MECCANO FIVE-PIN BOWLING ALLEY

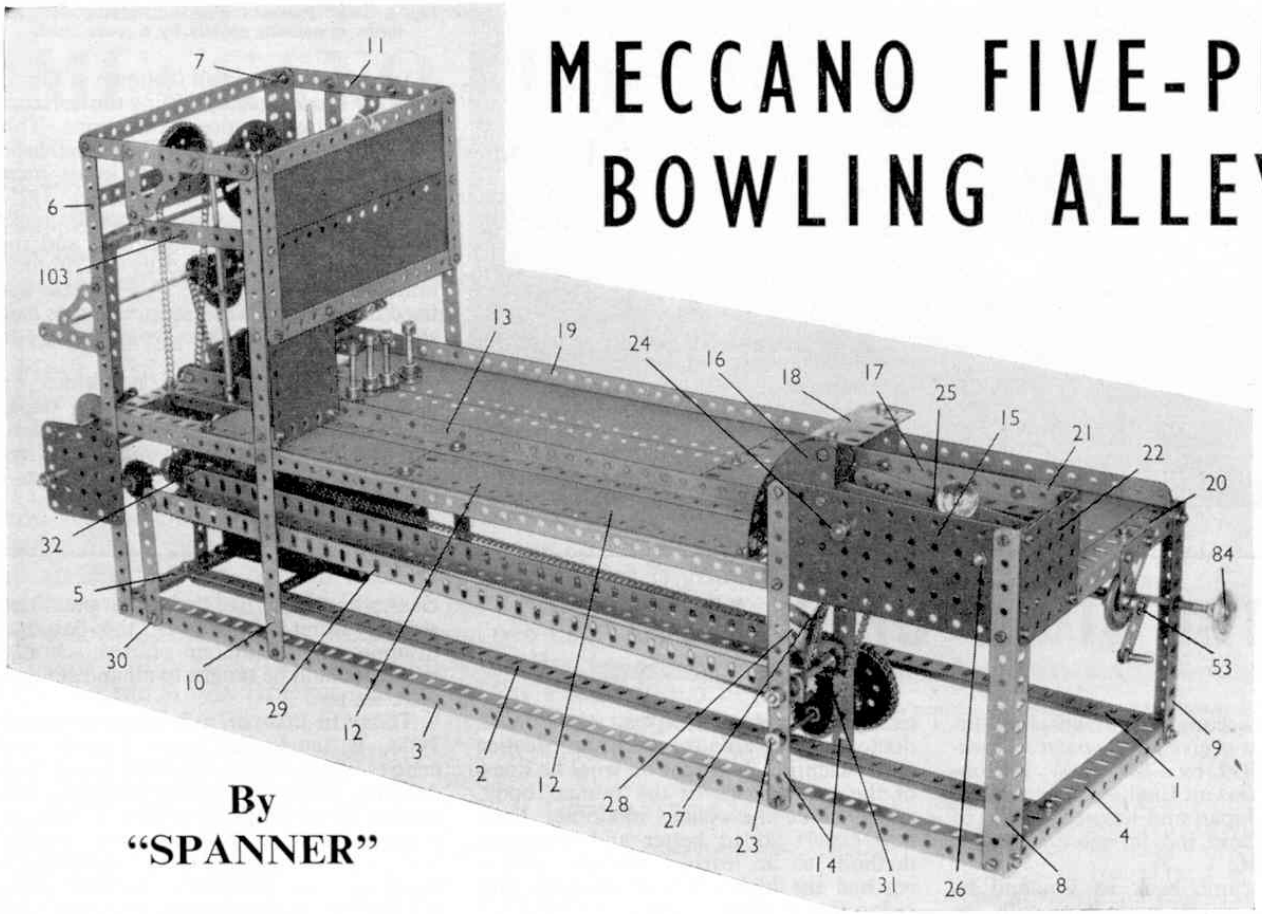

Fig. 1. General view of the Bowling Alley, with pins set in position.

By "SPANNER"

A Novel Model For Winter Evenings

AN indoor game which has become exceptionally popular throughout the length and breadth of this country in recent times, following its long reign as a top sport in America, is Ten-Pin Bowling. There is scarcely a city or large town in Britain which does not now possess its own bowling alley.

This month, we present a miniature of this splendid game—a Five-Pin Bowling Alley, made entirely of Meccano. It is a model that is sure to provide endless amusement for the builder and his friends during the winter months and, indeed, it could be the ideal adjunct to the Christmas party when teams can play against each other.

