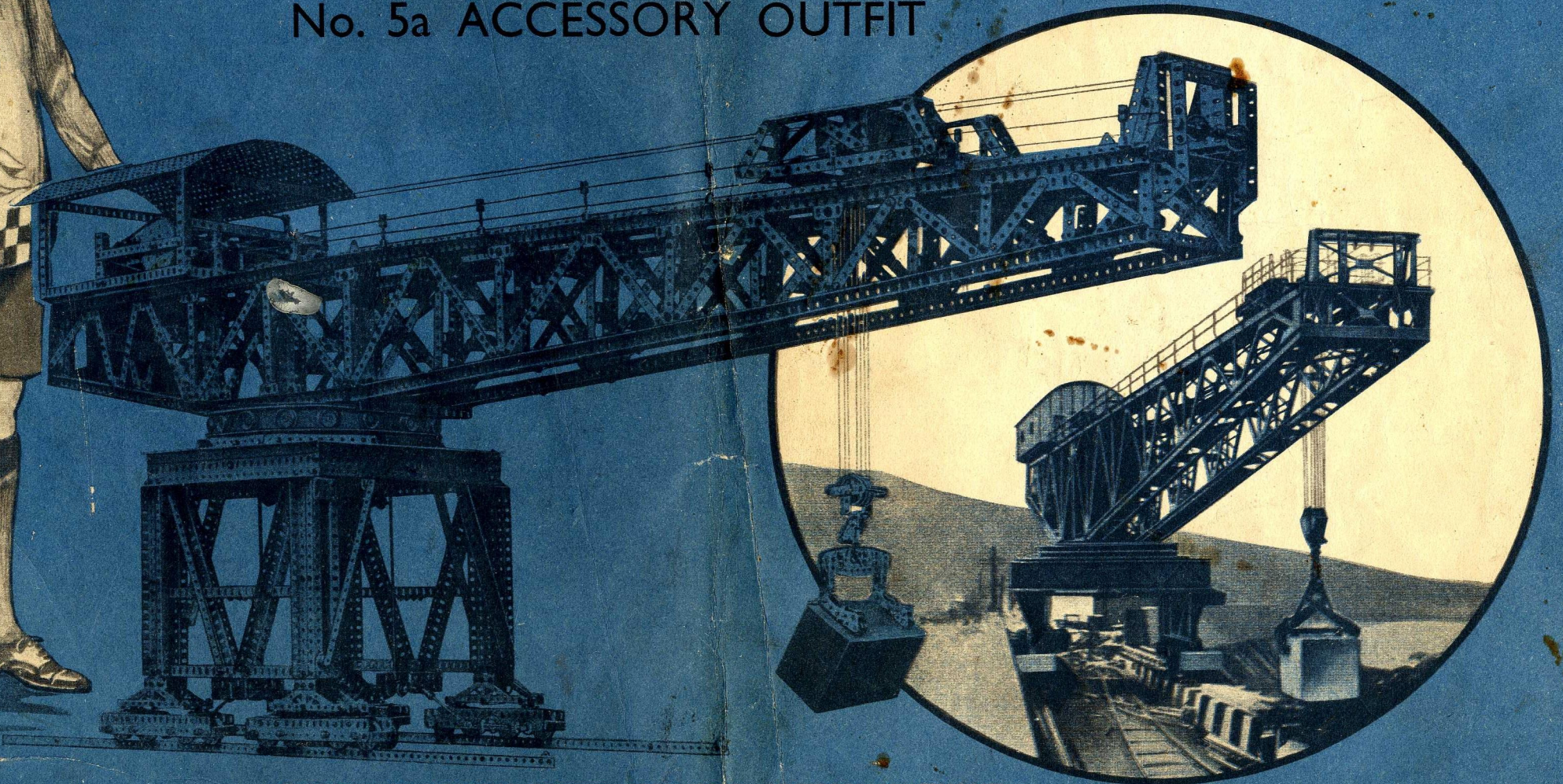
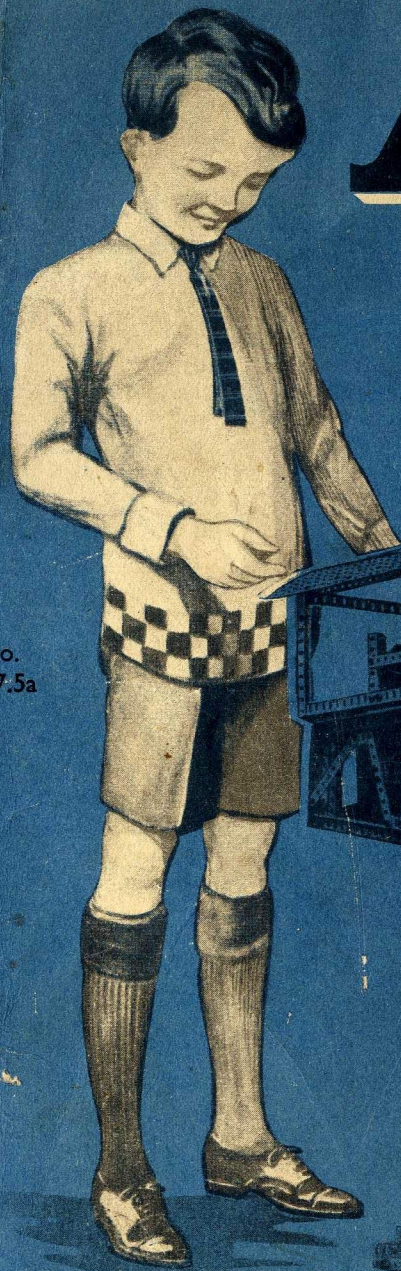


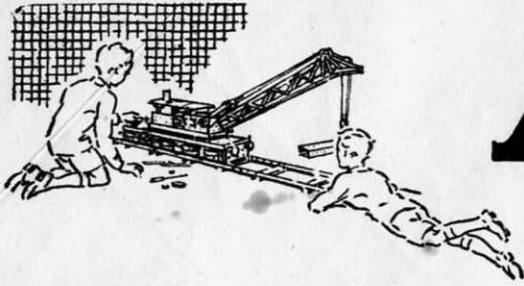
MECCANO

INSTRUCTIONS FOR
No. 5a ACCESSORY OUTFIT

No.
47.5a

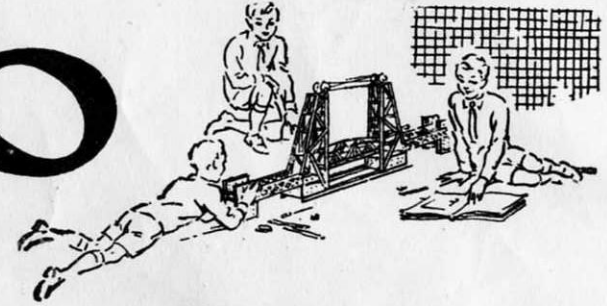


COPYRIGHT BY MECCANO LIMITED, BINNS ROAD, LIVERPOOL 13, ENGLAND



MECCANO

Real Engineering in Miniature



MODEL-BUILDING WITH MECCANO

There is no limit to the number of models that can be built with Meccano—Cranes, Clocks, Motor Cars, Aeroplanes, Machine Tools, Locomotives—in fact everything that interests boys. A screwdriver and a spanner, both of which are provided in each Outfit, are the only tools necessary.

When you have built all the models illustrated in the Manuals of Instruction the fun is not over, but is just beginning. Now comes the chance to make use of your own ideas. First of all, re-build some of the models with small changes in construction that may occur to you; then try building models entirely of your own design. In doing this you will feel the real thrill of the engineer and the inventor.

HOW TO BUILD UP YOUR OUTFIT

Meccano is sold in 11 different Outfits, ranging from No. 0 to No. 10. Each Outfit from No. 1 upwards can be converted into the one next larger by the purchase of an Accessory Outfit. Thus Meccano No. 1 Outfit can be converted into No. 2 Outfit by adding to it a No. 1a Accessory Outfit. No. 2a Outfit would then convert it into a No. 3, and so on. In this way, no matter with which Outfit you begin, you can build it up by degrees until you have a No. 10 Outfit.

All Meccano parts are of the same high quality and finish, but the larger Outfits contain a greater quantity and variety, making possible the construction of more elaborate models.

Special Note.—The Meccano Plates (Flanged, Flat, Curved, etc.) are shown in the Manuals with diagonal white lines. In the new Meccano Outfits these parts are plain.

Several of the illustrations in this Manual show how miniature figures and various small articles can be introduced to add realism to the models. These are not included in the Outfit. Many of them are Meccano Dinky Toys that can be bought separately from your Meccano dealer.

THE "MECCANO MAGAZINE"

The "Meccano Magazine" is published specially for Meccano boys. Every month it describes and illustrates new Meccano models for Outfits of all sizes, and deals with suggestions from readers for new Meccano parts and for new methods of using the existing parts.

There are model-building competitions specially

planned to give an equal chance to the owners of small and large Outfits. In addition, there are splendid articles on such subjects as Railways, Famous Engineers and Inventors, Electricity, Chemistry, Bridges, Cranes and Aeroplanes, and special sections dealing with the latest Engineering, Aviation and Shipping News. Other pages deal with Stamp Collecting, and Books of interest to boys; and a feature of outstanding popularity is the section devoted to short articles from readers.

If you are not already a reader write to the Editor for full particulars, or order a copy from your Meccano dealer, or from any newsagent.

THE MECCANO GUILD

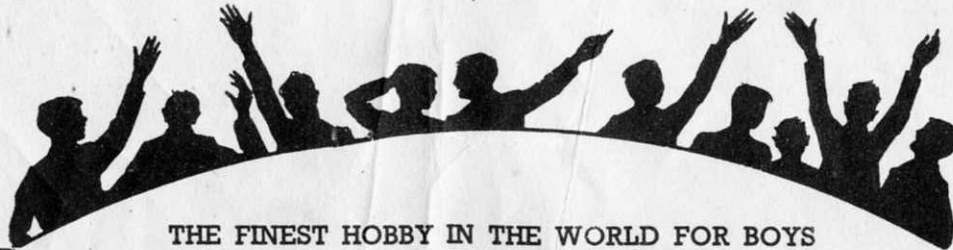
Every owner of a Meccano Outfit should join the Meccano Guild. This is a world-wide organisation, started at the request of Meccano boys. Its primary object is to bring boys together and to make them feel that they are all members of a great brotherhood, each trying to help others to get the very best out of life. Its members are in constant touch with Headquarters, giving news of their activities and being guided in their hobbies and interests. Write for full particulars and an application form to the Secretary, Meccano Guild, Binns Road, Liverpool 13.

Clubs founded and established under the guidance of the Guild Secretary provide Meccano boys with opportunities of enjoying to the utmost the fun of model-building. Each has its Leader, Secretary, Treasurer and other officials. With the exception of the Leader, all the officials are boys, and as far as possible the proceedings of the clubs are conducted by boys.

MECCANO SERVICE

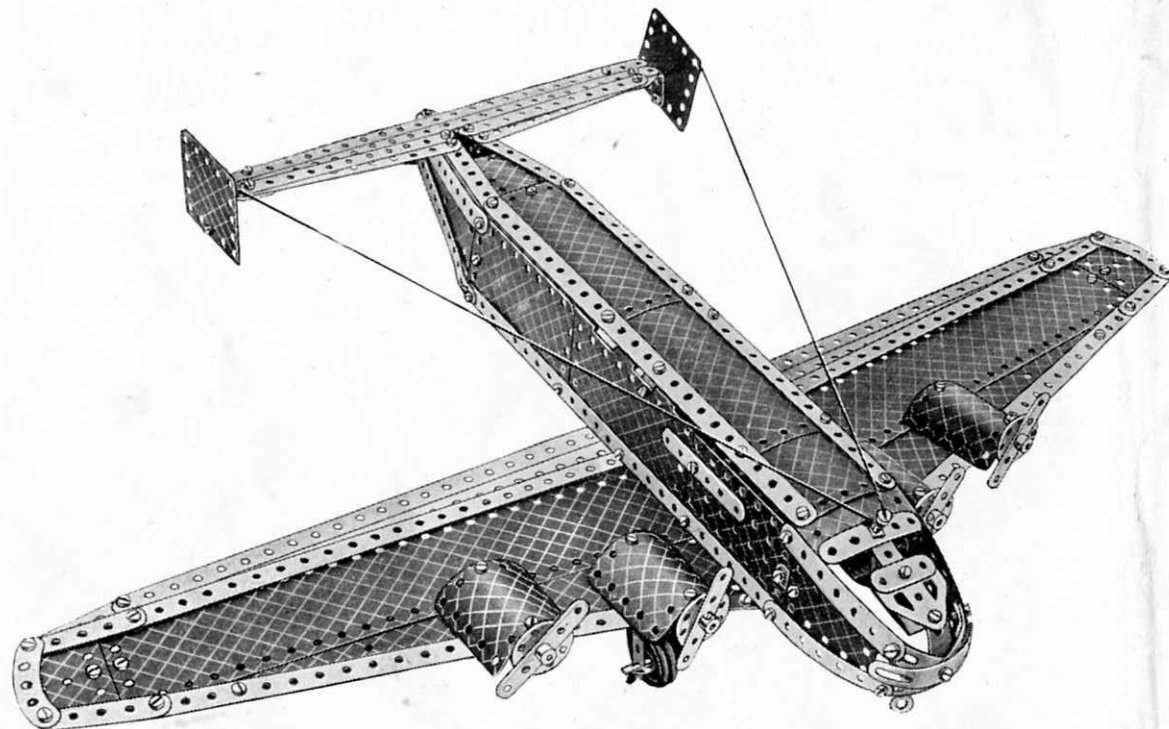
The service of Meccano does not end with selling an Outfit and an Instruction Manual. If ever you are in any difficulty with your models, or if you want advice on anything connected with this great hobby, write to us. We receive hundreds of interesting letters from boys in all parts of the world, and each of these is answered personally by one of our staff of experienced experts.

Whatever your problem may be, write to us about it. Do not hesitate. We shall be delighted to help you in any way possible.



THE FINEST HOBBY IN THE WORLD FOR BOYS

6.1 FOUR-ENGINEED MONOPLANE



The sides of the fuselage are constructed on two $12\frac{1}{2}$ " Angle Girders 1, and as they are identical their construction can be followed from the illustration above. The fuselage top is connected to the sides by Obtuse Angle Brackets. The tail of the fuselage is tapered to a point with $5\frac{1}{2}$ " Strips and $5\frac{1}{2} \times 1\frac{1}{2}$ " Flexible Plates, the upper Strips being joined by two Angle Brackets. Two $3\frac{1}{2}$ " Strips and a $2\frac{1}{2} \times 1\frac{1}{2}$ " Flexible Plate form each side of the forward part of the fuselage, and the nose is made up of four Formed Slotted Strips bolted together through their centre holes.

Three $12\frac{1}{2}$ " Strips form the trailing edge of each wing, and the leading edge also is a $12\frac{1}{2}$ " Strip. These are lengthened with $2\frac{1}{2}$ " Strips and are connected by a $2\frac{1}{2}$ " Curved Strip at the tip, the framework so formed being filled in with a $12\frac{1}{2}$ " Strip Plate, a $5\frac{1}{2} \times 2\frac{1}{2}$ " and a $5\frac{1}{2} \times 1\frac{1}{2}$ " Flexible Plate. A Semi-Circular Plate completes the tip.

The engine nacelles are $1\frac{1}{4}$ " radius Curved Plates and $2\frac{1}{2} \times 2\frac{1}{2}$ " Flexible Plates, which are connected to the wings by Reversed Angle Brackets. A Wheel Disc is attached to the front of each nacelle by an Angle Bracket. The shanks of the $\frac{3}{8}$ " Bolts 2 form propeller shafts on which the propellers, $2\frac{1}{2}$ " Strips, are retained by Collars.

U-Section Curved Plates bolted underneath the wings form supports for $2\frac{1}{2}$ " Curved Strips, which provide bearings for the landing wheel axles. The axles are $1\frac{1}{2}$ " Rods, and each carries two 1" Pulleys fitted with Rubber Rings.

A direction-finding aerial is represented by Rod and Strip Connector 3 mounted on a Threaded Pin.

Parts required

12 of No. 1	3 of No. 18a	4 of No. 59	4 of No. 188
10 " " 2	4 " " 22	2 " " 90	4 " " 189
4 " " 3	1 " " 23	4 " " 90a	5 " " 190
2 " " 4	4 " " 24a	1 " " 111	2 " " 191
11 " " 5	7 " " 35	2 " " 111a	4 " " 192
2 " " 6a	99 " " 37	6 " " 111c	2 " " 197
2 " " 8	9 " " 37a	1 " " 115	1 " " 198
6 " " 10	3 " " 38	4 " " 125	2 " " 199
6 " " 12	1 " " 40	3 " " 126a	2 " " 200
2 " " 12a	2 " " 48a	1 " " 147b	1 " " 212
6 " " 12c	2 " " 53	4 " " 155	2 " " 214

4 of No. 215

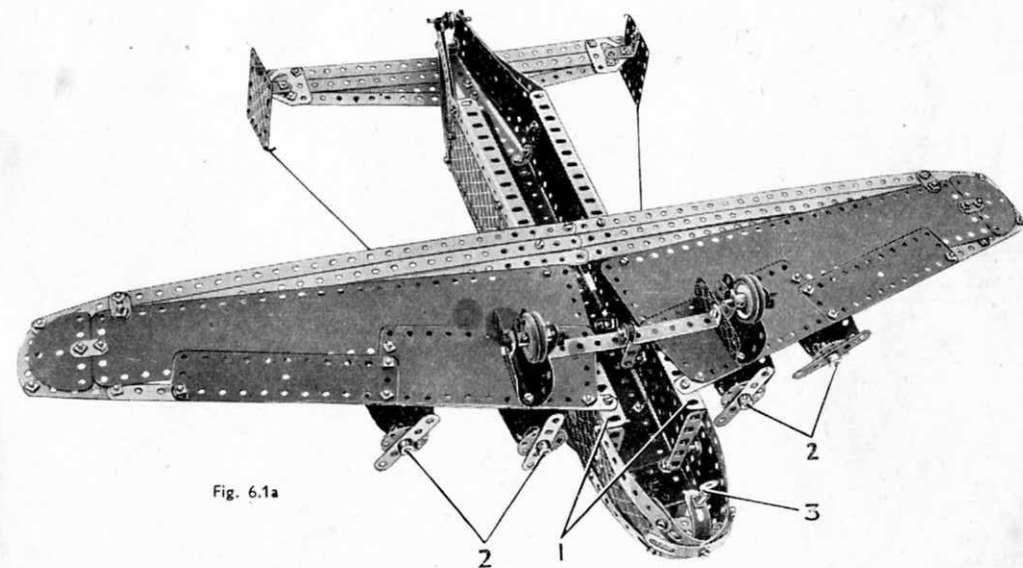
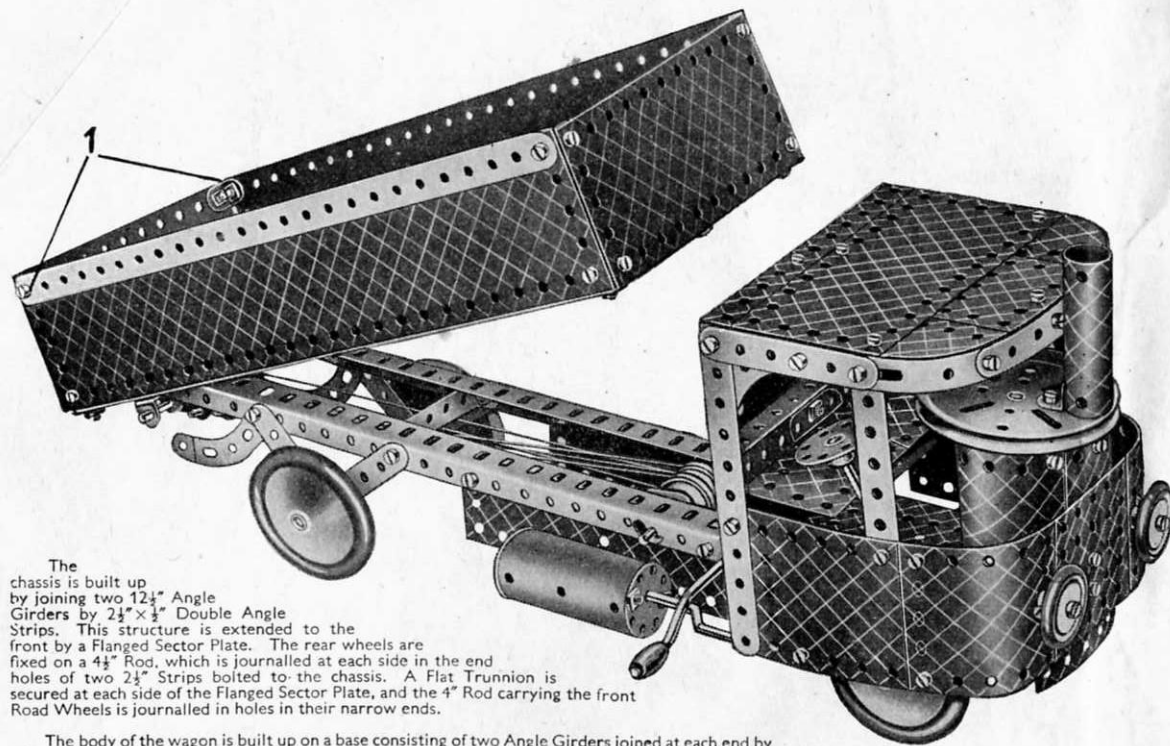


Fig. 6.1a



The chassis is built up by joining two $12\frac{1}{2}$ " Angle Girders by $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strips. This structure is extended to the front by a Flanged Sector Plate. The rear wheels are fixed on a $4\frac{1}{2}$ " Rod, which is journalled at each side in the end holes of two $2\frac{1}{2}$ " Strips bolted to the chassis. A Flat Trunnion is secured at each side of the Flanged Sector Plate, and the $4\frac{1}{2}$ " Rod carrying the front Road Wheels is journalled in holes in their narrow ends.

The body of the wagon is built up on a base consisting of two Angle Girders joined at each end by a $5\frac{1}{2}$ " Strip. The bottom is filled in with $12\frac{1}{2}$ " Strips bolted between the two $5\frac{1}{2}$ " Strips. Two $12\frac{1}{2}$ " Strip Plates 1 bolted to the Angle Girders form the sides, and a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate is secured by four Angle Brackets to the front end. The $\frac{3}{4}$ " Bolts 1, which hold two Angle Brackets supporting the rear $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate, are lock-nutted, and the end of the body is free to swing open when the body is tipped.

The body of the wagon is pivoted on a 5" Rod, which passes through holes in the Angle Girders forming the chassis and through two Double Brackets bolted beneath the body.

The tipping mechanism is shown in Fig. 6.2a. A $3\frac{1}{2}$ " Rod is passed through the Angle Girders forming the sides of the chassis, and it carries between the Angle Girders a Fishplate, a 1" fast Pulley, a 1" loose Pulley and a $\frac{1}{2}$ " loose Pulley, all of which are held on the Rod by Spring Clips.

The Pulleys at the rear end of the body are carried on a 2" Rod passed through holes in $1\frac{1}{2}$ " \times $1\frac{1}{2}$ " Angle Brackets. The 2" Rod carries a Collar, a 1" fast Pulley, a 1" loose Pulley and a $\frac{1}{2}$ " fast Pulley.

The Cord is tied to a Cord Anchoring Spring on the Crank Handle. It is then taken over the Rods and Pulleys in the following order:— Over the front Rod, rear Rod, $\frac{1}{2}$ " loose Pulley (front), 1" fast Pulley (rear), 1" loose Pulley (front), 1" loose Pulley (rear), 1" fast Pulley (front), $\frac{1}{2}$ " fast Pulley (rear). Finally it is tied to the Fishplate on the front Rod.

