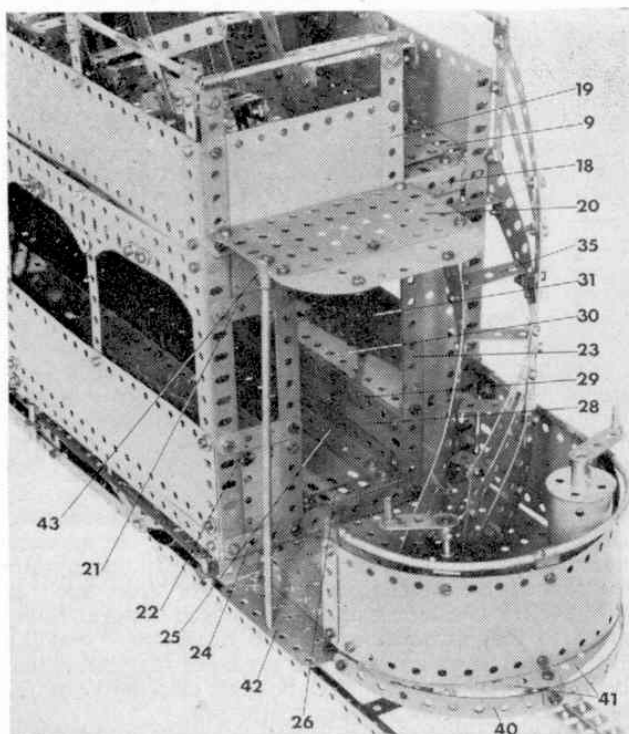


BONE SHAKER

by Spanner



Above, as on real trams, the Meccano model is equipped with two identical driving platforms, one at each end, carrying an external stairway to the top deck as well as the driving control. This view shows one of the platforms in detail.

DURING THE first quarter of this century virtually every major town and city in Britain established an electric tramway system. Trams, in actual fact, were the first-ever means of mass urban public transportation and there are many people, even today, who maintain (perhaps with good reason!) that they would still have advantage over the buses that have replaced them. Nonetheless, they have been replaced, but I venture to suggest that just about everybody mourns their passing to some extent. Most Meccano model-builders, having a mechanical bent, certainly do so, but we, at least, are in a position to recreate the glory of the old tram days in model form, which is what our model-builder has tried to do with the excellent advanced model featured here. It is based on a 1903 tramcar used for many years by Bradford City Tramways with complete success.

Construction, although lengthy, is not difficult.

Chassis

Bolted to one end of an 18½ in. Angle Girder 1 is a 5½ × 5½ in. compound flat plate 2, edged by a 5½ in. Angle Girder 3 and built up from one 5½ × 3½ in. and one 5½ × 2½ in. Flat Plate. The assembly projects a distance of nine holes past the end of Girder 1. A second 5½ in. Angle Girder 4 is bolted to the underside of the plate, as shown, the securing Bolts also fixing a 4½ × 2½ in. Flat Plate 5 to the top of the plate. Bolted to the underside of this last Plate is a 2½ × 1½ in. Flexible Plate 6.

Another entire Girder/Plate arrangement is now similarly built up and the two are joined at each end by a 3½ in. Angle Girder 7 bolted between compound flat plate 2 and the opposite Angle Girder 1. The "truck," incorporating the wheels, will also be attached to Girders 1, but it is advisable to leave this until after the main bodywork has been completed.

Try building this advanced Meccano model based on an old 1903 tramcar used by Bradford City Tramways early this century. To be concluded next month:

