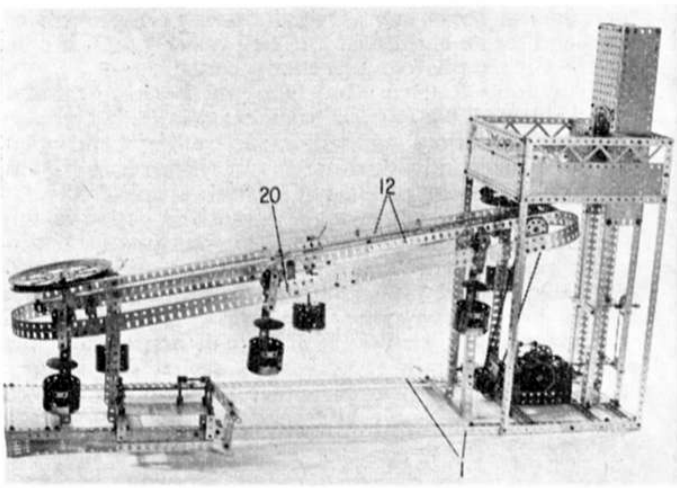
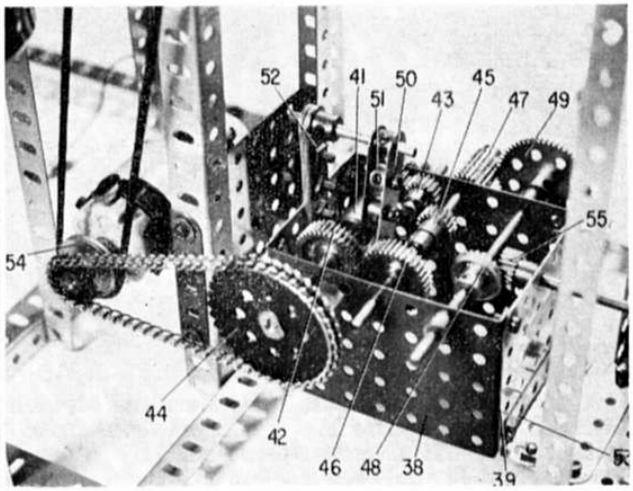




CHAIRLIFT

An impressive continual-running display model described in two parts by 'Spanner'.

PART ONE – BASE, TOWERS, TRACK, AND LIFT

SCATTERED throughout the world are numerous modellers who make an invaluable contribution towards the Meccano hobby by building either for exhibitions, or for display in local dealers' windows. Needless to say, these modellers are always looking for suitable display models to build and so I am particularly pleased to feature here the Automatic Chairlift illustrated in the accompanying photographs. This is ideal for display and, in fact, it was designed for that very purpose by Mr. Harold Taylor of Huddersfield—the man to whom Meccano Magazine has been indebted for most of our models for longer than I can remember.

To be effective, a display model obviously requires movement and yet, at the same time, it needs to be sufficiently simple in operation to stand up to continuous running for long periods at a time. In ths case ample movement is present, supplied by six chairs, or "cupolas", moving non-stop up and down an inclined rail, together with a lift at the end of the model which automatically ascends and descends in its shaft, and the fact that the actual model illustrated was displayed for several weeks in a Huddersfield store is sufficient proof that it will run continuously. It therefore qualifies as an ideal Meccano demonstration unit.

Although a large model, construction is not particularly complex. A long rectangular base is built up from two 39½ in. compound angle girders 1 connected at the ends by 9½ in. Angle Girders 2, each compound girder consisting of a 5½ in., a 24½ in. and a 12½ in. Angle Girder, bolted together. Counting from one end, the compound girders are further connected through their fifth, fifteenth, and twenty-third holes by additional 9½ in. Angle Girders, numbered 3, 4 and 5 respectively, while counting from the other end, the seventh and fifteenth holes are joined by 9½ in. Girders 6 and 7.

