

THE G.M. SERIES OF MODERN SUPERMODELS

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Grandmother Clock

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Clocks over 6 feet 6 inches/2 metres high are called grandfather clocks ; those below this height are known as grandmother clocks.

The model described in this leaflet is driven by a No. 2 Clockwork Motor and it will run for about twenty-eight hours on one winding.

Made entirely from standard Meccano and Elektrikit parts, it was designed by Sgr. A. Farina, of Milan, Italy.

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Grandmother Clock

1. INTRODUCTION

There have been many types of clock since mechanical movements superseded the earlier clepsydras or water clocks. Among the most handsome were the "long case" clocks, nowadays better known as grandfather clocks; Meccano examples are the well known S.H.L.14 and S.H.L.14a. The term "grandfather" should be confined to those clocks of 6 feet 6 inches/2 metres or more in height, and the term was first used about 1876. Clocks of less than this height are referred to as grandmother clocks.

Naturally the length of time for which a weight-driven clock will run depends on the length of the fall and for this reason, most grandmother clocks are not driven by weights, but by a spring or by electrical means.

The clock described in this leaflet is of the spring-driven type, and it will run for about twenty-eight hours on one winding of a No. 2 Meccano motor. It is built entirely of standard parts and is quite easy to construct. It is fitted with a seconds hand and no difficulty should be found in arranging an electrical striking mechanism by referring to Section XVIII of "Electricity and Meccano" in M.J.22, where a suitable circuit is given under "Non-repeating Cycles" for the control of an electric motor by the hands of a clock.

A general view of the completed model is given in Figure 1.

2. BASE

Two pairs of $5\frac{1}{2}$ " angle girders 1 and 2 are bolted together to form a square as shown in Fig. 2. To girders 2 are bolted two further ~~5~~⁵ $7\frac{1}{2}$ " angle girders 3 and 4 and in each corner of the latter are fixed adjustable feet. Each foot consists of a $1\frac{1}{8}$ " bolt 5, a 1" pulley and tyre 6 lock-nutted on the bolt, a 1" rod 7 fitted in a collar 8 and a coupling 9 which is bolted to the girder 3 or 4. The purpose of the four feet is to permit the clock to stand level, so that the pendulum (see Section 7) may be exactly central.

3. CASE

Each upright of the case consists of a channel girder made from a pair of $18\frac{1}{2}$ " angle girders 10, see Fig. 2. They are joined at their lower ends by two $4\frac{1}{2}$ " flat girders 11 and 12 and two $4\frac{1}{2}$ " angle girders 13 and 14, see also Fig. 1. At their upper ends the girders 10 are joined by two further $4\frac{1}{2}$ " flat girders 15 and 16, see Figs. 1 and 4. Four $5\frac{1}{2}$ " curved strips 17 and 18 are used to brace the lower ends, and four similar strips 19 and 20 to brace the upper ends, see Fig. 1. If desired, the sides may be plated. The case is secured to the base by $4\frac{1}{2}$ " angle girders not seen in the figures.

4. DIAL

This is seen in Fig. 3. It consists of a hub disc 21 to which is bolted a 4" circular plate 22, as shown. A flanged ring 23 is fixed to the hub disc by three 2" strips 24 and $\frac{1}{2}$ " x $\frac{1}{2}$ " angle brackets 25, see also Figs. 4 and 5. These 2" strips also form the numerals III, IX and XII. The remaining numerals are also 2" strips held by $\frac{1}{2}$ " x $\frac{1}{2}$ " angle brackets

to the hub disc, but they cannot be bolted to the flanged ring because the holes in the latter do not allow this.

A second 4" circular plate 26 is bolted to plate 22 and the hub disc and also to the flanged ring; a gear ring 27 is also held by bolt 28 and a $\frac{1}{2}$ " bolt 29 holds the gear ring and the numeral VI represented by a pair of 2" strips 30 (double for strength) spaced from the ring by a collar (not seen in Fig. 4). Bolt 31 is a $\frac{1}{2}$ " pivot bolt (Part 545) held in the strips 30 by two nuts; this is used as a bearing for the seconds hand rod 67, see Section 6.

