces Meccano Sprocket Chain is fascinating to watch. It is a comparatively small, table-top machine which is fed from a large spool of bright steel wire. This is drawn into the machine which cuts off enough wire to make one chain link and then puts in the rather complicated bends and the two loops required to hitch one link to the next. It actually performs this hitching operation also, forming a continuous chain by closing the loops of one link on to the ring portion of the next. The operator has a pre-set length of 40 in. (1 metre approx.) marked on the bench and, as the Chain comes from the machine, it is measured against the standard and cut with wire nippers as required. Literally miles of Sprocket Chain are used by the Model Room at Binns Road and they normally have it supplied to them from the factory below on wooden reels like small cable drums. In this case, the machine is allowed to make an unbroken length until the drum is filled up.

Most serious constructors have Sprocket Chain in their Meccano collection, often in various lengths and sometimes in peculiar condition! It is so easy to take Sprocket Chain for granted, but it needs looking after like any other Meccano part and an inspection of well-used Chain often reveals some surprising shapes. The first part of Fig. 2 shows the common faults encountered when links have suffered at the hands of heavy-handed enthusiasts, or indifferent tools.

If Sprocket Chain is in good condition it should appear as a continuous parallel arrangement as shown in part B of Fig. 2. In fact, by holding up the Chain, and stretching it at eye-level, a full length should look like a neat run of miniature railway line with no kinks or twists in it. If you have lengths like this, keep them for long-reach jobs. On the other hand, short lengths which are distorted should not be thrown away as they will make quite satisfactory chain slings for crane hoists, or lashings for heavy-duty lorry loads.

There is a simple way of opening the links at any point in a length of Sprocket Chain and this is shown in Fig. 1. A slim-bladed electrician's screwdriver is used to prise open the loops, one at a time, by keeping the back of the link flat on a table with pressure at point A and by rotating the screwdriver in the direction indicated. It is only necessary to open the loop sufficiently to accept the ring portion of the next link. When closing the loops, a small pair of thin-nosed pliers is the most suitable tool, but, again, they must be used with care so that, on closing the loop, it is not crushed out of shape in any direction or made too tight to give adequate freedom of movement in the adjacent link.

Fig. 3 shows a simple rig on which the novice may exercise his skill in producing a Sprocket Chain drive. Construction is very simple and almost self-evident from the illustration. Two 5½ in. Angle Girders 2 are secured at either end by 2½ × 1½ in. Flanged Plates 1 to provide a rigid base. Four Flat Trunnions 3 are mounted on the flanges to form bearings for the Crank Handle at one end and a 3½ in. Axle Rod at the other. The 2 in. Sprocket Wheels 4 are attached to the outer ends of the two shafts and held in place with Set Screws. Two Collars hold the shafts in place. Taking a length of Sprocket Chain longer than required, a full loop of chain is passed half way round both Sprocket Wheels, then the Sprocket Wheels are allowed to turn until a join is indicated by the position of one end

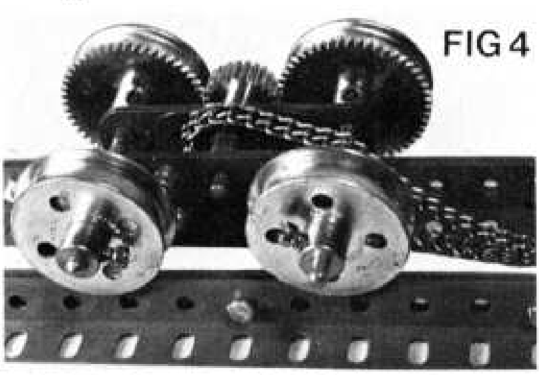


FIG 4

A bogey (shown upside down) from a dragline machine showing use of slack chain drive.

of the Chain lying on, say, the right-hand Sprocket. Note carefully where the break should be made in the length of Chain and then proceed to open the correct link carefully. Don't be the least bit surprised, if, when you offer the Chain up again, you are one link short or one link over. (This can happen with the most advanced modellers!) However, when you are satisfied that the Chain is a reasonable fit—and certainly not a tight one—you may well find that it is just a bit too slack.