Before going any further with the main framework, the chairlift supports and runners should be built. Two vertical 12½ in. Angle Girders 8, each extended one hole upwards by a 1½ in. Angle Girder, are bolted through the seventh and thirteenth holes of Angle Girder 4, two more 12½ in. Angle Girders 9 being bolted through the corresponding holes of Girder 5. At the other end of the model, the corresponding holes of Girder 7 receive two 8 in. compound angle girders 10 (each built up from a 5½ in. and a 4½ in. Angle Girder), while two 7½ in. Angle Girders 11 are bolted to Girder 6. Now secured to the upper ends of these vertical Girders are two 32½ in. compound angle girders 12, each compound girder projecting four holes past Girder 8 and three holes past Girder 11. Note that the Girder 8 securing Bolt also helps to hold a 1½ in. Corner Bracket 13 in position. The compound girders themselves are each built up from a 24½ in. and a 12½ in. Angle Girder and are joined together a little below centre by a 3½ in. Strip 14

Turning to Corner Bracket 13, the upper two Bolts fixing this to compound girder 12 also fix a 1 in. Corner Bracket 15 in position as shown, the free hole in this Bracket serving as a bearing for a 5 in. Rod held in place by a Collar and a 1½ in. Pulley 16. Mounted on the centre of this Rod is a Worm Gear which meshes with a ½ in. Pinion on a 3½ in. Rod 17, held by Collars in the centre hole of a 3½ × ½ in. Double Angle Strip, bolted between the lower corners of Corner Brackets 13, and in two 3½ in. Strips bolted one on top of the other between compound girders 12. Note that the Double Angle Strip is angled to lie parallel with the 3½ in. Strips, thus ensuring that the Rod is at right-angles to compound girders 12. A 6 in. Pulley 18 is fixed on the upper end of the Rod.

At the lower end of the assembly another 6 in. Pulley 19 is fixed on a 3½ in. Rod held by Collars in two more 3½ in. Strips, bolted between the fourth holes of girders 12, and in a 3½ × ½ in. Double Angle Strip bolted between the third holes down of Angle Girders 11. A tight loop of very stout cord or string is then passed round this Pulley and Pulley 18.

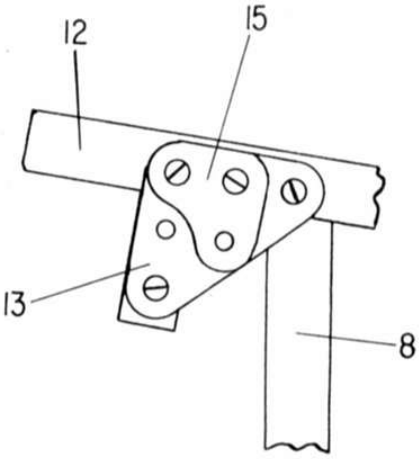
The actual rail 20 on which the cars run is built up from a selection of suitable Flat Girders, bolted together and shaped as shown.

It is of course an "endless" rail, with a circumference of 79 inches, and is attached to compound girders 12 by six $1\frac{1}{2} \times \frac{1}{2}$ in. Double Angle Strips (three at each side), each bolted to a 2 in. Strip 21 secured to one or other compound girder 12.

Now bolted to compound angle girders 1 through their end and nineteenth holes are four vertical $18\frac{1}{2}$ in. Angle Girders 22, connected together to form a square at the top by four $9\frac{1}{2}$ in. Strips 23, the securing Bolts along three sides also holding a $9\frac{1}{2}$ in. Braced Girder in place. Note that the front Strip and Braced Girder is not bolted direct to respective Angle Girders 22, but to two 4 in. compound strips 24, attached to the Angle Girders by Angle Brackets. The Braced Girder is extended downwards by a $9\frac{1}{2} \times 2\frac{1}{2}$ in. Strip Plate 25, the lower edge of which is overlaid by a $9\frac{1}{2}$ in. Strip and bolted to a $9\frac{1}{2}$ in. Angle Girder also attached to Girders 22 by Angle Brackets. Further similar Strip Plates are bolted between side Girders 22, the lower edges of these also being overlaid by $9\frac{1}{2}$ in. Strips. In addition, a $9\frac{1}{2}$ in. Angle Girder 26 is bolted between each pair of side Girders, through their fourth holes down, these Girders at each side being connected through their sixth holes by another $9\frac{1}{2}$ in. Angle Girder 27. Three $9\frac{1}{2} \times 2\frac{1}{2}$ in. Strip Plates are also bolted between the Girders, as shown, to form a floor area.

