DISNEYLAND MATTERHORN BOBSLEDS

FROM an original model by Jack Taylor and Bob Carter of the South California Meccano Club, rebuilt with modifications and photographed by Keith W. Cameron.

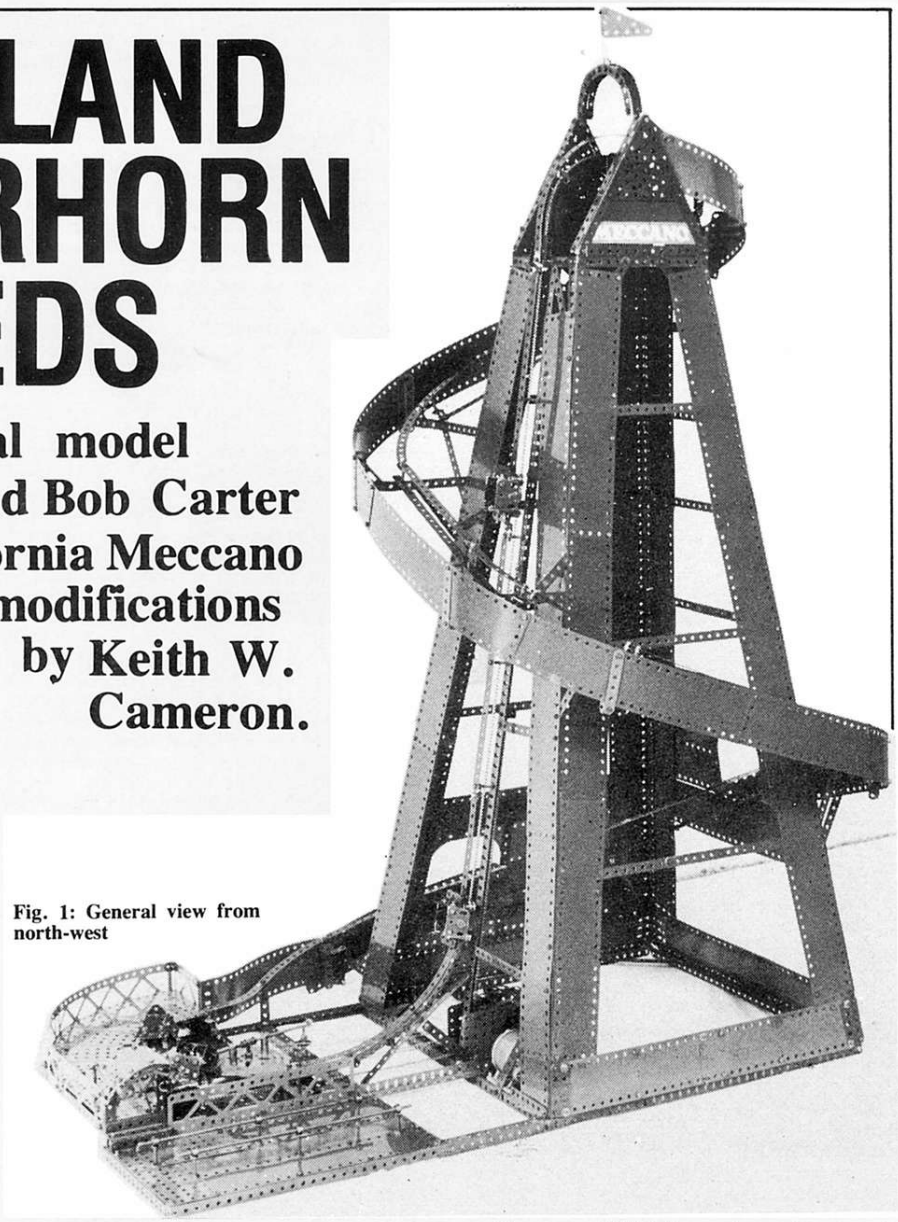


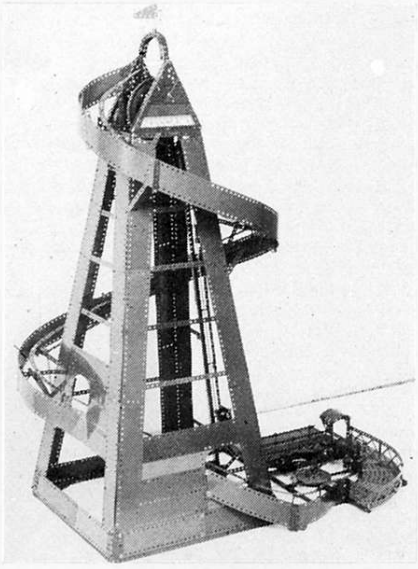
Fig. 1: General view from north-west

ONE of the most unforgettable rides at Disneyland, California, is the Matterhorn Bobsleds. The miniature Matterhorn is 146 feet in height, with two bobsled tracks, one on each side of the mountain, each track about 1200 feet long. A dozen bobsleds on each track can carry over 1800 passengers an hour, and on a summer afternoon there may be a long queue winding around the base of the mountain, with a two hour wait.

In this model, the bobsleds are taken at a steep angle up one side of the mountain tower, over a large wheel at the summit, and released to hurtle around the 'mountain', even inside the lower section, and down to the base station. As constructed, four bobsleds can be operated at one time, with a waiting period at the station. The model will run continuously without attention. Many variations in design are possible, to suit individual taste and numbers of parts available.

Side members of the tower and the bobsled track are shown lined with Strip Plates. This is done entirely for enhancing the appearance and is not necessary for correct operation. Some builders may well decide on different methods of 'decoration'. Although basically similar to the well-known 'scenic railway' or 'big dipper', the model incorporates enough new action and style to make it a novel and eye-catching entrant for an exhibition.

Fig. 2: General view from south-east.



The parts list is quite modest for a large model, not being much in excess of a No. 10 set. In the instructions, points of the compass are used to denote the parts under description. North is that aspect of the model where the station platform is situated.

THE BASE Figs. 1, 5, 6

West side, a 24½" and an 18½" Angle Girder, overlapping 11 holes, same length girders on east side but overlapping 13 holes. These two composite girders are joined by six 18½" Girders placed as shown. Note position of flanges. The base is completed by the addition of two 12½" Strips, a 9½" Strip, a 12½" Flat Girder, and a 24½" Angle Girder.

Two 12½"x2½" and one 9½"x2½" Strip Plates, a 5½"x2½" and a 4½"x2½" Flat Plate are added at the north-west end, and railings added for queues—two 11½" Rods held in Collars locknutted to 1 ⅛" Bolts. A Ball Race Flanged Disc is bolted where the radially placed strips meet the 18½" Angle Girder. A Channel Bearing is fixed to that same Angle Girder just to the east of the 24½" Girder, another Channel Bearing to the 12½" Flat Girder.