Bodywork and fittings

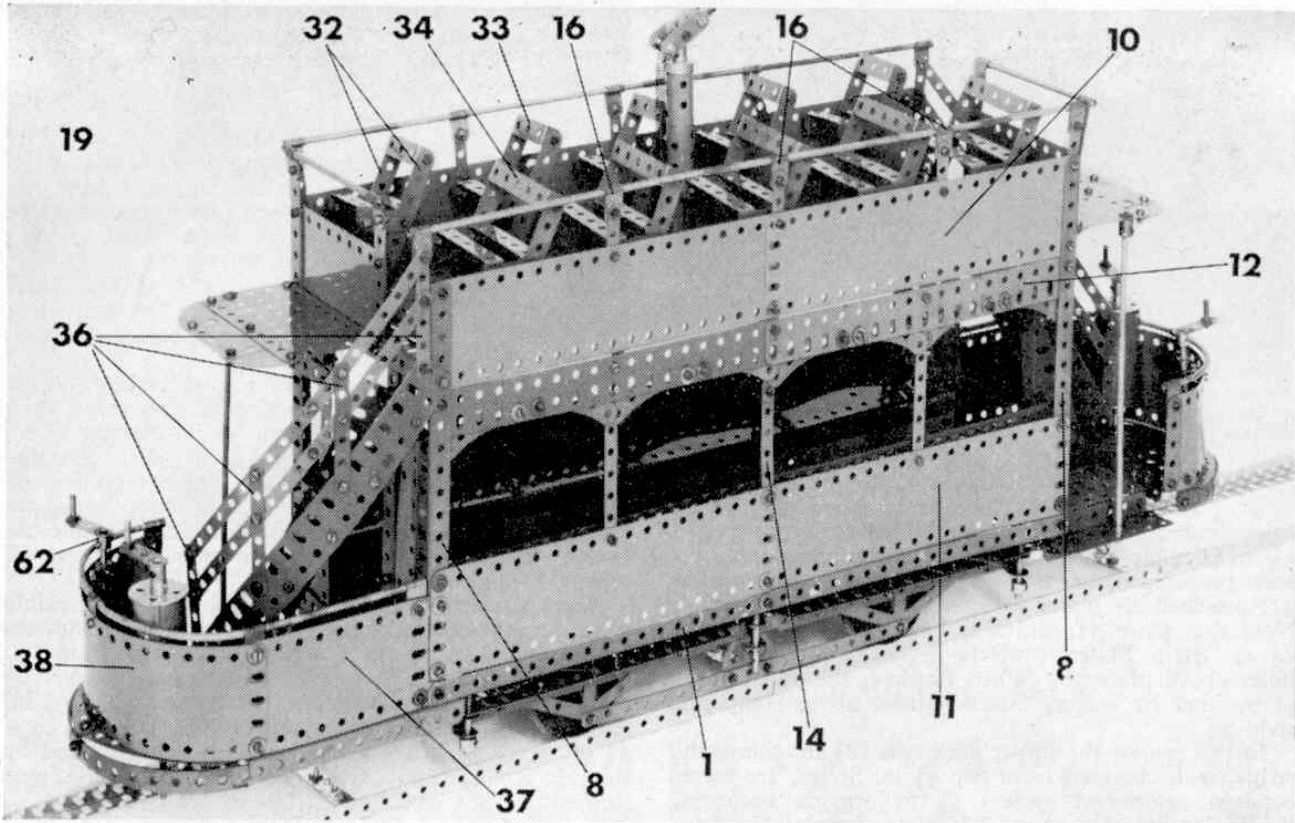
Although enclosing a fairly large area, the body is not at all difficult to build. Two 9½ in. Angle Girders 8 are fixed one to each end of each Girder 1, then Girders 8 are joined as shown by an 18½ in. Angle Girder 9 and two 10½ × 2½ in. compound strip plates 10 and 11, each obtained from two 9½ × 2½ in. Strip Plates overlapped one hole. Girder 9 coincides with the lower edge of plate 10.

Also bolted between Girders 8, immediately below plate 10, is an 18½ in. compound flat girder 12, built up from two 9½ in. Flat Girders. This compound flat girder is joined to compound strip plate 11 by two 4½ in. Narrow Strips 13 and a 10½ in. compound narrow strip 14 all equally spaced apart. Strip 14 is obtained from two 5½ in. Narrow Strips, overlapped one hole, and it can be seen that it extends from Angle Girder 1 upwards to project a distance of two holes above compound plate 10. Three 2½ in. Narrow Strips 15 are fixed to the plate, these also projecting a distance of two holes above the plate, and a right-angled Rod and Strip Connector 16 is added to the top of each one. Lower down, a curved top is given to each side window by two 2½ in. Curved Strips 17.

Girders 9 are now joined at each end by a 6½ in. compound angle girder 18, obtained from one 5½ in. and one 4½ in. Angle Girder. Attached to the outside of this compound girder are a 4½ in. Flexible Plate, edged by two 3½ in. Strips 19, and a 4½ in. Angle Girder to which a 4½ × 2½ in. Flat Plate 20 is bolted to serve as a canopy. Plate 20 is extended by two Semi-circular Plates and a 2½ × 1½ in. Flexible Plate.