Turning to the base, a $2\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plate 28, extended one hole inwards by a $2\frac{1}{2}$ in. Flat Girder, is bolted to the centres of Angle Girders 3 and 2. Also secured to these Girders by Angle Brackets are four $24\frac{1}{2}$ in. Angle Girders 29 serving as the lift shaft. These Girders are connected at the top by a $3\frac{1}{2} \times 2\frac{1}{2}$ in. Flanged Plate, while a $5\frac{1}{2} \times 3\frac{1}{2}$ in. Flat Plate 30 is bolted to the front pair of Girders and a $12\frac{1}{2} \times 2\frac{1}{2}$ in. Strip Plate 31 to each side pair of Girders. In addition, each front Girder is connected to nearby Strip 23 by a $3\frac{1}{2}$ in. Flat Girder 32, to which a $3 \times 1\frac{1}{2}$ in. Flat Plate is bolted to provide a safety barrier. A 3 in. Stepped Curved Strip is bolted to the lower edge of Plate 30 to serve as a door arch, the securing bolt also holding a $1 \times \frac{1}{2}$ in. Reversed Angle Bracket in place to serve as a lift "stop".

The lift itself consists quite simply of two $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flanged Plates connected together by two $2\frac{1}{2} \times 1\frac{1}{2}$ in. Flexible Plates, with the remaining space being enclosed by two $2\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plates 33, one at each side. Before finally enclosing the space, however, two Handrail Supports 34 are secured, one through the second row centre hole of each Flanged Plate. A length of Cord is tied to the lower of these and is taken down and around a 1 in. Pulley 35 on a $5\frac{1}{2}$ in. Rod journalled in a $3\frac{1}{2}$ in. Angle Girder, bolted between the thirteenth holes of inner Girders 29, and in a $3\frac{1}{2}$ in. Strip bolted between outer Girders 29. The Rod is held in place by a Collar inside the Strip and a 1 in. Pulley fitted with a Rubber Ring outside the Strip. Free on the Rod, but held in contact with the Rubber Ring by a Compression Spring held by a Collar, is a $1\frac{1}{2}$ in. Pulley 36, this arrangement serving as an efficient friction clutch.



The Cord is now taken up and threaded through the appropriate holes in the Flanged Plates of the lift, then continued upwards and over another 1 in. Pulley on a 3 in. Rod held by Collars in Plate 30 and in a $3\frac{1}{2}$ in. Strip 37, bolted to rear Girders 29. From there, it is taken down and finally tied to a $2\frac{1}{2}$ in. Driving Band attached to upper Handrail Support 34. The Cord, of course, must be pretty taut to prevent it slipping on the 1 in. Pulleys. Guide rails for the lift are provided by tight lengths of Cord running between Flat Plate 28 and the Flanged Plate at the top of the shaft, the Cords passing through the centre end holes of the Flanged Plates in the lift.

The drive system, cupolas, etc., and further photographs will appear in Part Two in the next issue.

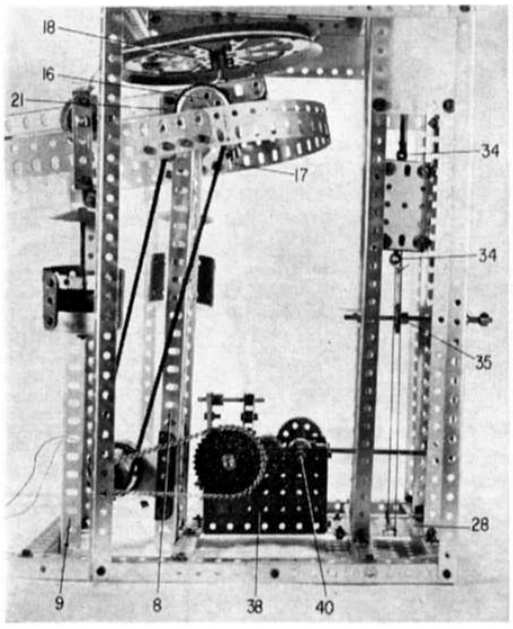
Opposite page, left, this Automatic Chairlift makes an excellent model for display at Exhibitions, or in dealers' windows.