5. MECHANISM FRAMEWORK

This is shown in Figs. 4, 5 and 6 and consists of two $5\frac{1}{2}$ " angle girders 32 and 33 which are bolted to angle girders 10 by means of $\frac{1}{2}$ " x $\frac{1}{2}$ " angle brackets. A $5\frac{1}{2}$ " x $2\frac{1}{2}$ " flanged plate 34 is bolted to girders 32 and 33 and spaced from them by collars 35 and 36. A similar flanged plate 37 is next fixed in position; this is mounted in 1" corner brackets 38, spaced by collars 39. Two $5\frac{1}{2}$ " angle girders 40 and 41 are now bolted in position, two further 1" corner brackets 42 and 43 being arranged as shown in the figures. A $5\frac{1}{2}$ " strip 44, a $3\frac{1}{2}$ " strip 45 and a $2\frac{1}{2}$ " strip 46 are now bolted in place. A $2\frac{1}{2}$ " x $\frac{1}{4}$ " double bent strip 47 joins strips 44, 45 and 46. A $1\frac{1}{2}$ " angle girder 48 is bolted to the lower short flange of plate 37 and a second $1\frac{1}{2}$ " angle girder 49 is bolted to its top flange. A $5\frac{1}{2}$ " strip 50 is then bolted to girders 48 and 49 in the position shown, four washers being used for spacing at top and bottom.

6. DRIVING MECHANISM

A No. 2 Clockwork Motor is bolted to the framework by means of a $\frac{1}{2}$ " x $\frac{1}{2}$ " angle bracket 51, a $\frac{1}{2}$ " x $\frac{1}{2}$ " double bracket 52 and a 1 " x $\frac{1}{2}$ " angle bracket 53 (Figs. 5 and 6), and similar brackets on the opposite side (Fig. 4); washers and long bolts are used where necessary.

A $3\frac{1}{2}$ " rod 54 is used in place of the motor shaft, see Figs. 5 and 6; a $\frac{1}{2}$ " pinion 55 on this rod drives a 57-tooth gear 56 on a $1\frac{1}{2}$ " rod 57. Rods 54 and 57 are both journalled in strip 50 and plate 37. A second $\frac{1}{2}$ " pinion 58 on rod 57 (Fig. 6) drives a gear ring 59 by its inside teeth. The gear ring is fixed to a bush wheel 60 by means of a $3\frac{1}{2}$ " strip 61, washers being used for spacing; the bush wheel is loose on a $3\frac{1}{2}$ " rod 62 on which the minute hand is fixed by means of a rod socket 63 (Fig. 3), see Section 8. A clutch to permit adjustment of the hands is made from a $\frac{1}{2}$ " x $\frac{1}{2}$ " angle bracket 64 and a spring clip (Fig. 6).

A 60-tooth gear 65 on rod 54 (Fig. 6) drives a $7/16$ " pinion 66 on a compound rod 67; this rod consists of two 2" pivot rods (Part 549) and a $1\frac{1}{2}$ " rod joined by rod connectors. On the rear end of rod 67 is fixed a 3" sprocket wheel 68 to act as the scape wheel (Fig. 5); on the front end the seconds hand, represented by a pointer 69 (Part 156), is held (Fig. 3). The rod 67 is journalled in two $\frac{1}{2}$ " pivot bolts (Part 545) 31 (Fig. 3) and 70 (Figs. 5 and 6), the latter being fixed in a $2\frac{1}{2}$ " strip 71 bolted to girders 32 and 33 by $\frac{1}{2}$ " x $\frac{1}{2}$ " angle brackets and spaced from the girders by collars.

The hour hand is driven from a $7/16$ " pinion 72 fixed on rod 62 (the minute hand rod), see Fig. 6; this pinion drives the 60-tooth gear wheel 73 on a $1\frac{1}{2}$ " rod 74 journalled in strip 50 and plate 37. Rod 74 also carries a $\frac{1}{2}$ " pinion 75 which drives a 57-tooth gear wheel 76, loose on rod

62 ; the pinion 75 and gear wheel 76 are placed between plate 37 and the dial, as also is gear 65. Gear 76 carries a coupling 77 between two $\frac{1}{2}$ " x $\frac{1}{2}$ " angle brackets 78 ; the fixing bolts in the coupling must not foul rod 62 because the coupling must be free to rotate on the rod. Coupling 77 is passed through the central hole in the hub disc 21 and circular plate 22, and a $\frac{1}{2}$ " x $\frac{1}{2}$ " angle bracket is bolted to the coupling ; this angle bracket carries the hour hand, see Section 8.