Several of the Flexible Plates have been removed from the model in Fig. 6.2b to show the construction of the cab. The back consists of a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate, which is bolted to the chassis by one of its flanges, and is extended upwards by a flat plate 2 obtained by removing the centre pin from a Hinged Flat Plate. The front of the cab is formed by a $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate and a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plate attached to the Flanged Sector Plate by an Angle Bracket, and each side consists of a $4\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate and a $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate, overlapped three holes and bolted together. The sides are secured at the

6.2 TIPPING STEAM WAGON

Parts required

11 of No. 1	2 of No. 15b	14 of No. 35	2 of No. 80c	3 of No. 189
10 " " 2	2 " " 16	99 " " 37	4 " " 90a	3 " " 190
1 " " 3	1 " " 17	10 " " 37a	2 " " 111a	2 " " 191
2 " " 4	1 " " 19b	7 " " 38	4 " " 111c	3 " " 192
8 " " 5	1 " " 19g	2 " " 38d	1 " " 125	2 " " 197
4 " " 8	1 " " 19h	1 " " 40	1 " " 126	1 " " 198
1 " " 10	5 " " 22	3 " " 48a	2 " " 126a	2 " " 199
3 " " 11	2 " " 22a	2 " " 48b	2 " " 155	2 " " 200
13 " " 12	1 " " 23	1 " " 52	1 " " 176	2 " " 214
2 " " 12a	1 " " 23a	1 " " 53	1 " " 186	2 " " 215
1 " " 15	1 " " 24	1 " " 54	4 " " 187	1 " " 216
1 " " 15a	2 " " 24a	2 " " 59	4 " " 188	

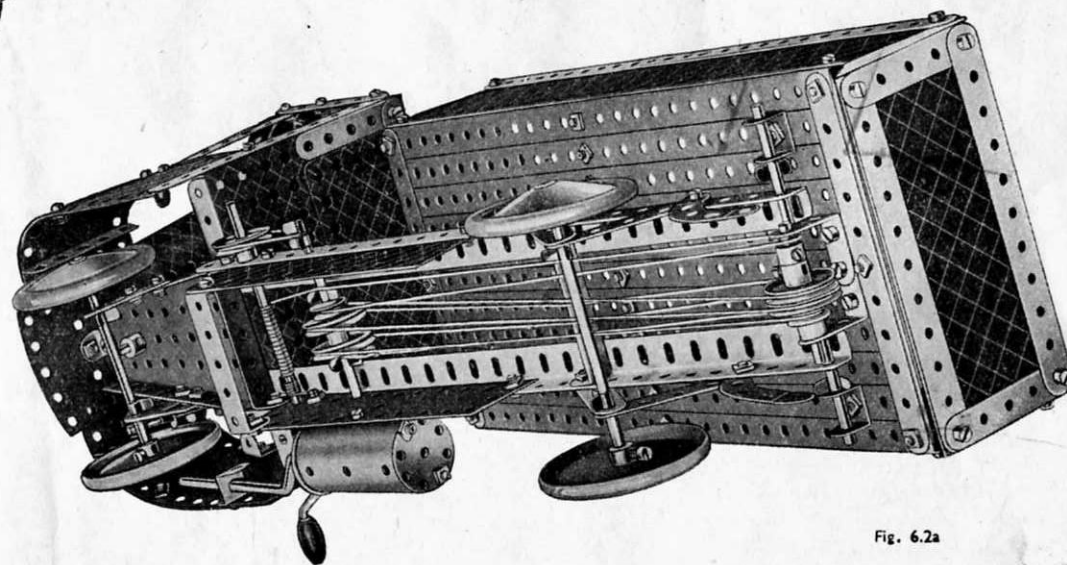
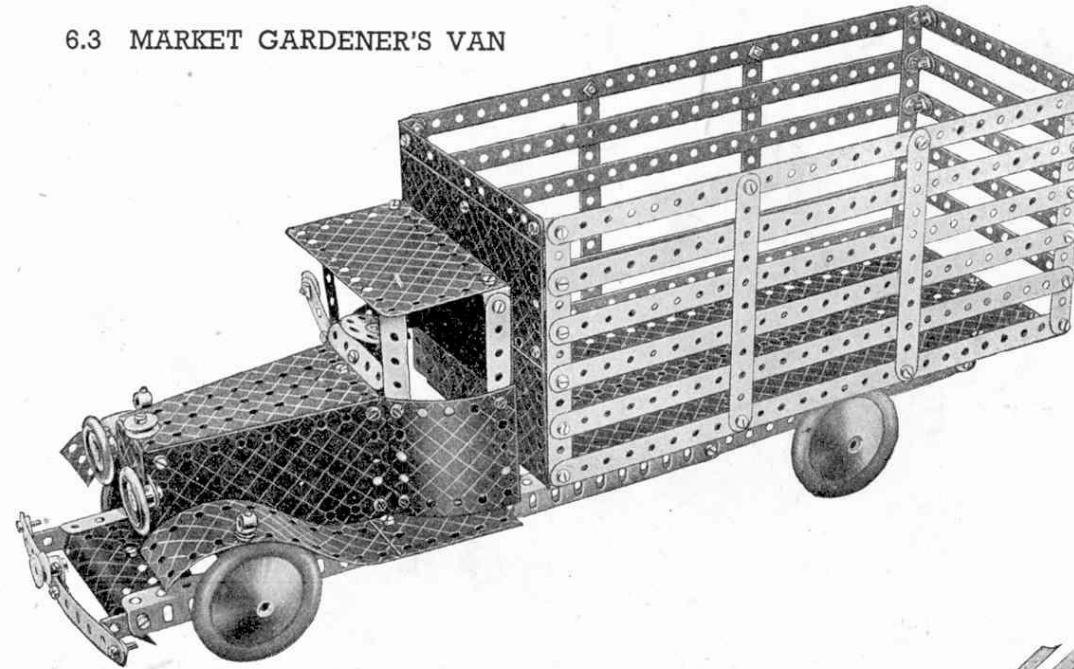


Fig. 6.2a

(Continued on next page)

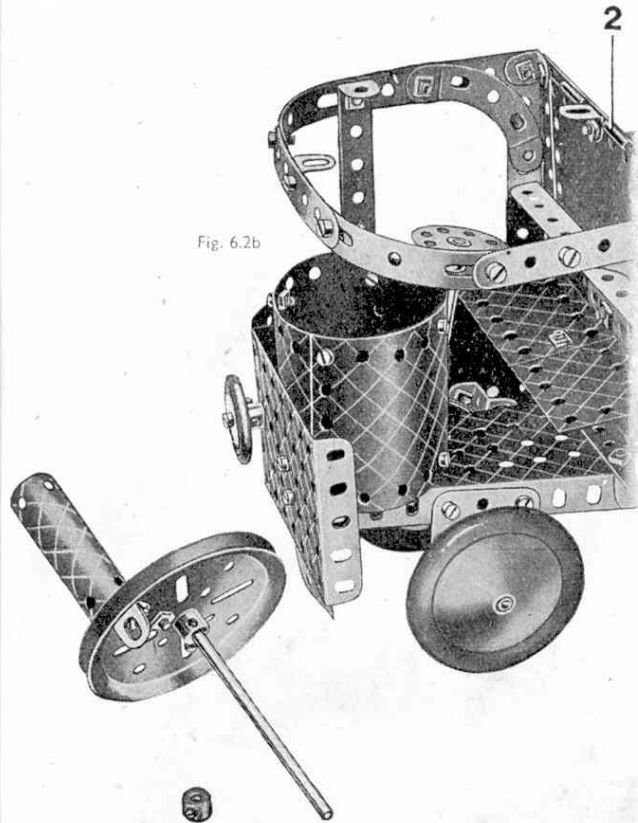
6.3 MARKET GARDENER'S VAN



Parts required

12 of No. 1	9 of No. 38
14 " " 2	1 " " 38d
2 " " 3	1 " " 51
2 " " 4	1 " " 52
6 " " 5	2 " " 54
2 " " 6a	2 " " 59
4 " " 8	6 " " 111c
2 " " 10	2 " " 125
2 " " 11	2 " " 126
16 " " 12	2 " " 126a
2 " " 12a	2 " " 155
6 " " 12c	4 " " 187
2 " " 15	2 " " 188
2 " " 15b	3 " " 189
2 " " 22	2 " " 191
1 " " 23	1 " " 192
1 " " 23a	2 " " 197
1 " " 24	1 " " 198
7 " " 35	1 " " 199
105 " " 37	2 " " 200
1 " " 37a	

Fig. 6.2b



(Continued from previous page)

forward end to the $3\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate, and at the rear to the shorter flanges of the $5\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate. The seat is represented by two $2\frac{1}{2} \times 1\frac{1}{2}$ " Flexible Plates attached to the $5\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate by a Trunnion.

The steering wheel is formed by a Bush Wheel locked on the end of a 4" Rod, which passes through a Double Bracket and is fastened in position by two Spring Clips. The Double Bracket is bolted to one of the flanges of the Flanged Sector Plate.

The Boiler is constructed from two U-Section Curved Plates and two $1\frac{1}{8}$ " radius Curved Plates, and is bolted to the $3\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate at the front of the cab. The top of the cab consists of a $5\frac{1}{2} \times 1\frac{1}{2}$ " Flexible Plate and a $5\frac{1}{2} \times 2\frac{1}{2}$ " Flexible Plate, bolted together overlapping two holes, and then secured to the flat plate 2 by an Angle Bracket. The two Flexible Plates are extended to the front by a $2\frac{1}{2} \times 1\frac{1}{2}$ " Flexible Plate and two Semi-Circular Plates.

The chassis of the model consists of two $12\frac{1}{2}$ " Angle Girders joined across by $3\frac{1}{2}$ " Strips and extended at the rear by $12\frac{1}{2}$ " Strips. The $12\frac{1}{2}$ " Strips overlap the Angle Girders by 12 holes. The front Road Wheels are fastened on a 5" Rod journalled directly in the sides of the chassis. The back axle, another 5" Rod, passes through the holes of two Flat Trunnions bolted to the $12\frac{1}{2}$ " Strips forming the rear of the chassis.

The body of the van is built up on a framework consisting of two $12\frac{1}{2}$ " Angle Girders, joined at one end by a $5\frac{1}{2}$ " Strip and at the other end by a $5\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate. At intervals along the sides of the Angle Girders $5\frac{1}{2}$ " Strips are bolted, and to them $12\frac{1}{2}$ " Strips are secured horizontally. The body is fixed to the chassis by two $\frac{1}{2}$ " Reversed Angle Brackets at the front and by two Trunnions at the back.

The sides of the bonnet are formed by $4\frac{1}{2} \times 2\frac{1}{2}$ " Flexible Plates, which are bolted to a Flanged Sector Plate secured to the two $3\frac{1}{2}$ " Strips bracing the chassis. Another Flanged Sector Plate forms the top of the bonnet, and is fastened to the $4\frac{1}{2} \times 2\frac{1}{2}$ " Flexible Plates. The radiator, a $2\frac{1}{2} \times 1\frac{1}{2}$ " Flanged Plate, is bolted to the Flanged Sector Plates forming the top and base of the bonnet. The doors of the cab itself consist of two $1\frac{1}{8}$ " radius Curved Plates, which are fastened to the sides of the bonnet by Obtuse Angle Brackets. A Hinged Flat Plate forms the roof and back of the cab, and it is secured by Angle Brackets to two $2\frac{1}{2}$ " Strips bolted to the doors. The front of the roof rests on the ends of two $2\frac{1}{2}$ " Strips bolted to the doors just behind the bonnet.

The mudguards are constructed by bending $5\frac{1}{2} \times 1\frac{1}{2}$ " Flexible Plates to shape and bolting their ends to the chassis. They are supported at the forward ends by a 4" Rod journalled in the sides of the bonnet and fastened in position by Spring Clips.

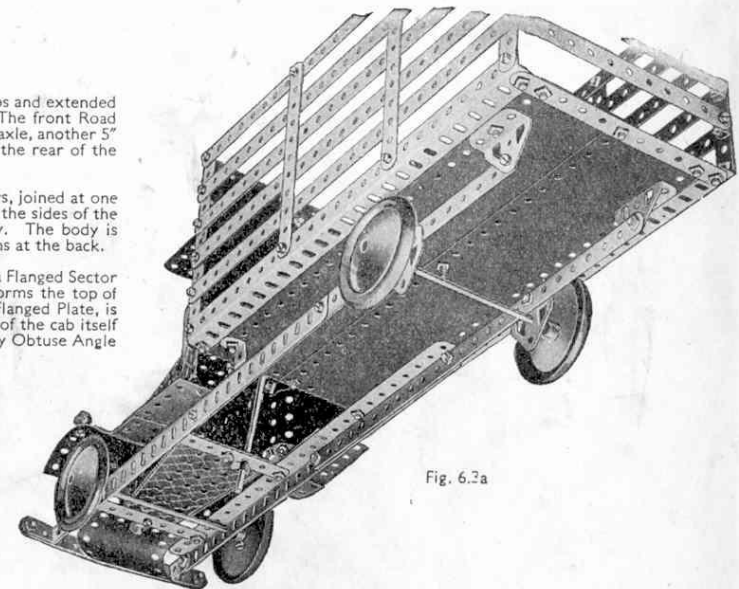
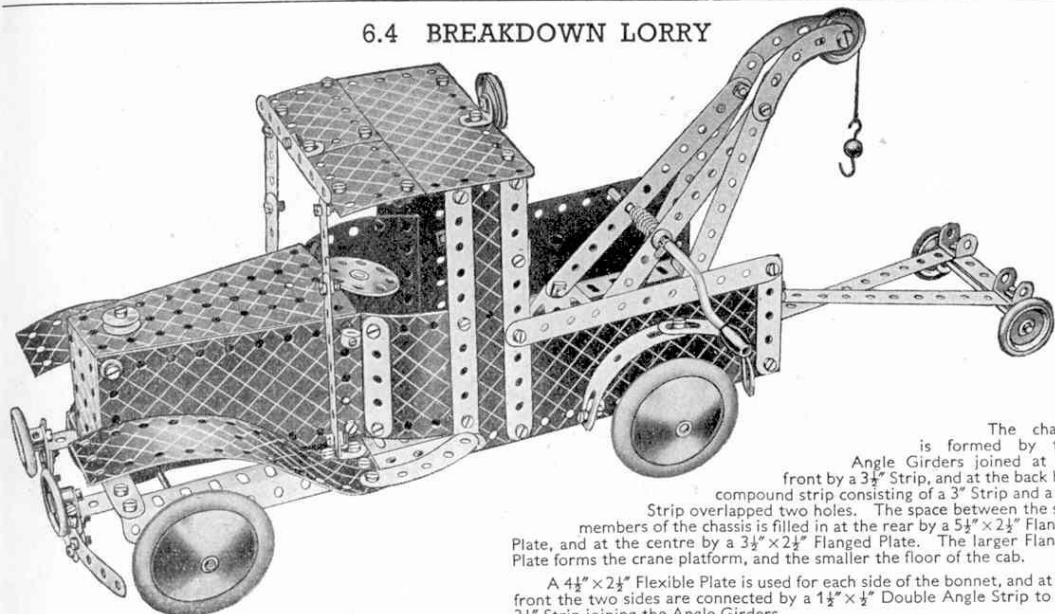


Fig. 6.2a

6.4 BREAKDOWN LORRY



The chassis is formed by two Angle Girders joined at the front by a $3\frac{1}{2}$ " Strip, and at the back by a compound strip consisting of a 3" Strip and a $1\frac{1}{2}$ " Strip overlapped two holes. The space between the side members of the chassis is filled in at the rear by a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate, and at the centre by a $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate. The larger Flanged Plate forms the crane platform, and the smaller the floor of the cab.

A $4\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate is used for each side of the bonnet, and at the front the two sides are connected by a $1\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip to the $3\frac{1}{2}$ " Strip joining the Angle Girders.

Parts required

13 of No. 2	1 of No. 48a	4 of No. 126a
4 " 3	1 " 48b	1 " 147b
1 " 4	1 " 51	4 " 155
8 " 5	1 " 52	1 " 176
2 " 6a	2 " 53	4 " 187
2 " 8	1 " 54	4 " 188
6 " 10	1 " 57c	4 " 189
2 " 11	3 " 59	2 " 191
12 " 12	2 " 90	2 " 192
2 " 12a	2 " 90a	1 " 198
4 " 12c	3 " 111c	2 " 200
2 " 15	1 " 125	4 " 215
1 " 15a	2 " 126	
2 " 16		
1 " 18b		
1 " 19g		
5 " 22		
1 " 22a		
1 " 23		
1 " 24		
5 " 35		
101 " 37		
1 " 37a		
6 " 38		
1 " 40		
1 " 44		
1 " 48		

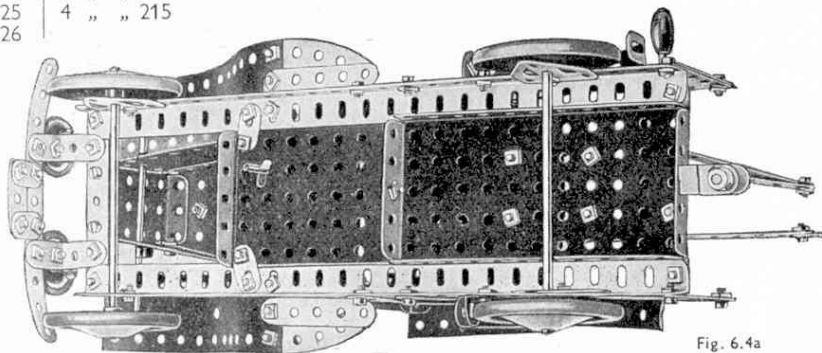
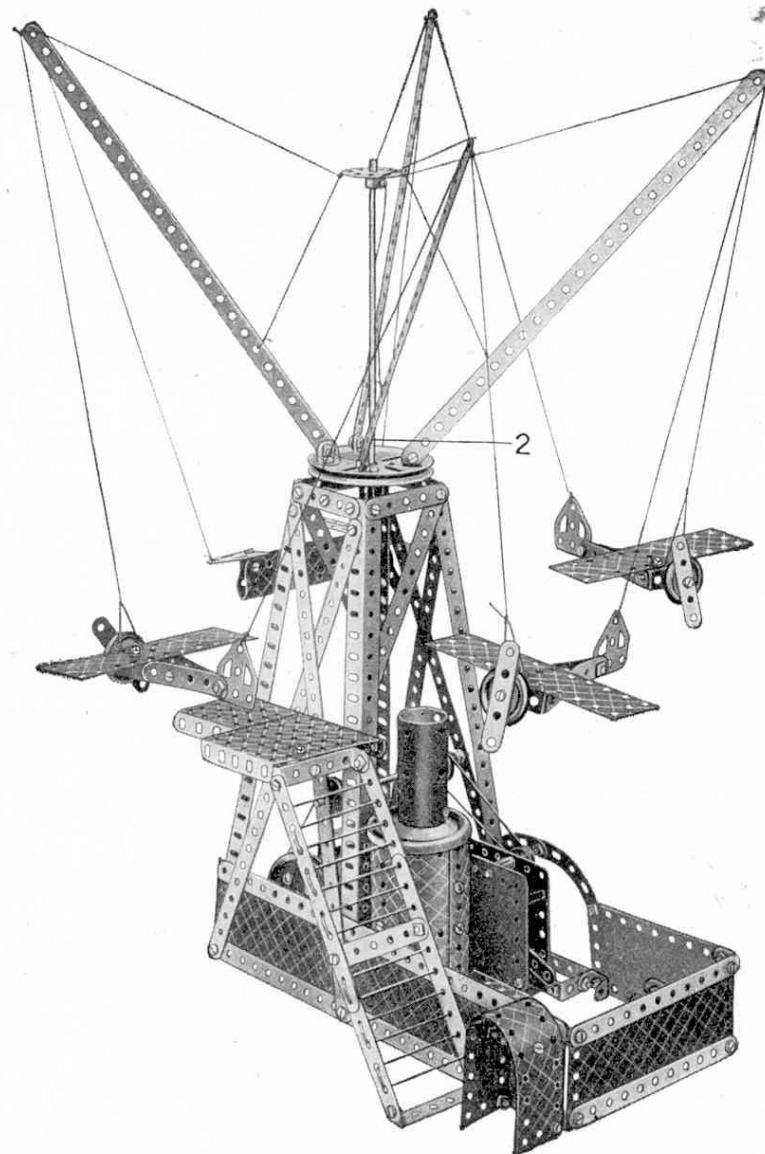


Fig. 6.4a

6.5 HIGH FLYERS



6.5 HIGH-FLYERS

A base for the model is provided by bolting two 12½" Strips to the Angle Girders that form the tower. Two 5½" Strips are bolted to the Angle Girders across their lower ends, and between them is fixed a 5½" × 2½" Flanged Plate. The Flanged Plate is extended on the inside by a 3½" × 2½" Flanged Plate attached to it by a Fishplate. The 3½" × 2½" Flanged Plate is attached also to one of the 12½" Strips of the base by a 1" × 1" Angle Bracket and a Double Bracket.

The boiler consists of two 5½" × 2½" Flexible Plates bolted together and extended by two 1½" radius Curved Plates. They are then curved to shape and their ends are bolted together. The boiler is fixed to the side of the model. The Road Wheel is fastened on a 3" Screwed Rod, which is lock-nutted to a Fishplate bolted to a 1" × 1" Angle Bracket inside the boiler. The 2½" Cylinder carries an Angle Bracket on its inside, and is fitted on to the Screwed Rod, where it is held in place by a Nut.

The No. 1 Clockwork Motor is fastened by Double Brackets to the 5½" × 2½" Flanged Plate and the 3½" × 2½" Flanged Plate. The drive is taken by a Driving Band from a ½" fast Pulley on the driving shaft of the Motor, to a 1" fast Pulley on a 5" Rod, journaled in the sides of the tower. This Rod carries also a second 1" Pulley, which is connected by a belt of cord to a 3" Pulley on the 3½" Rod carrying the Pulley 1 (Fig. 6.5a). Pulley 1 is fitted with a Rubber Ring, which is in contact with the rim of the Road Wheel at the bottom of the main shaft. The arms carrying the aeroplanes are fastened by Angle Brackets to a 3" Pulley on the main shaft, and are supported by Cords. The main shaft consists of an 11½" Rod and a 6½" Rod joined by a Rod Connector 2.

The construction of three of the aeroplanes will be clear from the illustration. The fuselage of the aeroplane partly hidden by the tower consists of two U-section Curved Plates bolted together at the tail. A 1" loose Pulley is attached to the fuselage by an Angle Bracket to form the engine. The wing is made of two 5½" Strips bolted to an Angle Bracket and to a Double Bracket fastened to the sides of the fuselage.

Parts required

11 of No. 1	1 of No. 52
12 " " 2	2 " " 53
4 " " 3	1 " " 54
2 " " 4	4 " " 59
12 " " 5	1 " " 80c
1 " " 6a	2 " " 90a
4 " " 8	2 " " 111
3 " " 10	2 " " 111a
4 " " 11	6 " " 111c
15 " " 12	2 " " 126
2 " " 12a	4 " " 126a
1 " " 13	4 " " 155
1 " " 14	2 " " 186
1 " " 15	2 " " 187
1 " " 16	3 " " 188
2 " " 19b	3 " " 189
5 " " 22	1 " " 191
2 " " 22a	4 " " 192
1 " " 23a	1 " " 197
1 " " 24	2 " " 199
105 " " 37	2 " " 200
6 " " 37a	1 " " 213
4 " " 38	1 " " 216
2 " " 40	1 No. 1 Clockwork Motor
2 " " 48	(Not included in Outfit).
8 " " 48a	

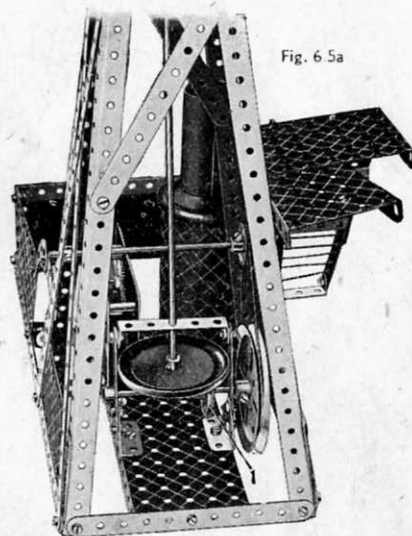


Fig. 6.5a

6.6 FURNITURE VAN

The construction of the model is commenced by building the van body, the base of which consists of two 12½" Angle Girders joined at each end by a 5½" Strip. The lower part of each side consists of a 12½" Strip Plate and different sized Flexible Plates, and the two flat plates 1 form the upper part of the sides. The flat plates 1 are obtained by removing the centre pin from a Hinged Flat Plate and using the two halves separately. Each half is bolted over a framework of 12½" Strips and 5½" Strips, which can be seen in Fig. 6.6a. The top is constructed from 12½" Strips clamped at each end between 5½" Strips connected to the frame.

The bonnet unit consists of two Flanged Sector Plates, the flanges of which are joined by 4½" × 2½" Flexible Plates. The radiator is bolted in position to the two Flanged Sector Plates, the upper Bolt being ½" long and carrying a ½" loose Pulley to represent the radiator cap. The lower Flanged Sector Plate is bolted to a 3½" × 2½" Flanged Plate, which is secured to the chassis.

The front bumper is fastened by two Reversed Angle Brackets to the ends of two 3½" × ½" Double Angle Strips fixed under the bonnet. The headlights are represented by 1" fast Pulleys on the shanks of two ½" Bolts, which are passed through a 2½" × ½" Double Angle Strip bolted to the radiator. Running boards are represented by 2½" × 1½" Flexible Plates bolted to the 3½" × 2½" Flanged Plate, and they provide supports for the front mudguards. The latter each consist of two Formed Slotted Strips coupled together by Fishplates and they are secured to the running board by Angle Brackets.

The seat inside the cab is made with two U-Section Curved Plates connected by Fishplates and attached by an Angle Bracket to the back of the seat, which consists of a 3½" × 2½" Flanged Plate extended by a 2½" × 2½" Flexible Plate.