At each end of the lower saloon, an entrance-way is left open, but to either side of this a vertical panel is built up. Both panels, however, are different, that beneath Plate 20 consisting of a 7½ in. Strip bolted to Angle Girder 18 and joined to nearby Girder 9 by two 2 in. Strips 21 and 22. The area above Strip 21 is enclosed by a 1½ × 1½ in. Flat Plate, while the area below Strip 22 is covered by a 2½ × 1½ in. Flexible Plate. The space between the Strips is left blank to represent a window.

The other panel at the opposite side of the entrance-way consists simply of a 5½ × 1½ in. Flexible Plate extended by a 2½ × 1½ in. Flexible Plate, both edged by a 7½ in. Strip 23. At the bottom, the two panels are connected by a 6½ in. compound Strip 24, obtained from two 4½ in. Strips and bolted between Angle Girders 8.



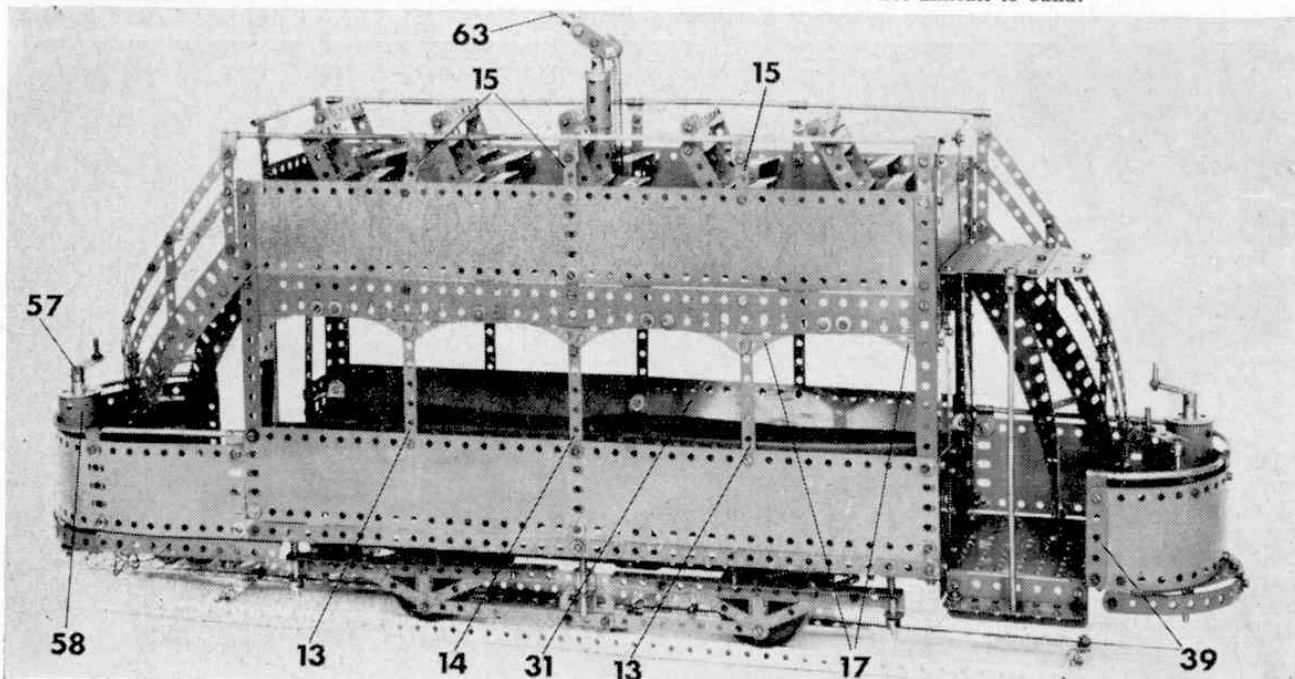
Inside the lower saloon two long bench seats running the full length are provided and these, together with the floor, can be built as a separate unit and fitted complete. Two $18\frac{1}{2}$ in. Angle Girders 25, placed $2\frac{1}{2}$ in. apart are joined at each end by a $3\frac{1}{2}$ in. Angle Girder 26, the intervening space being enclosed by a $12\frac{1}{2}$ ×