7. ESCAPEMENT

The crutch is a $2\frac{1}{4}$ " strip 79 to each end of which a $\frac{1}{2}$ " x $\frac{1}{2}$ " angle bracket 80 is fixed at an angle, see Fig. 5. Strip 79 is bolted to a crank 81 which is fixed on a 2" pivot rod 82 (Part 549) journalled in two $\frac{1}{2}$ " pivot bolts (Part 545) 83 and 84, fixed as shown in Figs. 4, 5 and 6. As with all escapements, the angle at which the brackets 80 are set is critical and careful adjustment will be necessary to ensure correct operation.

The pendulum consists of an $11\frac{1}{4}$ " rod 85 joined to an 8" rod 86 and articulated at the joint by means of two rod and strip connectors joined by a $\frac{3}{8}$ " bolt and locknuted, see Figs. 2, 5 and 6 ; a thin washer (Part 561) should be placed between the two rod and strip connectors, see Diagram A below. The bob is a boiler end 87 bolted to a face plate 88 by two $\frac{3}{4}$ " bolts ; the bob is fixed on the rod 86 by a $\frac{3}{8}$ " bolt 89 screwed into a collar, which allows easy adjustment of the bob. The exact position of the bob must be determined by trial and error, raising it to make the clock go faster and lowering it to cause the clock to go more slowly. The upper end of rod 85 is fixed in a coupling 90 fixed on rod 82.

8. MISCELLANEOUS

As seen in Fig. 3, the minute hand is a $3\frac{1}{2}$ " narrow strip 91 bolted to fishplate 92 which is itself bolted to the rod socket 63 on the end of rod 62, as explained in Section 6. The hour hand is a $2\frac{1}{2}$ " narrow strip 93 fixed to the $\frac{1}{2}$ " x $\frac{1}{2}$ " angle bracket bolted to coupling 77 as described in Section 6.

The dial is fixed to the mechanism framework by $1\frac{1}{8}$ " bolts 94 held in fishplates 95 bolted to plate 37, see Fig. 5.

9. NOTES

9.1 It is essential to use the Elektrikit pivot bolts and rods where indicated, as these greatly reduce the friction which the clockwork motor has to overcome. Before the introduction of these parts, rods had to be journalled in holes which gave rise to much friction ; this gave the motor more work to do and clocks did not run so long on one winding.

9.2 If a No. 2 Clockwork Motor is not available, the current No. 1 may be used, but a few minor alterations to the structure will be necessary.

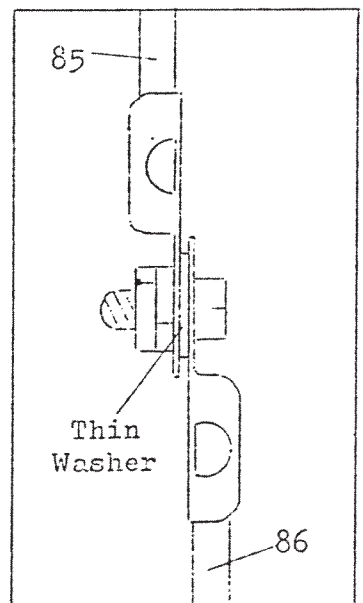


Diagram A

10. PARTS REQUIRED

GMM.SML.19

The following list includes the parts used to make the model as illustrated in this leaflet. Availability of parts and variations in design will naturally cause changes.