Since ten-pin bowling itself is a game which attracts all age groups there is no reason why the five-pin bowling alley illustrated here should not prove just as popular with people of various ages.

In the real thing, the pins are reset by complicated machinery after each player has had his shot or shots, and in the model we have endeavoured to create, on a smaller scale, a similar mechanism in Meccano.

The model can set up five pins in a row, sweep them away and return the bowling ball to the bowling position.

This is how you go about building the model:

THE FRAME

Construction of the frame should start with the base, which is formed from three 24½″ Angle Girders 1, 2 and 3 and also two 7½″ Angle Girders 4 and 5. This is connected to a similar rectangle by two 12½″ Angle Girders 6 and 7, one 7½″ Angle Girder 8 and a 5½″ Angle Girder 9. Bolt two 12½″ Strips 10 to the 24½″ Angle Girders 1 and 3 and join them at the top by 5½″ Strips 11 to the 12½″ Angle Girders 6 and 7. Two 7½″ × 2½″ Strip Plates, edged by 7½″ and 4½″ Strips, are attached to the 12½″ Strips 10 with Angle Brackets. One side is lengthened by a 3½″ × 2½″ Flexible Plate, supported on a 2½″ × ½″ Double Angle Strip bolted to the Strip 10 and the 18½″ Angle Girder 13.

Two 9½″ Strip Plates 12, overlapped seven holes, are bolted to the 24½″ Angle Girders, with the 18½″ Angle Girder 13 placed as shown. The 7½″ Strips 14 are bolted in position, supporting the 5½″ × 2½″ Flat Plate 15. On the inside of the model a 4½″ × 2½″ Flat Plate and a 2″ Flat Girder 21 replaces the Flat Plate 15. Secure the Semi-circular Plates 16 to the Flat Plates and at the same time bolt the 5½″ Angle Girders 17 on the inside. A 4½″ × 2½″ Red Plastic Plate 18 is fastened to the 9½″ Flat Plate 12 and the Semi-Circular Plate 16 by Angle Brackets. Between the Angle Girders 13 and 19, are fixed two 9½″ and two 12½″ Strip Plates, supported by two 5½″ Strips and the Angle Girder 20. Next attach a 2½″ × 2½″ Flat Plate 22 by an Angle Bracket to the Flat Girder. A 3½″

Rod 23 carries a 1″ and a 2″ Sprocket Wheel, and a second 3½″ Rod 24 has a 1″ Sprocket Wheel fixed in the centre and is connected by Chain to the lower Sprocket Wheel. Two 4½″ Strips 25 are held between two pairs of nuts ¾″ apart on a 3″ Screwed Rod 26, which is fastened to the Flat Plate and the Flat Girder with nuts, one on each side locked together. In the fourth holes of the Strips 25 a 1″ Screwed Rod with four nuts holds the Strips steady at ¾″ distance apart. The Strips rest on the Rod 24. A Hinge 27 is fastened to the Chain by a bifurcated paper fastener, and a 1″×½″ Double Bracket 28 is placed under the Hinge and fastened to the Chain by another bifurcated paper fastener, missing two links of Chain.

BALL RETURN CHUTE

Place two 18½″ Angle Girders 29 on the 3″ Rod 31. These are held by Collars so that their inside edges are ¾″ apart. A 3½″ Strip 30 is bolted to the other end and spaced away by a Collar. The Angle Girders are connected by a 1½″ Strip, and the inner Angle Girder 29 is fastened to a 5½″×3½″ Flat Plate 32 by an Angle Bracket. Two 1″×½″ Angle Brackets attached to the Flat Plate 32 are bolted to the 24½″ Angle Girder by the Bolts 33. A 4½″ Angle Girder 34 is bolted to the edge of the Flat Plate 32 to guide the balls on to the chute.