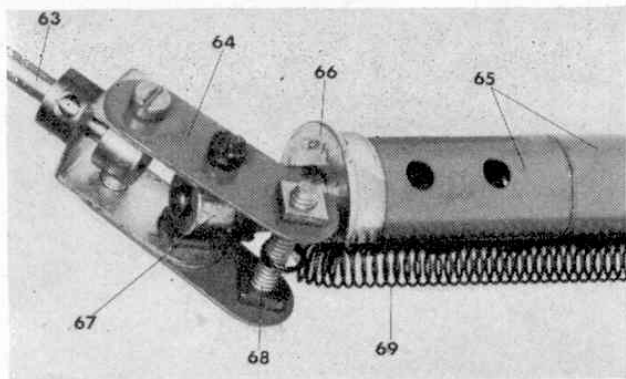
Above, this superb Meccano-built model, is based on a 1903 tram of the type used by Bradford city tramways early this century. It is driven by a Power Drive Unit.

$2\frac{1}{2}$ in. Strip Plate and a $5\frac{1}{2}$ × $2\frac{1}{2}$ in. Flat Plate 27, both bolted to the lower flanges of Girders 25.

Fixed to the vertical flange of each Girder 25 is an $18\frac{1}{2}$ × $1\frac{1}{2}$ in. compound flexible plate 28, built up from four $5\frac{1}{2}$ × $1\frac{1}{2}$ in. Flexible Plates, to the upper edge of which another $18\frac{1}{2}$ in. Angle Girder 29 is bolted. This

Below, if you are a tramway enthusiast, you will agree that this model has all the fascinating lines of a typical old-time tram. Despite its size—more than 24 in. long and 12 in. tall—it is not difficult to build.





Above, a close up view of the swivel connection between the trolley pole and its mounting, seen here lying on its side. Note the use made of the tapped bores in the Collars. Below, a close up view of the truck showing its suspension and wheel arrangement.

in turn has fixed to its free flange an $18\frac{1}{2} \times 1\frac{1}{2}$ in. compound flexible plate 30 obtained from four $5\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plates, then each seat is completed by a back provided by an $18\frac{1}{2} \times 2\frac{1}{2}$ in. compound strip plate 31, attached to plate 30 by Obtuse Angle Brackets. Note that plate 31, which is built up from two $9\frac{1}{2} \times 2\frac{1}{2}$ in. Strip Plates, projects a distance of only two holes above plate 30. When finished, the seat is fixed in position by bolting Angle Girder 26 to compound strip 24.

In the case of the upper deck two $18\frac{1}{2}$ in. compound strips, each obtained from two $9\frac{1}{2}$ in. Strips, are bolted between compound girders 18 to provide anchoring points for five $5\frac{1}{2} \times 3\frac{1}{2}$ in. Flat Plates forming the floor. To prevent the floor sagging in the middle, strengtheners are provided by one $5\frac{1}{2}$ in. and one $4\frac{1}{2}$ in. Angle Girder bolted in suitable positions to each compound girder 9 and projecting at right-angles under the floor. Each Angle Girder attached to one girder 9 coincides with its opposite number attached to the other girder 9, *but they are not bolted together.*

Two rows each of five seats are next added, one row consisting of single seats and the other of double seats. Both types are similarly built up from two $3\frac{1}{2}$ in Strips 32, fixed to the floor by Angle Brackets.

A $1\frac{1}{2}$ in. Strip is bolted to each of the $3\frac{1}{2}$ in. Strips, then the two sides are joined by three Double Angle Strips, $1\frac{1}{2} \times 1\frac{1}{2}$ in. 33 in one case and $2\frac{1}{2} \times \frac{1}{2}$ in. 34 in the other.