Parts required

12 of No. 1	1 of No. 24	6 of No. 111c
13 " " 2	1 " " 35	2 " " 125
3 " " 3	103 " " 37	2 " " 155
2 " " 4	8 " " 37a	4 " " 187
12 " " 5	5 " " 38	4 " " 188
4 " " 8	1 " " 48a	4 " " 189
8 " " 10	2 " " 48b	5 " " 190
2 " " 11	1 " " 51	2 " " 191
13 " " 12	1 " " 52	4 " " 192
1 " " 12a	2 " " 53	2 " " 197
1 " " 14	2 " " 54	1 " " 198
1 " " 15	4 " " 59	2 " " 199
1 " " 18a	2 " " 90a	2 " " 200
2 " " 22	2 " " 111	2 " " 214
1 " " 23	2 " " 111a	4 " " 215

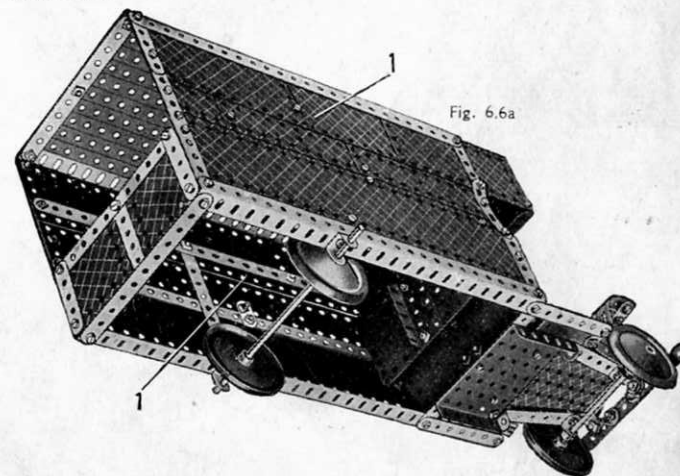
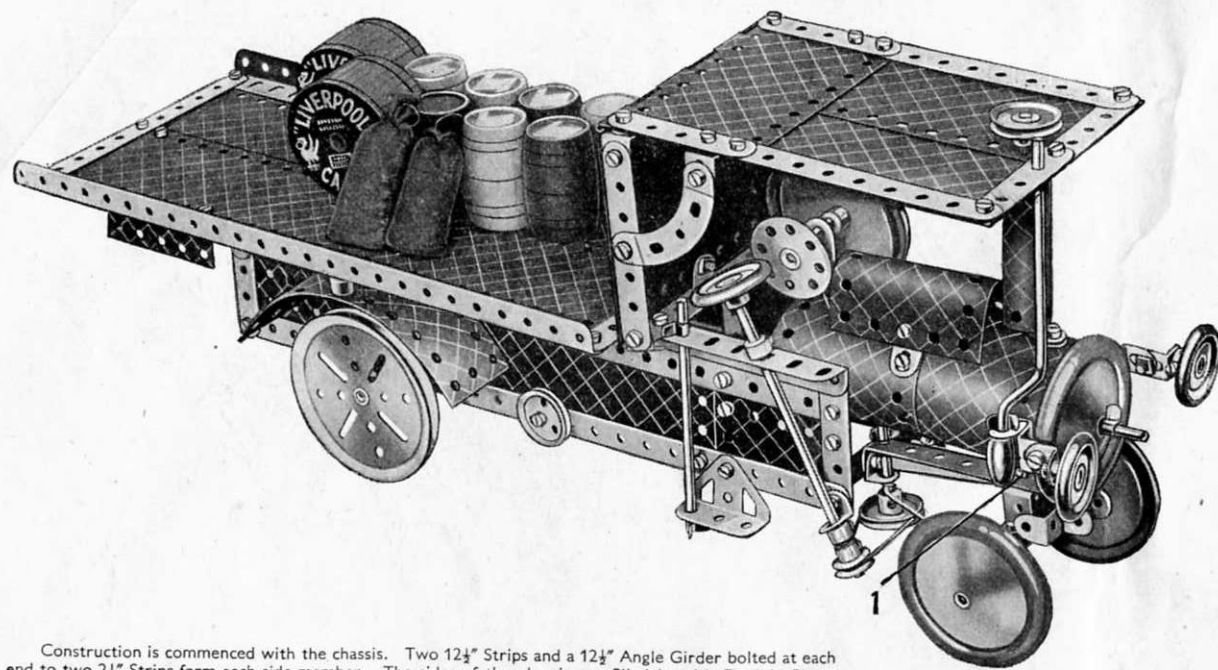


Fig. 6.6a

This Model can be built with MECCANO No. 6 Outfit (or No. 5 and No. 5a Outfits)



6.7 STEAM WAGON

Parts required

4 of No. 1	1 of No. 17	1 of No. 44	1 of No. 126
5 " " 2	1 " " 18a	1 " " 45	3 " " 155
3 " " 3	2 " " 19b	1 " " 48	1 " " 186
1 " " 4	1 " " 19g	3 " " 48a	4 " " 187
12 " " 5	5 " " 22	1 " " 48b	4 " " 188
4 " " 8	1 " " 22a	1 " " 51	2 " " 189
3 " " 10	1 " " 23	2 " " 53	4 " " 190
4 " " 11	1 " " 23a	4 " " 59	2 " " 191
12 " " 12	1 " " 24	1 " " 80c	4 " " 192
2 " " 12a	8 " " 35	2 " " 90a	2 " " 197
5 " " 12c	101 " " 37	2 " " 111	1 " " 198
1 " " 13	4 " " 37a	2 " " 111c	2 " " 199
2 " " 15	8 " " 38	2 " " 125	2 " " 200
2 " " 15b	1 " " 40		

Construction is commenced with the chassis. Two $12\frac{1}{2}$ " Strips and a $12\frac{1}{2}$ " Angle Girder bolted at each end to two $2\frac{1}{2}$ " Strips form each side member. The sides of the chassis are filled in with Flexible Plates and two Flanged Plates. The side members of the chassis are then joined together, at the rear by $2\frac{1}{2}$ " Strips and at the front by a $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip. The platform is bolted to the chassis by two $1"$ \times $1"$ Angle Brackets at the rear. At the front end it is bolted to a Fishplate attached to two $2\frac{1}{2}$ " Strips, which are overlapped one hole and bolted to the Angle Girders forming the side members of the chassis.

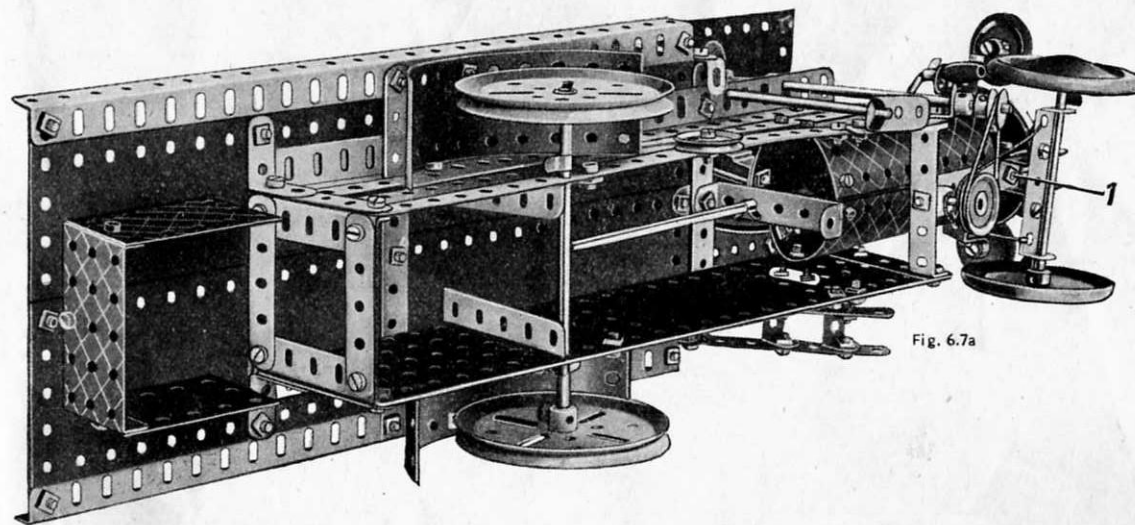
The boiler consists of two $4\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates extended by two $1\frac{1}{2}"$ radius Curved Plates and bent to shape, the end being joined together by two Obtuse Angle Brackets. The boiler front is a Road Wheel carried on an $11\frac{1}{2}"$ Rod, which is held by a Spring Clip in a $2\frac{1}{2}$ " \times $\frac{1}{2}"$ Double Angle Strip. The chimney is a U-Section Curved Plate bent to shape, and is attached as follows. A $3"$ Screwed Rod is lock-nutted at one end to a Fishplate bolted to the boiler, and passed up the centre of the chimney. The free end of the Screwed Rod projects through the roof of the cab and is held in the boss of a $1"$ Pulley.

The rear part of the roof is formed by a Hinged Flat Plate, extended at the back of the cab by two $2\frac{1}{2}"$ \times $2\frac{1}{2}"$ Flexible Plates. These are attached to the platform body by an Angle Bracket, which is held by the same Bolt as the Fishplate already mentioned. The Angle Brackets bolted to the $3\frac{1}{2}"$ Strips at the side of the cab are spaced from the Hinged Flat Plate by two Washers.

The front axle is mounted in the following manner. A Double Bracket is fastened by Obtuse Angle Brackets to the underside of the boiler, and a $3\frac{1}{2}"$ \times $\frac{1}{2}"$ Double Angle Strip is bolted to it and to the Double Angle Strip spacing the front of the chassis. To the Double Angle Strip a Double Bent Strip carrying the front axle support is lock-nutted by Bolt 1.

The steering column is journaled in the Angle Girder at the side of the cab, and also in an Angle Bracket. The $\frac{1}{2}"$ Pulley on the lower end of the steering column is connected to a $1"$ Pulley held on a $1\frac{1}{2}"$ Rod, by a Driving Band. Cord is wound several times around the $1\frac{1}{2}"$ Rod, and is tied at each end to the $2\frac{1}{2}"$ \times $\frac{1}{2}"$ Double Angle Strip supporting the front axle.

The rear mudguards are held by $\frac{3}{4}"$ Bolts, and are spaced from the platform by a Collar and two Washers. The rear wheels are $3"$ Pulleys fastened on the ends of a $5"$ Rod.



6.8 FOREIGN LEGION FORT

Read the "Meccano Magazine," published monthly. Place a regular order with your Meccano dealer or newsagent.

12 of No. 1
11 " " 2
4 " " 3
1 " " 4
12 " " 5
2 " " 6a
4 " " 8
7 " " 10
4 " " 11
16 " " 12
2 " " 12a
1 " " 12c
1 " " 13
1 " " 14
2 " " 15
2 " " 16
2 " " 17

Parts required

4 of No. 18a
1 " " 19h
4 " " 22
2 " " 22a
1 " " 23
1 " " 23a
1 " " 24
10 " " 35
105 " " 37
6 " " 37a
12 " " 38
1 " " 40
2 " " 48
7 " " 48a
1 " " 51
1 " " 52
2 " " 53
2 of No. 214

2 of No. 54
4 " " 59
1 " " 90
6 " " 111c
2 " " 125
2 " " 126
4 " " 126a
1 " " 147b
4 " " 188
4 " " 189
3 " " 190
2 " " 191
4 " " 192
2 " " 197
1 " " 198
1 " " 212
1 " " 213

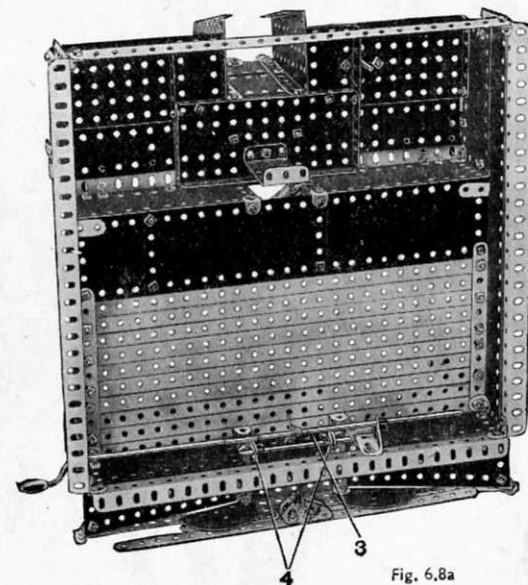
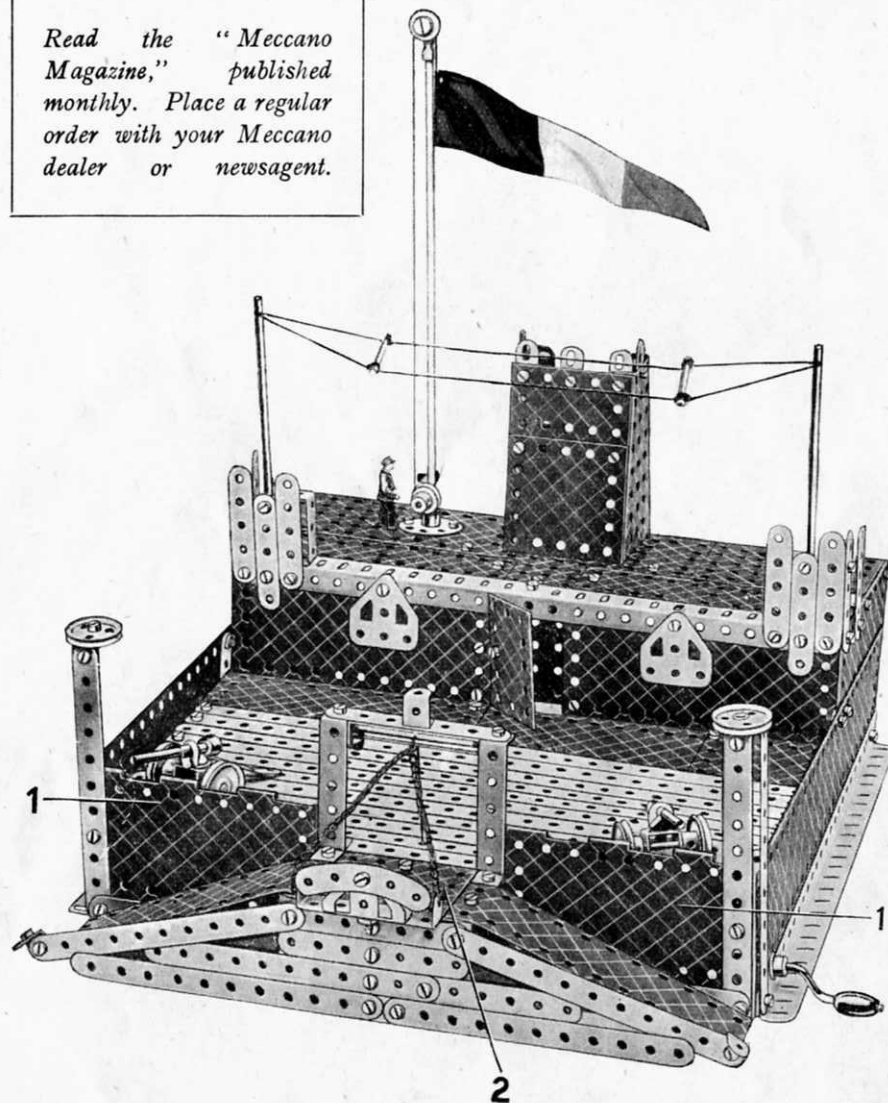


Fig. 6.8a

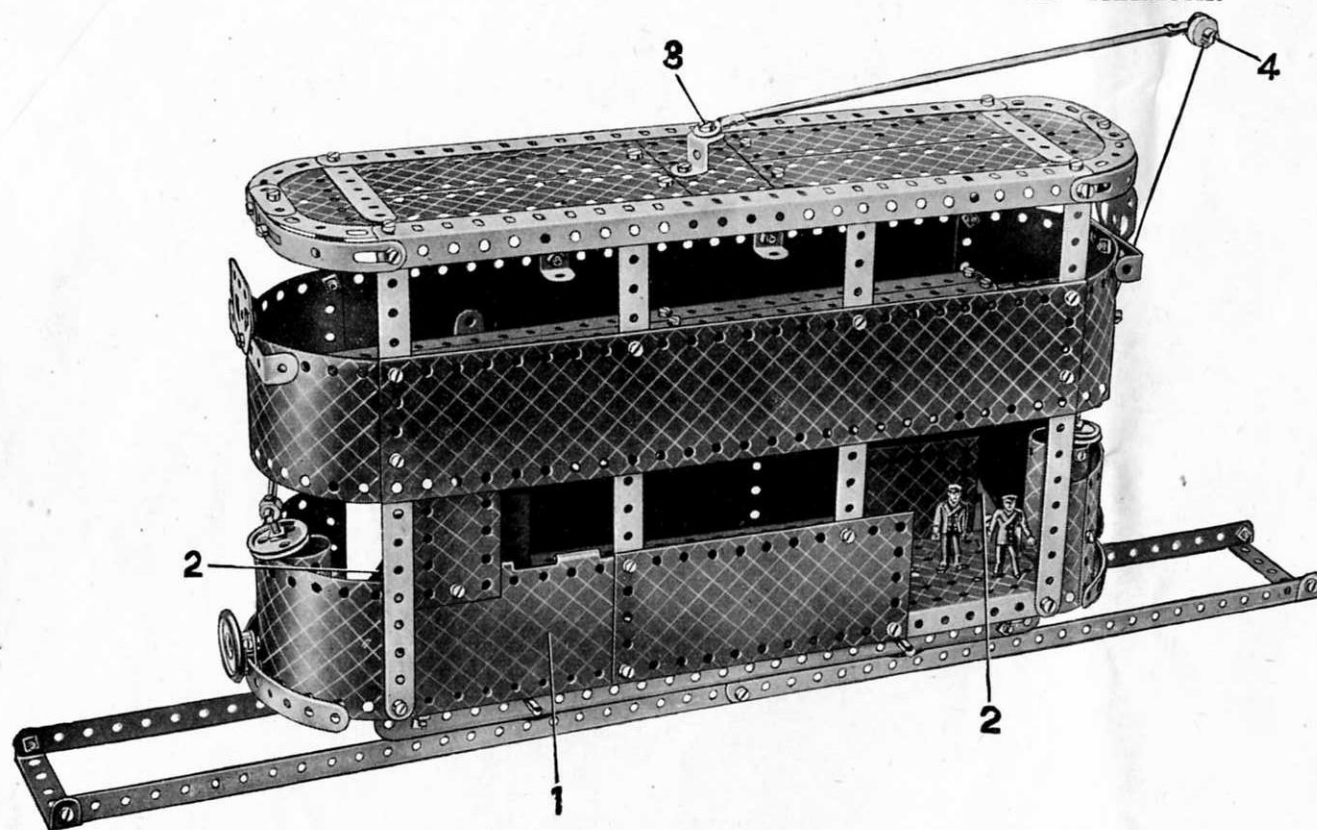
The base of the fort consists of three Angle Girders and a $12\frac{1}{2}$ " Strip joined at each end by Angle Brackets to $12\frac{1}{2}$ " Strips. Two $12\frac{1}{2}$ " \times $2\frac{1}{2}$ " Strip Plates are bolted to the Angle Girders to form the sides. The $12\frac{1}{2}$ " Strips that form the floor of the court-yard are bolted to $5\frac{1}{2}$ " Strips attached by Angle Brackets to the $12\frac{1}{2}$ " \times $2\frac{1}{2}$ " Strip Plates. Reference to the illustrations will make clear the construction of the barrack rooms.

The observation tower is formed by two Flanged Sector Plates, the front flanges of which are joined by a $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " and a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plate. The Flanged Sector Plates are bolted to the $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate forming the centre part of the roof. An $11\frac{1}{2}$ " Rod is used for the flag mast and is held upright in the boss of a Bush Wheel bolted to the roof. The Cord for raising and lowering the flag passes around a $\frac{1}{2}$ " fast Pulley at the bottom of the pole and a $\frac{1}{2}$ " loose Pulley at the top. The $\frac{1}{2}$ " fast Pulley is held on the shank of a $\frac{3}{8}$ " Bolt passed through a Double Bracket on the $11\frac{1}{2}$ " Rod, and the $\frac{1}{2}$ " loose Pulley is carried on a Pivot Bolt lock-nutted to a Rod and Strip Connector at the top of the Rod. The Rods forming the wireless masts are held in Collars bolted to the $2\frac{1}{2}$ " Strips at the corners of the roof.

The centre pin is removed from a Hinged Flat Plate, and the halves are used as flat plates 1 in the construction of the front of the fort. The approach roadways are formed by $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates bolted to the $2\frac{1}{2}$ " Strips fastened to the front $12\frac{1}{2}$ " Strip of the court-yard. The Strips at the front of the fort are supported by two Flat Trunnions (see Fig. 6.8a).

A $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate 2 is used for the drawbridge, and to its rear end is bolted a $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip 3, which is pivoted on a $3\frac{1}{2}$ " Rod journaled in two Angle Brackets 4. The operation of raising and lowering the drawbridge is controlled by a Crank Handle, to the shaft of which a $6\frac{1}{2}$ " Rod is attached by a Rod Connector. Cord is wound around the $6\frac{1}{2}$ " Rod, led over a $3\frac{1}{2}$ " Rod at the top of the gateway, and finally is tied to the front of the drawbridge.

6.9 TRAMCAR



Parts required

11 of No. 1	9 of No. 12	4 of No. 24a	1 of No. 48b	4 of No. 90a	2 of No. 191
13 " " 2	2 " " 12c	4 " " 35	1 " " 51	6 " " 111c	4 " " 192
3 " " 3	1 " " 13	105 " " 37	1 " " 52	3 " " 125	2 " " 197
2 " " 4	2 " " 16	6 " " 37a	2 " " 53	2 " " 126a	1 " " 198
11 " " 5	2 " " 18a	10 " " 38	2 " " 54	1 " " 155	2 " " 199
2 " " 6a	5 " " 22	1 " " 38d	2 " " 59	4 " " 188	2 " " 200
4 " " 8	2 " " 22a	1 " " 40	2 " " 80c	4 " " 189	2 " " 212
6 " " 10	1 " " 23	1 " " 48	1 " " 90	4 " " 190	2 " " 214
		8 " " 48a			
		4 of No. 215			

Construction is commenced with the chassis as shown in Fig. 6.9a. Two $12\frac{1}{2}$ " Strips are connected by Angle Brackets to two Angle Girders, and the last named are joined across at each end by compound strips consisting of two $2\frac{1}{2}$ " Strips overlapped two holes. The bottom is filled in by bolting a $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate by its flange to the lower Angle Girder, and a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate to the other Angle Girder. A Flanged Sector Plate and a $5\frac{1}{2}$ " Strip are bolted to the $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate, and two further $5\frac{1}{2}$ " Strips are attached by Reversed Angle Brackets, one to the $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate, and the other to the compound strip that spaces the Angle Girders.

The sides of the car are next added. One half of a Hinged Flat Plate is used at 1, and the other half is used in a similar position on the opposite side of the model. Five $5\frac{1}{2}$ " Strips carry the upper deck, and $2\frac{1}{2}$ " Strips and Double Angle Strips support the roof. The $5\frac{1}{2}$ " Strips 2 are bolted to $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates, which in turn are fastened to the floor of the tramcar.

The upper deck consists of five $12\frac{1}{2}$ " Strips, three of which are bolted to one side of a $3\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip, while the other two are fastened to a Fishplate that is attached to the Double Angle Strip. The floor is filled in with $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates, with a Flanged Sector Plate at the front end and a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flanged Plate at the rear end.

U-Section Curved Plates are attached by Obtuse Angle Brackets to each end of the tram to represent the speed control boxes, the securing Bolts holding also an Angle Bracket. Two 3" Screwed Rods are each fitted with a 1" loose Pulley, and Collars with $1\frac{1}{2}$ " Rods locked in them are fixed on the upper end of each Screwed Rod to form the control switch.

A Reversed Angle Bracket is bolted to a $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate in the roof of the tram and a Rod and Strip Connector is attached by lock-nutted Bolt 3 to its other end. A second Rod and Strip Connector is carried at the end of the $11\frac{1}{2}$ " Rod forming the trolley, and a $\frac{1}{2}$ " loose Pulley is attached by lock-nutted Bolt 4.

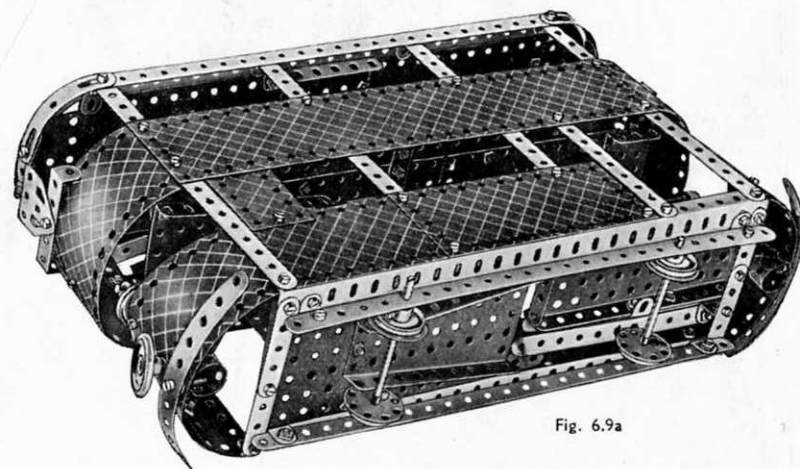
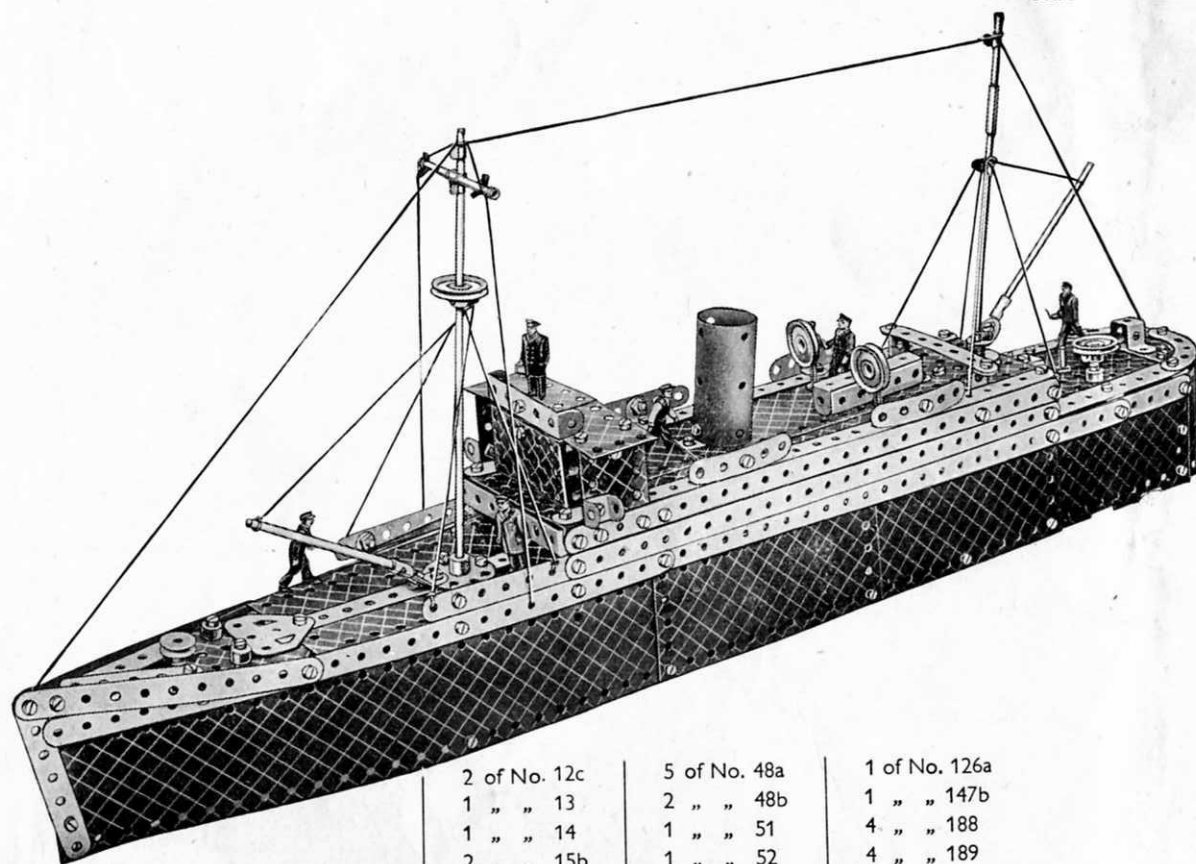


Fig. 6.9a

This Model can be built with MECCANO No. 6 Outfit (or No. 5 and No. 5a Outfits)

6.10 LINER



Parts required	2 of No. 12c	5 of No. 48a	1 of No. 126a
10 of No. 1	1 " " 13	2 " " 48b	1 " " 147b
9 " " 2	1 " " 14	1 " " 51	4 " " 188
3 " " 3	2 " " 15b	1 " " 52	4 " " 189
12 " " 5	2 " " 17	2 " " 53	4 " " 190
2 " " 8	5 " " 22	1 " " 54	2 " " 191
2 " " 10	1 " " 23a	4 " " 59	4 " " 192
4 " " 11	1 " " 24	2 " " 80c	2 " " 197
14 " " 12	7 " " 35	2 " " 90a	1 " " 198
2 " " 12a	98 " " 37	2 " " 111a	2 " " 212
	10 " " 37a	6 " " 111c	1 " " 213
	3 " " 38	1 " " 115	1 " " 214
	1 " " 40	2 " " 125	1 " " 216
	1 " " 45	2 " " 126	

Construction of the model is commenced by connecting two Angle Girders together by $5\frac{1}{2}$ " Strips in the manner shown in Fig. 6.10a. Each side consists of a $12\frac{1}{2}$ " \times $2\frac{1}{2}$ " Strip Plate overlapping the Angle Girder 10 holes, and two $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates also bolted to the Angle Girder. The hull is extended rearwards at 1 (Fig. 6.10a) by the halves of a Hinged Flat Plate from which the centre pin has been withdrawn. The stern consists of two $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates, overlapped and bolted together along their long sides and fastened to the flat plates 1. The $12\frac{1}{2}$ " \times $2\frac{1}{2}$ " Strip Plates are connected together at their free ends, the Bolt holding also two $3\frac{1}{2}$ " Strips. The two compound strips consisting of two $12\frac{1}{2}$ " Strips and a $2\frac{1}{2}$ " Strip, which extend the full length of the ship on each side, are bolted to flat plates 1 and sloped upwards. The ends of the strips are clamped at the bows by the $5\frac{1}{2}$ " Strips.