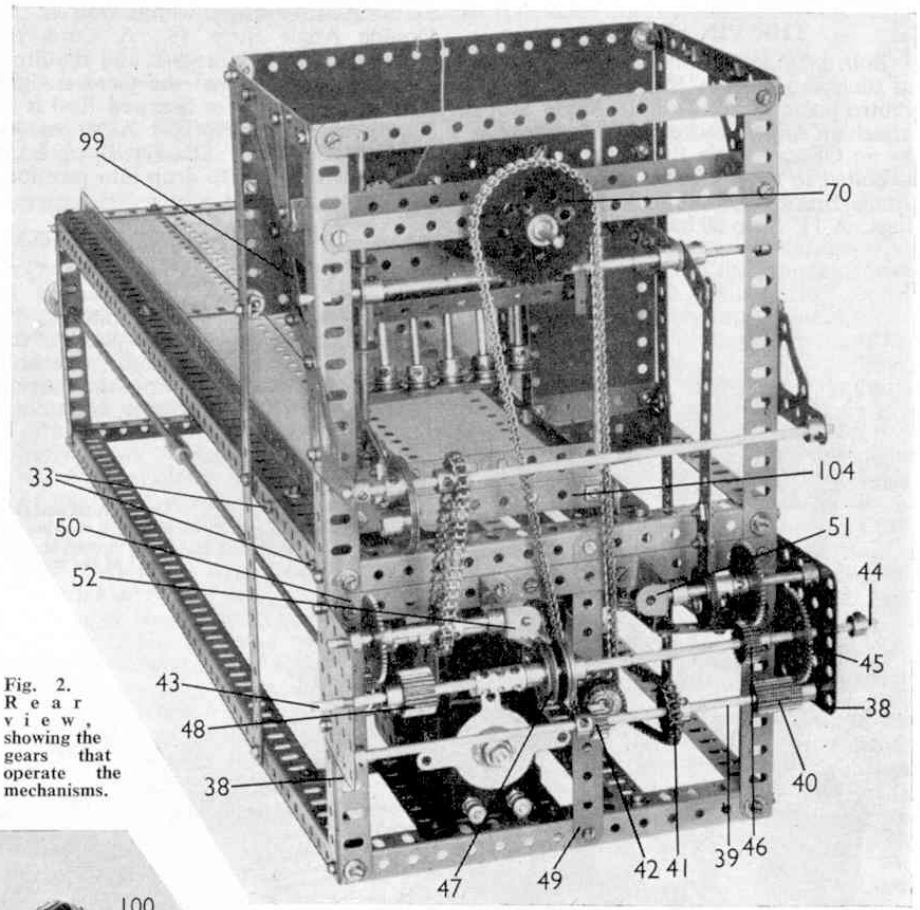

Fig. 2. Rear view, showing the gears that operate the mechanisms.

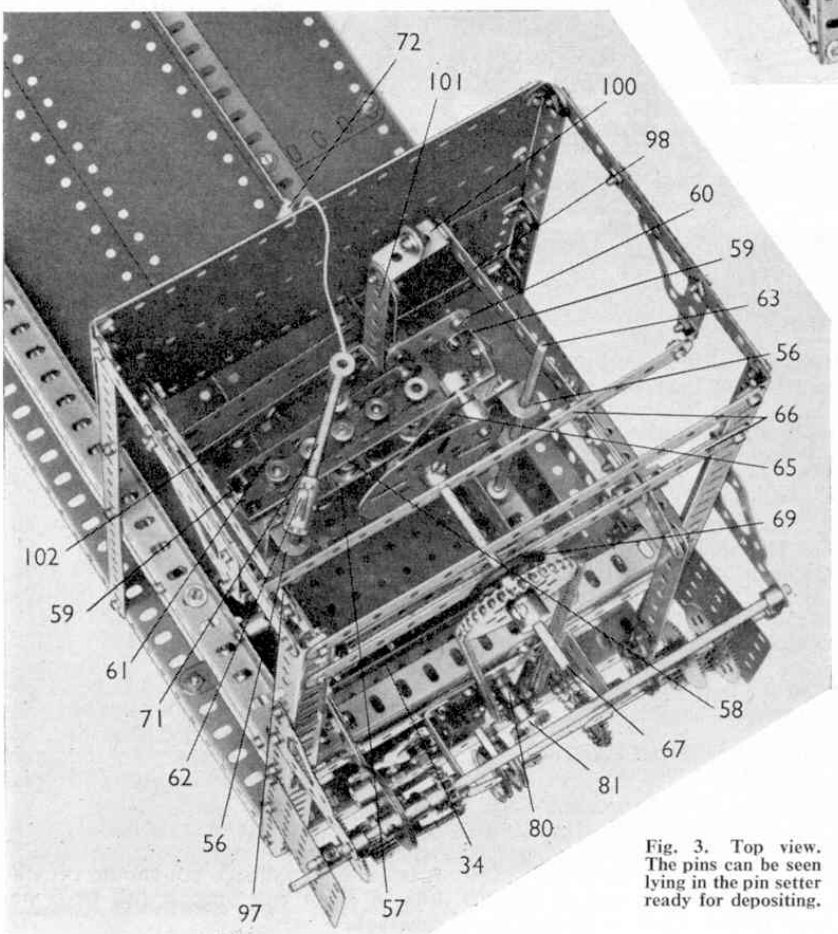

Fig. 3. Top view. The pins can be seen lying in the pin setter ready for depositing.