3	x	2	1	x	13	2	x	52	4	x	133a
1	x	2a	1	x	13a	10	x	59	4	x	142c
3	x	3	2	x	16	1	x	62	2	x	146a
1	x	4	2	x	18a	6	x	63	1	x	156 *
4	x	5	5	x	18b	1	x	64	1	x	162a
13	x	6	4	x	22	2	x	70	1	x	167b
8	x	7a	1	x	24	3	x	89	1	x	179
2	x	8b	3	x	26	1	x	95b	2	x	180
8	x	9	2	x	26c	4	x	103c	2	x	212
4	x	9a	2	x	27a	1	x	109	2	x	213
2	x	9f	2	x	27d	6	x	111	1	x	235
4	x	10	1	x	35	8	x	111a	1	x	235b
2	x	11	124	x	37	4	x	111c	5	x	545
20	x	12	42	x	37a	7	x	111d	3	x	549
3	x	12b	49	x	38	1	x	118	1	x	561

No. 2 Clockwork Motor
* or substitute

11. OTHER CLOCKS

Many types of clocks have been published by Meccano Ltd. and there are also three others in the GMM Series of Modern Supermodels, as well as a Self-starting Electric Clock in M.J.8. A full list of clocks will be found in Section 3 of The Meccanoman's Guide and its Supplements, and also in "An Introduction to Meccano Clocks". Details of these publications will be found on the back pages of this leaflet.

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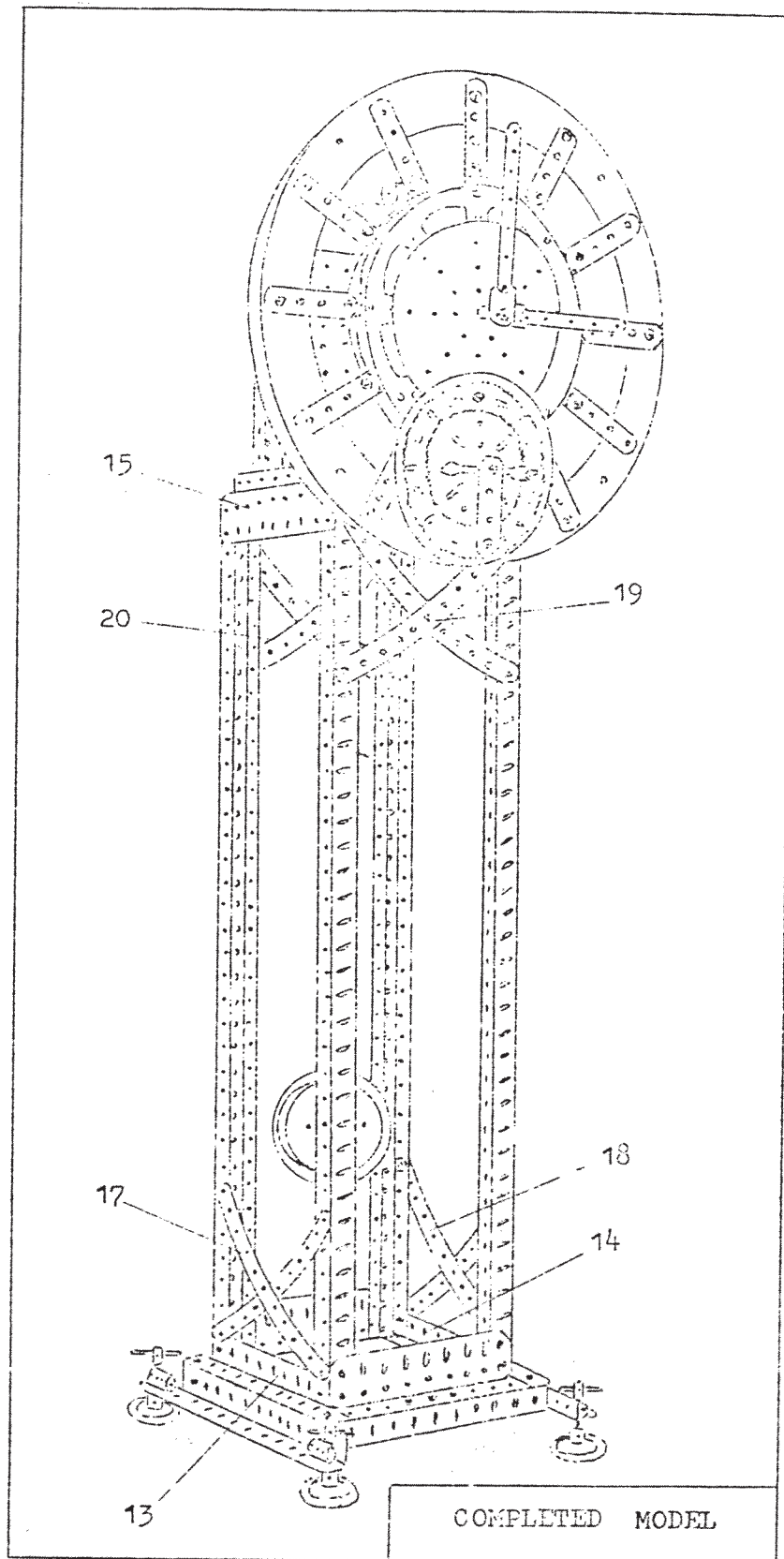