The $12\frac{1}{2}$ " Strips forming the sides of the superstructure are fastened to the sides of the ship at each end by $2\frac{1}{2}$ " Strips. The boat deck is filled in at each end by a $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate, and the centre portion, consisting of Flexible Plates bolted together as shown in Fig. 6.10a, is bolted to two $12\frac{1}{2}$ " Strips, which in turn are fastened to the $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plates. The ventilators are represented by 1" fast Pulleys, which are secured on the ends of 3" Screwed Rods fastened to the deck by nuts in the following manner. The Screwed Rods are inserted in one of the tapped holes in the boss of each Pulley, and the set screw is tightened up against the end of the Screwed Rod.

The front of the wheelhouse consists of a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flanged Plate, secured by an Angle Bracket to the two $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates forming the roof. A $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plate is used also for each of the side supports of the wheelhouse, and the roof is fastened to them by two Trunnions.

The foredeck is formed by a Flanged Sector Plate, extended to the rear by two $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible plates and a $5\frac{1}{2}$ " Strip. The Flexible Plates are secured by 1" \times 1" Angle Brackets bolted to $\frac{1}{2}$ " \times $\frac{1}{2}$ " Angle Brackets to the $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate forming the base of the wheelhouse.

The aft deck consists of a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate fixed to the boat deck by a $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip, and to the stern by a Semi-Circular Plate. The spaces between the $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate and the sides of the ship are filled in by $5\frac{1}{2}$ " Strips. The Semi-Circular Plate and the $2\frac{1}{2}$ " small radius Curved Strips are fastened to the stern of the ship by an Angle Bracket.

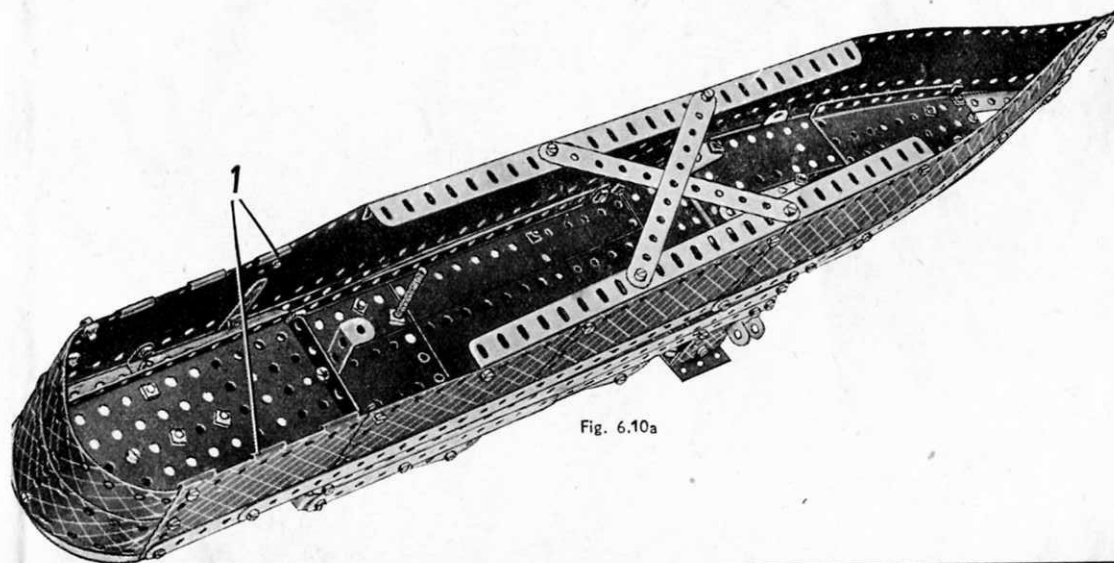
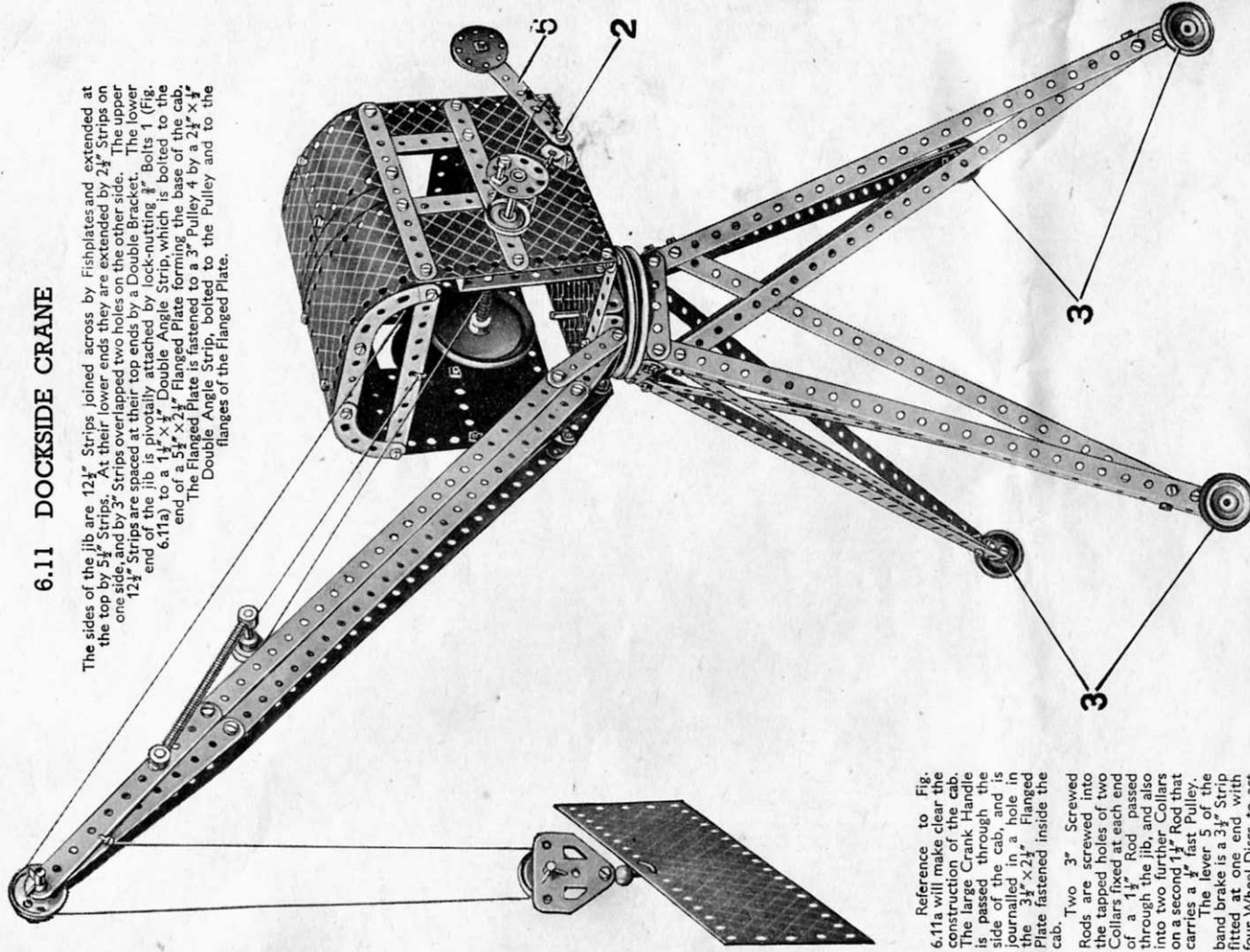


Fig. 6.10a

6.11 DOCKSIDE CRANE

The sides of the jib are 12½" Strips joined across by Fishplates and extended at the top by 5½" Strips. At their lower ends they are extended by 2½" Strips on one side and by 3" Strips overlapped two holes on the other side. The lower 12½" Strips are spaced at their top ends by a Double Bracket. The lower end of the jib is pivotally attached by lock-nutted ½" Bolts 1 (Fig. 6.11a) to a 1½" x 2½" Double Angle Strip, which is bolted to the end of a 5½" x 2½" Flanged Plate forming the base of the cab. The Flanged Plate is fastened to a 3" Pulley 4 by a 2½" x ½" Double Angle Strip, bolted to the Pulley and to the flanges of the Flanged Plate.



Reference to Fig. 6.11a will make clear the construction of the cab.

The large Crank Handle is passed through the side of the cab, and is journaled in a hole in the 3½" x 2½" Flanged Plate fastened inside the cab.

Two 3" Screwed Rods are screwed into the tapped holes of two Collars fixed at each end of a 1½" Rod passed through the jib, and also into two further Collars on a second 1½" Rod that carries a ½" fast Pulley.

The lever 5 of the band brake is a 3½" Strip fitted at one end with four Wheel Discs to act as a weight.

The other end of the Strip is pivoted on a lock-nutted ½" Bolt 2, which carries two Washers on its shank for spacing purposes. Cord is tied to Strip 5, led around a 1" Pulley on a Rod passed through the side of the cab, and finally tied to a Reversed Angle Bracket. The superstructure is free to swivel on a 2" Rod, which is locked in the boss of the lower 3" Pulley but is free in the boss of 3" Pulley 4. The 1" Pulleys 3, fitted with Rubber Rings, are attached by ½" Bolts to Obtuse Angle Brackets at the base of the legs. The Bolts carry two Washers on their shanks for spacing purposes.

Luffing is controlled by a Cord that is first wound around the 5" Rod carrying the Bush Wheel, then passed around the ½" fast Pulley in the jib, and finally tied to the 5½" Strip at the front of the cab.

The hoisting movement is controlled by a second Cord that is wound around the Crank Handle, then passed over the 5½" Strip previously mentioned, and over a 1" loose Pulley on a 2" Rod at the jib-head. It is then led over a 1" loose Pulley in the pulley block and finally tied to the jib.

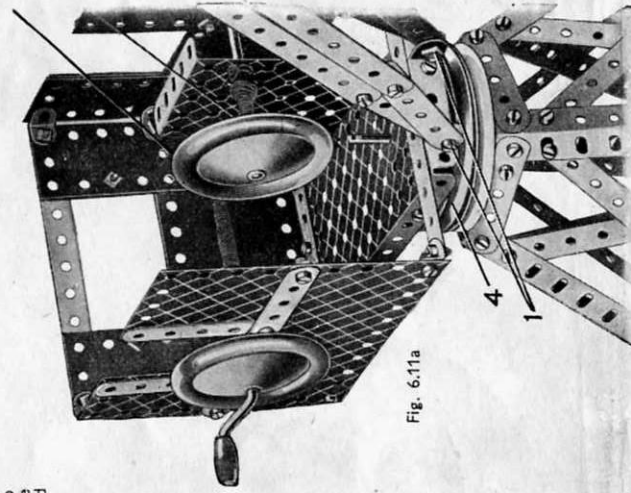


Fig. 6.11a

Parts required		1 of No. 19h		1 of No. 53	
12 of No.	1	5 "	22	1 "	57c
13 "	2	2 "	22a	4 "	59
1 "	3	1 "	23a	2 "	80c
2 "	4	1 "	24	2 "	90a
12 "	5	4 "	24a	2 "	111a
4 "	8	7 "	35	6 "	111c
4 "	10	91 "	37	1 "	125
1 "	11	7 "	37a	2 "	126a
12 "	12	14 "	38	1 "	147b
6 "	12c	1 "	38d	4 "	155
1 "	15	1 "	40	2 "	187
2 "	17	1 "	48	4 "	188
2 "	18a	1 "	48a	2 "	189
1 "	18b	1 "	52	3 "	190
2 "	19b	1 "			
		2 of No. 191	4 of No. 192		

6.12 EIFFEL TOWER

Two sides of the lower platform at the top of the tower are formed by $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates fastened to the frame by Reversed Angle Brackets. The other two sides are each constructed from a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate and a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate bolted together overlapping one hole, and they also are secured to the frame by Reversed Angle Brackets. The top platform consists of three $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates bolted together and attached by $1'' \times 1''$ Angle Brackets to the top of the frame. Four $2\frac{1}{2}''$ Strips are curved slightly and fastened by Obtuse Angle Brackets to the $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates.

Several of the Flexible Plates have been removed in Fig. 6.12a to show the construction of the top of the frame and the arrangement of the Pulleys and Bush Wheel on the compound rod at the top of the tower.

Each of the lifts consists of two Double Brackets joined by Fishplates, and an Angle Bracket is fastened to the side of each lift to receive the guide Cord 1. The operating cable consists of two Cords of equal length. The first of these is tied to the bottom of one lift, taken around the $1''$ Pulley on the Crank Handle and then tied to the bottom of the other lift. The second Cord is tied to the roof of the second lift, taken over the $1''$ loose Pulley at the top of the tower and then tied to the top of the first lift.

The guide Cord is anchored to a Washer 2, and is pushed through the Angle Bracket on the outside of one lift, then taken through the end holes on the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate 4, across the back of the Flanged Plate, to similar holes on the other side. It then passes upwards through the Angle Bracket of the second lift to the top of the model, where it is secured to Bolt 3.

The lifts should be spaced on the Cord so that when one reaches the top of the tower the other is at the bottom.

12 of No.	1	4	of No.	10
10	"	2	"	11
1	"	4	"	12
4	"	5	"	12a
4	"	8	"	12c
			"	15
			"	16
			"	17
			"	19g
			"	22
			"	22a
			"	24
			"	24a
			"	35
			"	37
			"	37a
			"	38
			"	38d
			"	40
			"	48a
			"	48b
			"	51
			"	52
			"	53
			"	59
			"	111
			"	125
			"	126
			"	155
			"	187
			"	188
			"	189
			"	190
			"	213
			"	214
			"	215
			"	4

Parts required

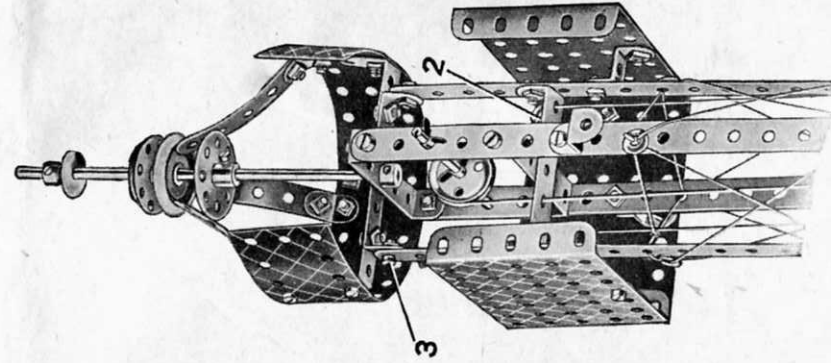
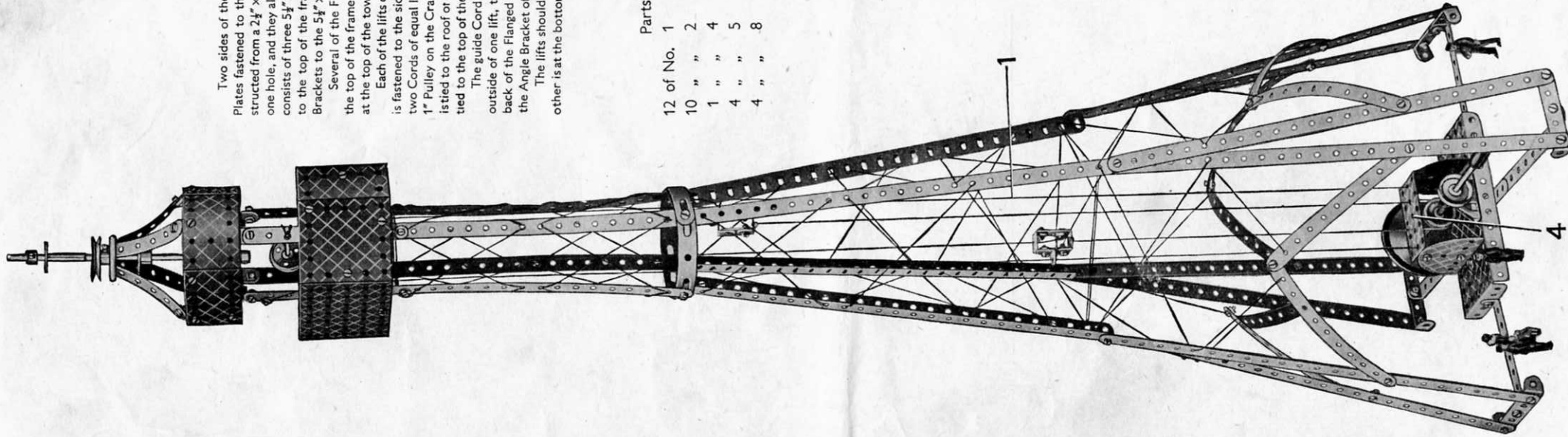


Fig. 6.12a

This Model can be built with MECCANO No. 6 Outfit (or No. 5 and No. 5a Outfits)

This Model can be built with MECCANO No. 6 Outfit (or No. 5 and No. 5a Outfits)

6.13 MECHANICAL HORSE AND TRAILER

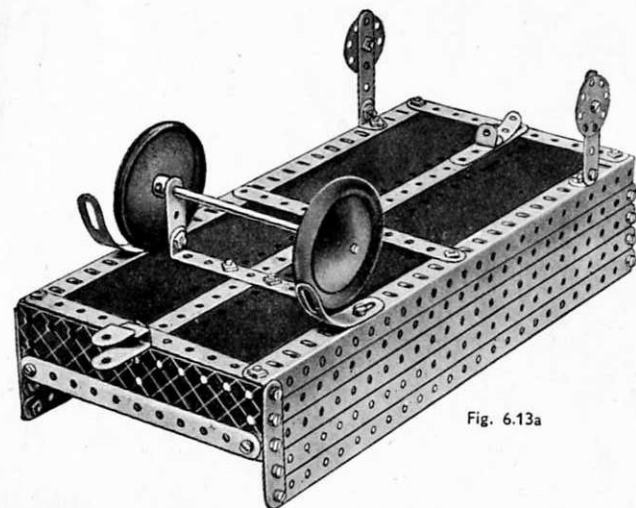
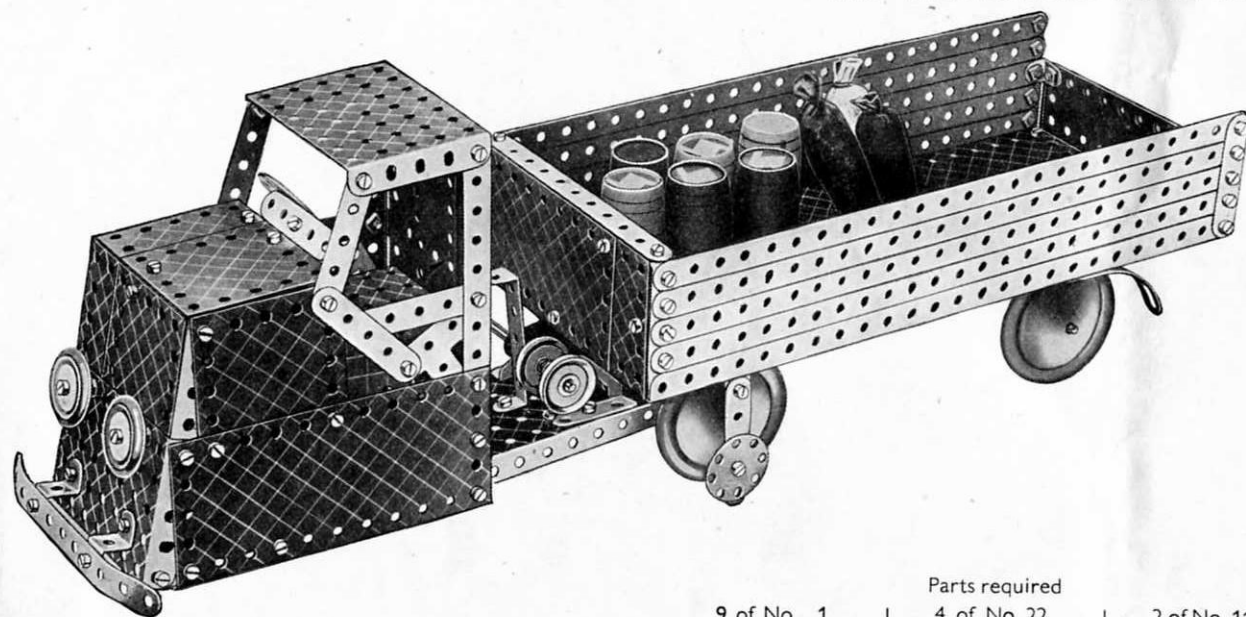


Fig. 6.13a

9 of No. 1
10 " " 2
3 " " 3
2 " " 4
12 " " 5
2 " " 6a
2 " " 8
2 " " 10
16 " " 12
2 " " 12a
3 " " 12c
2 " " 15
1 " " 15a
2 " " 16
1 " " 19b
1 " " 19g

Parts required
4 of No. 22
1 " " 24
2 " " 24a
5 " " 35
105 " " 37
6 " " 37a
4 " " 38
2 " " 38d
1 " " 44
1 " " 48
5 " " 48a
2 " " 48b
1 " " 51
1 " " 52
2 " " 53
2 " " 90

2 of No. 111
2 " " 111a
4 " " 111c
4 " " 125
2 " " 126
3 " " 126a
1 " " 147b
2 " " 155
4 " " 187
4 " " 188
4 " " 189
6 " " 190
2 " " 191
2 " " 192
2 " " 197
2 " " 215

The cab and bonnet of the mechanical horse are first constructed, and are built up on a base consisting of two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Strips bolted to the flanges of a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate. Two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates are bolted to the $5\frac{1}{2}''$ Strips so that the Strips are extended one hole beyond the edge of the Flexible Plates, thus allowing the $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate representing the radiator to be sloped backwards and bolted to the Flexible Plates. Two $3''$ Strips are bolted inside the flanges of the $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate and they overlap the flanges two holes. Two $5\frac{1}{2}''$ Strips overlap the rear ends of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates by three holes, and $1'' \times 1''$ Angle Brackets are bolted to the lower rear corners of the two Flexible Plates for the purpose of holding the back in position.

Each side of the bonnet is completed by bolting a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate to the $3''$ Strip and also to the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate. The upper rear corners of the $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates are joined across by a $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip, each Bolt holding also a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate and two $2\frac{1}{2}''$ Strips. One of the $2\frac{1}{2}''$ Strips is bolted to a Flat Trunnion and the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate, and the other is used to support the $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate that represents the roof of the cab.

The upper part of the radiator is completed by two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates overlapped three holes. They are attached to the $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate by the $\frac{1}{2}''$ Bolts that hold in place the $1''$ Pulleys and $\frac{3}{4}''$ Washers representing the headlamps. Two further $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates are attached by an Angle Bracket to those previously mentioned, and are bolted also to the $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip spacing the sides of the bonnet.

The back of the cab consists of two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates overlapped three holes and bolted to the $1'' \times 1''$ Angle Brackets. The upper portion of the back is completed by overlapping three $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates along their long edges and bolting them at their top ends to a $3\frac{1}{2}''$ Strip and to Angle Brackets.

The driving seat is a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate attached to the back of the cab by an Angle Bracket.

The steering wheel is a Bush Wheel held on a $3\frac{1}{2}''$ Rod. The Rod is passed through the hole of an Obtuse Angle Bracket bolted to the $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip. It is held by a Spring Clip in the hole of a Fishplate, which is bolted to an Angle Bracket fastened to the side of the bonnet.

The single front wheel is a $3''$ Pulley, which is free to turn on a $3\frac{1}{2}''$ Rod, and is retained in position by two Spring Clips. The Rod is journaled in holes in two Reversed Angle Brackets bolted to the sides of the bonnet.

The rear part of the chassis is a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, and it carries a ramp built as follows. Two Trunnions are bolted to the Flanged Plate, and a $3\frac{1}{2}''$ Strip and a $2\frac{1}{2}''$ Strip are bolted to each Trunnion as shown in Fig. 6.13c. The $2\frac{1}{2}''$ Strips are extended by $2\frac{1}{2}''$ large radius Curved Strips, which are bolted also to a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip fixed to the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate. A Flat Trunnion is attached to an Obtuse Angle Bracket held by the same Bolt as the $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip. The Crank Handle is passed through holes in the $2\frac{1}{2}''$ Strips forming the ramp, and two $1''$ Pulleys are secured to it, one on each side of the near $2\frac{1}{2}''$ Strip. The inner $1''$ Pulley is fitted with a $\frac{1}{2}''$ Bolt, which is used to allow the trailer to be unhitched from the power unit. The $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip at the end of the ramp acts as a stop for the trailer.