MOTOR DRIVE

An E15R Motor is bolted to the Angle Girder 5 and a 5½″ Strip fixed between the Angle Girders 1 and 2. The side plates of the Motor are extended by 3″×1½″ Flat Plates. A reduction train of Gear Wheels and Pinions giving a 36 to 1 ratio is fitted, starting with a 7/16″ Pinion on the motor shaft. The 7/16″ Pinion drives a 60-tooth Gear Wheel, a ½″ Pinion driving a 57-tooth Gear Wheel, the latter train being repeated twice. All the Rods are 2½″ long, except the final one carrying the two 1″ Sprocket Wheels 35 and 36, which is a 3½″ Rod. Sprocket Wheel 35 drives the 2″ Sprocket Wheel 37 on the Rod 23. Next bolt two 2½″×2½″ Flat Plates 38 to the 12½″ Angle Girders 6 and 7. On an 8″ Rod 39 secure a ¾″×½″ Pinion 40, a Sprocket Wheel 41, and a ½″ Pinion 42. A 6½″ Rod 44 is joined to a 3″ Rod 43 by a Coupling and on it is secured a 57-tooth Gear Wheel 45, a ¾″ Pinion 46, two 1″ Pulleys 47, and a ¾″×½″ Pinion 48. Bolt a 5½″ Strip 49 and a 7½″ Strip 50 to the Angle Girders as shown. Two 1½″×½″ Double Angle Strips 51 and 52 are attached to the 7½″ Strip 50 and also a 1″ Corner Bracket at the back of the 1½″×½″ Double Angle Strip 52. A compound rod 53, consisting of two 11½″ Rods and a 2½″ Rod, joined by Couplings, has a Coupling 55 secured at one end which carries a 1″ Rod that engages between the 1″ Pulleys 47. The other end of the Rod 53 is journalled in a 1½″ Corner Bracket and carries a Crank with Threaded Pin. The 1″ Pulley with Rubber Ring presses against the Corner Bracket. The Rod 53 will bring down the Pin remover and also move it towards the rear, to clear the "deck", by putting the different motions in gear.

THE PIN SETTING

Bolt a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 56 at each end of a $4\frac{1}{2}''$ Strip 57, and in the centre holes of the Double Angle Strips attach an Angle Bracket which is extended by an Obtuse Angle Bracket that in turn is bolted to a $4\frac{1}{2}''$ Double Angle Strip 58. Angle Brackets 59 are lock-nutted to the lugs. A $1\frac{1}{2}''$ Strip 60 has Fishplates bolted at each end; one is secured to the Angle Bracket 59, the other to a $3\frac{1}{2}''$ Strip 61, which is bolted to the other Angle Bracket 59. A $6\frac{1}{2}''$ Rod 62 is attached by a Threaded Coupling to the framework, whilst the $6\frac{1}{2}''$ Rod 63 is secured by a Rod Socket. The Double Angle Strips 56 slide up and down on these rods. Next lock-nut a $2\frac{1}{2}''$ Strip 65 in the centre of the $4\frac{1}{2}''$ Strip 57. Two $7\frac{1}{2}''$ Strips 66, one bolted to the Angle Girders 6 and 7, and the other to the Corner Gussets attached to the $5\frac{1}{2}''$ Strips 11 are fixed in place. A $3\frac{1}{2}''$ Rod 67, journalled in the $7\frac{1}{2}''$ Strips 66 has a Face Plate 68, a 1" Pulley with Rubber Ring 69, and a 2" Sprocket 70 secured to it. An Adaptor for Screwed Rod fastened to the Face Plate is connected to the $2\frac{1}{2}''$ Strip 65 and held by a Collar. The Rubber Ring presses against the $7\frac{1}{2}''$ Strip 66. A Coupling on Rod 62 supports a $2\frac{1}{2}''$ Rod 71, on the end of which is another Coupling carrying a $1\frac{1}{2}''$ Rod and Collar. It is so adjusted that as the motion reaches its highest point the Collar presses on the $3\frac{1}{2}''$ Strip 61, closing it within 3/16" of the Double Angle Strip 58. A Cord 72, attached to the framework and the Strip 61, is adjusted so that the Cord is tight when the Adaptor for Screwed Rod is at "20 mins. past o'clock". As it moves towards "half past", the "jaws" open up and allow the Pins to drop into position.