THE TOWER Figs. 1, 2, 3, 4

Each side is a 24½" and an 18½" Angle Girder overlapping seven holes forming a truncated pyramid 18½" square at its base where it is attached by ½"x½" Angle Brackets to the Angle Girders of the base. The sides are joined at the top by 5½" Strips on the north and south sides, and by 7½" Strips on east and west.

The tower should now be either finished with Strip Plates or with appropriate struts and braces for rigidity. Horizontal strips (some regular, some composite) are added for strength and appearance. If Strip Plates are used, their free edges should be strengthened by 12½" Strips running their full length and overlapping the cross strips.

A support for the track lift is made from a 24½" and an 18½" Angle Girder overlapping eight holes and held on the north aspect of the tower, flanges inward and to east, being bolted above to the 5½" Strip and below to a Fishplate fixed to the cross Girder. This composite girder is braced by a 7½", a 5½" and a 4½" Strip, all being fixed horizontally between it and the north-west side girder. The four corners of the base below the tower should be braced with 5½" (or longer) Strips.

THE SUMMIT PULLEY Figs. 7, 12, 13

Two 7½" Strips are bolted to the 5½" Strips at the top of the tower, using ½"x½" Angle Brackets and the top hole of the flange of the track-lift-support girder. These 7½" Strips, spaced three holes apart, with their surface planes vertical, support two Corner Gussets each. The upward pointing Gussets have bolted to them a 4½" Angle Girder on the east and a 5½" Angle Girder on the west. The free flanges of these Girders are supported by being bolted to a 2½" Strip and a 2" Strip, which converge to be connected by an Angle Bracket

to the outer 7½" Strip in each case.

A 2½" Rod is journalled in the fifth hole from the lowest in each Angle Girder, and the Rod carries Collars and a 6" Pulley, which has had its groove partly filled with three carefully placed 15" Driving Bands to provide a flat surface for the chain. See diagram Fig. 24. The lower Corner Gussets carry a 2½" Rod in their lowest hole and this rod carries Collars and a 1" Sprocket Wheel.

THE BOBSLEDS Figs 8, 9, 13

These should be assembled next in order to have them available to check out the track and chain lift as they are assembled. Each bobsled consists of a lower frame made from a rectangular arrangement of 1½" Strips, front and rear, and 2" Strips on each side. These strips are held together, the 2" Strips *above* the 1½" Strips, by ¾" Bolts at each corner of the rectangle. The Bolts are head down, and each carries two ½" Brass Pulleys, a Washer, a Nut, two Washers, the two strips, and a locknut. Only allow enough play in the Pulleys for free rotation.

Adjust the assembly so that a 12½" Strip can run through the grooves and between the corresponding sets of Pulleys on each side without slipping out. Considerable play is correct—it is needed for curves. The bobsled body is composed of two Trunnions joined by a 1½"x½" Double Angle Strip. On each side are 1½" Flat Girders connected to the Trunnions by ½"x½" Angle Brackets bolted to their irregular holes. One Flat Girder has a Pawl without Boss fixed to its lower central hole by an Obtuse Angle Bracket.

Two ¾" Washers are bolted to the corresponding hole of the other Flat Girder for balance. Body and frame of the bobsled are united by a 1½" Strip bolted to the centre holes of the 2" Strips and to the centre hole of the Double Angle Strip. Note the direction of the Pawl. Its point should be 1" below the level of the groove of the upper set of Pulleys. A double set of Pulleys is used to provide tracking at joints, where the lower pair ride on Fishplates spaced from the main track by *two* Hexagonal Nuts. This prevents jamming of Pulleys on rounded ends of strips. *Metal* pulleys must be used, plastic pulleys wear excessively.

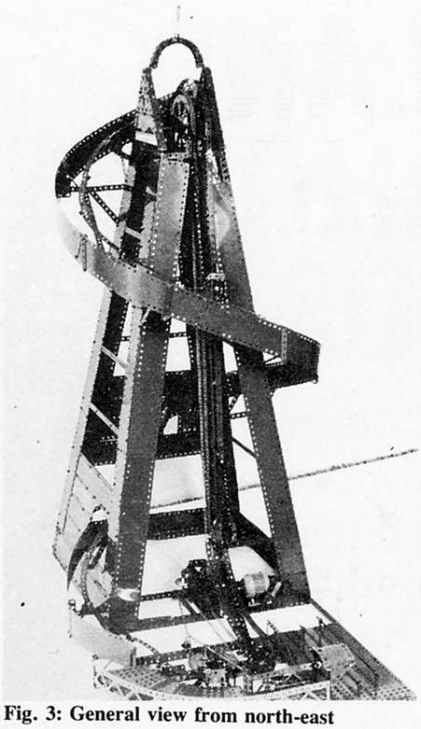


Fig. 3: General view from north-east

Fig. 4: General view from south-west

TRACK

As already noted, Hexagonal Nuts *must* be used on all track sections to allow the bobsled