On the rig shown in Fig. 3 it is a simple matter to "stretch" the distance between the shafts because the Flat Trunnions 3 are mounted on the slotted holes of the two Flanged Plates and, by careful adjustment of the Nuts and Bolts, the position of the Sprocket Wheels can be adjusted to take up any slack. Care should be taken not to twist the two shafts out of parallel alignment with each other, adjusting all four Trunnions if necessary. This is a point worth noting so that, when the enthusiast designs his own models, some means of lateral adjustment of the shafts should be built in, if possible.

There are many occasions in modelling in Meccano where standard spacing is unavoidable for shafts and this does not always tie up with optimum spacing for Sprocket drives. There are ways round this problem, however. First, if you have an assortment of Chain, try them out—you may find one length a better fit than the other as lengths of Sprocket Chain vary after use owing to natural elongation wear. Secondly, if the fit is loose but the drive is satisfactory, leave it alone. In extreme cases, a slack Chain should be taken up by means of a "jockey" sprocket which is a third Sprocket Wheel mounted on a sprung arm to bear against the slack portion of the chain. Well-experienced constructors can sometimes do the trick by putting a light squeeze on a number of adjacent links to shorten their loops fractionally, but this requires skill if a jammed and distorted Chain is to be avoided.

Sprocket drives retain the advantage of gears in providing fixed ratios. In the rig of Fig. 3 a 1 : 1 ratio is shown. This ratio would be the same if both wheels are the same size so why not use the smallest Sprocket Wheels at each end? These would be ¾ in. dia. and there would be no objection to this so long as heavy drive is not required where slipping could well occur. The larger Sprockets reduce the slip possibilities on heavier drives.

A word of warning here on gear ratios via Meccano Sprocket Wheels: count the teeth! A 1½ in. Sprocket Wheel driving a 3 in. Sprocket Wheel gives a reduction ratio of 2 : 1, as expected, but a 1 in. Sprocket driving a 3 in. Sprocket does *not* give a 3 : 1 ratio as might be expected. This is because the teeth ratio is 18 for the 1 in. Sprocket and 56 for the 3 in. Sprocket which is not a 3 : 1 arrangement. The ¾ in. Sprocket, 14 teeth, does give proper ratios with the 1½ in. Sprocket, 28 teeth (2 : 1) and with the 3 in. Sprocket, 56 teeth (4 : 1). The rig in Fig. 3 will demonstrate all this by attaching the range of Sprockets mentioned and will provide good practice in handling Sprocket Chain.

There are occasions, as has been mentioned earlier in the series, when a chain drive is deliberately attached with a slack loop and Fig. 4 shows such an application to the travelling bogey of a dragline subject to unsteady levels when running over undulating track. For clarity, this particular bogey is shown mounted upside down so that the drive arrangements are clear.

Fig. 5 shows just how compact a Meccano Chain drive can be. This shows a travelling bogey from a dockside crane in which all wheels are driven. For this purpose, ¾ in. Sprocket Wheels are adequate, the drive being spread over a total of 12 wheels when the crane is in motion. This is a case where the spacing for all wheels is identical and the lengths of Chain can be trimmed to the same length and preferably fitted to the small Sprocket Wheels *before* sliding them in place on their Axle Rods. This avoids a common, but not good practice of forcing the Chain on with the wheels in position which invariably stretches the Chain and stretched chain can be disastrous on such short runs. Whether or not one closes the final link in the Chain is a matter of personal choice. The link should be closed on an exhibition or demonstration model, of course, but the open end is frequently left in case early adjustments are required. The Chain will still give a satisfactory drive, even if the last link does not have its loops fully closed.

Finally, a word on storing Sprocket Chain: drop it into the bottom of your cabinet in a heap and you are asking for trouble! You can expect a tangled, dirty mess on trying to retrieve it later. Either wind it on to a stiff card or wooden reel and put it into a plastic bag (a dry one, or your Chain will rust—*don't* blow into the bag to open it!), or hang your Chain in selected lengths from hooks inside your Meccano storage cupboard if you are lucky enough to have one. Be very sparing on oil with Sprocket Chain. The slightest overdose will guarantee a chain looking like a hairy caterpillar in no time! Look after your Sprocket Chain and it will serve you well.