Figure 1

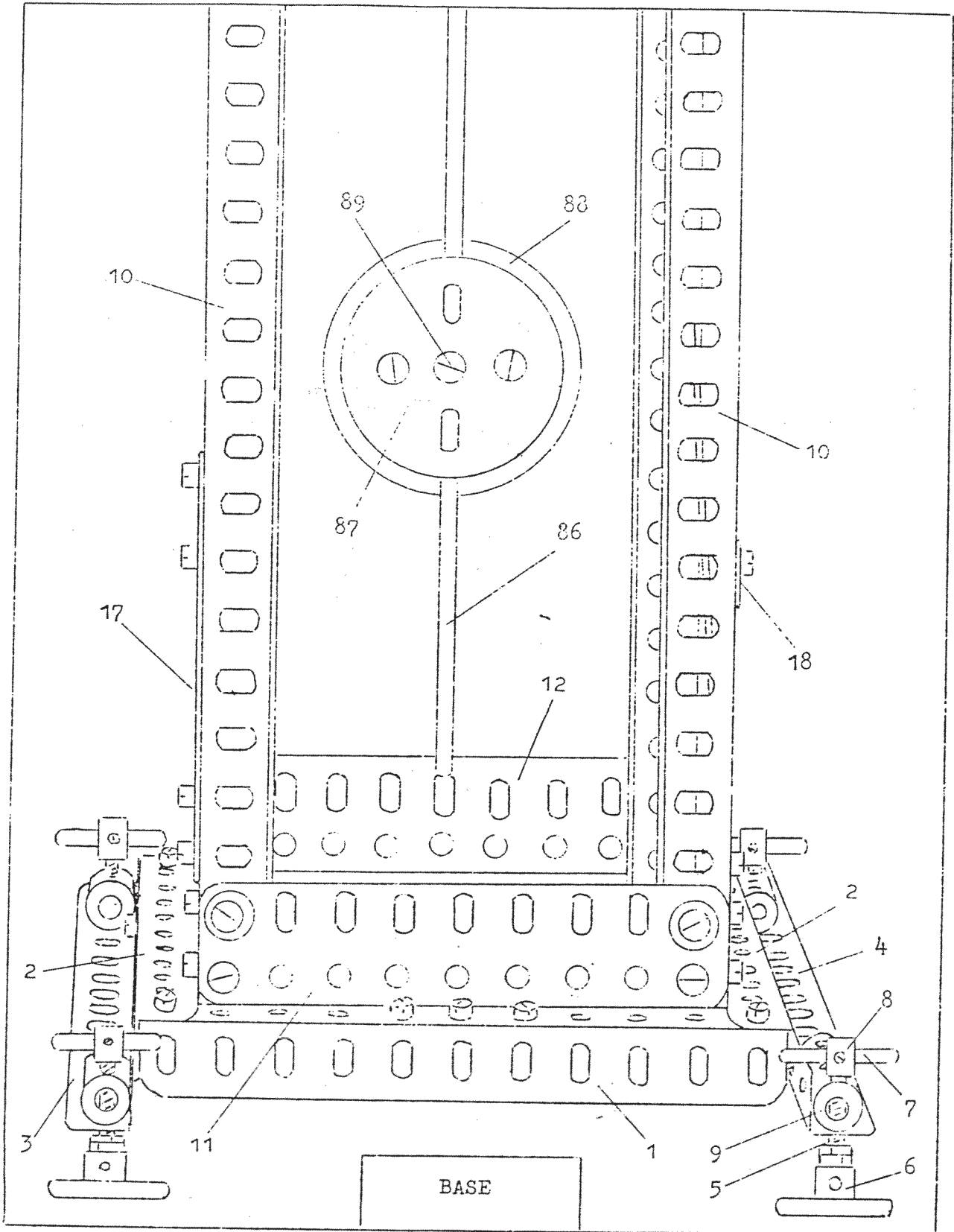


Figure 2

