

A NEW MECCANO MODEL

MOTOR-CYCLE AND SIDECAR

WE have received numerous suggestions regarding the construction of a Motor-cycle with Meccano, and in view of the interest that our readers have shown in the idea, we willingly complied with the wishes of many correspondents who requested that particulars of such a model should be published in the "Meccano Magazine."

A very interesting model of a "V-twin" motor-cycle and sidecar outfit was sent in by L. Cunningham, of Baxter Avenue, Southend-on-Sea, and the cycle illustrated herewith has been based on the lines suggested by our contributor. The construction of the model should prove to be no light tax on the ingenuity of even long-experienced Meccano boys, and it is undoubtedly a case in which very nimble fingers are called for!

The only item included in the model that is not a regular Meccano part consists of a small elastic band; this should be about $1\frac{1}{2}$ " in length when fully extended. The novel use of the Curved

of a $2\frac{1}{2}$ " Rod 22 (Fig. A) nipped in the end of the Coupling 23, in which the back axle 24 is allowed to rotate freely. A Set-screw 25, carrying one Washer, is passed through a hole in the Flat Girder 19, and entering the threaded bore of a Collar 26, grips the Rod 22 fast in position. Another tie-rod of different construction is fitted to the left-hand side of the machine. This comprises a $4\frac{1}{2}$ " Axle Rod 27 (Fig. C) secured to the Flat Girder 21 by means of a Collar and set-screw 28, in a similar manner to that just described. Two Couplings 29 and 30 are mounted on the Rod 27. Coupling 30 forms an additional support for the back axle, and the centre transverse hole of the Coupling 29 is employed as a bearing for a $2\frac{1}{2}$ " Axle Rod 31 (Fig. B). This Rod 31 carries a $\frac{1}{2}$ " fast Pulley 32 (Fig. C) and a $\frac{3}{4}$ " Sprocket Wheel 33 (Fig. B).