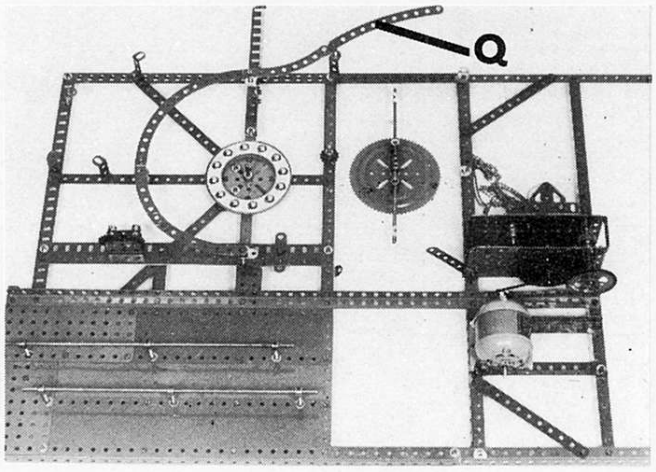


Fig. 5: Base, north end, from above

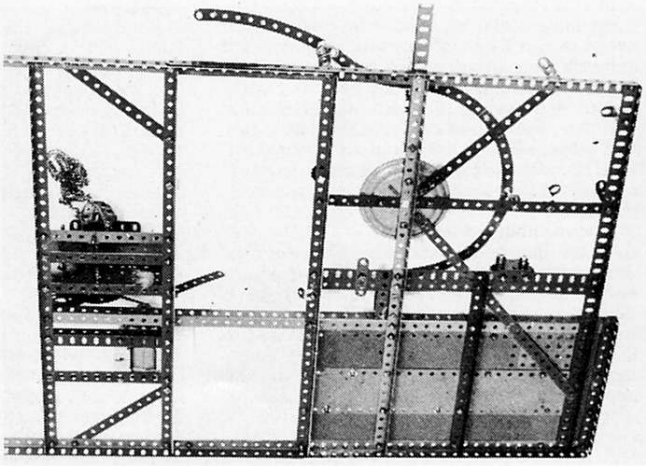


Fig. 6: Base, north end, from underneath

Fig. 8: Bobsled, dismantled to show frame and body separately

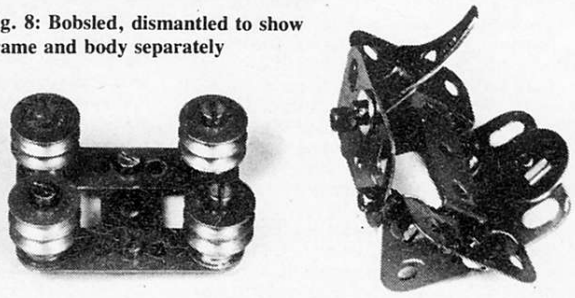
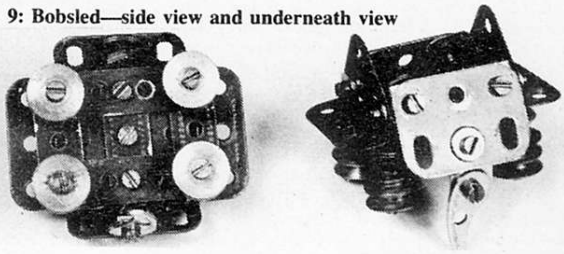
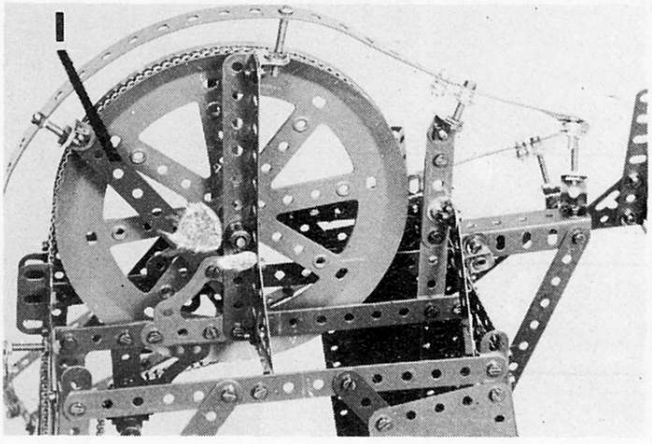


Fig. 9: Bobsled—side view and underneath view



Below: Fig. 7: Summit pulley, summit track and supports



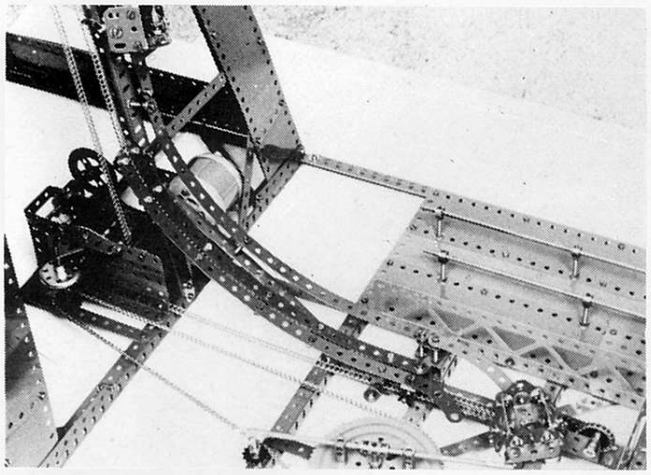


Fig. 10: Lower lift track, chain guide, gearbox and chain (from east)

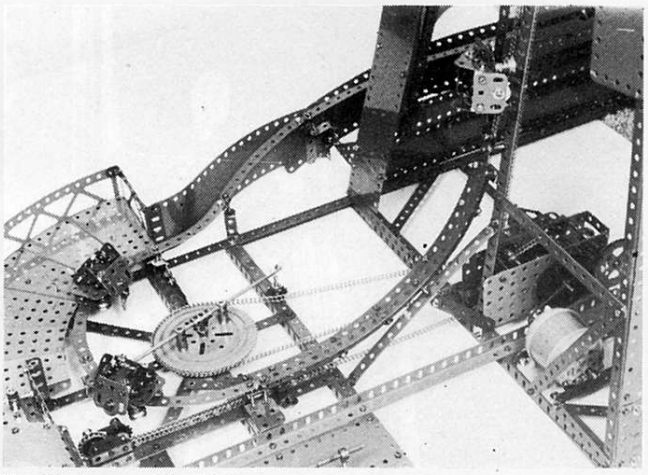


Fig. 11: Same as Fig. 10 from west. Bobsleds on semicircular track.

wheels to pass. No Washers can be used. To simplify description, the following terms will be used uniformly:

Simple support: This is a ¾" or 1⅛" Bolt secured with a Hexagonal Nut and locknutted to the part described.

Track joint: All joints (*except* at the 'semi-circle') comprise a Fishplate spaced from the end holes of neighbouring lengths of track strips by *two* Hexagonal Nuts and secured by a third Nut on each Bolt. ⅜" Bolts are used for the purpose of simple connection of strip and Fishplate but a *Joint-support* will be specified where the Bolt serves both purposes of connection to Fishplate and support to frame. Square Nuts can be used on supporting Bolts to locknut to the frame.

SEMI-CIRCLE Fig. 5

This portion of track is laid first. It consists of a semi-circle of four 4" Curved Strips and an approach strip, five in all. To preserve the correct shape, no Fishplates are used, but each Curved Strip overlaps the one ahead—ie to the west. At the east end of the semi-circle a ¾" Bolt simple support is locknutted in the short lug of a 1"x½" Angle Bracket, which is fixed by a 1" Corner Bracket to the upturned flange of a 7½" Angle Girder bolted at the east end of an 18½" Angle Girder of the base.

At the northernmost point, the track is joined and supported on a 1 ⅛" Bolt locknutted in one lug of a ½"x½" Double Bracket bolted to the 12½" Strip. At the western end the track is held on a 1 ⅛" Bolt carrying a Fishplate and locknutted to the Channel Bearing. The joints between the Curved Strips not mentioned are left unsupported. They can be opened conveniently as required to slip bobsleds on the track.

LOWER LIFT TRACK Figs. 10, 11

This concave section leads the bobsled to the steep climb of the tower section. It is a 12½" Strip formed to a curve similar to that of the inner edge of a 5½" Curved Strip. The lowest hole of this formed strip is supported on a 1 ⅛" Bolt which is also fixed to the Fishplate and Channel Bearing of the semi-circle. The upper end hole of this formed strip is secured by a 1 ⅛ Bolt (with Fishplate and three Nuts) locknutted to the 16th hole from the bottom of the track-lift-support girder.