(Continued on next page)

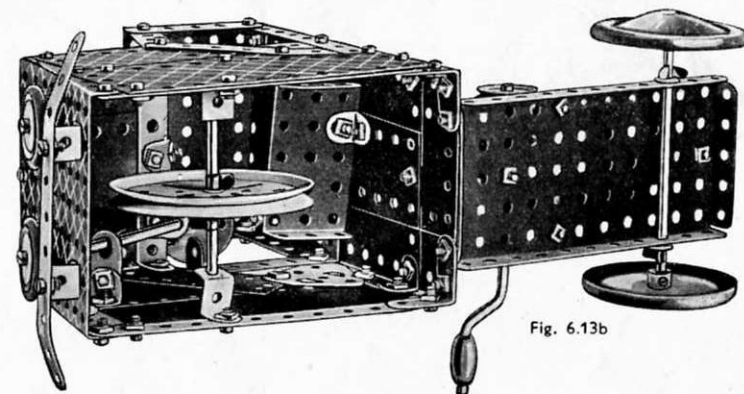


Fig. 6.13b

(Continued from previous page)

An underneath view of the trailer is shown in Fig. 6.13a. Its main members are $12\frac{1}{2}$ " Angle Girders, joined across by a $5\frac{1}{2}$ " Strip at each end. At the centre a $12\frac{1}{2}$ " Strip is bolted across the $5\frac{1}{2}$ " Strips, and the floor is filled in with two $12\frac{1}{2}$ " Strip Plates. Each of the sides is built up from four $12\frac{1}{2}$ " Strips, bolted at the rear end to a $2\frac{1}{2}$ " Strip and at the front end to a $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip. The front end of the trailer consists of two $4\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates overlapped seven holes, and attached by Angle Brackets to the bottom and sides. The rear end is a $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plate fixed to a $5\frac{1}{2}$ " Strip and attached to the sides by Angle Brackets, and the rear coupling hook is a Stepped Bent Strip bolted to a Fishplate.

The rear Road Wheels are carried on a $4\frac{1}{2}$ " Rod journaled in $1\frac{1}{2}$ " Strips bolted to a $3\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip. The front wheels are Wheel Discs bolted to $2\frac{1}{2}$ " Strips attached by Angle Brackets to the Angle Girders.

The $2\frac{1}{2}$ " Strip seen underneath the trailer in Fig. 6.13a, is fitted with an Angle Bracket, which engages with the Flat Trunnion forming part of the ramp on the mechanical horse.

When the Crank Handle is turned the $\frac{3}{4}$ " Bolt in the boss of the inner Pulley lifts the front of the trailer and releases the Angle Bracket from behind the Flat Trunnion.

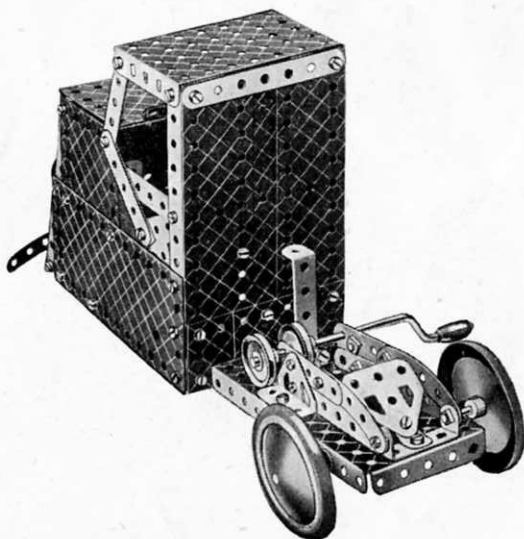
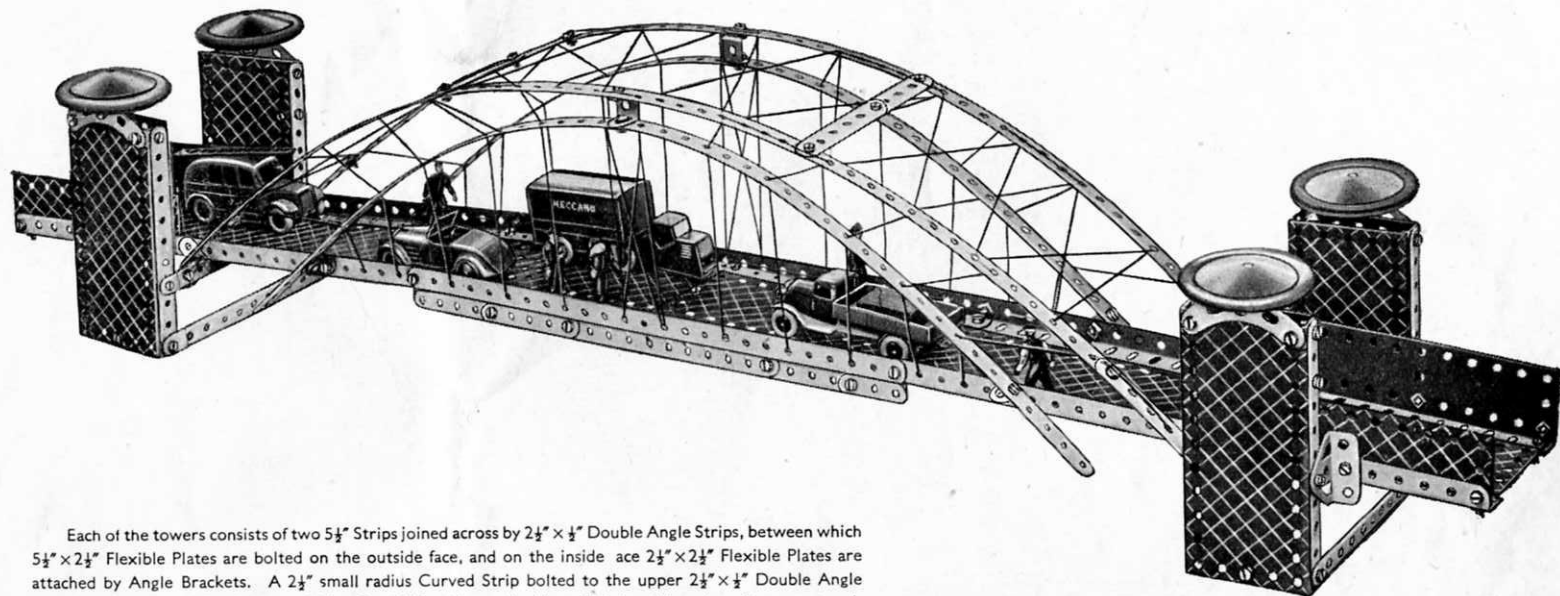


Fig. 6.13c

6.14 SYDNEY HARBOUR BRIDGE



Each of the towers consists of two $5\frac{1}{2}$ " Strips joined across by $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strips, between which $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates are bolted on the outside face, and on the inside face $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates are attached by Angle Brackets. A $2\frac{1}{2}$ " small radius Curved Strip bolted to the upper $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip carries an Angle Bracket, to which a Road Wheel is attached by a $\frac{3}{4}$ " Bolt. The pairs of towers at each end of the bridge are joined across by two $5\frac{1}{2}$ " Strips and a compound strip formed from two $3\frac{1}{2}$ " Strips.

Each side of the span consists of two Angle Girders joined together by two $12\frac{1}{2}$ " Strips arranged in the form of an angle girder. The two sides are connected by $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plates held by the same Bolts as the $12\frac{1}{2}$ " Strips, and also by a $3\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip at the centre. The roadway at the centre of the span is represented by two $4\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates overlapped one hole and bolted between the $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plates. The remainder of the roadway consists of $12\frac{1}{2}$ " \times $2\frac{1}{2}$ " Strip Plates, attached to the $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plates at one end and clamped between Fishplates and the Angle Girders at the other end. The sides of the approach roadways are $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates bolted to the Angle Girders of the span. The completed span is attached to each pair of towers by a Trunnion bolted in the position shown in the illustration.

The top of the suspension arch on each side consists of two $12\frac{1}{2}$ " Strips, bolted together and extended at each end by a $2\frac{1}{2}$ " Strip. An Obtuse Angle Bracket and an Angle Bracket are bolted to the end of the $2\frac{1}{2}$ " Strip, the Angle Bracket being attached to the span and the Obtuse Angle Bracket to the upper $5\frac{1}{2}$ " Strip spacing the towers. The inside of the arch is made of two $12\frac{1}{2}$ " Strips fixed by Angle Brackets to the sides of the roadway and connected by a Double Bracket to the other arch at its centre.

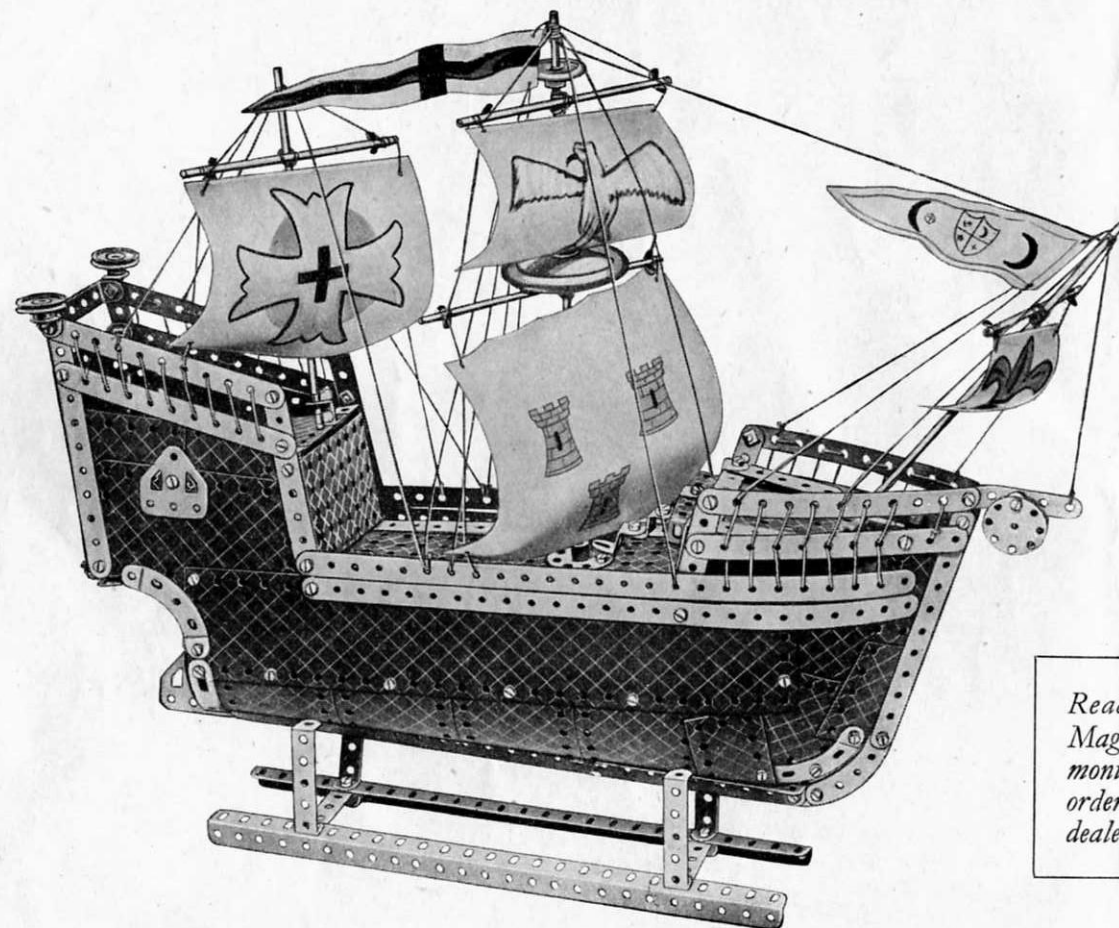
The arches on each side are braced across by compound strips, each of which consists of a $3\frac{1}{2}$ " Strip and a 3 " Strip overlapped three holes. The model is completed by adding the roadway suspension cables, which are represented by Cord and are arranged as shown in the illustration.

Parts required

12 of No. 1	16 of No. 12	2 of No. 111
14 " " 2	4 " " 12c	2 " " 111a
4 " " 3	103 " " 37	6 " " 111c
2 " " 4	6 " " 37a	2 " " 126
10 " " 5	1 " " 40	4 " " 187
2 " " 6a	8 " " 48a	4 " " 189
4 " " 8	1 " " 48b	4 " " 190
4 " " 10	2 " " 53	2 " " 191
2 " " 11	4 " " 90a	4 " " 192
	2 of No. 197	

This Model can be built with MECCANO No. 6 Outfit (or No. 5 and No. 5a Outfits)

6.15 GALLEON



Read the "Meccano Magazine," published monthly. Place a regular order with your Meccano dealer or newsagent.

Parts required

6 of No. 1	13 of No. 12	3 of No. 22	2 of No. 48	2 of No. 90	4 of No. 188	2 of No. 199
14 " " 2	1 " " 12c	1 " " 24	7 " " 48a	4 " " 90a	3 " " 189	2 " " 200
3 " " 3	1 " " 13	2 " " 24a	2 " " 48b	3 " " 111c	4 " " 190	1 " " 212
2 " " 4	1 " " 14	13 " " 35	1 " " 51	4 " " 125	2 " " 191	2 " " 213
12 " " 5	2 " " 15	104 " " 37	1 " " 52	3 " " 126a	4 " " 192	2 " " 214
2 " " 6a	1 " " 15a	1 " " 37a	2 " " 53	1 " " 155	2 " " 197	2 " " 215
4 " " 8	1 " " 15b	4 " " 38	1 " " 54	1 " " 187	1 " " 198	
5 " " 10	4 " " 16	2 " " 40				

Construction is commenced by bolting four $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates and one $5\frac{1}{2}" \times 1\frac{1}{2}"$ Flexible Plate to one of the two Angle Girders forming the keel of the vessel, as shown in Fig. 6.15b. Two Formed Slotted Strips also are bolted to the Angle Girders at the stern. The $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates are extended on the rear side of the model by two $5\frac{1}{2}" \times 1\frac{1}{2}"$ Flexible Plates overlapping each other one hole. Two $12\frac{1}{2}" \times 2\frac{1}{2}"$ Strip Plates are then bolted to each side of the model in the positions shown, and the sides are curved up and joined across at the stern by two $2\frac{1}{2}"$ Strips overlapped one hole, and by Angle Brackets.

The keel is extended at the bows by $2\frac{1}{2}"$ large radius Curved Strips and by two $5\frac{1}{2}"$ Strips fastened together by Angle Brackets. The stern is filled in by two Semi-Circular Plates, which are bolted to a $2\frac{1}{2}" \times 1\frac{1}{2}"$ Flanged Plate and attached by a Fishplate to the $2\frac{1}{2}"$ Strips spacing the sides, the Bolt holding also two $1\frac{1}{2}"$ radius Curved Plates.

One half of a Hinged Flat Plate is used for one side of the poop, and the other half is used for the poop deck, and is bolted to a $3\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strip.

The main deck consists of a $3\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate bolted across the ship just in front of the forecabin, and to it two $12\frac{1}{2}"$ Strips are bolted one on each side. These Strips support a $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate by means of Angle Brackets.

The forecabin is spaced across by a $3\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strip to which is bolted a Flanged Sector Plate forming the deck, and two $1\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips. The $5\frac{1}{2}"$ Strips forming the rails of the forward deck are bolted to the ends of $1\frac{1}{2}"$ Strips extending the bows. The bows are completed by bolting one U-Section Curved Plate to the $5\frac{1}{2}"$ Strips forming the sides of the upper deck, and another U-Section Curved Plate to the $2\frac{1}{2}"$ small radius Curved Strips near the keel.

The mainmast is an $11\frac{1}{2}"$ Rod held in the boss of a Bush Wheel bolted to the $3\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate forming part of the deck, and it carries a $5"$ Rod and a $4\frac{1}{2}"$ Rod, which represent spars. The mast on the poop is made from two Rods joined by a Rod Connector. It is passed through a hole in a Reversed Angle Bracket bolted to the poop, and through a hole in the deck, and is held in position by Spring Clips. This mast carries a $3\frac{1}{2}"$ Rod as a spar.

(Continued on next page)

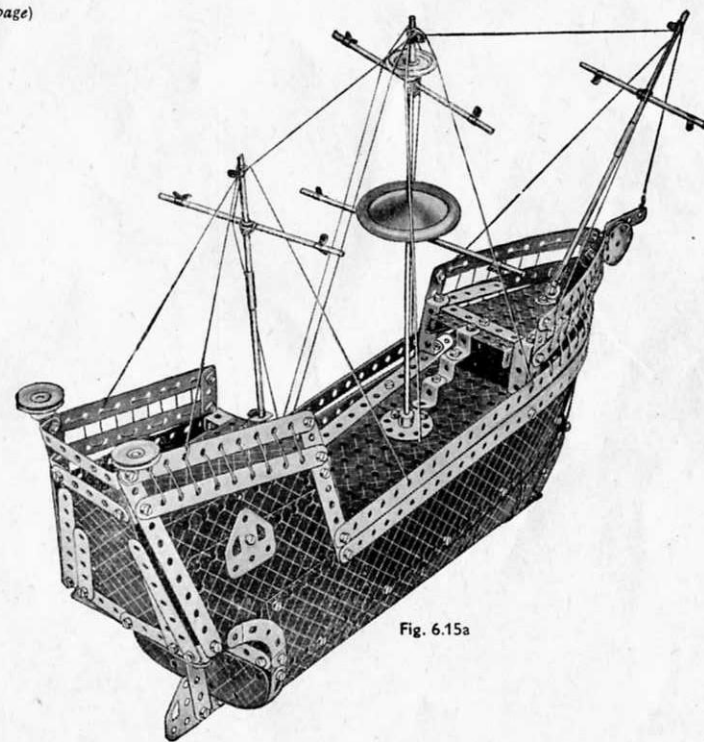


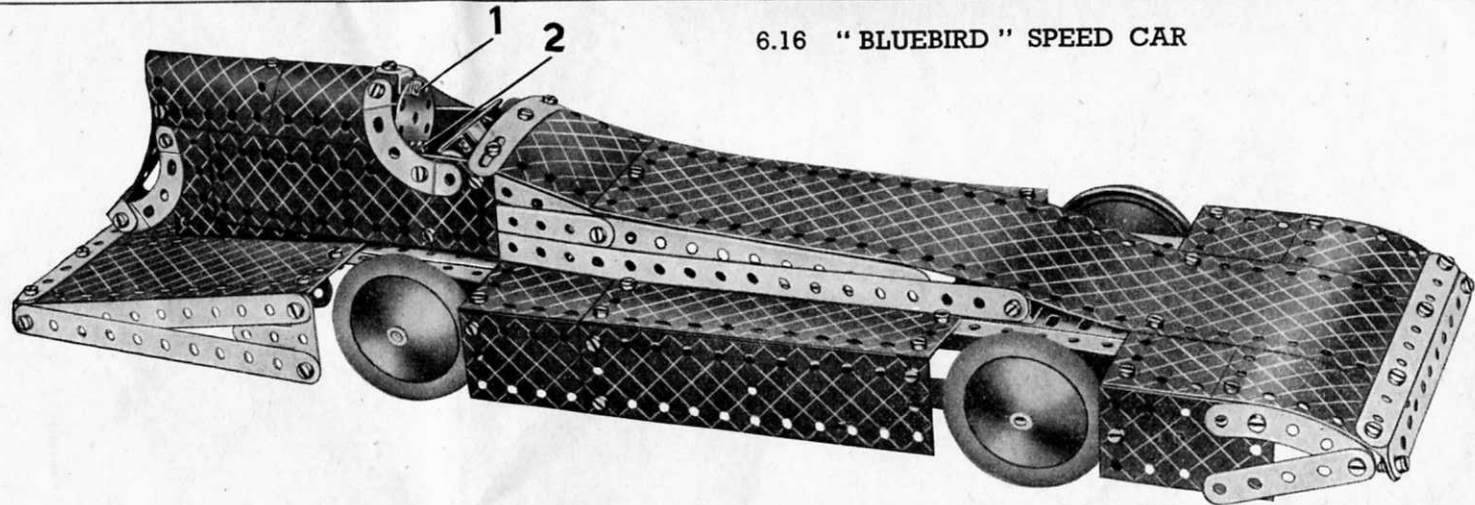
Fig. 6.15a

(Continued from previous page)

The forward mast also is a 5" Rod joined to a 3½" Rod by a Rod Connector, and it is mounted in a Rod and Strip Connector attached to the Flanged Sector Plate by an Obtuse Angle Bracket. The spars are fastened to the mast by Cord, and the method of rigging the model is shown in Fig. 6.15a.

The sails and pennant can be cut from white cardboard or stiff paper. The topsail is 5" long at its upper edge, 5½" long at its lower edge, and 3½" wide. The mainsail is 5½" long, broadening to 6½" at its lower edge, and 5" in width. The foresail is 3½" long, broadening to 4", and 2½" wide, and the sail on the after mast is 5" in length broadening to 5½", and is 4½" in width. The pennant is 6" long and 1" wide.

The model is carried on a stand made by joining two 12½" Angle Girders across by 2½" x ½" Double Angle Strips. Four 2½" x ½" Double Angle Strips are bolted to the Angle Girders in an upright position, and they are bent inward slightly so that the keel of the galleon can rest on their ends.



6.16 "BLUEBIRD" SPEED CAR

The chassis is built up as shown in Fig. 6.16a. It consists of four Angle Girders, pairs of which are joined across at the rear end by Flat Trunnions, and at the front by 1½" Strips bolted in the fourth holes from the front ends of the Angle Girders. These form bearings for the axles. The lower Angle Girders or side members are joined together at the rear by a 2½" Strip, and at the front by a 3½" x 2½" Flanged Plate. The upper Angle Girders are joined across by three 5½" Strips, two of which are bolted five holes from the rear ends and seven holes from the front ends of the Angle Girders respectively, to form supports for the streamlined casing between the wheels.

Two 12½" Strips overlapping the chassis 13 holes extend the tail of the car, which consists of two Flanged Sector Plates bolted by the flanges of their broad ends to a 2½" x ½" Double Angle Strip on one edge, and to an Angle Bracket on the other edge. The narrow ends of the two Flanged Sector Plates are spaced one hole apart, and are bolted in the second hole in their flanges to a 5½" Strip. Two 2½" small radius Curved Strips and a 2½" Strip are bolted to a Double Bracket and fixed as shown. Two U-Section Curved Plates overlapped one hole also are bolted to the Flanged Sector Plates, and are joined to the 5½" x 1½" Flexible Plates by 2½" small radius Curved Strips.

Two 5½" x 2½" Flexible Plates are bolted between the two 5½" Strips to form the rear wheel fairings, and the 5½" Strips forming the sides are bolted to a Flat Trunnion and a Double Bracket. The engine and cockpit fairing consists of a 12½" x 2½" Strip Plate and a 2½" x 2½" Flexible Plate, bolted at the join to a 2½" x ½" Double Angle Strip. The last named is joined in turn to two 5½" Strips that fill in the side of the fairing. The method of building up the streamlined radiator will be clear from the general view of the model.

The front and rear axles are 5" Rods held in place by Collars. They carry a 1" Pulley, fitted with Rubber Ring, and a Road Wheel at each end. The headrest is a Wheel Disc lock-nutted to Bolt 1. Bolt 2 holds in place a second Wheel Disc, which in turn is bolted at right angles to a third Disc 3 by means of Reversed Angle Bracket.

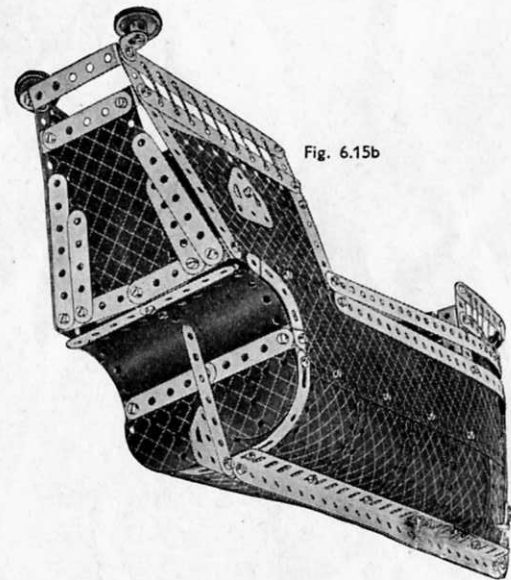


Fig. 6.15b

Parts required

4 of No. 1	1 of No. 24	2 of No.126
13 " " 2	3 " " 24a	4 " " 126a
4 " " 3	95 " " 37	4 " " 155
2 " " 4	1 " " 37a	4 " " 187
6 " " 5	2 " " 48	4 " " 188
2 " " 6a	5 " " 48a	4 " " 189
4 " " 8	1 " " 53	5 " " 190
3 " " 11	2 " " 54	4 " " 192
14 " " 12	4 " " 59	1 " " 197
1 " " 12a	2 " " 90	2 " " 199
2 " " 12c	4 " " 60a	2 " " 200
2 " " 15	1 " " 111	1 " " 215
4 " " 22	1 " " 125	

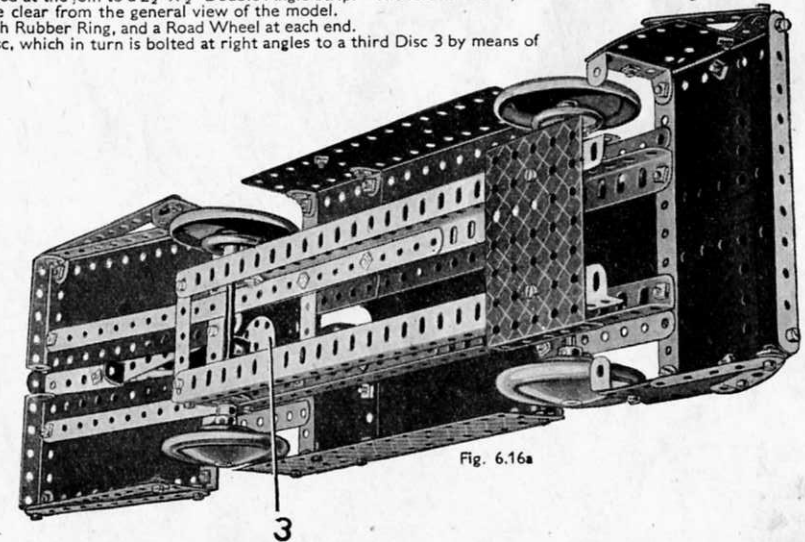


Fig. 6.16a

6.17 WINDMILL

The corners of the main frame are four Angle Girders, connected at their lower ends by $5\frac{1}{2}$ " Strips and at their upper ends by $2\frac{1}{2}$ " Strips. The sides are filled in with $12\frac{1}{2}$ " \times $2\frac{1}{2}$ " Strip Plates and at the front Flexible Plates are used in order to leave a space for the doorway. A $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate fastened to the front $5\frac{1}{2}$ " Strip by Angle Brackets forms a platform in front of the doorway.