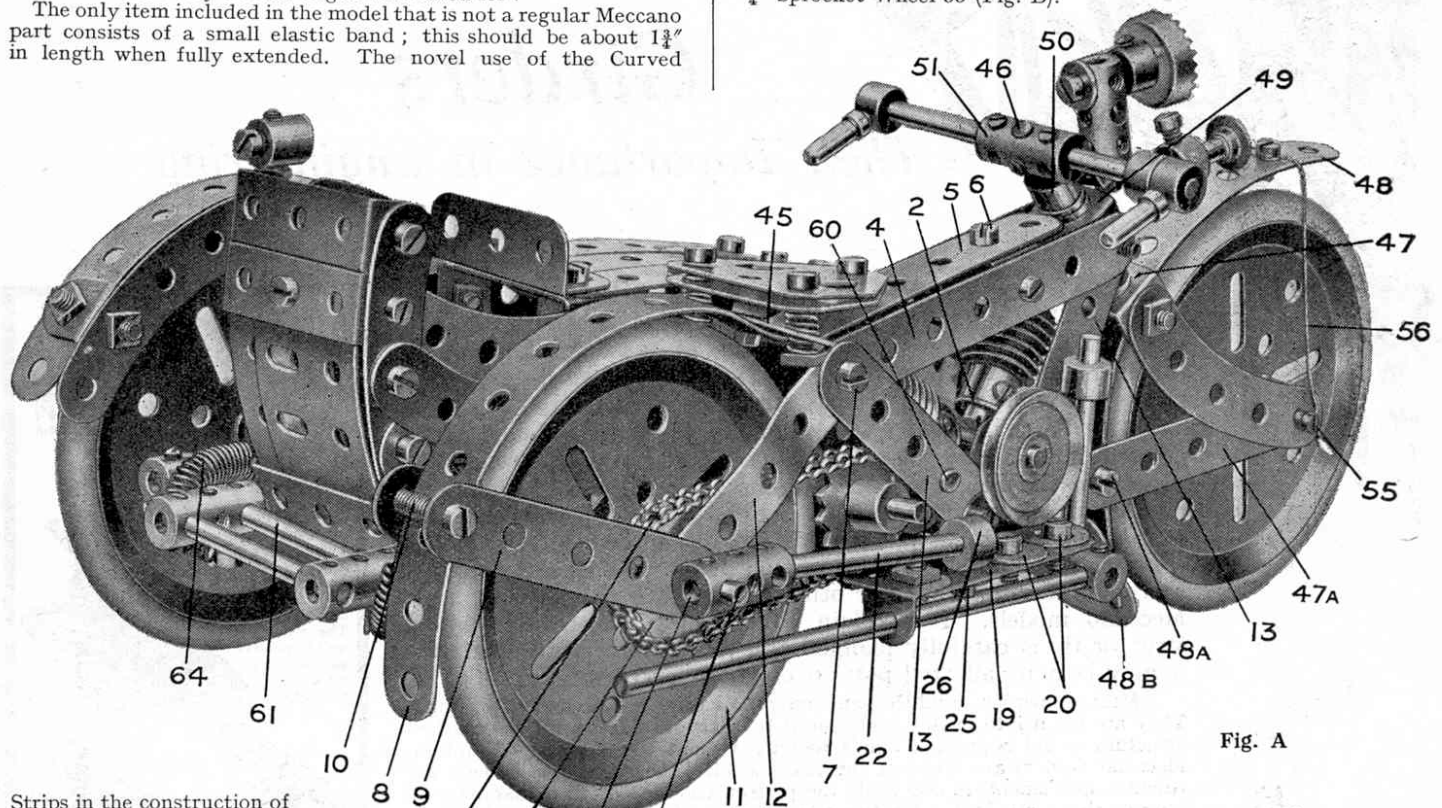


Fig. A

Strips in the construction of the sidecar, by which a pleasing stream-line effect has been obtained, forms an interesting feature of the model.

Both the sidecar and saddle are mounted on springs.

Each engine cylinder consists of a Worm Wheel, secured by its set-screw to the shank of a bolt passed through a Flat Bracket 2 carried from a Double Bracket 3 (Fig. C). The tank consists of two $3\frac{1}{2}$ " Strips 4 (Fig. A) and one $3\frac{1}{2}$ " Strip 5 held together by Double Brackets at 6 and 7. A $5\frac{1}{2}$ " Strip 8 is bolted by its end hole to the end of the Strip 5, and is bent round as shown to form the rear mudguard. It is clamped in position between two $2\frac{1}{2}$ " Strips 9 by means of a $\frac{1}{4}$ " Bolt 10. The driving wheel 11 is carried in the ends of $2\frac{1}{2}$ " Strips 12, which are bent slightly as shown in Fig. B, as also are the Strips 9.

The V-shaped engine frame is built up from $2\frac{1}{2}$ " Strips 13 converging upon $1\frac{1}{2}$ " Triangular Plates 14 (Figs. B and C). The side $2\frac{1}{2}$ " Strips have been removed in Fig. C in order to reveal some of the engine details; normally they are secured by the Bolts 15, 16, 17 and 18. A $2\frac{1}{2}$ " Flat Girder 19 (Fig. A) is secured to two Angle Brackets 20 bolted to the base of the outer $1\frac{1}{2}$ " Triangular Plate. A similar Flat Girder 21 (Fig. C) is attached to the first Girder 19 by means of bolts passed through the elongated holes of both girders.

A tie-rod provided on the right-hand side of the machine consists

The back axle 24 (a $2\frac{1}{2}$ " Rod journaled through the Couplings 23 and 30 and Strips 9 and 12) is gripped by the set-screw of the driving wheel 11, and carries a $1\frac{1}{2}$ " Sprocket Wheel 34 (Fig. A) which is caused to engage with the $\frac{3}{4}$ " Sprocket 33 by means of a Sprocket Chain 35, composed of 39 links. The $\frac{1}{2}$ " Pinion 32 (Fig. C) is connected to the shaft of the flywheel 36 by means of a small rubber band 37, which passes round the groove of the pulley and round the flywheel shaft itself, being guided between a Washer and Collar with set-screw 38. Hence, as the machine runs along, the flywheel is caused to revolve at considerable speed.

A $5\frac{1}{2}$ " Rod 39 and $2\frac{1}{2}$ " Rod 40 (Fig. B) represent the exhaust pipe. The Rod 39 passes through the Angle Bracket 41, and is secured in the end of the Coupling 42, representing the silencer; the $2\frac{1}{2}$ " Rod 40 is secured in the centre transverse hole of the Coupling 42, while its upper end, passing through the Collar 43, is gripped by its set-screw. The latter, carrying a Washer, passes through the centre hole of the Strip 13 before entering the Collar. The short exhaust pipe 40 is duplicated on the other side of the machine (see Fig. C); it should be noted that the Coupling 44 in this illustration is connected to Coupling 42 (Fig. B) by means of a $1\frac{1}{2}$ " Axle Rod.