DRIVE FOR PIN SETTING MECHANISM

Two $1\frac{1}{2}''$ Corner Brackets 73 are bolted to the side-plates of the motor, one hole from the starting lever, and on the inside a $1'' \times 1''$ Angle Bracket 74 is fastened by the same bolts. On a 3" Rod 75 secure two Cranks 76 and 77. A Threaded Pin is attached to the Crank 76 which is placed between two $\frac{1}{2}''$ Pulley Wheels with boss 78 secured to a 3" Rod 79. On the end of Rod 79 is a $\frac{3}{4}''$ Sprocket Wheel 80, and a $\frac{3}{4}''$ Contrate Wheel 81. The Sprocket Wheels 70 and 80 should then be connected by Chain. The Collar 82, loosely attached to the Crank 77 by a nut and bolt, is fastened to a 2" Rod that is extended with two $11\frac{1}{2}''$ Rods 83. Place two Compression Springs and a 1" Pulley 84 on the end of the Rod. By pressing the 1" Pulley in, the Contrate Wheel engages with the Pinion 42.

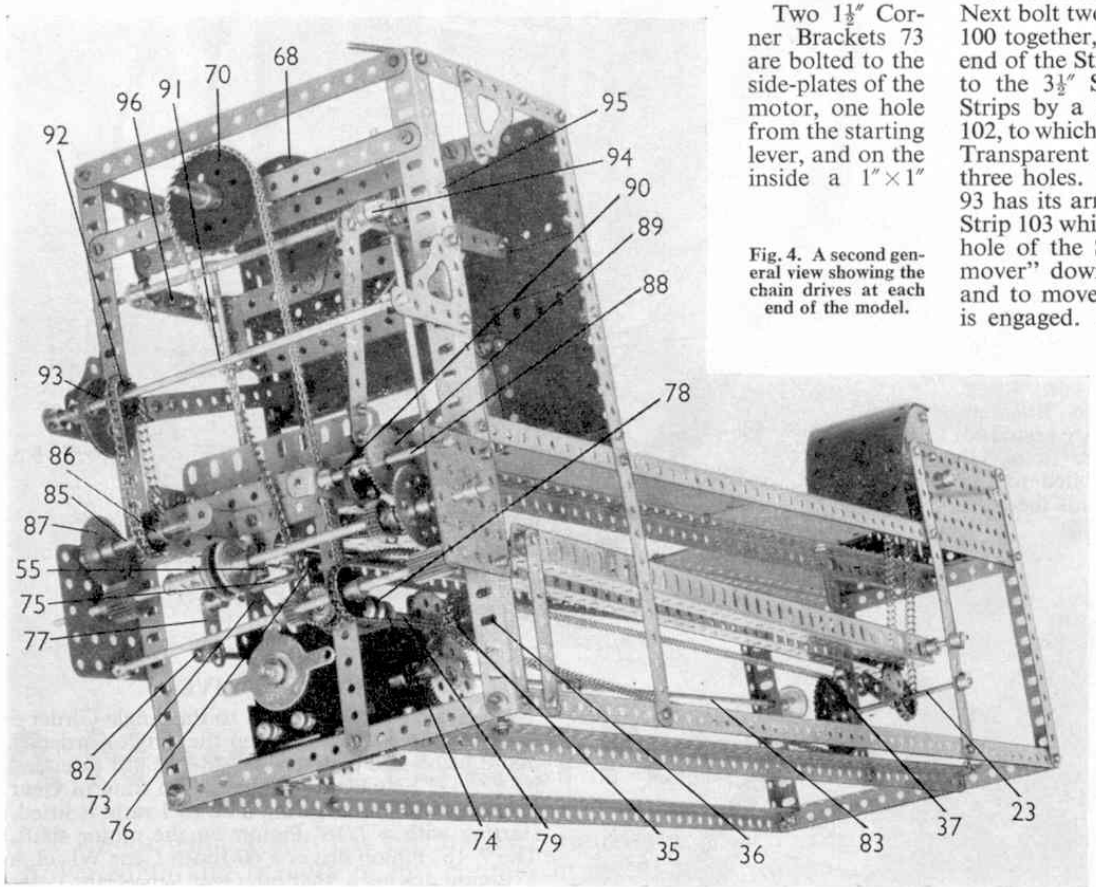

Fig. 4. A second general view showing the chain drives at each end of the model.