The top portion of the windmill is constructed as follows: Two Flanged Sector Plates are bolted together at right angles by their flanges at the narrow end. Two $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates are then bolted across the flanges at the wide ends of the Flanged Sector Plates. The lower corners of the $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates are braced across by $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strips, the Bolts holding also $2\frac{1}{2}$ " small radius Curved Strips, which in turn are bolted to the upper ends of the Angle Girders forming the corners of the main frame.

A superstructure (Fig. 6.17a) is erected at the rear to hold the directional vanes. It is constructed by fastening two compound strips, each consisting of a $5\frac{1}{2}$ " and a $2\frac{1}{2}$ " Strip, to the back $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate by a $1\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip. The compound strips are braced by two $2\frac{1}{2}$ " Stepped Curved Strips, also fastened to the $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate by a $1\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip. A 2" Rod, journaled in the end holes of the compound strips, carries at its end a Bush Wheel, to which are bolted $2\frac{1}{2}$ " Strips representing the vanes.

The construction of the sails, and the manner in which they are mounted, are clear from the illustration.

A Crank Handle journaled as shown in Fig. 6.17a carries on its shaft a 1" Pulley, that is connected by a Driving Band to a $\frac{1}{2}$ " Pulley on a 5" Rod midway up the frame. A 1" fast Pulley, also on the 5" Rod, is connected by Cord to the 3" Pulley on the shaft of the sails, and a 1" Pulley on this shaft is connected by a Driving Band with the 2" Rod carrying the directional vanes.



Parts required

8 of No. 1	1 of No. 15	2 of No. 38	2 of No. 90
14 " " 2	1 " " 17	1 " " 40	4 " " 90a
4 " " 3	2 " " 19b	1 " " 48	4 " " 111c
2 " " 4	1 " " 19g	5 " " 48a	1 " " 126
12 " " 5	3 " " 22	2 " " 48b	2 " " 126a
2 " " 6a	1 " " 23a	1 " " 51	1 " " 186
4 " " 8	1 " " 24	1 " " 52	1 " " 186a
6 " " 12	2 " " 35	1 " " 53	1 " " 187
1 " " 12a	92 " " 37	2 " " 54	2 " " 189
1 " " 13	4 " " 37a	4 " " 59	4 " " 192
			2 " " 197

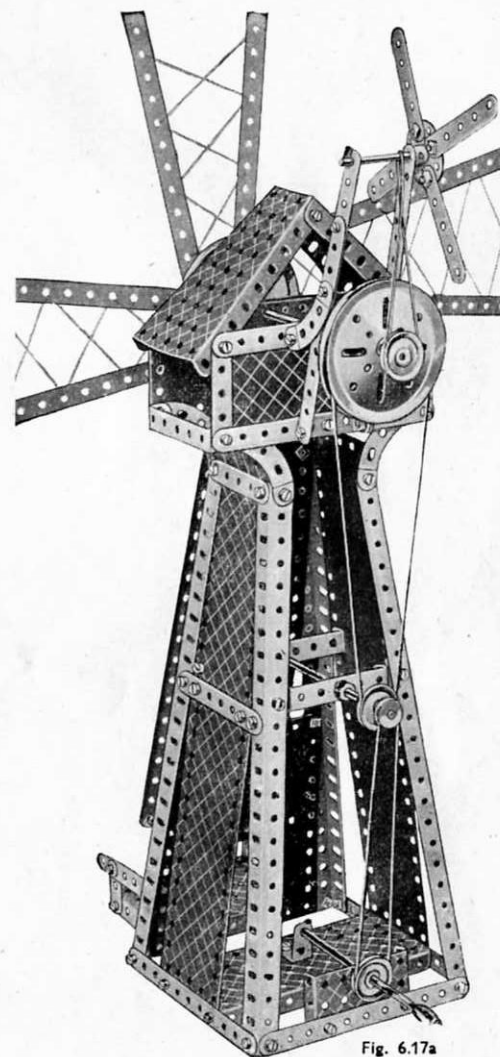


Fig. 6.17a

6.18 FLYBOATS

The base consists of two $12\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plates, joined at each end by $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates and strengthened by $5\frac{1}{2}''$ Strips bolted to the ends of the base. Four Angle Girders are bolted to the base as shown in the illustration, and pairs of them are joined at the top by compound strips, each of which consists of two $5\frac{1}{2}''$ Strips overlapped, five holes. The Angle Girders are braced across by $12\frac{1}{2}''$ Strips.

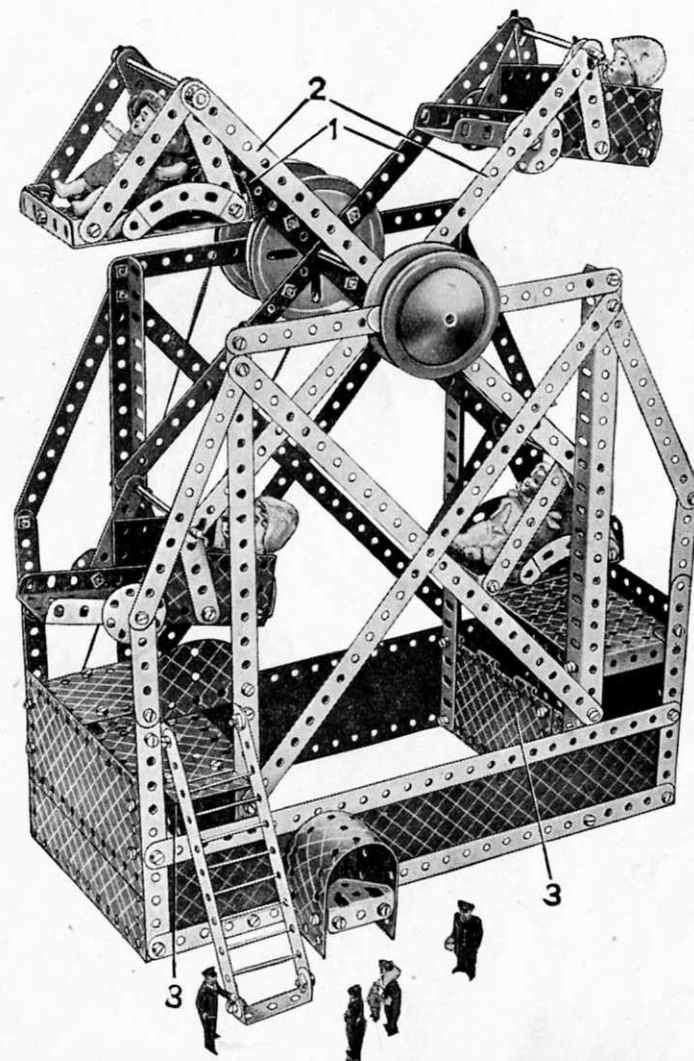
The centre pin is withdrawn from a Hinged Flat Plate and the halves are used as flat plates 3. The $12\frac{1}{2}''$ Strips 1 and 2 form the supports for the carriages. The Strips 2 are bolted across a Bush Wheel mounted on the $6\frac{1}{2}''$ Rod forming the main shaft. Strips 1 are bolted across a $3''$ Pulley also secured on the $6\frac{1}{2}''$ Rod.

Two of the carriages are made by fastening $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips inside the flanges of a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate. Two $3''$ Strips and two $3\frac{1}{2}''$ Strips are then bolted to the ends of the $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips. A $4''$ Rod passes through the holes in these Strips and through the end holes of the $12\frac{1}{2}''$ Strips 1 and 2. A back is provided by a U-Section Curved Plate bolted to the rear of the $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, and the sides are formed by $2\frac{1}{2}''$ small radius Curved Strips.

The base of each of the other two carriages is a Flanged Sector Plate. The sides consist of $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates, and bearings for the $3\frac{1}{2}''$ Rods on which the carriages are supported are provided by the end holes of $2\frac{1}{2}''$ Strips, bolted to the flanges of the Flanged Sector Plate. The back is formed by two Flat Trunnions fixed to a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip secured between the flanges of the Flanged Sector Plate.

The Crank Handle (Fig. 6.18a) by which the carriages are set in motion, is journaled in the $12\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plate forming the rear side of the base, and also in a $1'' \times 1''$ Angle Bracket. The $1'' \times 1''$ Angle Bracket is bolted to the half of a Hinged Flat Plate used in the construction of the left-hand platform. The drive is taken by Cord from a $1''$ Pulley on the shaft of the Crank Handle to a $3''$ Pulley on the main shaft.

The pay-box consists of a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate bent to shape, and is secured to the base by a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip. The counter is formed by a Trunnion, and is fastened in position by Angle Brackets.



Parts required

12 of No. 1	2 of No. 16	1 of No. 40	4 of No. 126a
14 " " 2	2 " " 19b	2 " " 48	2 " " 187
4 " " 3	1 " " 19g	8 " " 48a	4 " " 188
2 " " 4	3 " " 22	2 " " 48b	2 " " 189
12 " " 5	1 " " 23a	1 " " 52	4 " " 190
2 " " 6a	1 " " 24	2 " " 53	4 " " 192
4 " " 8	4 " " 24a	2 " " 54	2 " " 197
8 " " 12	14 " " 35	3 " " 59	1 " " 198
1 " " 12a	105 " " 37	4 " " 90a	2 " " 199
1 " " 14	6 " " 37a	6 " " 111c	1 " " 214
2 " " 15b	8 " " 38	1 " " 126	

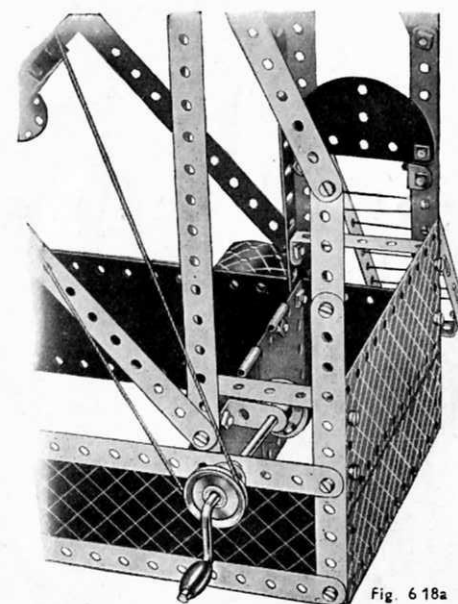


Fig. 6.18a

This Model can be built with MECCANO No. 6 Outfit (or No. 5 and No. 5a Outfits)

6.19 GIANT DRAGLINE

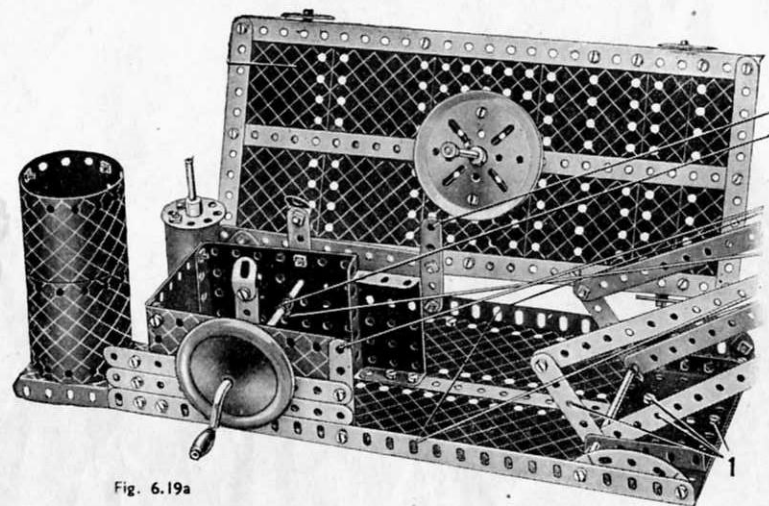


Fig. 6.19a

12 of No.	1
12 "	2
3 "	3
8 "	5
2 "	6a
4 "	8
2 "	10
2 "	11
3 "	12
2 "	12c
1 "	14
1 "	15
1 "	15a
2 "	15b
2 "	16
1 "	17
1 "	18b
2 "	19b
1 "	19h
4 "	22

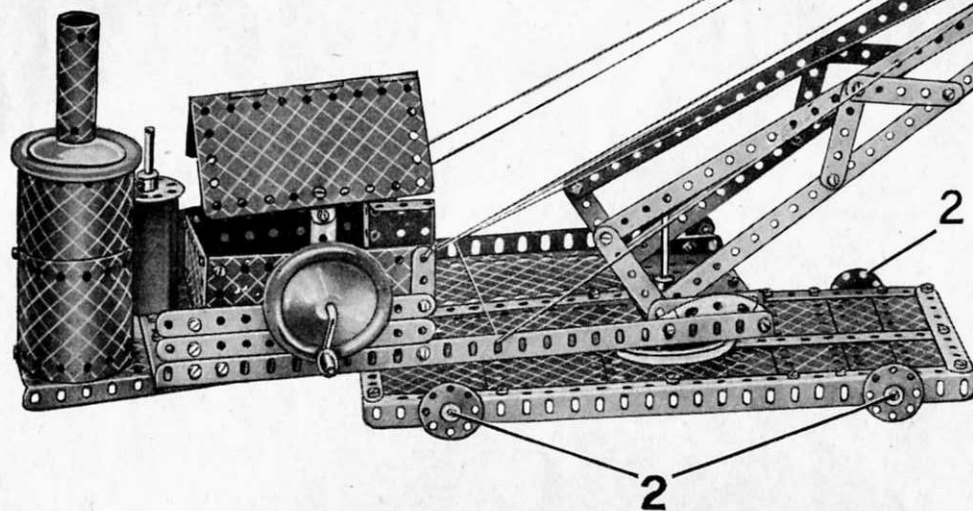
2 of No.	22a
1 "	24
4 "	24a
5 "	35
97 "	37
14 "	37a
7 "	38
1 "	40
2 "	48
3 "	48a
1 "	48b
1 "	51
1 "	52
2 "	53

Parts required

2 of No.	54
1 "	57c
3 "	59
1 "	80c
2 "	90a
2 "	111a
6 "	111c
4 "	125
4 "	126a
1 "	147b

2 of No.	187
4 "	189
4 "	190
4 "	192
2 "	197
1 "	198

1 of No.	199
2 "	200
1 "	216



The base is constructed by joining two Angle Girders at each end by a $5\frac{1}{2}$ " Strip. It is then filled in by a $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flanged Plate and different sized Flexible Plates. The Bolts 2 carrying the Wheel Discs are lock-nutted. A 3" Pulley Wheel is bolted to the centre of the $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flanged Plate. The control platform is built up in a similar manner to the base, but is filled in by two $12\frac{1}{2}$ " Strip Plates. A 3" Pulley is secured under the forward end of the platform by four Reversed Angle Brackets, which are held by the Bolts shown at 1. A 4" Rod is passed through the upper 3" Pulley, and its lower end is gripped in the 3" Pulley bolted to the base. The platform, therefore, is free to swivel, but is retained in position on the Rod by a Collar.

The rear side of the cab (Fig. 6.19a) consists of two $2\frac{1}{2}$ " x $2\frac{1}{2}$ " Flexible Plates, overlapped one hole and fastened to the Angle Girder at the edge of the platform. The rear side of the cab is formed by a $3\frac{1}{2}$ " x $2\frac{1}{2}$ " Flanged Plate and a $2\frac{1}{2}$ " x $1\frac{1}{2}$ " Flanged Plate. The $3\frac{1}{2}$ " x $2\frac{1}{2}$ " Flanged Plate is secured to the base by a $3\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strip, and the $2\frac{1}{2}$ " x $1\frac{1}{2}$ " Flanged Plate is bolted in position by its flange. A Hinged Flat Plate is used for the roof, and it is attached by Obtuse Angle Brackets to two $1\frac{1}{2}$ " Strips bolted to the sides. The boiler consists of two $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flexible Plates and two $1\frac{1}{2}$ " radius Curved Plates.

The chimney is formed by bending a U-Section Curved Plate so that the two ends overlap. A Bolt is fastened through the overlapping portions, and carries also an Angle Bracket inside the chimney. A $6\frac{1}{2}$ " Rod, on the end of which is a Spring Clip, is slipped through the Angle Bracket and locked in the boss of a Road Wheel. The Wheel is placed over the boiler, and the lower end of the $6\frac{1}{2}$ " Rod passes through a Flanged Sector Plate, which is bolted at the rear of the base. The Rod is held in position by another Spring Clip.

(Continued on next page)

(Continued from previous page)

The jib is constructed from 12½" Strips bolted end to end. It is pivoted at its lower end on a 4" Rod journalled in the flanges of a 3½"×2½" Flanged Plate held by Bolts 1. The jib is held at an angle of about 30 degrees by Cord, which is tied to the cab and then taken over a 1" fast Pulley on a 2" Rod journalled in the jib. From there the Cord is led through holes in the Angle Girders forming the sides of the platform over a 1" Pulley on the other end of the 2" Rod, and finally is tied to the cab.

The Crank Handle in the sides of the cab controls the movement of the bucket. Cord is wound a few times round the shaft of the Crank Handle and then is taken over a 4½" Rod in the jib and tied to the front of the bucket. The other end of the Cord is led around 1" fast Pulley on a Rod at the end of the jib, and through the pulley block at the back of the bucket. It is then tied to a Fishplate carried on the 2" Rod journalled in the jib.

THE MECCANO GUILD

Every Meccano owner should join the Meccano Guild, an organisation started at the request of enthusiastic model-builders.

At its head is the President, Mr. Roland G. Hornby, son of the inventor of Meccano, who controls the movement and takes a personal interest in every member. In joining the Guild a Meccano boy becomes a member of a great brotherhood of world-wide extent.

Wherever he happens to be, even in strange countries, he will know that he has met a friend whenever he sees the little triangular badge of membership.

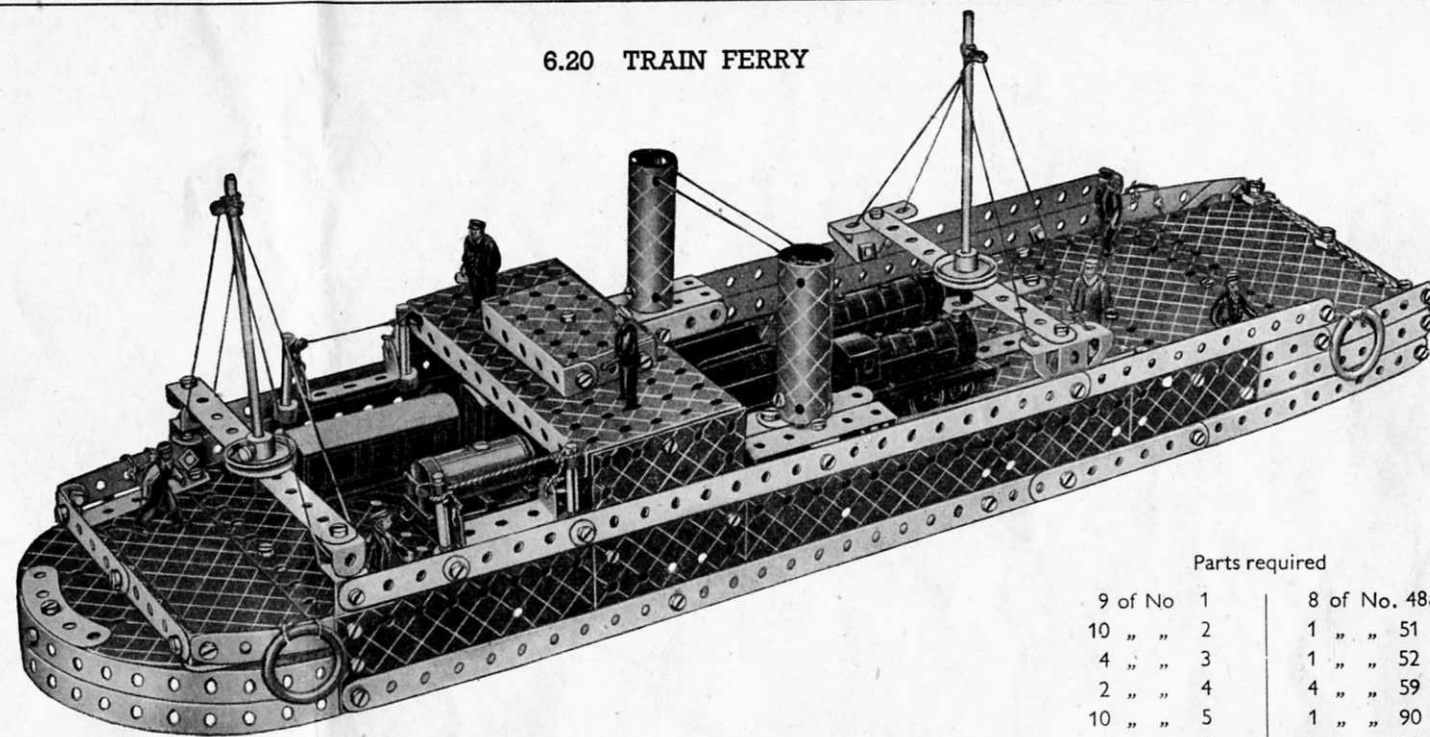
All that the Meccano owner has to do to join the Guild is to fill in the official application form enclosed in his Outfit, or obtained from the Guild Secretary, Binns Rd., Liverpool 13, have his signature witnessed and send the form to the Secretary with the necessary amount in stamps to pay for the official badge, to be worn in his buttonhole.

A Certificate of Membership also is sent to those who are enrolled.

The price of the badge for boys living in the British Isles is 1/- For those living overseas it is 1/6 (30 cents in Canada)

Write to the Guild Secretary for full information.

6.20 TRAIN FERRY



Construction is commenced by bolting 12½" Angle Girders together to make two 17½" compound angle girders, and then connecting them by two 5½" Strips. The sides of the ship consist mainly of 5½"×1½" and 2½"×1½" Flexible Plates, and are bolted to the framework and strengthened at the bottom by 12½" Strips.

The bows are formed by bending 12½" Strips to shape and bolting them to the sides of the ship. At the stern the sides are extended by means of Strips, and are joined across by 2½" Strips to form a square end. Fig. 6.20a shows the layout of the Flexible Plates and Strip Plates forming the deck.

A 5½"×2½" Flanged Plate is used for the bridge, and is supported by two 2½"×2½" Flexible Plates bolted to the sides. The twin funnels are made from U-Section Curved Plates. The supports to which the funnels are bolted are built up from 2½"×½" Double Angle Strips and 2½" Strips attached to a 1"×1" Angle Bracket, the complete assembly being attached to the sides of the vessel by Double Brackets.

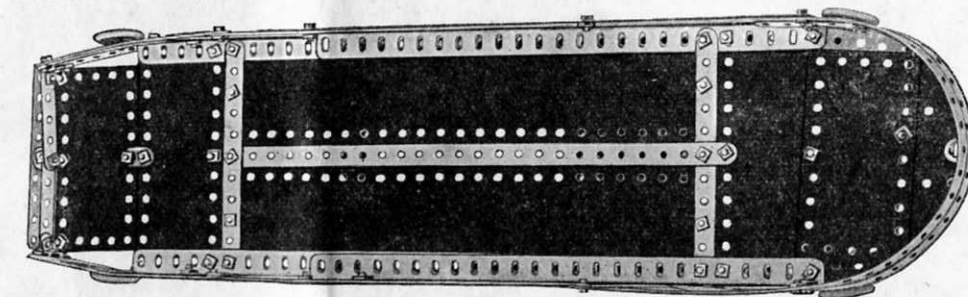
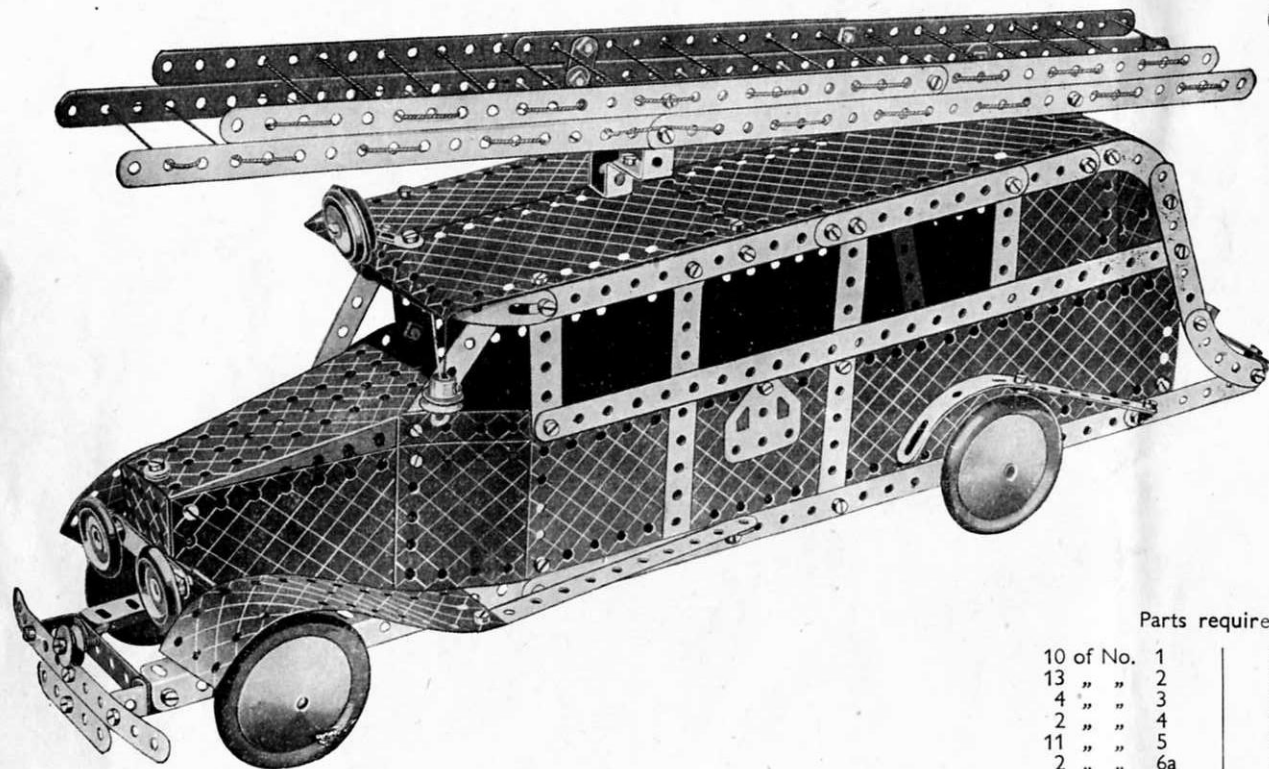


Fig. 6.20a

Parts required

9 of No	1	8 of No. 48a
10 " "	2	1 " " 51
4 " "	3	1 " " 52
2 " "	4	4 " " 59
10 " "	5	1 " " 90
4 " "	8	1 " " 111
7 " "	10	3 " " 111c
4 " "	11	2 " " 125
9 " "	12	2 " " 126
2 " "	12a	2 " " 126a
2 " "	15	4 " " 155
4 " "	18a	4 " " 188
2 " "	22	4 " " 189
8 " "	35	2 " " 190
93 " "	37	2 " " 191
7 " "	37a	2 " " 192
9 " "	38	2 " " 197
1 " "	40	2 " " 199
2 " "	48	2 " " 214



Each side member of the chassis consists of a pair of Angle Girders connected by two $\frac{3}{8}$ " Bolts, the nuts of which are left untightened. The side members are joined together at the front by a $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip and a $5\frac{1}{2}$ " Strip. The rear Angle Girders are not joined, but are pushed apart as far as the $\frac{3}{8}$ " Bolts allow. Reference to Fig. 6.21a will make the arrangement clear.