A further 1 ⅛" Bolt for simple support at the 14th hole from the north end of the formed strip is locknutted in an obliquely placed 7½" Strip, this bolt also securing a ½"x½" Angle Bracket. This 7½" Strip is held at each end by Obtuse Angle Brackets attached to the 18½" Angle Girder and the track-lift-support girder—10th hole from the bottom. The ½"x½" Angle Bracket is bolted to a 3½" Strip secured to the west gear plate.

TOWER LIFT TRACK Fig. 1, 12

From below this consists of a 5½" Strip and two 12½" Strips joined with Fishplates and supported on 1 ⅛" Bolts locknutted to the track-lift-support girder at each join and at the halfway point of the longer strips. This should result in the topmost hole of this track being opposite the next hole to the top of the track-lift-support girder. Run a bobsled along the track so far completed, to assure free running. Tighten all nuts.

SUMMIT TRACK Fig. 7, 12

Add supports as follows: 1) An obliquely mounted 5½" Strip 1, its lower end bolted to the 7½" Strip immediately behind the Corner Gusset, its 4th hole bolted to the upper irregularly placed hole of the Corner Gusset, an Angle Bracket bolted to its top hole. 2) A 4" composite Strip bolted vertically to the 7½" Strip (hole next to the south end) and supported by a slanting 3" Strip held by ½"x½" Angle Brackets to it and the outside 7½" Strip of the tower.

Bend a 12½" Strip so that its first 9 inches conforms to a circle of 8" diameter. Give the remaining 3½" a twist to the left of about 10°. Slightly straighten out the first 2" of the formed end and attach by the end hole to a Fishplate at the top of the tower lift track, using a 1 ⅛" Bolt to secure it to the 5½" Strip. Fix the next Bolt (¾") through the 10th hole of the track and locknut to the Angle Bracket at the end of the oblique 5½" Strip 1.

The third support point is a 1 ⅛" Bolt locknutted to a ½"x½" Angle Bracket bolted to the top of the vertical 5½" Angle Girder. A Round Headed Bolt should be used at this support point because the convex track might cause the bobsleds to jam on a Cheese Head Bolt. Old-style Bolts can be used elsewhere. At the other end of the summit track there is a *Joint-support* to a 4" Curved Strip, a ¾" Bolt in the latter being locknutted to the Angle Bracket at the top of the composite 4" Strip. Run the bobsled over this section of track and adjust track height around the circumference of the 6" Pulley. With the bobsled seated level on the track, the tip of the Pawl should bear gently on the rubber surface of the Driving Bands. Adjust the position of the Pulley on the Rod also. A length of Chain should be laid in the Pulley and manually worked to produce smooth propulsion of the bobsled over this section.

DESCENT TRACK Figs. 12, 14 - 19

Each separate strip comprising the track will be given an identifying letter.

A - 4" Curved Strip: **Joint-support** above to summit track as already described; **track-joint** below to rail B.

B - 4" Curved Strip: **Joint-support** above to A, using 1 ⅛" Bolt locknutted to ½"x½" Double Bracket bent to slope of track and held at end hole of 2½" Angle Girder fixed to the 5½" Strip of the tower by Corner Angle Bracket and braced below by 4½" Strip and ½"x½" Angle Bracket. **Joint-support** below using 1 ⅛" Bolt lock-nutted to 1"x1" Angle Bracket bent to conform to slope and attached with 1" Corner Bracket to 5½" Strip braced with 3½" Strip. Outer end of 5½" Strip holds 3½" Angle Girder braced by 1½" Corner Bracket for support of Strip Plates.

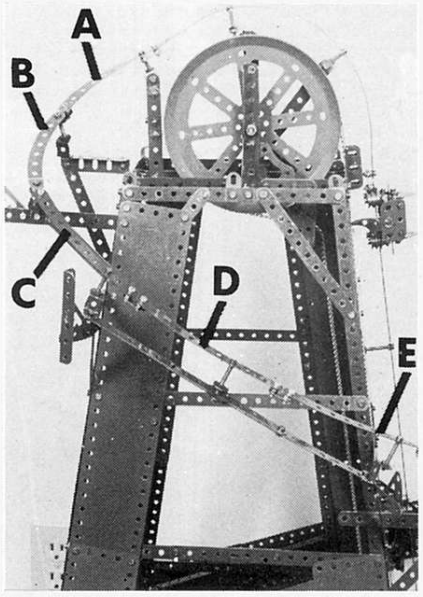
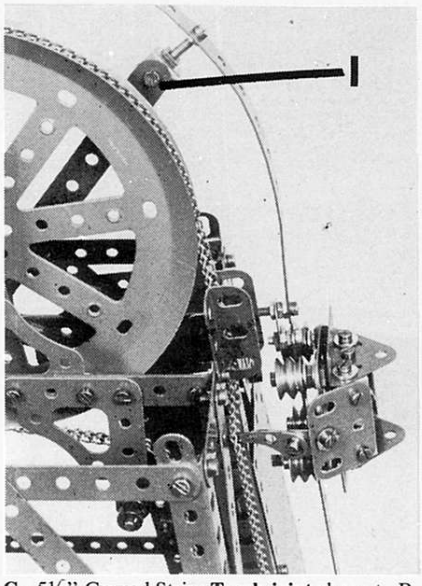


Fig. 12: Summit pulley and track from east, some plates removed.

Below Fig. 13: Bobsled approaches summit.



C - 5½" Curved Strip: **Track-joint** above to B. **Simple Support** at 9th hole, 1 ⅛" Bolt locknutted to ½" Reversed Angle Bracket ('RAB') bolted to top hole of composite 10½" Strip. This strip is supported above on a 5½" Strip braced by a 4½" Strip, and below on a 7½" Strip braced by a 5½" Strip. **Track-joint** below to D, a 5½" Curved Strip.

D - **Track-joint** above to C. **Simple-support** at

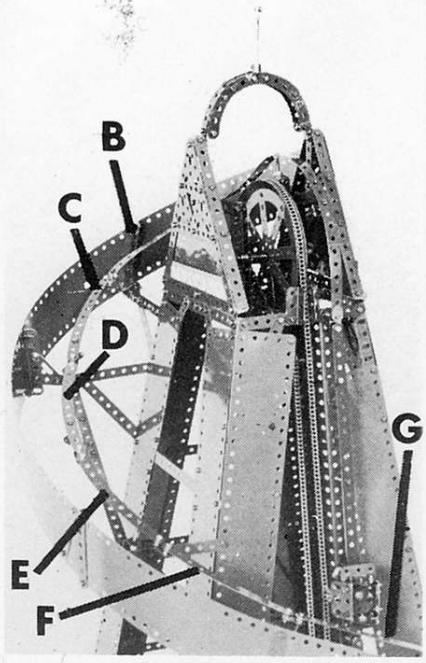


Fig. 14: Summit and upper descent track, from north-east.