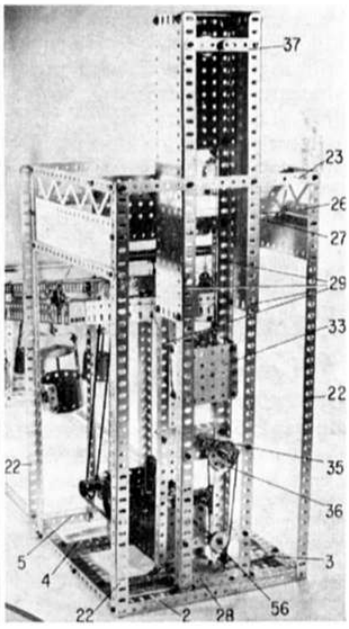
Opposite page, right, the automatic reversing gearbox which controls lift movement.

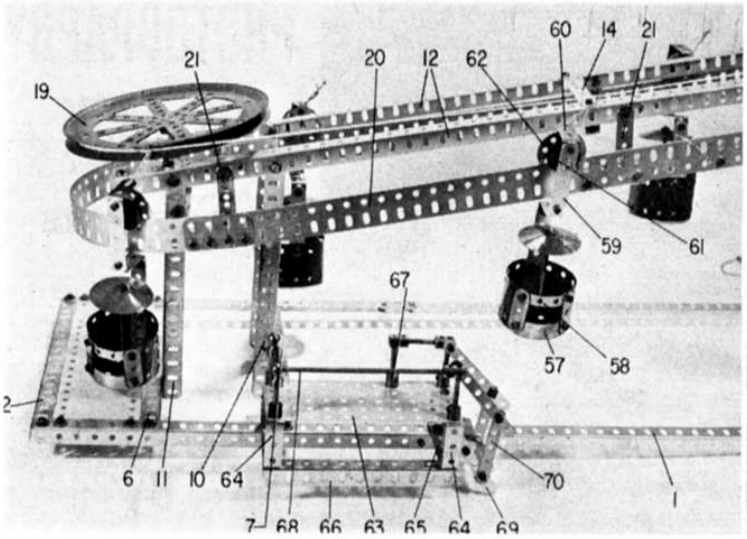
Top of this page, a diagram (not to scale) showing the top mount for the upper chairlift drive pulley.

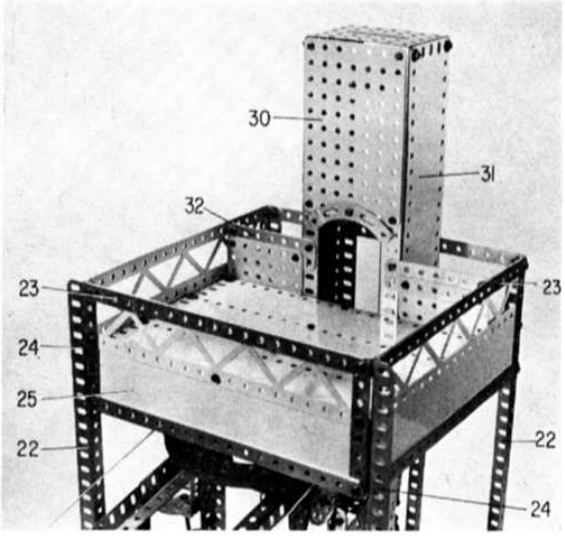
Right, a side view of the taller tower showing the upper end of the chairlift rail and the position of the automatic reversing gearbox.

Far right, a rear view of the taller tower showing the assembly of the lift shaft.









AUTOMATIC CHAIRLIFT

Above, the top of the taller tower in the model.
Left, a close-up view of the lower tower, showing the cupola loading platform.