The sides of the body consist of $12\frac{1}{2}$ " \times $2\frac{1}{2}$ " Strip Plates, and are attached by Fishplates to the rear Angle Girders. The roof is formed by four $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates, and is secured by Angle Brackets to the compound strips forming the top of the windows. The curved back is obtained by bending Flexible Plates to the correct shape and fastening them to a framework of Strips.

The sides of the bonnet are each represented by a $4\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate, and are secured to the body of the fire-engine by $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates and $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates. The last named are bolted to the $12\frac{1}{2}$ " \times $2\frac{1}{2}$ " Strip Plates forming the sides of the body. A Flanged Sector Plate forms the top of the bonnet, and is secured by the flanges of its narrow end to the two $4\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates. At its wide end it is fastened to the $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates secured to the body. The radiator is represented by a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flanged Plate bolted to the front end of the Flanged Sector Plate. The Bolt carries two Washers above the Flanged Sector Plate to represent the radiator cap.

6.21 STREAMLINED FIRE ENGINE

Two 1" fast Pulleys are used for the headlights, and they are secured to a $2\frac{1}{2}$ " Strip fixed by $\frac{3}{8}$ " Bolts to the $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flanged Plate forming the radiator. The $\frac{3}{8}$ " Bolts pass through the end holes of the $2\frac{1}{2}$ " Strip, and are locked in the bosses of the 1" Pulleys. The front bumper is represented by a $5\frac{1}{2}$ " Strip extended downward by a $2\frac{1}{2}$ " Strip. It is fastened in position to the $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip at the front of the chassis by two Reversed Angle Brackets.

The Road Wheels are held on 5" Rods journaled in the sides of the chassis. The front mudguards are each formed by a $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plate bolted to the $5\frac{1}{2}$ " Strip joining the side members of the chassis. A $3\frac{1}{2}$ " Strip extended by a Formed Slotted Strip and secured by an Angle Bracket to the side of the body, is used for each of the rear mudguards.

The rear 5" Rod carries a Collar between the side members of the chassis. A Pivot Bolt, which carries a 1" fast Pulley 2 against its head, is screwed into the tapped hole of the Collar, thus holding it in position on the Rod. A Flanged Sector Plate 1 is loosely suspended from a $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip 3 by a lock-nutted $\frac{3}{8}$ " Bolt. When the rear Road Wheels revolve, the Pulley 2 strikes the Flanged Sector Plate 1, and thus provides an automatic gong.

(Continued on next page)

Parts required

10 of No. 1	1 of No. 45
13 " " 2	3 " " 48a
4 " " 3	1 " " 51
2 " " 4	1 " " 53
11 " " 5	2 " " 54
2 " " 6a	4 " " 59
4 " " 8	2 " " 90
5 " " 10	4 " " 90a
14 " " 12	2 " " 111
2 " " 12a	2 " " 111a
4 " " 12c	6 " " 111c
2 " " 15	1 " " 115
1 " " 15b	2 " " 125
2 " " 17	2 " " 126a
1 " " 19g	1 " " 147b
3 " " 22	3 " " 155
2 " " 22a	4 " " 187
1 " " 23	3 " " 188
1 " " 23a	4 " " 189
2 " " 24a	6 " " 190
6 " " 35	2 " " 191
105 " " 37	4 " " 192
4 " " 37a	2 " " 197
7 " " 38	2 " " 200
2 " " 38d	2 " " 214
2 " " 40	4 " " 215

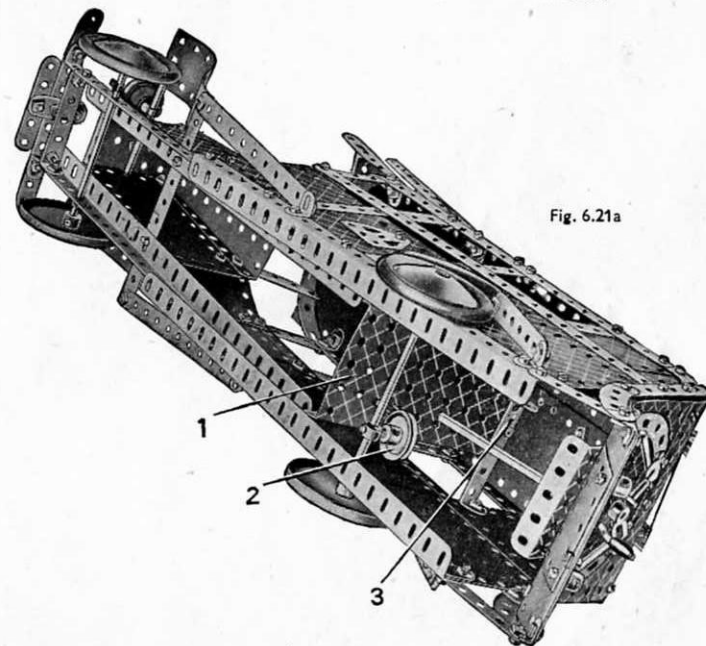


Fig. 6.21a

(Continued from previous page)

The fixed escape ladder consists of two pairs of compound strips, each built up from two $12\frac{1}{2}$ " Strips bolted together overlapping eight holes. The escape is attached to the roof of the car at the rear by a $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip, and at the front by a compound bracket, which is built up by attaching $1"$ \times $1"$ Angle Brackets to the ends of a Double Bent Strip. The extension escape is built up from two pairs of compound strips each consisting of two $12\frac{1}{2}$ " Strips overlapping 13 holes. The extension ladder is fastened to the fixed part of the escape by Fishplates. The rungs of the ladders are represented by Cord threaded through the holes in the Strips.

The searchlight at the front of the fire-engine is made by placing a $\frac{3}{4}"$ Washer, a $1"$ loose Pulley fitted with a Rubber Ring, a Wheel Disc, and a second $1"$ loose Pulley on the shank of a $\frac{1}{2}"$ Bolt. The complete unit is then fastened to the roof by a compound bracket consisting of two Obtuse Angle Brackets bolted together.

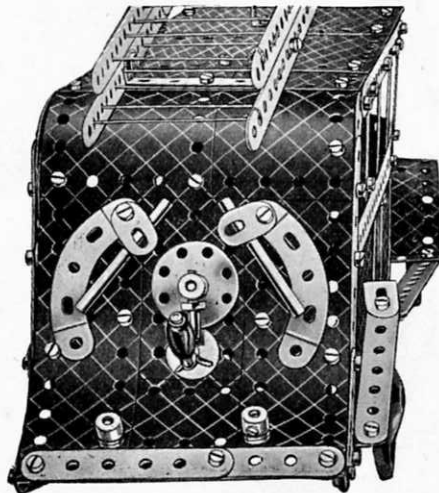
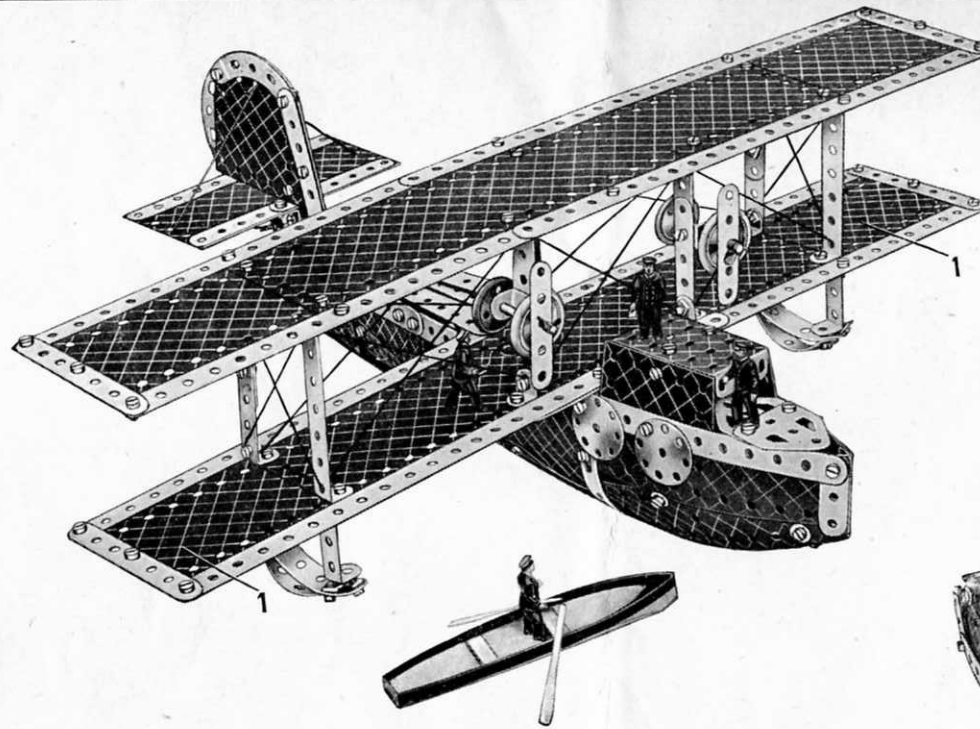


Fig. 6.21b



Parts required

11 of No. 1	4 of No. 24a	6 of No. 111c
11 " " 2	4 " " 35	1 " " 125
4 " " 3	102 " " 37	2 " " 126a
2 " " 4	9 " " 37a	2 " " 155
12 " " 5	14 " " 38	4 " " 188
2 " " 6a	1 " " 40	4 " " 189
10 " " 10	2 " " 48	2 " " 190
4 " " 11	3 " " 48a	2 " " 191
14 " " 12	2 " " 48b	3 " " 192
1 " " 12a	1 " " 51	2 " " 197
3 " " 12c	2 " " 90	1 " " 198
2 " " 17	4 " " 90a	2 " " 199
2 " " 22	2 " " 111	2 " " 200
2 " " 22a	4 " " 111a	1 " " 215

6.22 TWIN-ENGINE FLYING BOAT

The fuselage is built up from Flexible Plates, and as each side is identical, reference to the illustrations will make the construction clear.

The lower wing consists of a $12\frac{1}{2}"$ \times $2\frac{1}{2}"$ Strip Plate, extended at each end by the flat plates 1, and it is framed by $12\frac{1}{2}"$ and $3\frac{1}{2}"$ Strips. The flat plates 1 are obtained by removing the centre pin from a Hinged Flat Plate. The wing is attached by Angle Brackets to the sides of the fuselage. The top wing is constructed in a similar manner, except that the $12\frac{1}{2}"$ \times $2\frac{1}{2}"$ Strip Plate is extended by $4\frac{1}{2}"$ \times $2\frac{1}{2}"$ Flexible Plates and not by the halves of a Hinged Flat Plate. It is braced from the lower wing by $3\frac{1}{2}"$ \times $\frac{1}{2}"$ Double Angle Strips, and by double angle strips built up from Strips and Angle Brackets. The propellers are supported on 2" Rods journaled in Double Brackets bolted to the inner wing supports.

The control cabin is constructed by bolting two $2\frac{1}{2}"$ \times $1\frac{1}{2}"$ Flexible Plates to the sides of the fuselage in front of the wings, and then joining them across at the top by a $2\frac{1}{2}"$ \times $1\frac{1}{2}"$ Flanged Plate.

A $5\frac{1}{2}"$ \times $2\frac{1}{2}"$ Flexible Plate is used for the tailplane and is secured by Angle Brackets to two $2\frac{1}{2}"$ large radius Curved Strips bolted to the end of the fuselage. The rudder is formed by two $2\frac{1}{2}"$ \times $2\frac{1}{2}"$ Flexible Plates, which are attached to the tailplane by an Angle Bracket. The rudder is given a curved outline by bolting to it $2\frac{1}{2}"$ small radius Curved Strips.

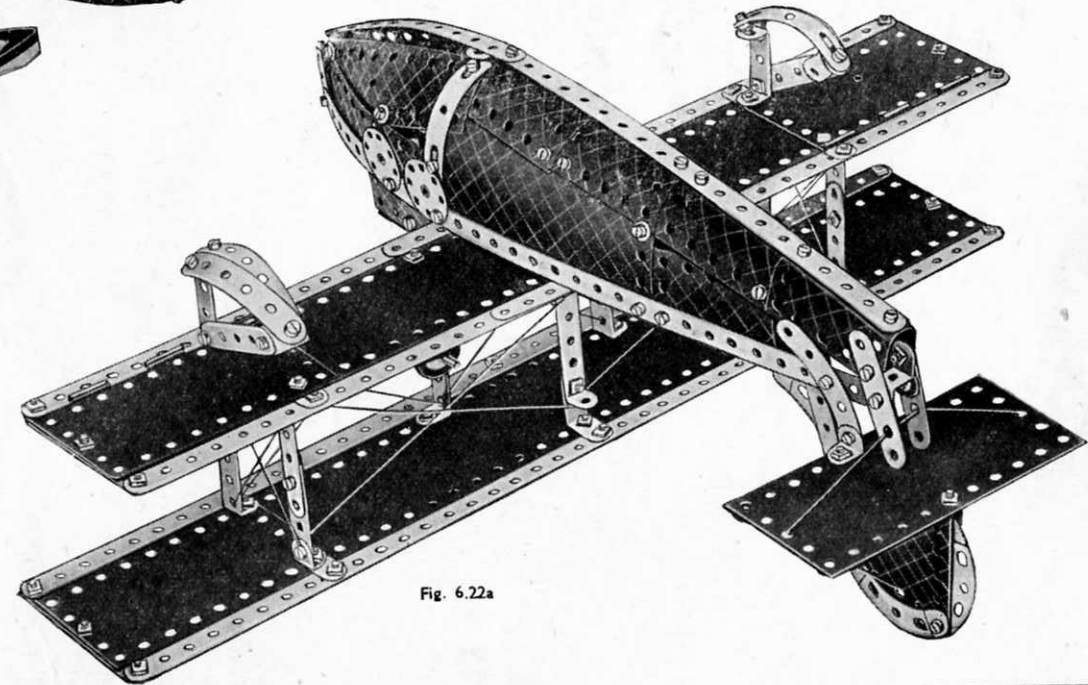
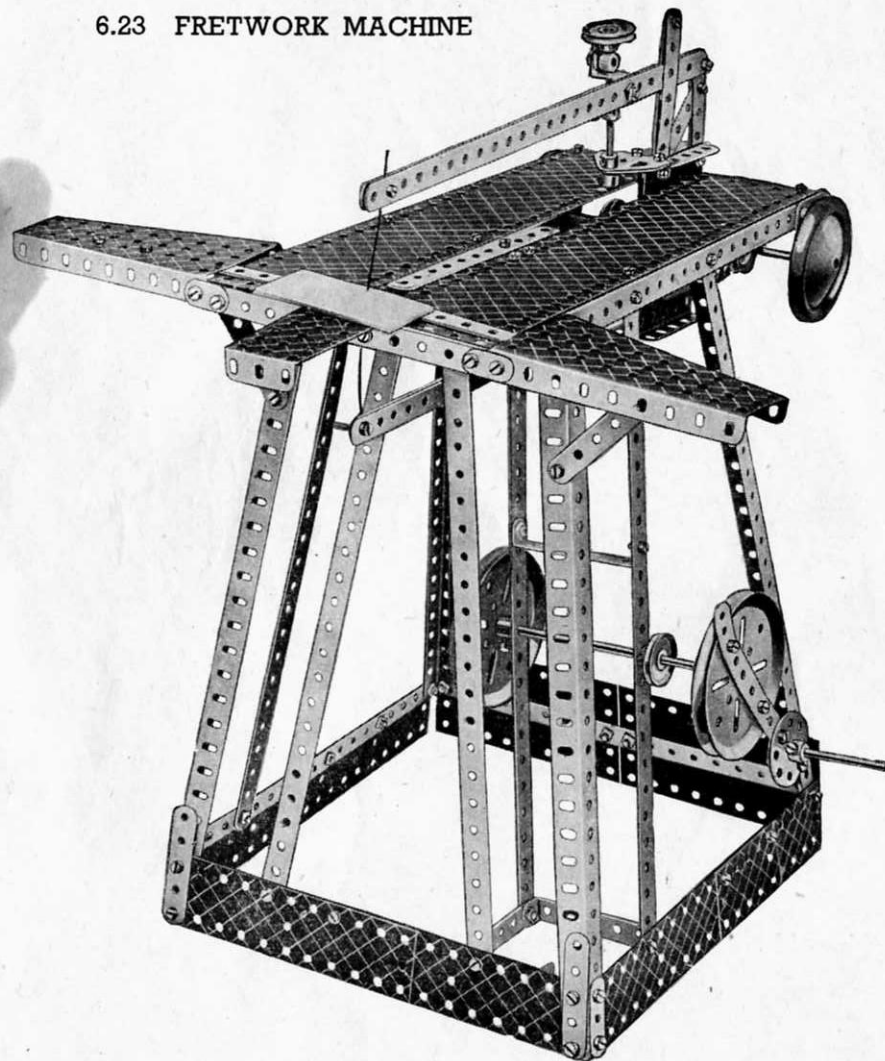


Fig. 6.22a

6.23 FRETWORK MACHINE



The main framework of the model consists of four $12\frac{1}{2}$ " Angle Girders joined across at their lower ends by compound strips consisting of two $5\frac{1}{2}$ " Strips. The Strips spacing the sides are overlapped two holes, and those spacing the front and rear are overlapped four holes.

The base is extended downwards by $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " and $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates, which are joined at the corners by Angle Brackets bolted at the rear of the model. At the top the Angle Girders are spaced at the front and rear by $5\frac{1}{2}$ " Strips, and at the sides by $12\frac{1}{2}$ " Strips, which are bolted so that they extend five holes to the front of the table. Four $12\frac{1}{2}$ " Strips are bolted to the frame of the base and to the upper $5\frac{1}{2}$ " and $12\frac{1}{2}$ " Strips, and a supplementary framework to support the operating handle is also added (see Fig. 6.23a).

The table is shown complete in the front view of the model, and in Fig. 6.23a one of the $12\frac{1}{2}$ " \times $2\frac{1}{2}$ " Strip Plates has been removed. A $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate is bolted across the $12\frac{1}{2}$ " Strips at the sides of the table. The two $12\frac{1}{2}$ " \times $2\frac{1}{2}$ " Strip Plates are bolted to the Flanged Plate and joined by Angle Brackets to the ends of the $12\frac{1}{2}$ " Strips, the Bolts carrying also two Flat Trunnions. The table is extended to the front by a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flanged Plate, which is bolted to a $5\frac{1}{2}$ " Strip and to the ends of two $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strips. The side extensions are Flanged Sector Plates, each of which is attached to the frame by a Flat Fishplate, a $3\frac{1}{2}$ " Strip and a $12\frac{1}{2}$ " Strip. A $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip provides additional support underneath.

(Continued on next page)

Parts required

12 of No. 1	1 of No. 45
14 " " 2	1 " " 48
4 " " 3	6 " " 48a
8 " " 5	1 " " 51
2 " " 6a	1 " " 52
4 " " 8	2 " " 53
2 " " 10	2 " " 54
7 " " 12	4 " " 59
2 " " 12a	1 " " 80c
1 " " 14	2 " " 111a
1 " " 15a	6 " " 111c
1 " " 17	1 " " 115
2 " " 19b	2 " " 126
4 " " 22	4 " " 126a
1 " " 24	1 " " 147b
1 " " 35	2 " " 187
83 " " 37	4 " " 188
8 " " 37a	4 " " 189
13 " " 38	2 " " 191
	2 " " 197

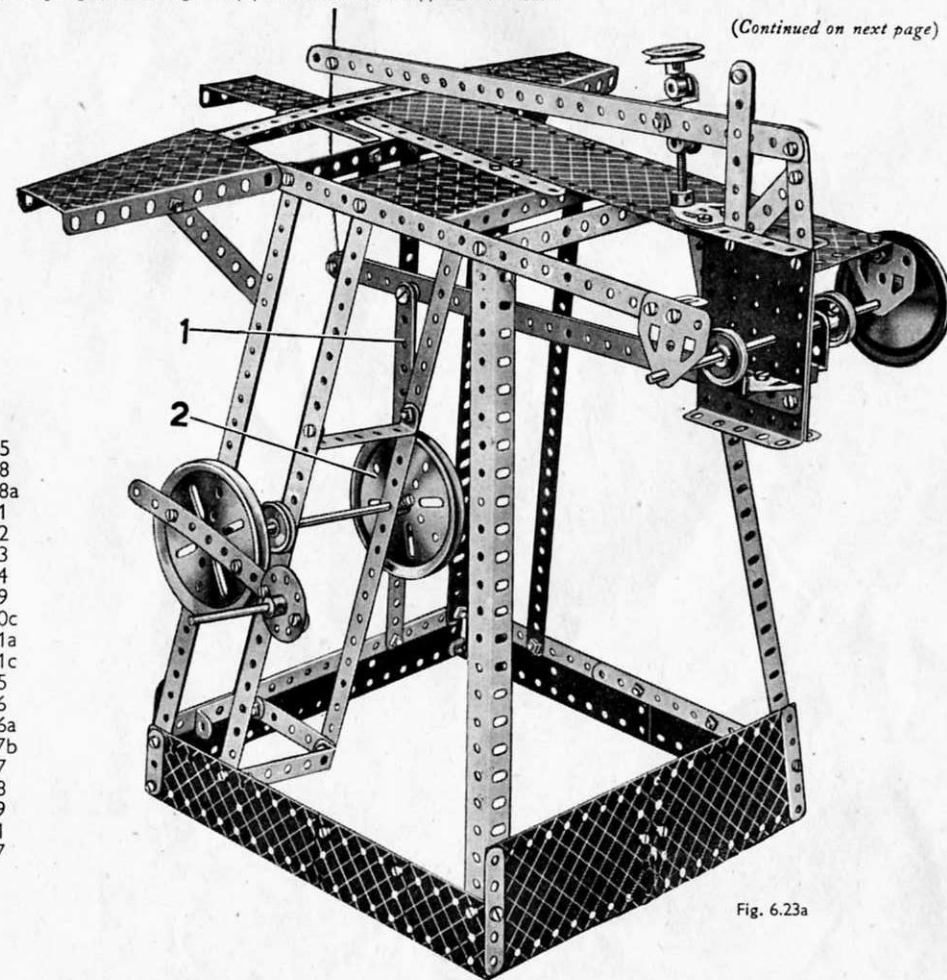


Fig. 6.23a

6.24 BATTERY LOCOMOTIVE

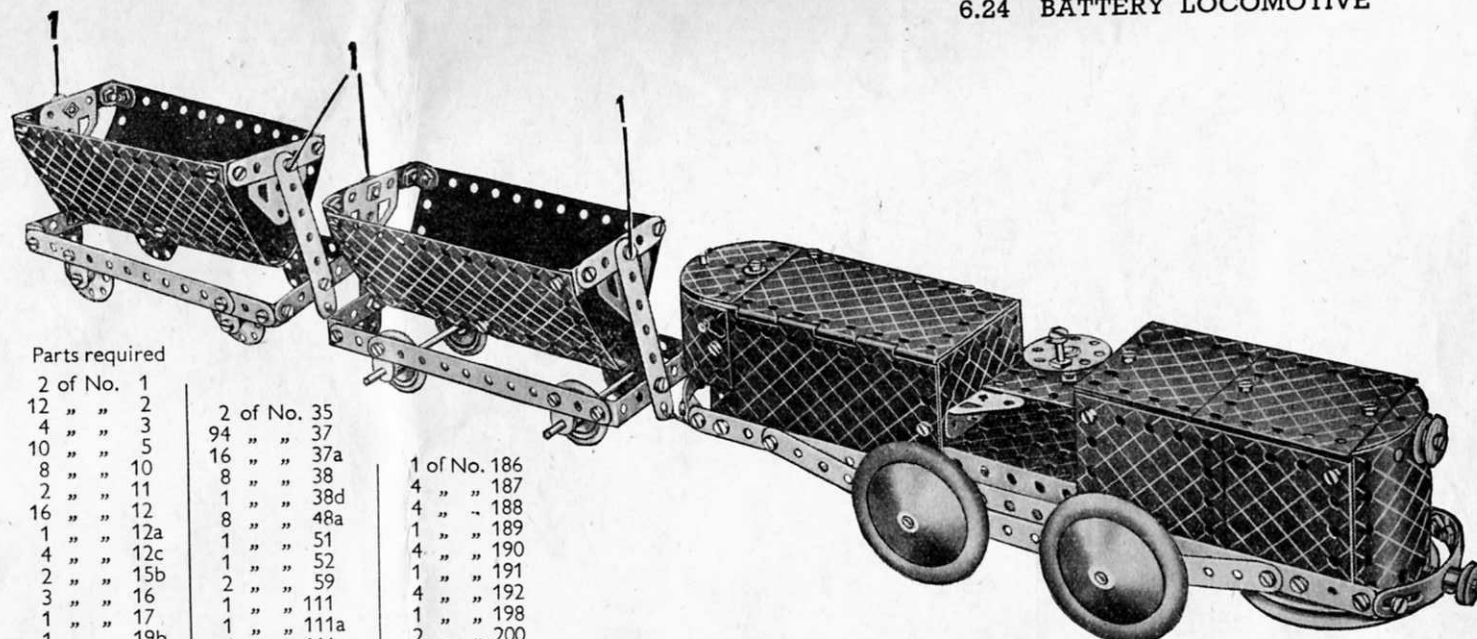
(Continued from previous page)

The saw frame consists of two long arms, each consisting of two $12\frac{1}{2}$ " Strips bolted together. One of the arms is bolted between two $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plates, and the other is lock-nutted at its end to an N-shaped piece, consisting of two $2\frac{1}{2}$ " Strips and two $3\frac{1}{2}$ " Strips braced across by a $2\frac{1}{2}$ " Strip in the manner shown. A tensioning device for the saw blade consists of a Double Bent Strip lock-nutted to the upper arm. A 3" Screwed Rod is passed through holes in the Double Bent Strip and a Collar is screwed on each of its ends.