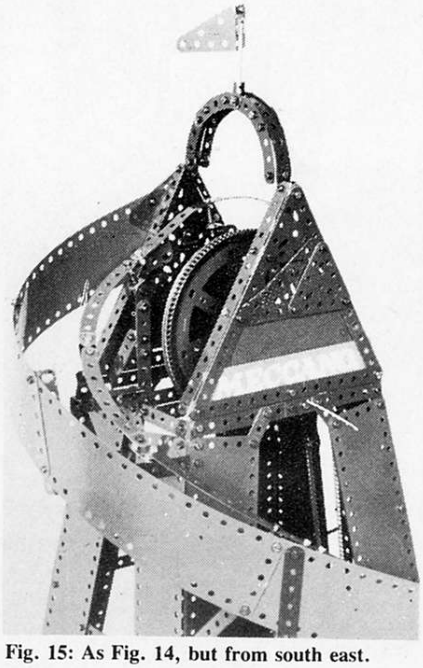


Fig. 15: As Fig. 14, but from south east.

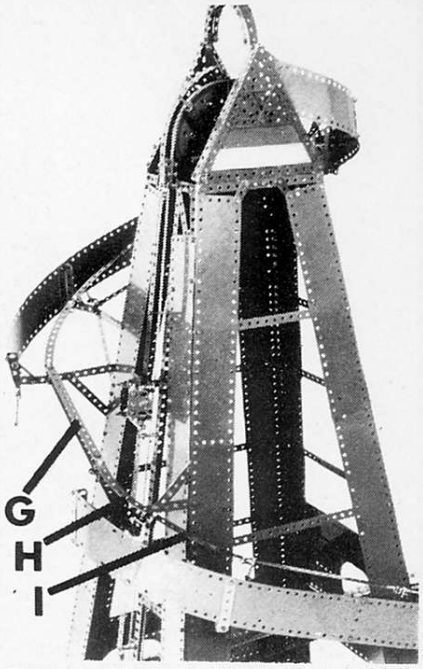


Fig. 16: Mid portion of descent track from north-west.

8th hole using 1 ⅛" Bolt locknutted in RAB bolted to 1" Triangular Plate fixed to the composite strip. **Track-joint** below to E, also a 5½" Curved Strip.

E - Track-joint above to D. **Simple-support** at 9th hole where 1 ⅛" Bolt is locknutted to ½" RAB bolted to lowest hole of composite 10½" strip. E is also a 5½" Curved Strip and has below a **Track-joint.**

F - Track-joint above to E, and below to G. F is a 5½" Curved Strip and has no support other than the track-joints. (Fig. 14).

G - 7½" Strip, lies parallel with north side of tower, and has **Joint-supports** above and below, on 1 ⅛" Bolts, both locknutted to ½" RAB's held on a 12½" Strip supported above and below by 7½" Strips to which it is connected by Obtuse Angle Brackets. The 7½" Strips are braced by a 4½" Strip and a 3½" Strip. Fig. 16.

H - 4" Curved Strip, **Track-joint** above to G. **Joint-support** below on ¾" Bolt locknutted to ½" RAB fixed to lowest hole of 12½" Strip.

I - 5½" Curved Strip. This strip curves round the north-west corner. **Track-joints** above and below, no other support. Figs. 16, 17

J - lies along west side, is a 9½" Strip. **Joint-support** above on 1 ⅛" Bolt locknutted to ½" RAB bolted to composite 15½" Strip which is supported above on a 5½" Strip (braced by a 3½" Strip) and below on a 4½" Strip braced by a 4½" Strip. **Joint-support** below on 1 ⅛" Bolt and ½" RAB. Figs. 17, 18

K - 5½" Curved Strip; **Track-joint** above to J, and below to L. **Simple-support** at 9th hole on 1 ⅛" Bolt locknutted to ½" Double Bracket mounted on a Fishplate at lower end of composite 15½" Strip.

L - 4" Curved Strip, this curves around south-west corner. **Track-joint** above to K. **Joint-support** below on ¾" Bolt locknutted to ½" RAB on a 5½" Strip supported above on a 4½" Strip braced by a 4½" Strip, and below on a composite 21½" Strip to be described.

M - 4" Curved Strip, only supports are **Track-joints** above and below. The 21½" Composite Strip supports the track that lies within the tower and is supported by ½"x½" Angle Brackets on cross strips on the south and east faces of the tower. The cross strip on the south face is a composite 15" Strip bolted at the 22nd holes (from the bottom) of the side Angle Girders. The east face cross strip is a composite 17½" Strip at the 8th holes from the bottom. The 21½" Strip is supported near its midpoint by a 9½" Strip attached to it and the lower part of the frame by ½"x½" Angle Brackets.

N is a 12½" Strip, **O** is a 7½" Strip and both lie within the tower. **N** has a **Joint-support** above and below, using ¾" Bolts locknutted to ½" RAB's supported on the 21½" Strip.

O is supported only by **Track-joints** above and below. (Fig. 19).

P - 5½" Curved Strip has joint-supports above and below on 1 ⅛" Bolts, locknutted above to a ½" RAB on the composite 21½" strip. Below, the 1 ⅛" Bolt is locknutted to a 1"x1" Angle Bracket bolted to a 4½" Strip braced by a 2½" Strip.

Q - 5½" Curved Strip, **Track-joint** above, and **Joint-support** below on 1 ⅛" Bolt locknutted to 1" RAB fixed to frame. The 4" Curved Strip of the Semi-circle is joined to the Fishplate of this joint-support.

GENERAL NOTES ON TRACK SUPPORTS

Fishplates are described at all connecting points except for the Semi-circle. If Nuts are kept carefully tightened, the Fishplates will provide satisfactory operation. However, in cases where long operation periods are expected, 1½" Strips would provide more secure joints. Their use would obviate the slotted holes and the problems they cause in tightening Nuts. They would also allow the use of an extra ⅜" Bolt (and three Hexagon Nuts) at each joint with increased rigidity. (**Not** suitable where two 4" Curved Strips join.)