Part Two of a description of a fine continual-running model ideal for displays and exhibitions. By 'Spanner'

We come next to the drive system. As already mentioned, the model was originally designed for unattended dealer display work and, as such, incorporates an automatic reversing mechanism controlling continuous operation of the lift. This mechanism is actually a "standard" unit which has been used for many years by the Model-building Department of Meccano and it has also been featured in Meccano Magazine in the past. However, for the benefit of readers unfamiliar with its construction, it consists of two $3\frac{1}{2} \times 2\frac{1}{2}$ in. Flanged Plates 38, connected by two $2\frac{1}{2} \times 2\frac{1}{2}$ in. Flat Plates 39. Journalled in the Flanged Plates is a $4\frac{1}{2}$ in. Rod held in place by a Collar outside the Plates and carrying, inside, a $\frac{1}{2}$ in. Pinion, a Worm 41 and a 1 in. Gear 42. The Pinion meshes with an "idler" $\frac{1}{2}$ in. Pinion 43, revolving free on a $1\frac{1}{8}$ in. Bolt secured in the nearby Flanged Plate. A 2 in. Sprocket Wheel 44 is fixed on the end of the Rod.

Running parallel to the first Rod is a second $4\frac{1}{2}$ in. Rod, free to slide in its bearings and carrying a $\frac{1}{2}$ in. Pinion 45, a Collar and a 1 in. Gear 46 inside the plates and a $\frac{1}{2} \times \frac{3}{4}$ in. face Pinion 47 on the end of the Rod. The Pinion and 1 in. Gear should be so arranged that, as the Rod slides, Gears 42 and 46 mesh together, or Pinions 43 and 45 do so–*alternately*. The two sets of gears must never mesh at the same time and there should be a short neutral period between the change-over. A third parallel $4\frac{1}{2}$ in. Rod carries a $\frac{3}{4}$ in. Contrate 48 and a 57-teeth Gear 49, the latter outside the Plates and in constant mesh with wide-faced Pinion 47.

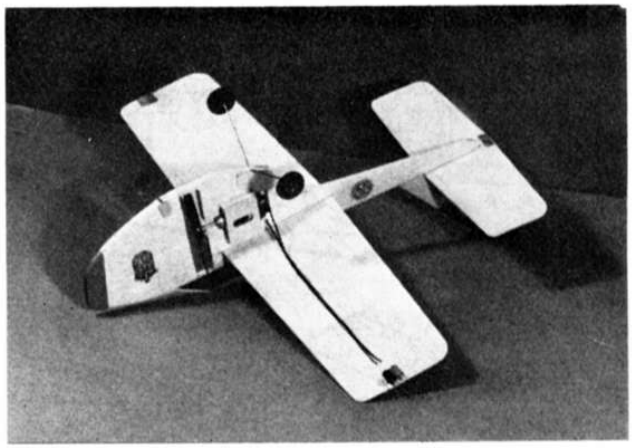
Now bolted to the inside of one Plate 40 is a Double Arm Crank, the boss coinciding with the centre hole in the Plate and two corresponding $1\frac{1}{2}$ in. Strips being bolted to the outside of the Plate to provide an extended mount for a $1\frac{1}{2}$ in. Rod held in the boss of the Crank. Running free on this Rod, but held in place by a Collar, is a 57-teeth Gear, suitably packed with Washers to mesh with the underside of Worm 41. Pivotally attached to the outside face of this Gear is a Slide Piece carrying a $3\frac{1}{2}$ in. Strip 50. The upper end of this Strip is tightly fixed to, but spaced by Collars from a Crank 51 mounted loose on a 2 in. Rod held in another Crank. This Crank is bolted to four $2\frac{1}{2}$ in. Strips, fixed one on top of the other to nearby Plate 40 to provide a really strong support. Held by Nuts in the centre hole of strip 50 is a $\frac{1}{2}$ in. Bolt, the head of which engages between the boss of Gear 46 and the adjacent Collar to actuate movement of the carrying Rod for changing gear. The completed unit is bolted to two $2\frac{1}{2}$ in. Angle Girders 53, one secured to Angle Girder 3 and the other to the Flat Girder bolted to Flat Plate 28.