Stairways

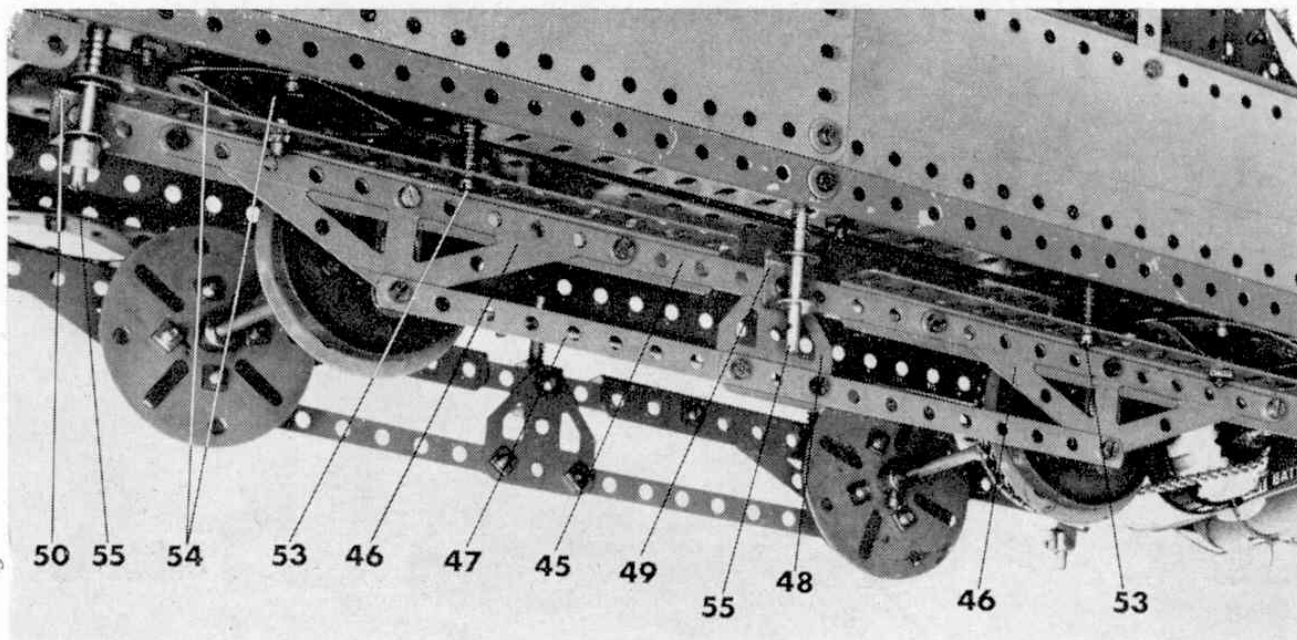
Like the full-size tram, our model has two curved external stairways, one at each end, running from the driving platform to the top deck. Both are similarly built from one $7\frac{1}{2}$ in. and one $9\frac{1}{2}$ in. Flat Girder, curved to shape and joined by six $1\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strips 35. At its lower end, the $7\frac{1}{2}$ in. Girder is attached to the platform by an Angle Bracket, while the upper end of the $9\frac{1}{2}$ in. Girder is bolted direct to Angle Girder 8.

A handrail is provided by four 3 in. Narrow Strips 36 joined by two $9\frac{1}{2}$ in. compound narrow strips, each obtained from one $4\frac{1}{2}$ in. and one $5\frac{1}{2}$ in. Narrow Strip. Fitted to the top of the upper Strip 36 is a right-angled Rod and Strip Connector which is connected to similar parts 16 by suitable Axle Rods joined by Rod Connectors. Right-angled Rod and Strip Connectors joined by a $4\frac{1}{2}$ in. Rod are also bolted to the tops of Strips 19.

Each platform is enclosed by a $4\frac{1}{2} \times 2\frac{1}{2}$ in. Flexible Plate 37 attached to one Angle Girder 8 by Fishplates and extended by a curved $9\frac{1}{2} \times 2\frac{1}{2}$ in. Strip Plate 38. The latter is attached to the platform at its ends by $1 \times \frac{1}{2}$ in. Angle Brackets and in the centre by a $\frac{1}{2} \times \frac{1}{2}$ in. Angle Bracket. In addition, one end is overlaid by a $2\frac{1}{2}$ in. Strip 39, while a hand-rail is again supplied by suitable Rods, some curved, attached by right-angled Rod and Strip Connectors.

A fender is next obtained from a curved $9\frac{1}{2}$ in Strip 40 wedged, at one end, behind Angle Girder 3 and attached, at the other end, to Plate 39 by a Fishplate. In the centre, it is attached to Flexible Plate 6 by a $1 \times \frac{1}{2}$ in. Angle Bracket to the top of which two 4 in. Stepped Curved Strips 41 are bolted. To provide a step, a $3\frac{1}{2}$ in. Flat Girder 42 is attached by Angle Brackets to another $3\frac{1}{2}$ in. Flat Girder which is in turn fixed by Angle Brackets to the underside of the platform. A vertical rail runs from the step to the canopy, being held in a Rod Socket 43 fixed to Flat Plate 20.

Continued next month.