Fig. 113 is a design to give adjustment

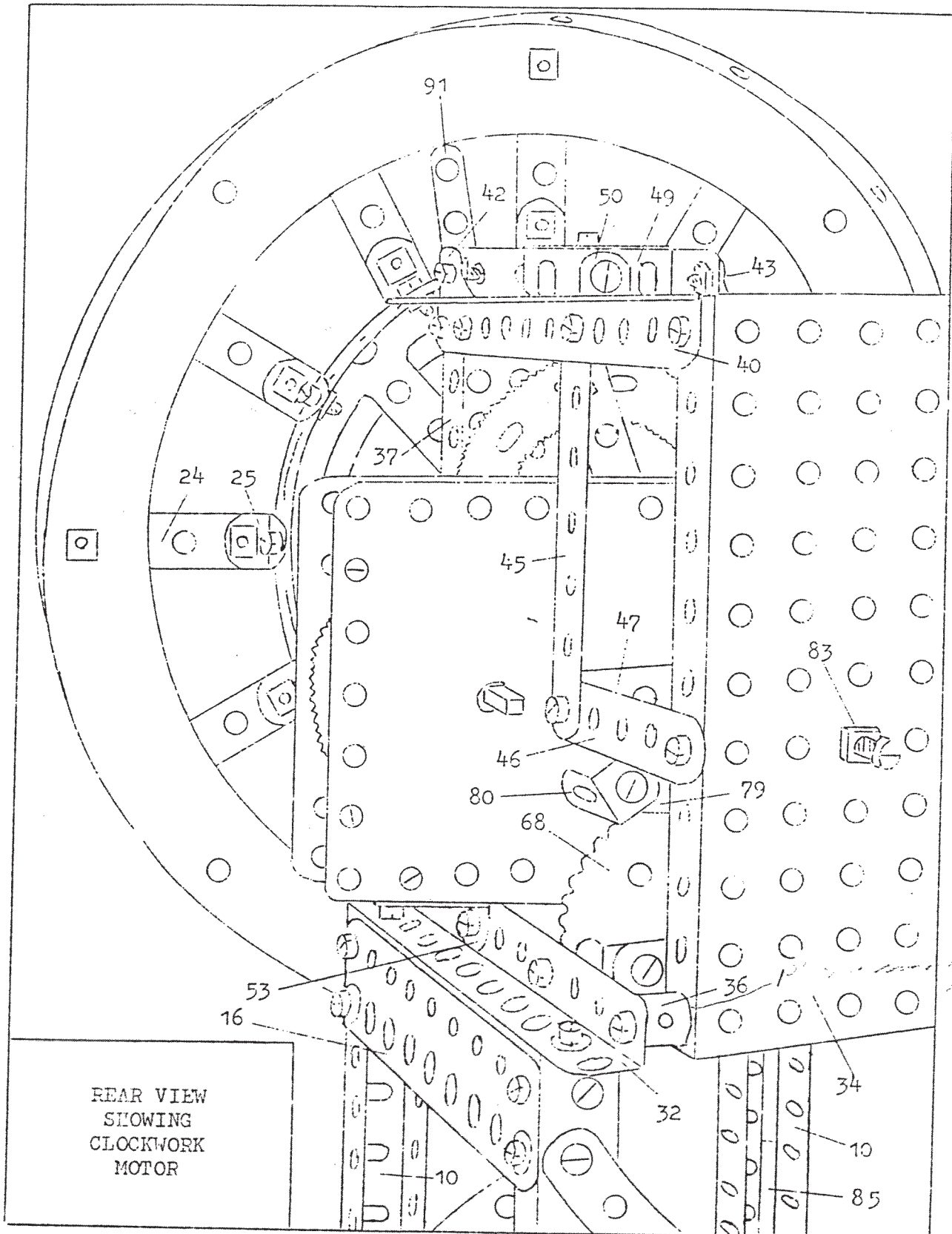