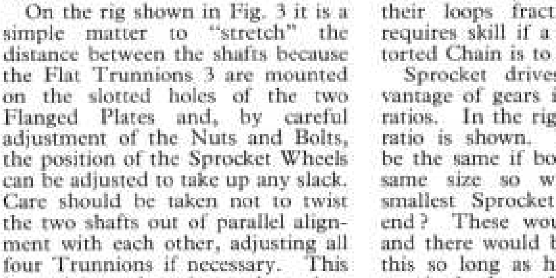
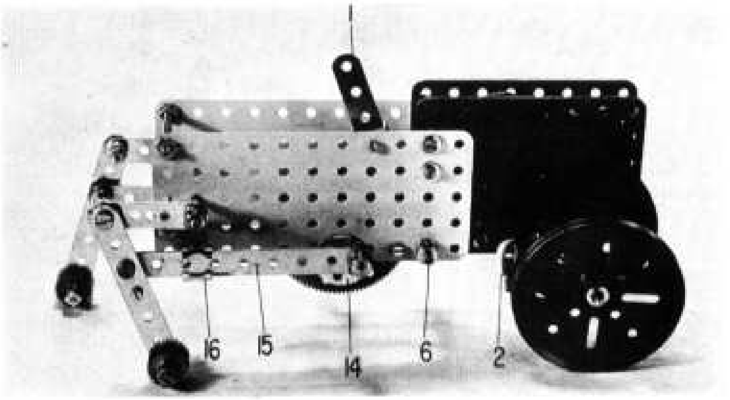


FIG 5

Another bogey, this time from a crane, which demonstrates compactness of sprocket drive.

Whoever heard of a WALKING TRACTOR?

— asks 'Spanner'



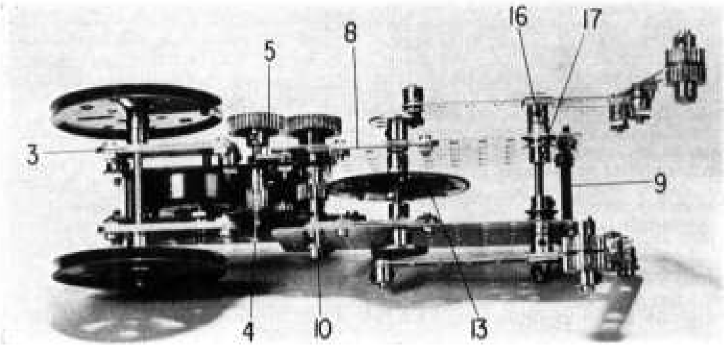
MANY and various are the models which I have seen since my first days of association with the Meccano hobby—big and small, complex and simple, common and unusual—but few, if any, can compare for sheer appealing "oddness" with the Walking Tractor (whoever heard of a "Walking Tractor"?) featured here! Built round a No. 1 Clockwork Motor, it goes whirring and stamping along with a weird marching gait that has captured the hearts of all of us in the office—all, that is, except for our hard-working but delicate secretary who tells us it reminds her of a "big, creepy-crawly cockroach"!

Creepy-crawlies aside, though, full credit for the model illustrated goes to Mr. H. J. Halliday of South East London, who supplied us with all the constructional details. Mr. Halliday, however, disclaims credit for the original idea as the model is actually based on a construction which appeared in a pre-war No. 7 Instructions Manual. Considerable modifications have of course been made, not least of which is the substitution of the No. 1 Clockwork for a long obsolete-electric motor, plus a greatly improved drive and gearing system.

Construction of the modified model is relatively simple. To begin with, a 3 in. Strip 1 is lock-nutted to the outside of the No. 1 Clockwork Motor's reversing lever, then a 2½ in. Flat Girder 2 is secured to each sideplate of the Motor in the position shown, but is spaced from the sideplate by a Collar on each of the two securing ½ in. Bolts. Note that, on the winding side, these securing Bolts pass through the end elongated holes of the Girder, while, on the other side, they pass through the end and fourth elongated holes of the Girder so as not to foul the reversing lever. Three 2½ in. Strips 3, one on top of the other, are bolted along the inside lower edge of each Flat Girder to provide extended bearing surfaces.

Next, and most important, the output shaft of the Motor is removed, along with the long-faced, 13-teeth final drive Pinion 4 it carries. This is achieved by simply loosening the Pinion's Grub Screw and sliding out the shaft which, in turn, enables the Pinion to be withdrawn. Once out, three Fishplates 5, one on top of the other, are bolted through their elongated holes to the outside of the non-winding sideplate of the Motor in such a position that the circular holes of the Fishplates coincide with the output shaft hole of the Motor. A 2 in. Rod 6, replacing the standard output shaft, is then mounted in the sideplates, this protruding at least three-quarters of an inch through the Fishplates and of course being fitted with Motor Pinion 4.