DRIVE FOR PIN CLEARING MECHANISM

Place on 3" Rod 85 a $\frac{3}{4}''$ Sprocket Wheel 86 and a 50-tooth Gear Wheel 87, and on a similar Rod 88 (journalled in the Double Angle Strip 51 and the Flat Plate 38), secure a 50-tooth Gear Wheel 89 and a Single Throw Eccentric 90 the Rods being held in position by Collars. An 8" Rod 91, carrying a Triple Throw Eccentric 93 and a $\frac{3}{4}''$ Sprocket Wheel 92, is placed in the Corner Gussets and driven by a chain from the Sprocket Wheel 86. The arm of the Eccentric 90 is extended by a $4\frac{1}{2}''$ Strip and lock-nutted to the Crank 94 secured to an 8" Rod 95. Two Cranks 96, fastened to the Rod 95, are extended by a $4\frac{1}{2}''$ and a $1\frac{1}{2}''$ Strip 97 and 98, and a $3\frac{1}{2}''$ Strip 99 is lock-nutted to the end of the Strip 97. Next bolt two $\frac{1}{2}''$ Reversed Angle Brackets 100 together, and lock-nut one lug to the end of the Strip 98, the other lug is bolted to the $3\frac{1}{2}''$ Strip 101. Connect the $3\frac{1}{2}''$ Strips by a $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 102, to which has been bolted two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Transparent Plastic Plates overlapped three holes. The Triple Throw Eccentric 93 has its arm extended by a $5\frac{1}{2}''$ and $1\frac{1}{2}''$ Strip 103 which is lock-nutted in the centre hole of the Strip 99. To bring the "remover" down, the Pinion 46 is engaged, and to move it backwards the Pinion 48 is engaged. A stop (for balls which are thrown too hard) is made by bolting a Flat Girder to a $4\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 104 attached to the frame. $\frac{7}{8}''$ diam. balls are required.

Parts required to build the Bowling Alley: 2 of No. 1; 8 of No. 1b; 7 of No. 2; 8 of No. 2a; 4 of No. 3; 1 of No. 4; 1 of No. 5; 5 of No. 6a; 7 of No. 7; 3 of No. 7a; 2 of No. 8; 5 of No. 8b; 3 of No. 9; 2 of No. 9a; 2 of No. 10; 1 of No. 11a; 16 of No. 12; 1 of No. 12a; 2 of No. 12b; 2 of No. 12c; 4 of No. 13; 3 of No. 13a; 3 of No. 14; 5 of No. 16; 5 of No. 16a; 5 of No. 16b; 1 of No. 17; 6 of No. 18a; 1 of No. 18b; 5 of No. 22; 7 of No. 23a; 1 of No. 25; 1 of No. 25a; 2 of No. 27; 4 of No. 27a; 1 of No. 27d; 4 of No. 26; 1 of No. 26b; 1 of No. 26c; 1 of No. 28; 192 of No. 37a; 173 of No. 37b; 46 of No. 38; 4 of No. 48; 3 of No. 48a; 1 of No. 48b; 2 of No. 48c; 1 of No. 52a; 1 of No. 53a; 32 of No. 59; 6 of No. 62; 8 of No. 63; 1 of No. 63c; 1 of No. 70; 3 of No. 72; 2 of No. 73; 1 of No. 80; 1 of No. 82; 89" of No. 94; 2 of No. 95; 5 of No. 96; 3 of No. 96a; 1 of No. 103c; 1 of No. 103g; 4 of No. 108; 1 of No. 109; 1 of No. 111a; 2 of No. 111c; 1 of No. 114; 2 of No. 115; 2 of No. 120b; 2 of No. 125; 1 of No. 130; 1 of No. 130a; 3 of No. 133; 1 of No. 133a; 2 of No. 155; 1 of No. 173a; 1 of No. 179; 1 of No. 190a; 2 of No. 193; 1 of No. 194c; 2 of No. 195; 4 of No. 196; 2 of No. 197; 2 of No. 214; 1 E15R Motor; 1 or more Large Marbles or Ball Bearings about $\frac{7}{8}''$ diameter.

So now, you builders and Club members, what about attempting this model? It is quite a challenge but should provide lots of good fun once it has been put together.