BONE SHAKER

by Spanner

The conclusion of the advanced tramcar model featured in June issue of Meccano Magazine. Based on a 1903 prototype used in Bradford.

IT IS at this stage in construction that the truck can be built up and then fitted to the chassis. Two similar side members are each obtained from two $7\frac{1}{2}$ in. Angle Girders 44, connected by a $5\frac{1}{2}$ in. Narrow Strip 45, but separated from each other by a distance of three holes. Two Girder Frames 46 are bolted one to the centre of each Girder 44 and their apexes are joined by a $9\frac{1}{2}$ in. compound narrow strip 47, built up from two $5\frac{1}{2}$ in. Narrow Strips. The Bolts joining these Narrow Strips also hold in place a Flat Trunion 48, the apex of which is bolted, along with a Double Bracket 49, to the centre of Narrow Strip 45. Another Double Bracket 50 is bolted to the outside end of each Girder 44.

Four wheels are now each produced from a Face Plate bolted to a Wheel Flange and are mounted in pairs on two $4\frac{1}{2}$ in. Rods 51. These are journalled in the bosses of Double Arm Cranks bolted to the insides of Girder Frames 46, a Collar spacing each wheel from the adjacent Crank. A 2 in. Sprocket Wheel 52 is fixed on one of the Rods, as shown, then the finished truck is secured to Angle Girders 1 by four $\frac{3}{4}$ in. Bolts 53 passed one through each Angle Girder 44. Compression Springs on the shanks of the Bolts separate Girders 44 and 1, further separation

being supplied by four pairs of curved $2\frac{1}{2}$ in. Strips 54. As can be seen, one Strip in each pair is bolted to Girder 1 while the other is bolted to Girder 44. Additional suspension is obtained from another six Compression Springs each mounted on a 2 in. Rod 55 held in the boss of a Double Arm Crank (fixed to the inside of Girder 1) and passed through the lugs of Double Brackets 49 and 50. Collars are mounted on the ends of the Rods passing through Brackets 50.

Motor and control mechanism

Bolted to the underside of Flat Plate 27 is a Power Drive Unit carrying a $\frac{3}{4}$ in. Sprocket Wheel on its output shaft. This Sprocket is connected by Chain to Sprocket Wheel 52.

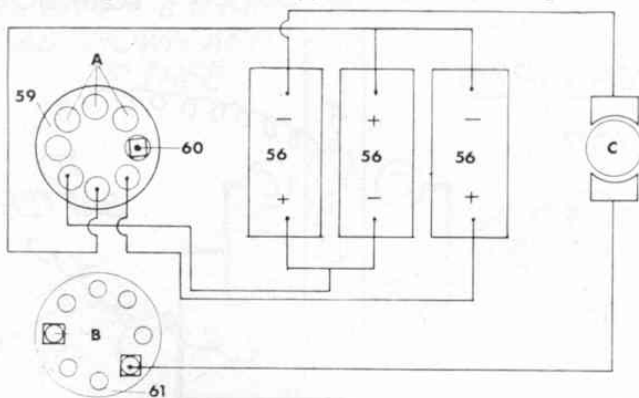
To make the tram self-supporting, a built-in power source for the P.D. Unit is provided by three Ever Ready 1839 or equivalent torch batteries 56, taped together and wired in series, i.e. the positive terminal of one battery is connected to the negative terminal of the next, and so on. It will be necessary to solder the connecting wires to the terminals.

A control lever is next built up from a Crank 57 mounted on a $5\frac{1}{2}$ in. Rod, journalled free in the boss of a Double Arm Crank bolted to the top of Flat Plate 5, and held in place by a Collar beneath the Plate. Mounted on the Rod between the two Cranks is an arrangement consisting of a Cylinder 58 in each end of which a $1\frac{1}{8}$ in. Flanged Wheel is wedged. Also mounted loose on the Rod is an 8-hole Insulating Bush Wheel 59 (Elektrikit Part No. 514), in seven holes of which Contact Studs are fixed. A $\frac{3}{4}$ in. Bolt 60, carrying a Washer, is fixed in the eighth hole, its shank projecting through a hole in Plate 5.

Connecting with the Contact Studs in Insulating Bush Wheel 59 is a Contact Screw in an 8-hole Bush Wheel 61, fixed on the lower end of the Rod. One of the Power Drive Unit leads is connected to this Bush Wheel, while all the other connections are as shown in the accompanying diagram. The batteries, incidentally, are fixed to the underside of the appropriate platform with Cord, and a Threaded Pin is attached to Crank 57.