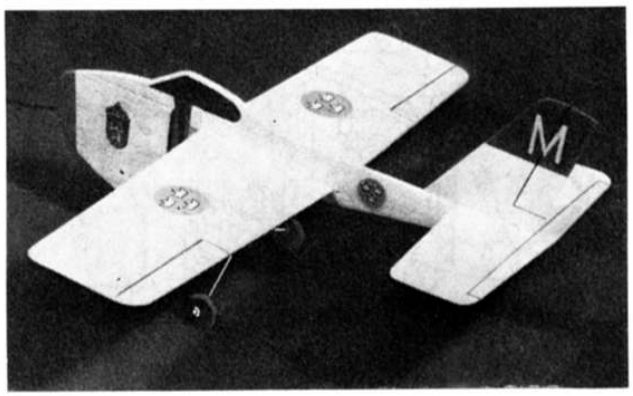
For display purposes, the original model was powered by a special mains motor, but, for our purposes, this is replaced by a 3–12 volt Motor with Gearbox (set in the 16:1 ratio) which is bolted to a $3\frac{1}{2} \times 2\frac{1}{2}$ in. Flanged Plate secured to Angle Girders 8. A 1 in. Pulley 54 and a $\frac{3}{4}$ in. Sprocket Wheel are fixed on the output shaft of the motor, the Pulley being connected by a 20 in. Driving Band to Pulley 16 and the Sprocket by Chain to Sprocket Wheel 44. In mesh with Contrate 48 is a $\frac{1}{2}$ in. Pinion 55 on the end of a $4\frac{1}{2}$ in. Rod journalled in nearby Plate 40 and in a $3\frac{1}{2}$ in. Strip bolted between rear Girders 29. A 1 in. Pulley 56, fixed on the other end of the Rod, is connected by a 10 in. Driving Band to Pulley 36 to complete the drive system.

Coming to the travelling cupolas, each of these consists of a Boiler End 57, to which a $5\frac{1}{2} \times 1\frac{1}{2}$ in. Plastic Plate is bolted, the ends of the Plate being edged by $1\frac{1}{2}$ in. Strips. As can be seen, a space remains between the ends of the Plate to represent the entrance, a safety bar being provided by a shaped $2\frac{1}{2}$ in. Narrow Strip 58, bolted between the upper corners of the Plate.

Held by Nuts in the centre of the Boiler End is a 3 in. Screwed Rod, on the upper end of which a Conical Disc is held by further Nuts. The supporting arm is a $3\frac{1}{2}$ in. Strip bolted to the Boiler End and Plate and to the top of which a

(*please turn to page 340*)





Simple, but very effective and safe in flight is Ray's cute Saab. Such electric models can be flown outdoors in calm weather, given a reasonable surface for take-off.

and reinforce the hole with a small piece of $\frac{1}{32}$ in. ply. Pass a piece of strong thin thread through the hole and tie a loop as shown. Sketch 5. Cut a small piece of sheet lead or neatly folded piece of empty cement tube and Evo-stik this weight to the *opposite* wing tip. Sketch 5.

As your SAAB J29F is to be flown indoors there is no need to dope it. The Swedish Royal Air Force insignia on our own model was painted on thin paper, with poster paints, cut out and cemented in position. The colour bands at the nose and the top of the fin can be put on using thick poster colour or with oil-pastels (a small box from any art shop). If you use the oil pastels just put them on thickly, then rub off the excess pastel with a soft rag and there you are. They are a very efficient and colourful way of decorating balsa models. Use Sellotape for masking to give neat lines The squadron letter M on the fin was painted in thick poster colour. Elevator, aileron lines etc. were added using a ruler and a black ball point pen. The cabin is two pieces of black tissue doped in position. Incidentally, if you really fancy your artistic ability with a paint brush and would like to add the squadron symbol on the nose, shown on the plan, and on our original SAAB J29F featured in the photos, here are the colours. The shield is blue, the winged heraldic beast is yellow. The four Tudor-type roses white, the interior of the crown red, with yellow base and cross. This emblem was worn on the SAAB J29F's of Flygflottily (Sqdn) 3 of the Swedish Royal Air Force, when these fighters were based at Malmen, Linkoping, Sweden. (No extra charge for all this info!).