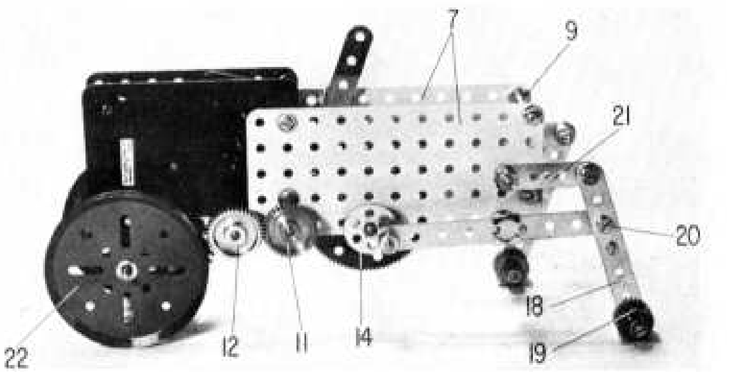
The Motor sideplates are now extended nine holes by two 5½ × 2½ in. Flat Plates 7, fixed in the positions shown, but spaced from the sideplates, as with the earlier-mentioned Flat Girders, by a Collar on the shank of each securing Bolt. These Bolts should be positioned one hole in from the ends of the Flat Plates—in the first and fourth holes down on the winding side of the Motor and the first and second holes down on its other side. Again as with the Flat Girders, three 2½ in. Strips 8 are secured along the inside lower edge of each Flat Plate to provide extended bearings. The outer ends of the Plates at each side are then rigidly connected together by Nuts and Washers on two 2 in. Screwed Rods 9 which pass through the end row first and fourth holes down of the Plates. Care must be taken to ensure that the Plates are arranged perfectly parallel to each other and to the Motor sideplates. A Double Bracket is bolted to the inside upper edge of one of the Flat Plates in the position shown, this acting as a guide for Strip 1, bolted to the Motor reversing lever.



Drive System

With Flat Plates 7 carefully lined up, a 2½ in. Rod, carrying a ½ in.

Heading shows clearly this utterly captivating Walking Tractor model designed by Mr. H. J. Halliday of South East London from an original idea featured in a pre-war Manual. Left, an underside view showing the inner gear arrangement.



The completed Tractor viewed from the opposite side.

Pinion 10 between the sideplates, is journalled in the lower corner holes of the Motor sideplates and in the corresponding holes of Plates 7, being held in place by the Pinion and a 1 in. Gear Wheel 11 fixed outside Plate 7. Both the Pinion and Gear are each spaced from the nearby plate by a Washer. The Gear meshes with a similar 1 in. Gear 12 on Rod 6, while the Pinion meshes with a 2½ in. Gear Wheel 13, fixed on another 2½ in. Rod journalled in the appropriate lower holes of Plates 7 (and Strips 8) and held in place by Collars and Washers inside the Plates. The Rod should project an equal distance each side.

Mounted on each projecting end of the Rod is an electrical 1 in. Bush Wheel 14 (Part No. 518), in one hole of which a Threaded Pin is carried. Note that the Threaded Pin in the Bush Wheel at one side is diametrically opposed at 180 deg. to the Pin in the other Bush Wheel. Free to turn on each Pin is a 4½ in. Strip 15, between two Washers, held in place by a Collar, with the Pin passing through the end hole in the Strip. The Strip slides in a Slide Piece 16, fixed on a 1 in. Rod journalled in the second row bottom hole of Plate 7 and held in place by the Slide Piece and a ½ in. Pulley with boss 17, the latter inside the Plate with its face bearing against the Plate. The Slide Piece is spaced from the Plate by four Washers. The whole assembly must be as "steady" as possible, while still allowing the 1 in. Rod to revolve with a minimum of friction.

Each of the model's two "legs" is next produced from two 3½ in. Strips 18, one on top of the other and bolted together through their centre holes. Two ¾ in. Pinions 19, bosses outwards, are tightly fixed by a 1⅛ in. Bolt to the lower ends of the Strips to form the feet, then the Strips are *pivotally* attached to the end of Strip 15 by a Pivot Bolt 20, suitably packed with Washers, which passes through the end hole of Strip 15 and the third holes down of the leg Strips. Pivotally attached by a similar Pivot Bolt to the upper end of the leg is a 2 in. Strip 21, held by Collars on a 3 in. Rod journalled in the second row centre holes of Flat Plates 7. Note that Strips 21 and the legs must pivot freely, yet without excessive side-play.