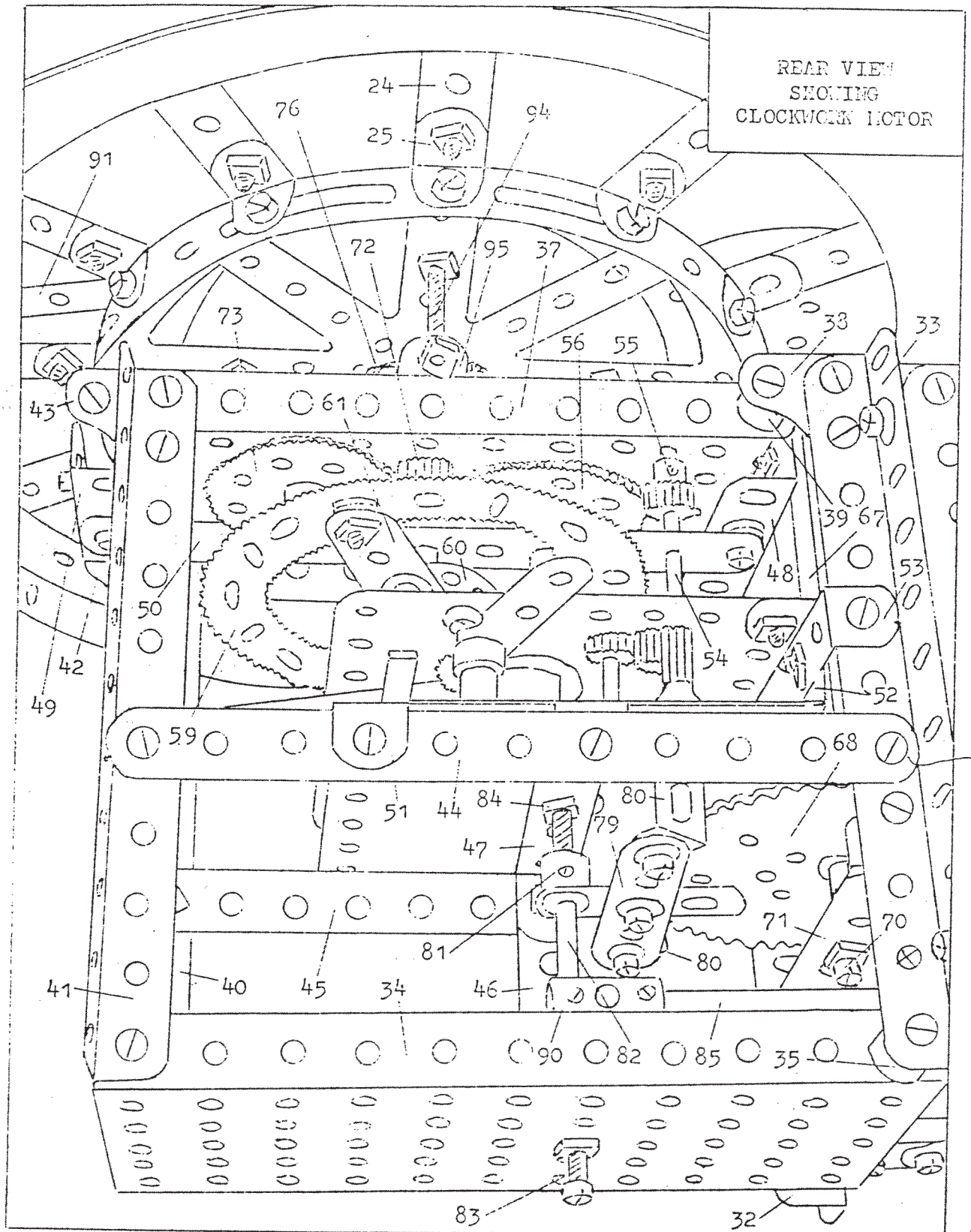