To complete the platform fittings, an imitation brake is built up from a Crank 62 on a $4\frac{1}{2}$ in. Rod held by Collars in Flat Plate 5 and in an Angle Bracket bolted to Strip Plate 38. A similar imitation brake is built on to the other platform together with an imitation control lever. The latter is built up in the same way as the above working controller except that no Bush Wheels are added beneath the platform, their places being taken simply by a Collar.

Finally the trolley pole (non-working) is represented by an $11\frac{1}{2}$ in. Rod 63 held by Collars in a $1 \times \frac{1}{2}$ in. Double Bracket, the lugs of which are extended by $1\frac{1}{2}$ in. Strips 64. The lower Collar is held on the Rod not by Grub Screws, but by Bolts passed through the lugs of the Double Bracket and into the tapped bores of the Collar. A Small Fork Piece carrying a $\frac{1}{2}$ in.

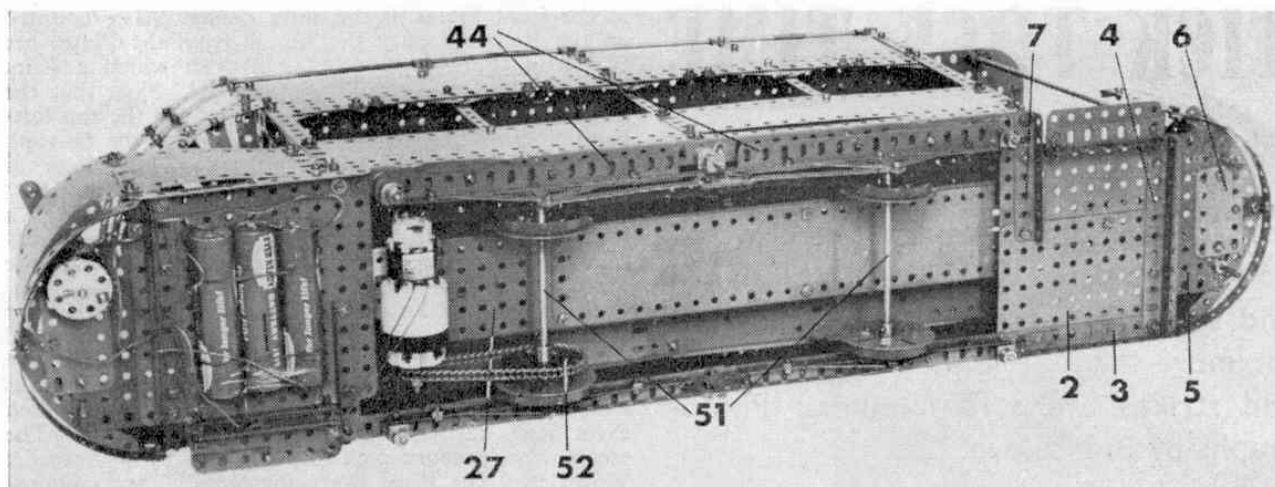


Super Plastic Kits from Japan continued

are fully sprung, and the tracks are constructed from a number of small links. The basic kit costs 99/11d. and another kit is available including a control unit for 124/-.

The detail on the Chieftain 1/25th scale model tank by Tamiya is superb. Once again, construction is fairly straightforward, providing each step is carefully followed. All wheels are independently sprung and the

tracks, instead of being the usual strip of flexible plastic, are fabricated from a number of plastic "links", each fitted with a soft rubber pad for additional grip. The performance is impressive, the model rapidly climbs steep slopes and obstacles. Power for the model is once again provided by electric motors. Another kit including the remote control unit that comprises of an additional motor and control panel, will be available at the end of the year price 126/-. Price for the basic kit we constructed is 99/11d.



loose Pulley is mounted on the top of the Rod.

The pole base consists of three Sleeve Pieces 65 wedged over two $\frac{1}{2}$ in. Pulleys with boss mounted on a $\frac{5}{8}$ in. Rod, the Pulleys coinciding with the joints between the Sleeve Pieces. A $\frac{3}{8}$ in. Flanged Wheel 66 is clamped over the top Sleeve Piece, followed by a Collar, then the whole thing is fixed in the centre of the top deck by another Collar mounted on the Rod beneath the deck. The Bolts fixing Strips 64 to the Double Bracket are screwed into the tapped bores of yet another Collar 67 which is fixed to the top of the $\frac{5}{8}$ in. Rod.