The saddle is composed of two Flat Trunnions secured to the

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Motor-Cycle and Sidecar—(continued from page 11)

framework by means of three $\frac{1}{2}$ " Bolts. A $1\frac{1}{2}$ " Strip 45 (Fig. A), bolted transversely to the second hole of the $5\frac{1}{2}$ " Strip 8, forms supports for the rear saddle springs. The small compression springs placed on the three $\frac{1}{2}$ " Bolts are extracted from the Meccano Spring Buffers (Part No. 120a).

The steering column, handle-bars, etc., are constructed as follows: a 2" Rod 46 is passed through the Fork Piece 47 and its end enters the centre hole of the $5\frac{1}{2}$ " Strip 48, which is bent round to form the front mudguard. A Washer is then placed against the boss of the Fork Piece and the Rod 46 is journaled through two Double Brackets 49, which are placed one within the other and bolted to the ends of the Strips 4 and 13. Three Washers, a Collar 50, and Coupling 51 are then placed in position on the steering column as shown. The handle-bars are built up from Threaded Pins, Collars, and two $1\frac{1}{2}$ " Rods, carried from the Coupling 51.

The head-lamp is composed of a $\frac{3}{4}$ " Contrate Wheel 52 (Fig. B) secured to the shank of a $\frac{3}{4}$ " Bolt passed completely through the Coupling 53. The latter is secured to a bolt passed through an Angle Bracket, which, in turn, is secured by a Set-screw 54 to the Collar 50.

The front wheel forks consist of 2 $\frac{1}{2}$ " Strips 47a (Fig. A) and 2 $\frac{1}{2}$ " Curved Strips, all of which are slightly splayed to allow free movement of the road wheel. The mudguard 48 is clamped between the Strips 47a by means of a $\frac{3}{4}$ " Bolt 48a passed through their end holes, in a similar manner to the Bolt 10 on the rear mudguard 8. The set-screw of the front road wheel is removed in order that it may revolve independently of the $1\frac{1}{2}$ " Axle Rod 55. The wheel is held in a central position on its axle by means of a Collar and three Washers mounted within the forks on one side of the wheel to equalise the width of the boss on the other. The mudguard 48 is secured by means of a tie 56. This consists of a Meccano Heald (Part No. 101), the end holes of which are slipped over the axles 55 before the 2 $\frac{1}{2}$ " Curved Strips are placed in position. The Heald is then doubled beneath the Curved Strip and taken over the Strip 48, and thence down to the opposite end of the axle 55. It is secured to the mudguard by means of a bolt passed through its centre hole. A 1" Triangular Plate 48b bolted to the second hole of the Strip 48 forms a "splash-guard."

A "Klaxon" horn 57 (Fig. B) is provided. It is constructed from the "ram" of a Meccano Spring Buffer, the screwed end of which engages the threaded bore of a Collar 58 mounted on the handle-bars. A Collar 59 with Set-screw added represents the operating handle and completes the realistic effect.

The undercarriage of the sidecar is built up from a Crank Handle 60 (Fig. D) and 3 $\frac{1}{2}$ " Rod 61 connected by Couplings and 3 $\frac{1}{2}$ " Rod 62. Two couplings and a 2" Rod 63 serve as a luggage carrier, while bolts inserted in the Couplings carry Springs 64, between which the car is suspended. The Springs are attached to the car by means of a 2 $\frac{1}{2}$ " Rod 65. A Set-screw 66 passed through the bottom of the

car enters the threaded bore of a Collar on the Crank Handle 60, so holding the car in its correct position on its cradle.

Each side of the car is composed of the following parts (see Fig. B): 67, 2 $\frac{1}{2}$ " and 5 $\frac{1}{2}$ " Curved Strips overlapped two holes and bolted together; 68, 2 $\frac{1}{2}$ " Curved Strips and 3 $\frac{1}{2}$ " Strips overlapped two holes and bolted together; 69 and 70, 5 $\frac{1}{2}$ " Curved Strips. The front ends of all the side members, with the exception of 68, are bolted to a Corner Bracket 71 in the nose of the car. The floor (Fig. D) is composed of two 4 $\frac{1}{2}$ " Strips 72, a 5 $\frac{1}{2}$ " Strip 73 and two 2 $\frac{1}{2}$ " Strips 74, bolted to 1 $\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strips 75. The top (Fig. B) consists of three 3" Strips 76, two 2 $\frac{1}{2}$ " Strips 77 and one 1 $\frac{1}{2}$ " Strip 78, also secured to 1 $\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strips. The back is built up from three 1 $\frac{1}{2}$ " Double Angle Strips, bolted between the corner 2 $\frac{1}{2}$ " Curved Strips 80, and two 2 $\frac{1}{2}$ " Flat Girders slightly

bent as shown and secured by a bolt 79. All four sides taper towards the nose of the car and are secured to two Double Brackets bolted together by the nut and bolt 81 (Fig. D).