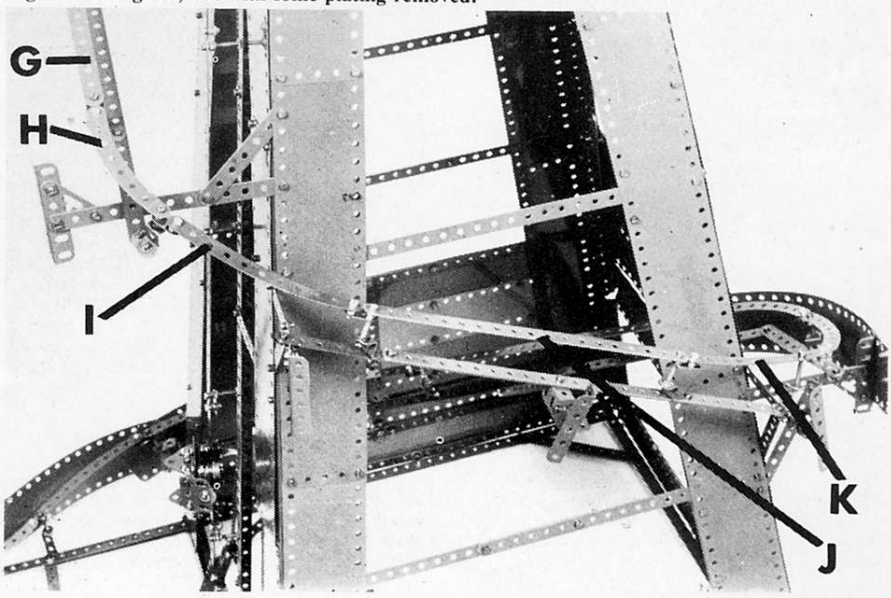
Curved Strips in sloping section of track **must** be given a regular longitudinal twist to allow accurate alighment. The twisting must be smooth and protioned out over the whole curve. If the twist is too extreme, derailment or jamming may result. The horizontal strips supporting the track are described of sufficient length to support spiralling Strip Plates. The strips project beyond the track supports by three or four holes to carry a 3" Angle Girder braced by a 1½" Corner Bracket.

The Strip Plates are fixed to the top holes of these 3" Angle Girders, the Bolt also securing a 3" Strip that grips the Strip Plate on its outer surface, being fastened below it to the lowest hole of the Angle Girder. No exact description of these parts is given, for they will vary with individual ideas. They do add considerably to the general appearance of the model. Archways can be added at the entrance and exit of that section of the track that passes through the tower.

GEARBOX AND MOTOR DRIVE Figs. 20, 21

Two 5½"x2½" Flat Plates are fixed by 5½" Angle Girders to the 18½" Angle Girders at the north side of the tower base. The tops of the Flat Plates are joined by 1½"x½" Double Angle Strips. A Double Bent Strip is attached to the western plate and a 3" Angle Girder supporting a Flat Trunnion is fixed to the east-

Fig. 17: As Fig. 16, but with some plating removed.



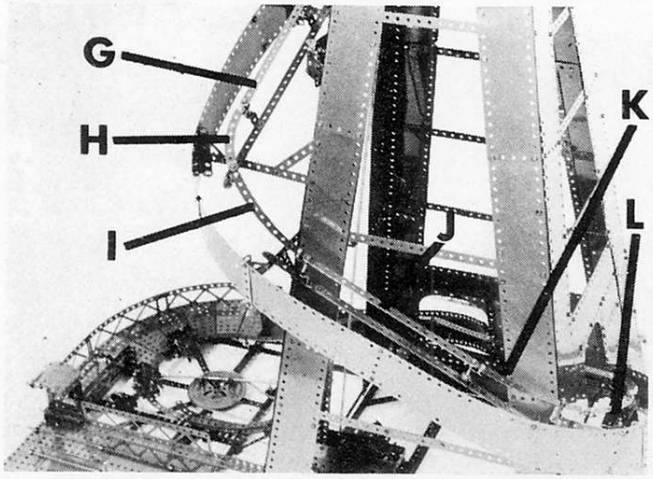


Fig. 18: As Fig. 16, but from south-west.

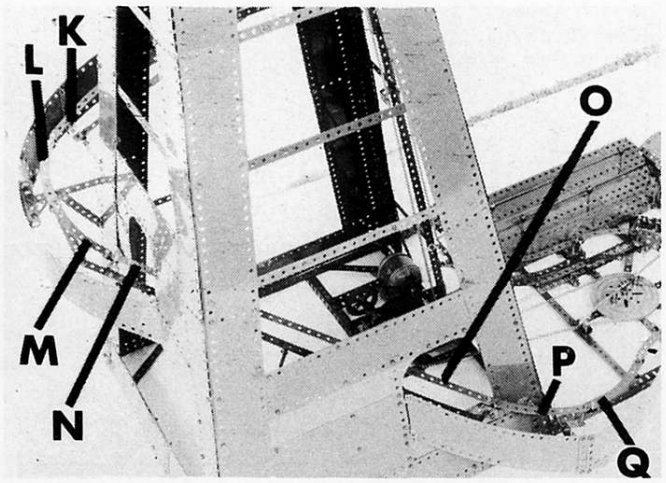


Fig. 19: Lower portion of descent track, from south-east.

ern plate. A 5½" Strip is bolted across the 18½" Angle Girders below the Flat Trunnion. The 3½" Strip mentioned in 'Lower Lift Track' is secured to the west gear plate.

A 1072 Motor is bolted to two 5½" Angle Girders on the west side of the gearbox. Using the original Motor Pulley on the slower of the output shafts, a 10" Heavy Driving Band drives a 2" Pulley on a 3" Rod journalled in the Double Bent Strip and the two Flat Plates. The Rod carries a ¾" Pinion driving a 1¼" Gear Wheel on a 2½" Rod immediately below, and which in turn carries a ½" Pinion driving a 2½" Gear Wheel on a 3½" Rod journalled three holes to the north.

This Rod carries a 2" Sprocket Wheel close to the west face of the east Flat Plate, separated by four Washers so that Chain will not scrape the Plate. On the east side of the plate, the 3½" Rod carries a 30-tooth Pinion (Argentine) or, if not available, a 25t Pinion, driving a 1½" Contrate on a 3" Rod journalled in the 5½" Strip and the Flat Trunnion and carrying a 1" Sprocket Wheel above the 5½" Strip. A ¾" Sprocket is free on a Long Threaded Pin fixed in the position shown to the east Flat Plate.

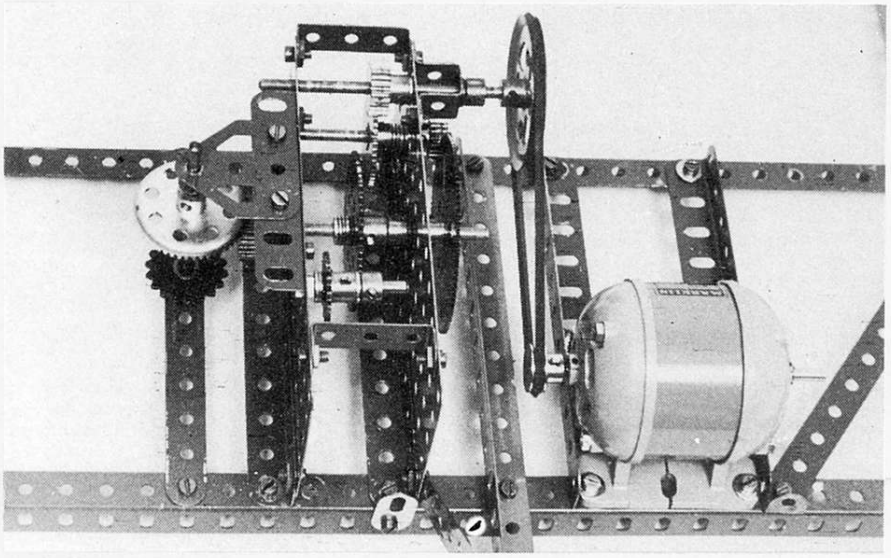


Fig. 20: Motor and gearbox from above, north (removed from model)