Finally, a 3½ in. Rod is journalled in the second-from-end circular holes of Flat Girders 2, where it is held in place by Collars. A 3 in. Pulley 22 is secured on each end of this Rod and, after lubricating all bearings and ensuring all moving parts are free-running, the model is completed.

Once built, the Walking Tractor cannot fail to bring hours of entertainment to one and all, but a notable way to increase the fun for youngsters (of any age!) is to build two or more examples and to race them against each other. Bearing in mind that Mr. Halliday's model achieved walks of forty feet or more, such racing could be extremely competitive.

PARTS REQUIRED

2—2a	2—16a	1—27c	2—81
4—3	1—16b	2—31	2—103f
1—4	1—17	43—37a	8—111a
12—5	2—18b	11—37b	2—111c
2—6	2—19b	71—38	2—111d
3—10	2—23a	2—50	2—115
1—11	4—25	20—59	4—147b
1—16	1—26	2—70	2—518
			1—No. 1 Clockwork Motor

Meccano Constructors' Guide

"Meccano Constructors' Guide" by B. N. Love is a welcome addition to bound Meccano literature. Published by M.A.P. in March, the book is in handy pocket size with paper back binding.

The contents take the reader from the basics to the advanced stages of model building and its twelve chapters cover a wide range of topics which are of general interest to the Meccano enthusiast. Essential mechanisms and methods of construction are illustrated with excellent prints by the author throughout the 144 pages. Although the book is an edited edition of a series of twelve monthly articles which appeared in the 1970 volume of Meccano Magazine, the compact assembly in the bound edition of Meccano Constructors' Guide puts the wealth of knowledge at the finger-tips of the modeller in concise form.

With a readership in mind from boyhood to retirement, the author has presented his book in easy style to appeal to the whole range of enthusiasts. Having more space available in the book, the general arrangement of script and illustrations makes for excellent continuity and the author's fine photographs are reproduced to full page size in many cases so that even greater detail is shown than that of the original magazine series.

Attractively presented with a 21 cm × 15 cm page format, the coloured cover depicts an automatic gantry crane receiving final adjustments from a father and son combination. The book retails at £1.25 and is available from M.A.P. and their agencies.

HOLY TRINITY *(from opposite page)*

meeting that a "good time was had by all" was once again true.

The next meeting will be held on 5th August and I have made a provisional booking of the Church Hall, Hildenborough, for that date. This hall is considerably larger than our present meeting place and will cost £7 to hire which is still very cheap. It is right on the main road between Sevenoaks and Tonbridge and it has its own car park alongside; exact directions for arrival will be circulated nearer the date.

Should anybody wish to contact me at any time, my address is 58 Leigh Road, Hildenborough, Kent. Tel: Hildenborough 3340.

TONY HOMDEN

(Mr. Homden would be pleased to hear from anybody interested in the Holy Trinity Meccano Club—'Spanner'.)

HOLY TRINITY MECCANO CLUB

A report on the fourth meeting

'SPANNER' writes: Reprinted below is a report on the fourth meeting of the Holy Trinity Meccano Club which has been supplied to us by the new Club Secretary, Mr. Tony Homden. It will be seen that the report begins with a message of farewell from the retiring Secretary, Mr. Peter Matthews, who is emigrating abroad, and I would therefore like to take this excellent opportunity of wishing Mr. Matthews "Bon voyage" and a successful "new life" on behalf of both Meccano Magazine and Meccano (1971) Ltd. Mr. Matthews has done a great deal of good for the Meccano hobby, not only founding the H.T.M.C., but also originating and building up his Meccano Museum—that utterly unique collection of Meccano literature, equipment and "lore" which we have mentioned in the M.M. in the past. Good luck in South Africa, Peter!

Report on the Fourth Meeting of the Holy Trinity Meccano Club

On Saturday 15th April, the fourth meeting of the Holy Trinity Meccano Club took place in the Scout Hut, Hurstpierpoint, Sussex. The occasion was marred for me by the knowledge that this would be the last time that I would be addressing the Club as its Secretary, as I will soon be leaving England to take up a new life in South Africa.