A seat is provided within the sidecar. This is constructed from two 1 $\frac{1}{2}$ " Flat Girders secured, by means of a bolt passed through the elongated hole in the end of each, to a $\frac{1}{2}$ " Reversed Angle Bracket.

The latter is bolted to the floor of the car by means of the screw 75 (Fig. D).

The third road wheel 82 runs freely upon a 1 $\frac{1}{2}$ " Rod bolted in the top transverse bore of a Coupling 83. Two Washers are placed on the 1 $\frac{1}{2}$ " Rod between this Coupling and the Wheel, while the latter is held in place by the Collar 84. The Coupling 83 is secured to the Rod 62, which passes through its centre. A 2 $\frac{1}{2}$ " Strip 85 (Fig. B) is secured to the Bolt 86 (Fig. D) passed through the lower end of Coupling 83.

The Strip 85 serves to support the mudguard, which is constructed from 5 $\frac{1}{2}$ " and 2" Strips overlapped two holes and bolted together. The mudguard is bent round the wheel as shown in Fig. B and carries two 2 $\frac{1}{2}$ " Curved Strips secured by Angle Brackets 87. A Flat Bracket 88 (Fig. D) is bolted to the end hole of the 2" Strip, and engages the Rod 62.

The side-lamp 89 consists of a Threaded Boss, screwed to the up-turned shank of a bolt which serves to secure the Angle Bracket 90.

The sidecar may be quickly connected or detached from the motor-cycle. The Crank Handle 60 passes through the Strips 13 of the engine-frame (its extreme end is just visible in Figs. A and B), while the Rod 61 enters the end hole of a Coupling 91 (Fig. C), where it is gripped by the set-screw. It will be seen, therefore, that by loosening this screw, the sidecar may be immediately detached and the motor-cycle used as a solo machine, if so desired.

All three wheels are fitted with Meccano Rubber Rings (Part No. 142) to represent pneumatic tyres.

Amongst other features that may be added if desired are a

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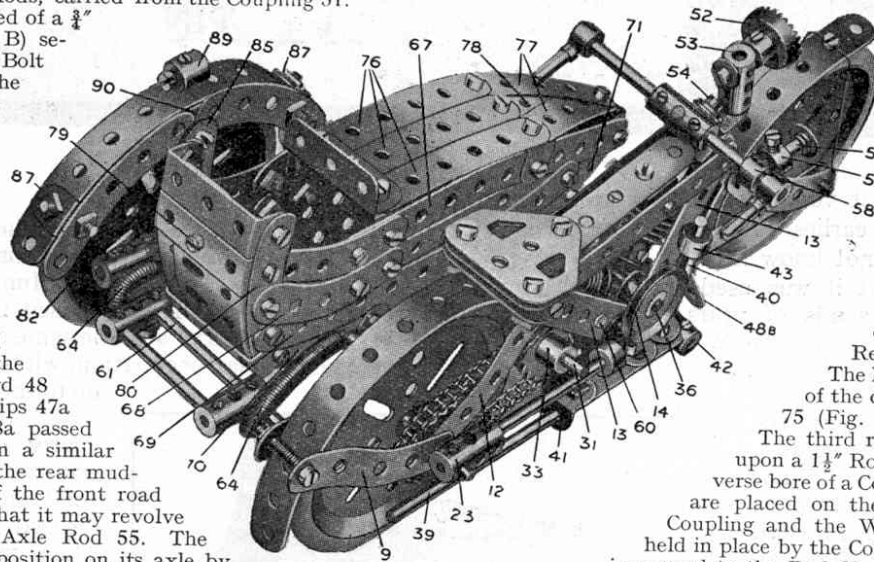