Held by Nuts in the end holes of Strips 64 is a 1 in. Screwed Rod 68 on which a Tension Spring 69 is mounted. The other end of this Spring is bolted to lower Sleeve Piece 65 to complete the model.

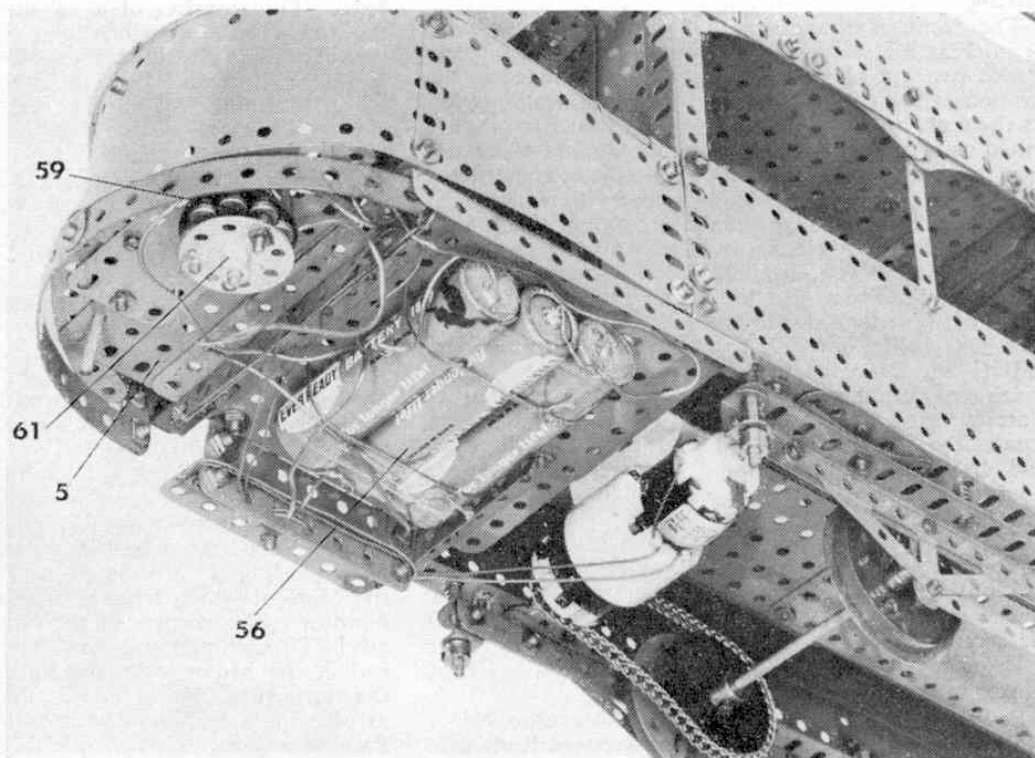
If required, a track can be built up from suitable Angle Girders, but the following parts list applies only to the model.

PARTS REQUIRED

6-1a	4-15a	2-74	2-179
4-1b	2-16a	4-89b	6-188
4-2a	6-17	16-90	18-189
24-3	4-20	1-94	4-191
8-5	1-20b	1-95	14-196
4-6	1-23	1-96a	1-197
20-6a	3-23a	6-103a	22-212a
8-7a	1-24	2-103d	4-213
4-8b	408-37a	2-103k	4-214
8-9	388-37e	4-109	2-216
10-9a	200-38	5-111	8-235
4-9b	1-43	1-111a	8-235a
6-11	27-48	4-111c	4-235d
1-11a	15-48a	4-113	12-235e
30-12	7-52a	4-115	
6-12b	4-53a	1-116a	1-514
6-12c	20-59	10-120b	7-544
6-13a	4-62	2-126a	1-543
2-14a	12-62b	4-137	4-561
7-15	3-70	3-163	
1 Power Drive Unit		3-3 V Batteries	

On opposite page, a wiring diagram showing the connections between the batteries, motor and controller Bush Wheels. A—Contact Studs; B—Contact Screws; C—Power Drive Unit.

Above, a complete underside view of the Tram showing construction of the driver's platform and drive from the motor to the truck.



At right, in this close-up view of the "business end" of the model, the layout of the batteries and controller Bush Wheels is clearly shown.