One of the things that I am looking forward to on my arrival in Cape Town is attending a meeting of the Cape Peninsular Meccano Club and establishing contact with enthusiasts in my new home. My intention of course, when settled in Johannesburg, is to establish a club there and to give Meccano Exhibitions once again.

The entire Meccano Museum will be travelling with me to Johannesburg . . . and will be rehoused, I hope in a much larger building than at present.

As a result of a vote taken at the meeting, it was decided that Tony Homden would become the new Secretary and the remainder of this report is written by him.

Goodbye to you all and happy modelling.

PETER MATTHEWS

All of us I know, join in wishing Peter every success in his new venture and, to use the old saying, our loss is somebody else's gain; in this case, South African Meccano enthusiasts who I know are already looking forward to his move.

My thanks go to all members who have entrusted the Club's future to me and I will do my best to repay that trust by working to expand and improve it even further for the benefit of all members.

The meeting went extremely well with twenty-five subscribing members and a number of guests being present. Three new members who brought with them models of high standard were welcomed.

The afternoon began with members working all round the hall, setting up models and sorting out an electrician's nightmare of cables and plugs, in order to give everyone who needed it, a power supply. Amid cries of "mine's working", "mine's dead", and "who turned the power off", order gradually emerged and even your new Secretary who was on the furthest end of the supply was connected up. (I mean of course, his model and not the Secretary!)

After a short business discussion, the feature begun at the last meeting of members giving talks and demonstrations of their models, was reintroduced and six members were persuaded to enter the spotlight.

The first victim was Phil Bradley who showed a superb Foden Steam Lorry as used for heavy haulage work in the pre-war years. All of Phil's skill and care was apparent in this model which conveyed beautifully the spirit of the prototype. A novel feature was the rear wheels design which were shod with flexible Plastic Plates which had been first bolted to the rim and then gently "cooked" in an oven to soften them, after which they were cooled and then the bolts removed.

This procedure removed the tendency of the Plates to spring flat when unbolted and all that remained to do to produce a smooth obstruction-free wheel rim was to wrap a layer of black adhesive tape around it to hold the plates in place. Not many people would consider putting their Meccano in an oven to cook and it demonstrates that techniques of construction are still being developed some seventy years after the hobby began.

Next on the rostrum was Geoff Bennet with an improved version of that old Supermodel favourite, the twin-cylinder Motor Cycle Engine. Using standard parts, Geoff had constructed a distributor which ran from the engine and caused light bulbs mounted in dummy spark plugs to flash at the correct time in the "firing" stroke.

Stuart Day showed another improved model, this time, of a Ransome Scrap-yard Crane, which appeared in the Meccano Magazine some years ago. The model performed all the functions of the prototype and was equipped with both lifting hooks and a fully operational grab. This was operated by a wire running inside a length of Spring Cord forming a very satisfactory "Bowden cable".

Michael Martin demonstrated a very ingenious Tower Crane which featured an extending counter-balanced jib which was modelled on a prototype operating near his home in Ilford. This crane was one of several at the meeting and showed that cranes really are one of the fundamental Meccano models.

From Henley-on-Thames, Mike Nicholls brought along and demonstrated a Watts Steam Engine which showed clearly to even the most uninitiated, the operation of Watts famous "sun and planet" motion which defeated the patent on the crank held by a rival inventor. The model also showed the "parallel link" which enabled the piston rod to operate the great overhead beam without the use of an accurately machined crosshead slide which was beyond the crude mechanics of those days.

Next, Geoff Wright intrigued us with a Meccano Slot machine which dispensed packets of Pocket Meccano after the correct price of 39p was inserted. This model sorted the coins out and added them up as they were put in the slot and as soon as the correct total in any combination of "silver" or bronze coins was reached, a Pocket Meccano Set could be obtained by pulling out the drawer.

The last speaker was the writer who showed a 15 in. Naval Gun Turret.

Tea was then served and our thanks go to our lady helpers, Anne Matthews, Margret Ta Bois and Diane Gamble, who provided much-needed refreshments in the form of sandwiches and cakes. After tea, members circulated around the hall examining models, swapping ideas and telling each other about plans for models as yet unbuilt. The meeting finally broke up at 8 p.m. and I think it fair to say that the remark of Peter Matthews which preceded the report on our third

(continued opposite)