Fig. B

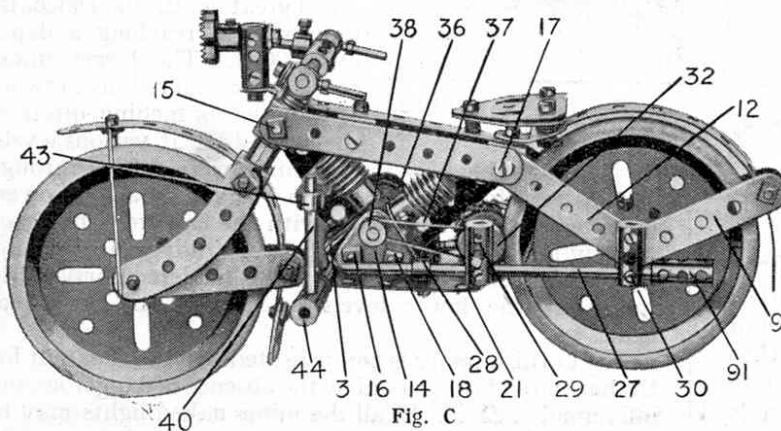


Fig. C

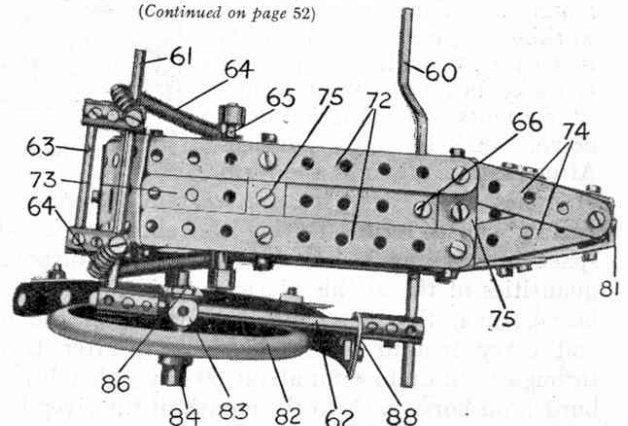


Fig. D

Waterloo Bridge—(cont. from page 27)

supported by six brick walls 2 ft. 3 in. thick, covered with corbel stones. It was formed by a layer of puddled clay 15 in. thick, then a layer of lime and fine gravel 3 in. thick followed by a layer of granite, broken in pieces 2 in. in diameter, 1 ft. thick. The roadway for carriages is 28 ft. wide and the footpaths on each side 7 ft. wide.

Through the centre of the masonry of each pier a hole 18 in. in diameter was cut, entering the river at one side of the pier at low water, and from the top of this hole inside the pier pipes were carried to drains on each side of the roadway, thus effectually carrying away all rain and surface water into the river.

An Ingenious Expedient

The engineer Dodds had proposed to found the piers of his bridge by means of caissons, but Rennie decided upon the use of cofferdams. A cofferdam may be described as consisting of two concentric rings of piles driven in contact with one another around the area on which the foundation is to be built. The space between the two rings of piles is tightly packed with clay so as to make the enclosure watertight, and the water inside is pumped out. Excavation to the proper depth is then made, the foundation is laid, and building operations proceed until the pier has reached a height above the level of the outside water. At this stage the cofferdam has served its purpose and is then removed.

The method employed by Rennie for constructing, floating and fixing the centres for the arches was very ingenious. Each centre consisted of eight ribs on the truss principle, resting upon wedges supported upon struts placed upon the offsets of the piers and abutments. All the ribs were connected together by transverse and diagonal ties as well as planking upon which the arch-stones rested.

The centres were constructed on a platform by the riverside, floated between the piers on barges specially built for the purpose, and raised into their proper places by means of four powerful screws fixed in cast iron boxes firmly bedded in the solid floor of the barge. The scheme proved so successful that the fixing of one centre was usually completed within a week. This method was new at the time and it is interesting to note that it was the same as that afterwards followed by Robert Stephenson in fixing the great tubes of the Conway and Britannia Bridges.

A Knighthood Declined

The bridge and its approaches were completed and opened with great ceremony in June 1817 by George IV., then Prince Regent, who was accompanied by the Duke of Wellington. It was originally named the Strand Bridge, but the name was subsequently altered to Waterloo in commemoration of the Battle of Waterloo and in honour of the Duke.

At the opening ceremony the Prince Regent offered to confer the honour of knighthood upon Rennie, who respectfully declined it. Writing afterwards to a friend he said: "I had a hard business to escape knighthood at the ceremony." He preferred to remain simply John Rennie, engineer of the noble structure he had successfully brought to completion.

The Conquest of the Air—*(Continued from page 55)*

aeroplane's wings. When in the air, the machine is controlled by the elevator and steered by the rudder in the ordinary manner.