CHAIN GUIDE Figs. 10, 11, 22, 23

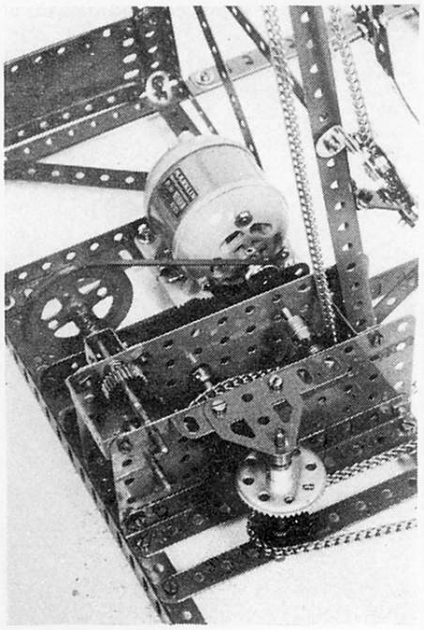
Two 12½" Strips are formed into identical curves, about 1" larger in radius than the lower lift track. They must conform as closely as possible to allow proper register of the distance from bobsled to Chain. The two formed Strips are joined by Fishplates, ⅜" Bolts, and three Hexagonal Nuts on each bolt, at (counting from the north end) the 3rd, 8th, 12th, 17th, and 22nd holes of each strip.

The 25th holes are joined by the long lug of a 1"x½" Angle Bracket. The Bolts at the 3rd holes also are secured in the round hole lugs of ½" Reversed Angle Brackets. ½"x½" Angle Brackets are secured below the 1st holes and a 2½" Curved Strip is also held at the 1st hole of the east strip as shown. A 1½" Rod is held by Spring Clips in the round lug holes of the Angle Brackets. The chain guide is held in place by the Reversed Angle Brackets below, fixed by their slotted holes to the end holes of a 2" Strip which is below the 12½" Flat Girder and fixed to the Girder slotted hole by a Bolt in its centre hole.

Above, the chain guide is fixed to the track-lift-support girder by the lug of the 1"x½" Angle Bracket, in the 13th hole from the bottom. The space between the 12½" Strips must be wide enough to admit easily the tip of the Pawl. Its most northerly point should be opposite the 1 ⅛" Bolt supporting the last 4" Curved Strip of the semi-circle, and the Reversed Angle Brackets can be rotated to achieve this.

Run a bobsled on the lower lift track and adjust it and the chain guide so that the point of the Pawl remains well within the guide but does not catch on the Fishplates. A 1" Sprocket and a ¾" Sprocket each held on 1" Rods are placed in the Channel Bearing that is near the north end of the 12½" Flat Girder, and the Rods are secured with Collars.

Below:
Fig. 21: Motor and gearbox from east. Note chain location in guide.



THE CHAIN

This must be arranged to face the opposite way to usual practice, that is, the open hooks must face inward. This is necessary to allow free movement of the Chain in the guide. The part of the Chain that normally faces outward is narrower and tends to jam in the slot of the guide.

Two lengths of Chain are joined and fed though the guide, up the tower and over the 6" Pulley, around the 1" Sprocket, thence down to the ¾" Sprocket of the gearbox, around the 2" Sprocket, out along the 12½" Flat Girder, under and around the 1" Sprocket of the Channel Bearing, and down again under the ¾" Sprocket where the join can most conveniently be made between it and the guide.

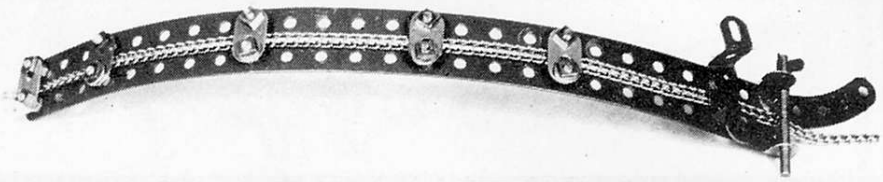
Note that the Chain enters the guide **under** the 1½" Rod, then rises to the space between the 12½" Strips and the Fishplate. It is at this point that the tip of the Pawls of the Bobsleds engage at the commencement of their climb, being brought to this point by the pusher that will now be described.

THE PUSHER Figs. 10, 11

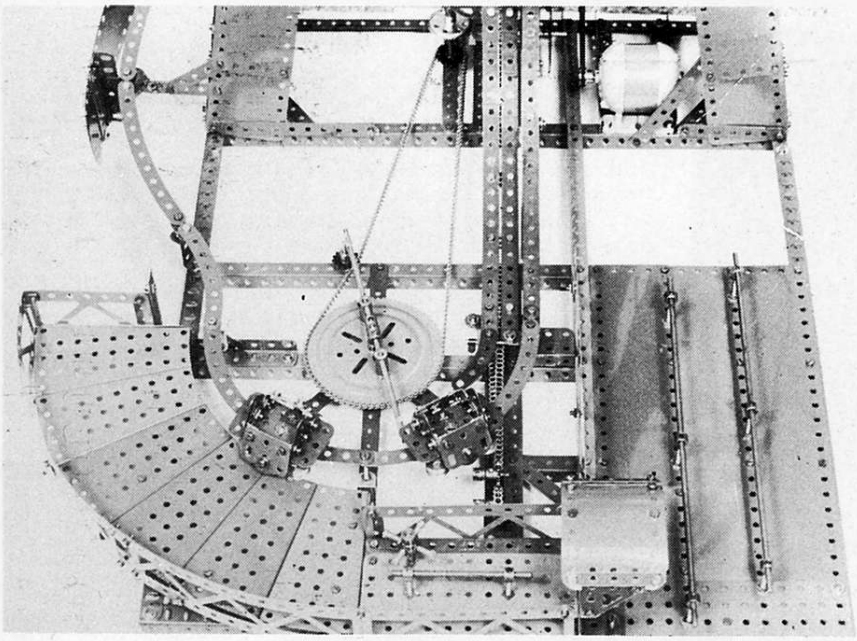
Secure a Rod Socket to the centre hole of the Ball Race Flanged Disc, with a 1" Rod held in the Rod Socket. Fix two Threaded Couplings to the outer holes of the Ball Race Toothed Disc, separated from the upper surface by three Washers on each bolt. Secure an 8" Rod in the end transverse untapped holes of the Threaded Couplings with equal lengths extending. At the ends of the Rod fix Rod and Strip Connectors facing as shown. Assemble the complete Ball Thrust Bearing and hold in place with a Collar on the 1" Rod.