Figure 4



Rev. 4/27/11 and
cont. in 19

Figure 5

Use narrow strip
for = 44

Strip inside
with collar and
washer for rear

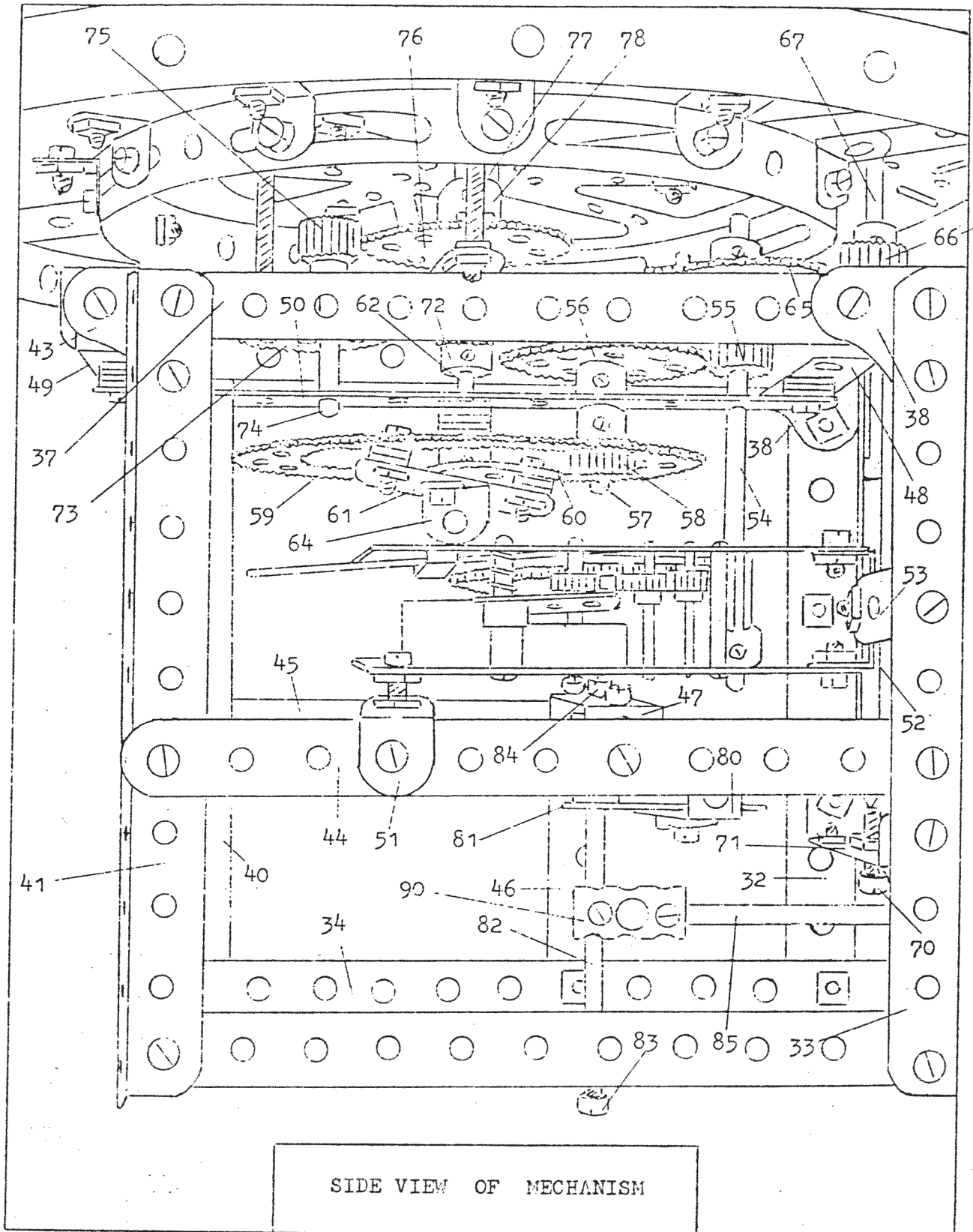


Figure 6

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