The chief advantages of the Auto-giro are that in addition to being able to fly at a comparatively high speed, climbing and gliding in the usual manner, it is also able to fly at very low speeds and to descend almost vertically under complete control. The fact that it can fly at such low speeds makes the type valuable for observation purposes, for with the ordinary aeroplane, which must be kept on the move, it is often very difficult for a detailed observation of any particular feature to be made, unless the aeroplane circles over the spot or travels backwards and forwards over it a number of times.

The Auto-giro has a span of 36 ft. and a total weight, including pilot, of 2,000 lbs. Its maximum air speed is 68 miles per hour, and its minimum speed 30 miles per hour. It is claimed that in its earlier tests the machine climbed to a height of 1,150 ft. This is indeed a creditable performance for a machine of such unusual design and one that is obviously only in the experimental stages.

The designer of the Auto-giro claims that he could build a machine that would attain a higher speed than any existing aeroplane and yet retain a low landing speed. He suggests that fitted with 450 h.p. engines, his future machines will certainly attain a speed of over 300 miles per hour, and that such machines would have a landing speed of under 40 miles an hour. On the other hand, at a sacrifice of speed, Auto-giros can be built to carry big loads.

Whether these anticipations can be realised or not remains to be seen, but it is a fact that the Auto-giro has caused considerable interest among experts and has proved that there is a decided possibility in machines of the helicopter type, a point that has long been denied by some experts.

Motor-Cycle and Sidecar—*(Continued from page 13)*

pillion (constructed from two short Flat Girders "sprung" by a method similar to that employed in the saddle) and a rear stand, for attachment if the model is used as a solo outfit. Still further refinements, such as number-plates, etc., would give the finishing touch to the compact and realistic appearance of the model.

PARTS REQUIRED:—

Motor Cycle		
2 of No. 2	1 of No. 18B	1 of No. 96
2 " " 3	2 " " 19B	1 " " 96A
1 " " 4	1 " " 22	1 " " 101
10 " " 5	1 " " 23A	2 " " 103G
1 " " 6A	2 " " 32	3 " " 111
2 " " 10	28 " " 37	3 " " 111A
6 " " 11	10 " " 37A	2 " " 115
4 " " 12	16 " " 38	1 " " 116
1 " " 15	11 " " 59	3 " " 120A
1 " " 15A	8 " " 63	2 " " 126A
1 " " 16	3 " " 77	2 " " 142
5 " " 17	2 " " 90	Small elastic band
4 " " 18A	6½ " " 94	
Sidecar		
2 of No. 2	1 of No. 17	1 of No. 64
2 " " 2A	1 " " 18A	6 " " 89
5 " " 3	1 " " 19	8 " " 90
5 " " 5	1 " " 19B	2 " " 103F
2 " " 6A	55 " " 37	2 " " 103H
1 " " 9F	1 " " 37A	1 " " 111A
1 " " 10	3 " " 38	1 " " 125
2 " " 11	2 " " 43	2 " " 133
3 " " 12	7 " " 48A	1 " " 142
2 " " 16	4 " " 59	
1 " " 16A	5 " " 63	

My Clockwork Train

Sometimes on rainy Saturdays,
I can't go out to play,
And so I take my clockwork train,
And travel miles away.
I start at Bookcase Corner,
And go to Plymouth Sound;
And via Table Tunnel,
I travel round and round.
Sometimes I have an accident,
My train falls off the rail;
I have to send the breakdown gang,
I know it cannot fail.
I sometimes have excursion trains
To Wembley once I went;
And I have football specials too,
And mails with me are sent.
I take my sister's little dolls,
And ride them round the track,
And when they've had their money's worth,
I bring them safely back.
Although I've lots of other toys,
I still come back again,
And many happy hours I spend
With my "Hornby Clockwork train."

*(By Master Wilfred Ashworth, of Parton, Cumberland.)***Meccano Assists Inventor—(cont. from page 50)**

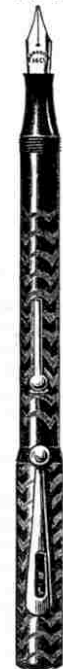
An escalator based upon Mr. Cannon's patent is to be installed in the White City Exhibition for 1927, and a similar transport system is already employed in three or four factories in this country, where it forms an economical method of conveying goods. It is claimed to be the cheapest form of transport known.

At the White City it will be possible to maintain in continuous motion any number of cars up to 30; this would give the machine a maximum capacity of 2,000 passengers per hour. It is also claimed that this method of transport is quite safe, for the cars keep the same distance apart over the whole of the track, and there is no fear of some sticking and others racing.

"BETA" PENS

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SELF-FILLER
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HARD WEAR."

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