Connect the Toothed Disc to the 1" Sprocket with Chain adding as guide, a ¾" Sprocket on a Long Threaded Pin secured to the 18½" Angle Girder. Adjust the Rod and Strip Connectors so that they do not touch the semi-circular track. They should engage with the pair of rear ½" Pulleys. With the gearing described, one end of the pusher will have just launched a

Right: Fig. 22: Chain guide, aspect from below, removed from model.



Below: Fig. 23: Chain guide from the north, showing chain location, also details of station and pusher.



bobsled on its upward journey and the other end will engage a waiting bobsled when a further bobsled will be released from the summit and should enter the semi-circle before the next sweep of the pusher.

Any alteration in the number of bobsleds or of the track will require alteration of the gear ratios. Part of the fun of the model is figuring out such individual changes.

STATION Fig. 23

The platform consists of a quarter circle consisting of six Flanged Sector Plates joined by their flanges and connected near the entrance by a 3" Angle Girder to a 5½"x2½" Flat Plate and a 5½" Angle Girder. It is supported at the east end by a 4½" Flat Girder bolted to the 7½" Angle Girder of the base. At the entrance, support is by four 3" Angle Girders arranged in step formation. At intermediate points, support is given by 1" Reversed Angle Brackets between the Sector Plates and the base.

A covered arch is added, made from a 3½"x2½" Flexible Plate, edged with 2½" Narrow Strips and 3" Formed Strips, and secured to two 3" Curved Strips, 1½" Corner Brackets, and 3½" Strips. The platform is edged with Braced Girders attached by Angle Brackets. A rail and a turnstile (from 4-hole Collar) are added.

SUMMIT ARCHWAY Figs. 14, 15

This provides a focus of decorative appeal, helps to hide the 6" Pulley, and gives space for a 'MECCANO' emblem and a crowning flag! It is composed of two identical sides edged by 7½" Strips in girder formation joined by ½"x½" Angle Brackets. Four 2½" Triangular Plates are fixed in the upper portion on each side.

Below them the space is filled in with a 4½"x2½" Flexible Plate and two 3½"x2½" Triangular Flexible Plates. An archway consisting of a 12½" Strip formed into an inverted U-shape and edged by 2½" Curved Strips held to it by Double Brackets is secured to the apex of the sides by locknuts on ¾" Bolts, the ends of the Strip being secured by RH and LH Corner Angle Brackets to 2" Strips bolted to ½"x½" Angle Brackets fixed to the 2½" Triangular Plates.

A Rod Socket at the top of the arch holds a 2" Rod to which a 'flag' (a 2½"x1½" Triangular Plate) is attached by means of a Rod and Strip Connector. The Strip Plate on the outside of the bobsled track is attached to the west side of the archway as shown.

OPERATION

A bobsled released from the summit should course freely over the track and should come to rest near the centre portion of the station platform. Careful oiling with suitable light oil ensures free movement of the bobsleds and will help toward a predictable length of travel. All irregularities of track should be corrected. If the bobsleds tend to overshoot the platform, a braking strip should be incorporated under the semi-circular track.

If a 30-tooth Pinion is not available, a 25-tooth Pinion can be used, but the 1" Sprocket must be replaced with a ¾" Sprocket. This gives almost as good timing of the sweep action of the pusher.

DIAGRAM

This represents a cross-section of three 15" Driving Bands laid in the groove of the summit pulley. One band is laid in position and the twists taken out of it to make it conform to the groove. Two more bands are laid side by side as shown, and these two are adjusted to lie evenly without twists.

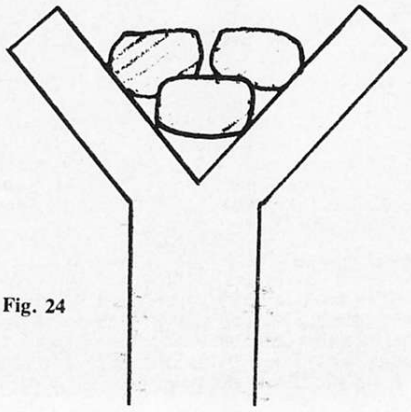


Fig. 24

PARTS LIST

A simple version, fully functional, but unadorned by Strip Plates and edging Strips can be built with No. 10 set with the addition of the following parts:

6 of No.	1B
8 of No.	8
10 of No.	10
28 of No.	23B
1 of No.	26K
4 of No.	54
2 of No.	48
2 of No.	89B
1 of No.	94
1 of No.	96A
24 of No.	111D
6 of No.	125
2 of No.	147C
26 of No.	111C

This list includes eight 12½" Angle Girders for making four composite 18½" Angle Girders required.

The version shown in the illustrations required the following:

52 of No.	1	8 of No.	76
18 of No.	1A	1 of No.	77
31 of No.	1B	8 of No.	89
29 of No.	2	2 of No.	89A
6 of No.	2A	10 of No.	89B
7 of No.	3	9 of No.	90
15 of No.	4	4 of No.	94
7 of No.	5	1 of No.	95
15 of No.	6	3 of No.	96
13 of No.	6A	3 of No.	96A
8 of No.	7	1 of No.	97
12 of No.	7A	1 of No.	99
1 of No.	8A	2 of No.	99A
2 of No.	8B	1 of No.	99B
6 of No.	9	2 of No.	100
1 of No.	9A	1 of No.	103B
1 of No.	9B	1 of No.	103C
14 of No.	9C	6 of No.	103F
4 of No.	9D	8 of No.	103H
1 of No.	9E	4 of No.	108
2 of No.	9F	20 of No.	111
38 of No.	10	10 of No.	111A
7 of No.	11	50 of No.	111C
55 of No.	12	30 of No.	111D
3 of No.	12A	1 of No.	115A
2 of No.	12B	5 of No.	124
15 of No.	12C	12 of No.	125
2 of No.	13	8 of No.	126
1 of No.	13A	1 of No.	126A
3 of No.	16	12 of No.	133
3 of No.	16A	3 of No.	133A
1 of No.	16B	1 of No.	140Y
3 of No.	18B	4 of No.	147C
1 of No.	19C	1 of No.	154A
1 of No.	20A	2 of No.	154B
32 of No.	23B	2 of No.	160
1 of No.	25	1 of No.	168
1 of No.	26	2 of No.	179
1 of No.	26K	1 of No.	186C
1 of No.	27	3 of No.	186D
1 of No.	27C	2 of No.	189
1 of No.	28	3 of No.	190A
850 of No.	37	4 of No.	191
150 of No.	37C	2 of No.	195
400 of No.	38	10 of No.	196
8 of No.	38D	37 of No.	197
1 of No.	45	4 of No.	201
6 of No.	48	3 of No.	212
1 of No.	53A	2 of No.	215
6 of No.	54	3 of No.	221
22 of No.	59	4 of No.	226
2 of No.	63C	2 of No.	235
4 of No.	70	1 Electric Motor E.U. 1072	