All that remains to be done is to carefully balance your model. Sketch G. Do this by pushing a pin into the balance point, as indicated on the plan. Tie a thread to the pin and see that your model hangs level. Ours needed a tiny piece of lead fastened with Evo-stik to the extreme rear edge of the tailplane. However, as balsa wood varies in density (and weight) your SAAB J29F may not need any weight. Also we had to carefully warp *up* the rear edge of the tailplane in order to obtain extra height when flying. Your first test flight will reveal if this will be necessary.

Well, that's it! Runway clear? Then let's roll. We know you are going to get a real thrill when you open up the motor and your SAAB J29F gathers speed for take-off. Airborne she looks great, and landings are safe and sure on the tricycle undercarriage. Lots of good flying to you.

CHAIRLIFT (*Contd. from page 345*)

1 × ½ Reversed Angle Bracket is secured. A 2½ in. Strip 59 is bolted to the spare lug of this Bracket, a 1 × 1 in. Angle Bracket 60 being secured in turn to the upper end of this Strip. Note that the lower fixture in the last case is made, not by a Bolt, but by a Long Threaded Pin, on the shank of which are mounted an electrical 1 in. Bush Wheel 61, a free-running ½ in. Pulley without boss and an 8-hole Bush Wheel 62. The cupola is mounted in position with the ½ in. Pulley running on the rail provided by the earlier-mentioned Flat Girders. Angle Bracket 60 is then connected by a short length of Cord to the cord running around 6 in. Pulleys 18 and 19.

Last of all, we have the cupola loading platform which is built up from a 4½ × 2½ in. Flat Plate 63 secured by Rod Sockets at the corners to four 1½ × ½ in. Double Angle Strips 64. The inner Double Angle Strips are bolted, along with two 2½ in. Strips 65, to appropriate compound girder 1, the free ends of Strips 65 being fixed to the spare lugs of the outer Double Angle Strips. The securing Bolts in the latter case also fix a 4½ in. Angle Girder 66 between the Double Angle Strips. Another Rod Socket 67 is secured to Plate 63 in the position shown, then suitable short Rods are fixed in all the Rod Sockets, Handrail Couplings or Short Couplings being fixed on the top of these to carry the horizontal handrails. The outer rail is supplied by a 5 in. Rod 68 and the end rail by a 2 in. Screwed Rod, with a short rail on the loading side coming from a 1½ in. Rod. A set of access steps is provided by two 1½ × ½ in. Double Angle Strips, bolted between two 3 in. Narrow Strips 69 which are attached to Plate 63 by Angle Brackets. Finally, handrails for these steps are supplied by two further 3 in. Narrow Strips connected to Strips 69 by two 2½ in. Narrow Strips 70. And that's it!

PARTS REQUIRED

7—1a	2—16	1—50	4—103g
2—2	1—16a	2—51	8—111c
14—3	1—17	1—52a	1—111d
16—5	5—18a	4—53	6—115a
6—6	2—18b	17—59	1—120b
15—6a	2—19c	1—62	7—124
8—7	2—21	1—62b	2—133
4—7a	4—22	3—63d	2—133a
6—8	6—23	4—72	2—136
10—8a	6—24	2—73	2—136a
2—8b	5—26	6—80a	1—155
5—9	1—26b	1—81	6—162a
2—9a	2—27a	1—89a	5—179
3—9b	1—29	1—94	1—186b
2—9d	2—31	1—95	1—186e
2—9f	2—32	1—96a	6—187d
11—12	320—37a	3—99a	2—188
6—12b	288—37b	2—103	6—196
1—15	80—38	6—103b	2—197
4—15a	13—48	2—103d	2—235
2—15b	2—48b	1—103f	2—235a
6—518	1—6-ratio Motor with Gearbox		