The shanks of two Bolts in the end holes of the Double Bent Strip engage in the plain holes of the Collars. The Screwed Rod passes also through a hole in two Flat Trunnions bolted to the flanges of the $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plates, and two Collars are held by their grub screws on the Screwed Rod on each side of the Flat Trunnions.

A $6\frac{1}{2}$ " Rod is passed through the end holes of $1"$ \times $1"$ Angle Brackets attached to Trunnions bolted to the $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plates, and is journaled in the two Flat Trunnions as shown.

The handle for operating the machine is constructed by fastening a 2" Rod in the boss of a Bush Wheel that is attached to a $5\frac{1}{2}$ " Strip. The Strip in turn is bolted across a 3" Pulley held on the end of a $4\frac{1}{2}$ " Rod journaled in two $12\frac{1}{2}$ " Strips. On its other end the $4\frac{1}{2}$ " Rod carries another 3" Pulley 2, which is pivotally connected by a $5\frac{1}{2}$ " Strip 1 to the lower arm of the frame. The lower end of the $5\frac{1}{2}$ " Strip is pivoted on a Threaded Pin and is held in place by a Spring Clip; its upper end being pivoted on a Pivot Bolt lock-nutted to the lower arm of the saw frame. The Pivot Bolt carries six Washers on its shank.



Parts required

2 of No. 1		
12 " " 2	2 of No. 35	
4 " " 3	94 " " 37	
10 " " 5	16 " " 37a	
8 " " 10	8 " " 38	1 of No. 186
2 " " 11	1 " " 38d	4 " " 187
16 " " 12	8 " " 48a	4 " " 188
1 " " 12a	1 " " 51	1 " " 189
4 " " 12c	1 " " 52	4 " " 190
2 " " 15b	2 " " 59	1 " " 191
3 " " 16	1 " " 111	4 " " 192
1 " " 17	1 " " 111a	1 " " 198
1 " " 19b	6 " " 111c	2 " " 200
5 " " 22	1 " " 115	2 " " 214
1 " " 23	1 " " 126	2 " " 215
1 " " 23a	4 " " 126a	
1 " " 24	1 " " 147b	
4 " " 24a	4 " " 155	

The construction of the chassis of the locomotive will be clear from the illustration. The $12\frac{1}{2}$ " Strips are spaced at each end by $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strips, the one at the front having a 3" Pulley bolted to it by a $\frac{3}{8}$ " Bolt passed through its boss.

The top and side of the rear part of the locomotive are completed by bolting a Hinged Flat Plate to one of the $12\frac{1}{2}$ " Strips forming the chassis and then attaching the Plate by Angle Brackets to the side.

A $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate forms the floor of the centre portion of the locomotive, and a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flanged Plate, bolted to two $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strips that space the sides, carries a Threaded Pin in its centre hole. A Bush Wheel carrying a Pivot Bolt is fastened to the Threaded Pin to form a control handle. The top of the front of the locomotive is fastened to $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strips, and the curved front and rear portions are then added.

The sides of the chassis of each truck consist of two $5\frac{1}{2}$ " Strips overlapped nine holes, and in the front truck the two sides are joined across by $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strips at each end. In the rear truck the sides of the chassis are joined by $2\frac{1}{2}$ " Strips and Angle Brackets. The two $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates forming the sides of the container of each truck are joined together at the bottom by a Double Bracket bolted to a $5\frac{1}{2}$ " Strip.

The Bolts 1 are lock-nutted to the $2\frac{1}{2}$ " Strips, and the Wheel Discs forming the wheels of the rear truck are lock-nutted to $\frac{3}{8}$ " Bolts, which have two Washers on their shanks for spacing purposes.

6.25 TOWER WAGON

Parts required

10 of No. 1	1 of No. 48
8 " " 2	8 " " 48a
2 " " 3	1 " " 48b
2 " " 4	1 " " 51
12 " " 5	1 " " 52
1 " " 6a	2 " " 53
4 " " 8	2 " " 54
6 " " 10	4 " " 59
2 " " 11	2 " " 111c
9 " " 12	4 " " 125
2 " " 12a	4 " " 126a
1 " " 12c	1 " " 176
1 " " 15	1 " " 186b
4 " " 16	4 " " 187
1 " " 19g	4 " " 188
3 " " 22	2 " " 189
1 " " 23	1 " " 190
1 " " 24	2 " " 191
6 " " 35	3 " " 192
105 " " 37	1 " " 199
2 " " 37a	2 " " 200
16 " " 38	4 " " 215
1 " " 40	

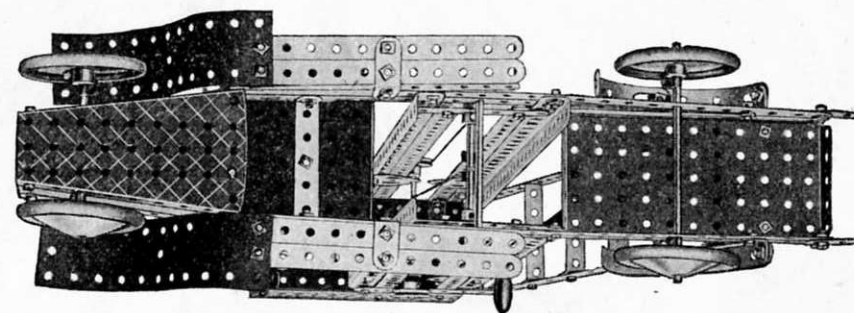
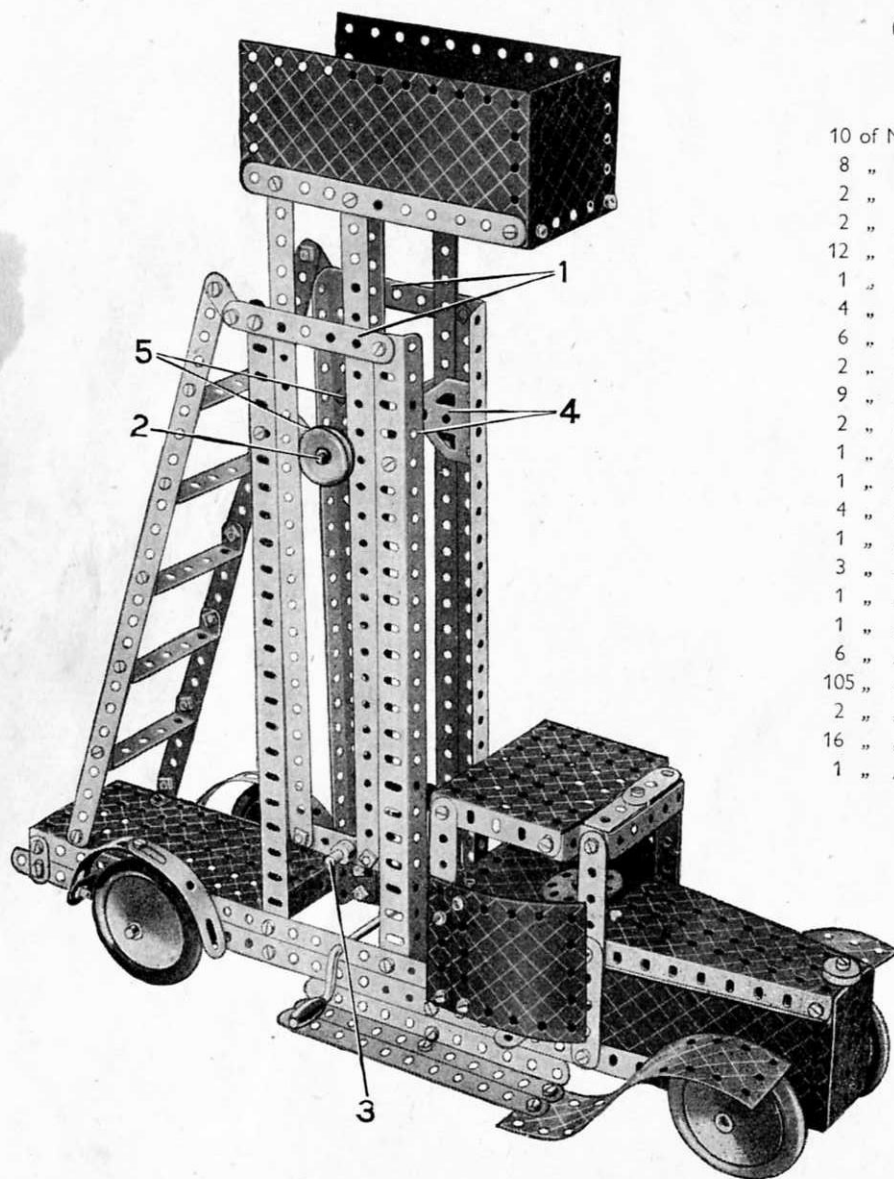


Fig. 6.25a

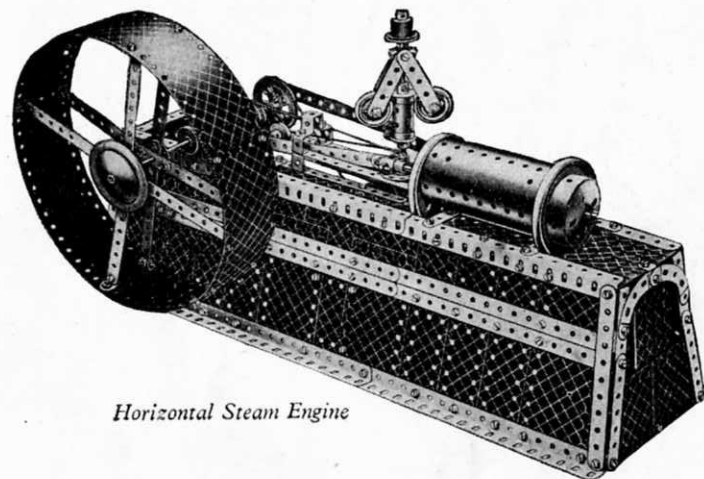
Each side member of the chassis consists of two $12\frac{1}{2}$ " Strips secured together by Fishplates. The side members are joined at the rear by a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate, and at the front by a Flanged Sector Plate. The bonnet is built up by bolting $4\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates to the flanges of the Flanged Sector Plate and then fastening another Flanged Sector Plate to their upper ends. The radiator, a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flanged Plate, is bolted in position between the ends of the Flanged Sector Plates, the upper Bolt being $\frac{1}{2}$ " long and carrying a $\frac{1}{2}$ " loose Pulley to represent the radiator cap.

A $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate forms the base for the cab, and is secured to the chassis by a $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip (Fig. 6.25a). The back of the cab consists of two $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates, overlapped three holes and supported by Angle Brackets between two $5\frac{1}{2}$ " Strips bolted to the flanges of the $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate. Each of the doors is constructed by bolting a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plate to the lower end of one of the $5\frac{1}{2}$ " Strips fastened to the $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate. A $1\frac{1}{8}$ " radius Curved Plate is then bolted to the $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plate, overlapping it two holes, each Bolt carrying two Washers between the Flexible and Curved Plates. A second $3\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate is fixed to the upper ends of the $5\frac{1}{2}$ " Strips, and is secured by Reversed Angle Brackets to two more $5\frac{1}{2}$ " Strips bolted to the chassis.

The front Road Wheels are fixed on a $3\frac{1}{2}$ " Rod journaled in the flanges of the lower Flanged Sector Plate, and the 5" Rod carrying the rear Road Wheels passes through the lower $12\frac{1}{2}$ " Strips.

The framework inside which the tower slides consists of four Angle Girders, which are bolted to the chassis as shown in the illustration and are joined at the top by the Strips 1. Each side of the tower is built up from $12\frac{1}{2}$ " Strips connected at the bottom by a 3" Strip, and bolted at their upper ends to the stand. To prevent the $12\frac{1}{2}$ " Strips from sliding too freely, Flat Trunnions are fastened to the Angle Girders at 4. The Crank Handle for raising and lowering the tower is journaled in the upper $12\frac{1}{2}$ " Strips of the chassis. It carries at its end a 1" Pulley, which is connected by a Driving Band to one of the Pulleys 5 on the $3\frac{1}{2}$ " Rod 2. Cord is fastened to a Cord Anchoring Spring on Rod 2, and its other end is tied to the centre of the $3\frac{1}{2}$ " Rod 3.

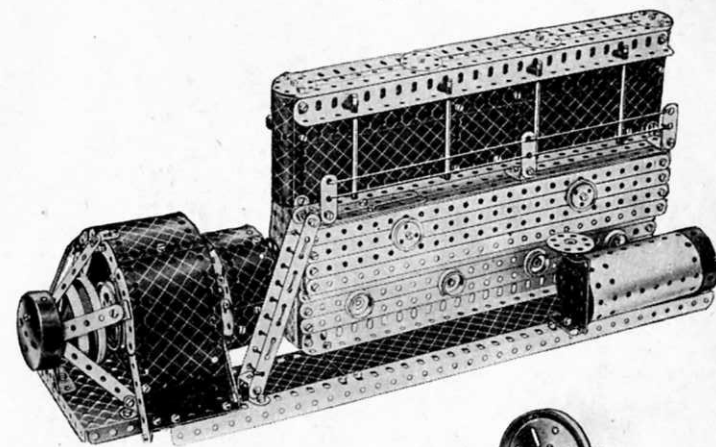
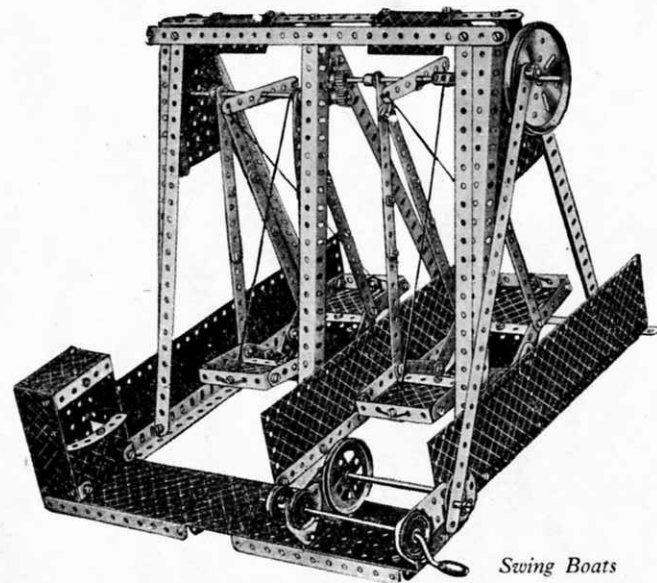
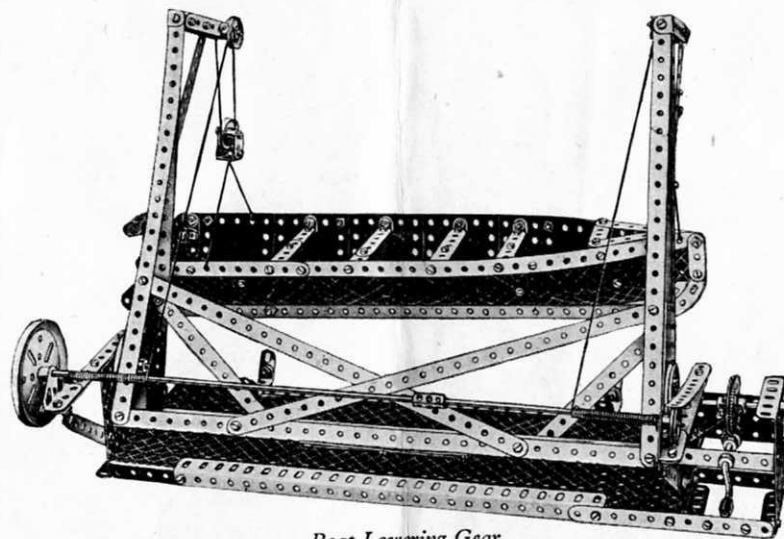
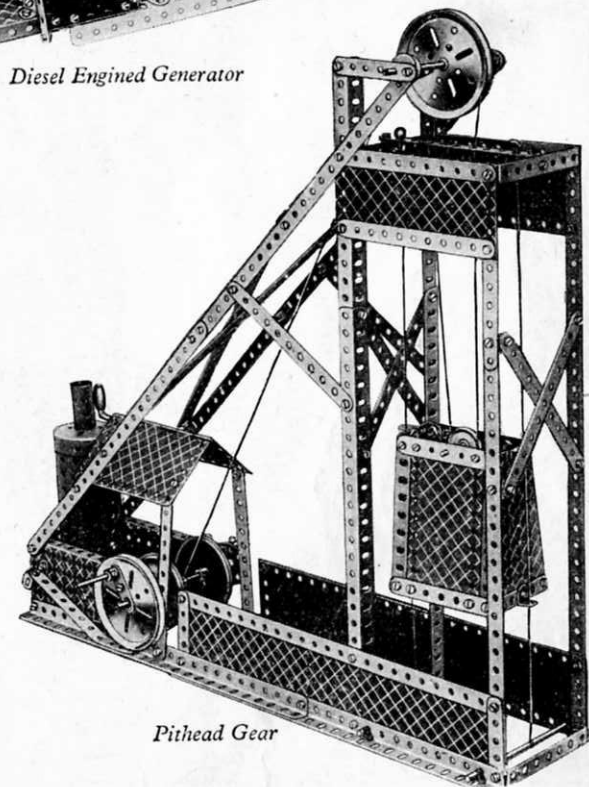
The ladder is constructed by bolting $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strips between two $12\frac{1}{2}$ " Strips. The latter are fastened at their lower ends to the $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate by Angle Brackets, and at their upper ends they are attached to two Fishplates bolted to Strips 1.

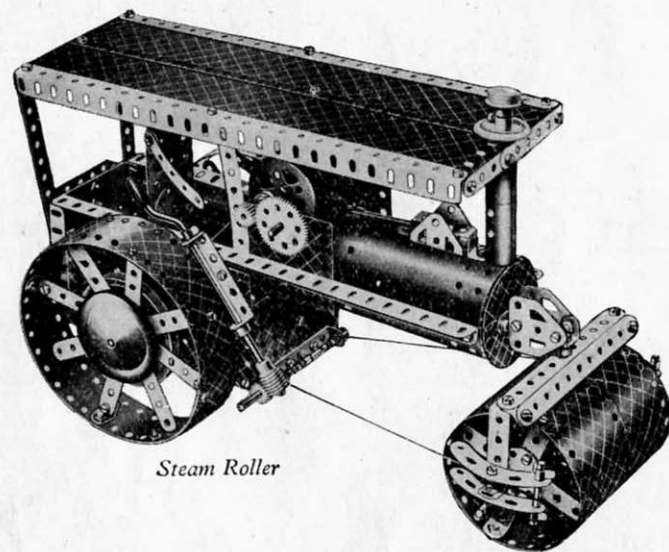
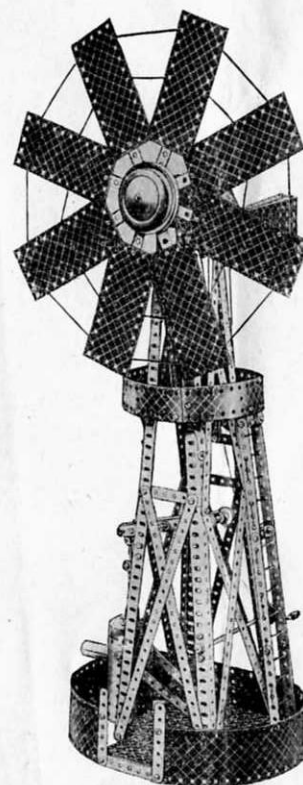
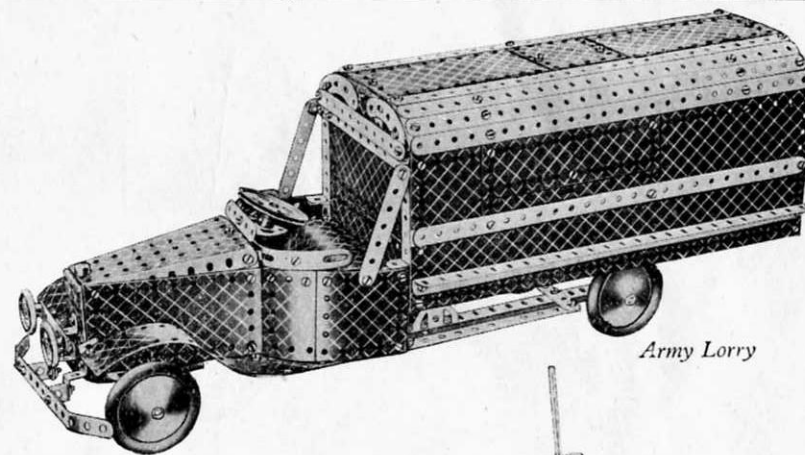
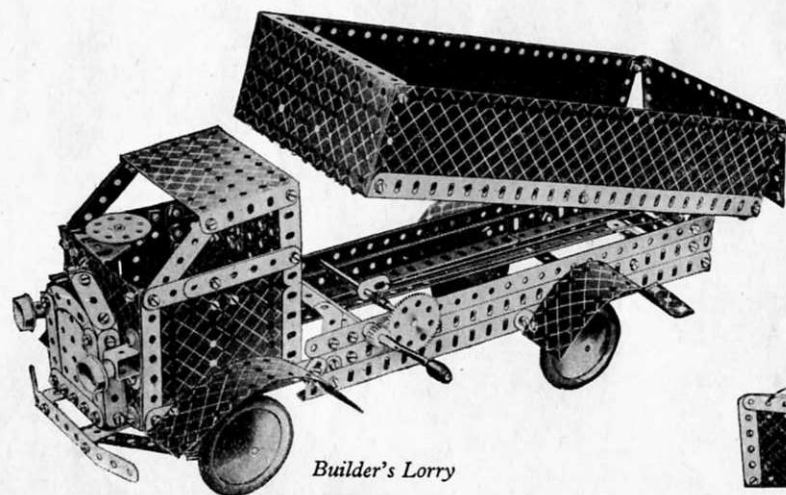
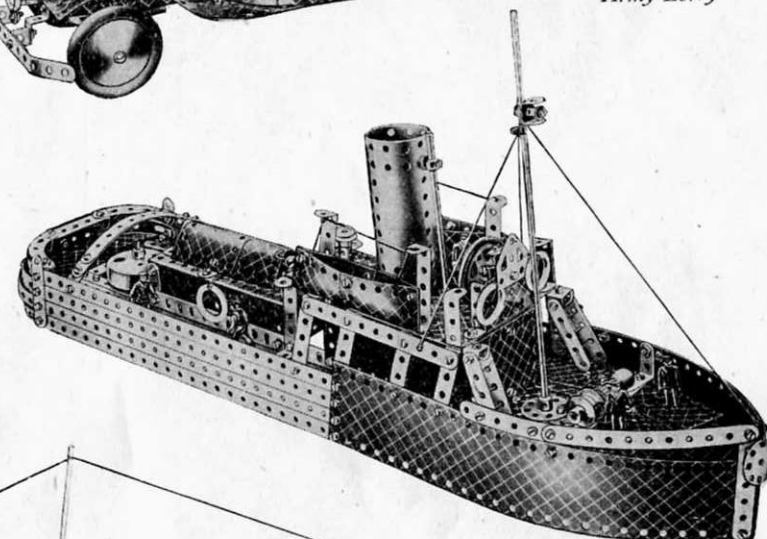
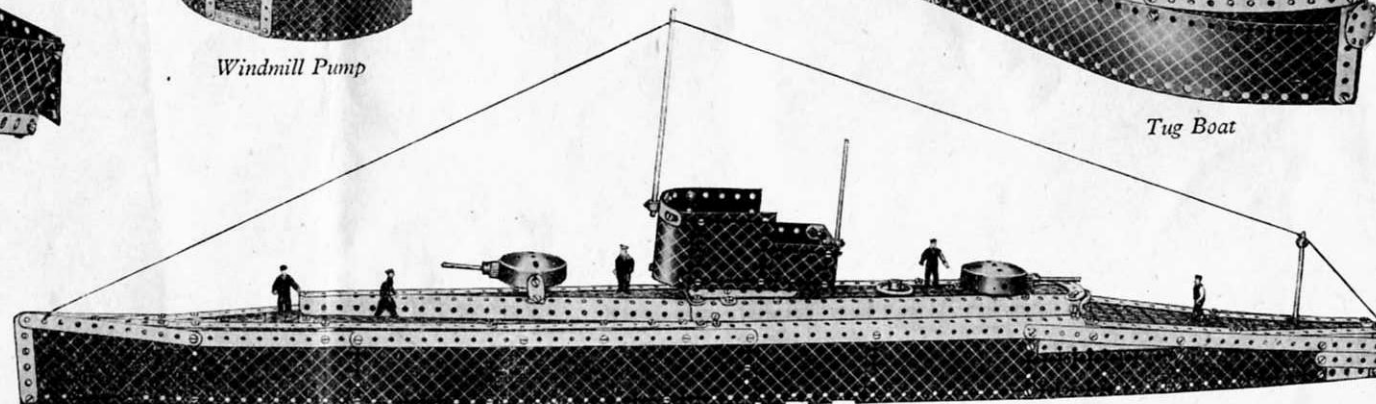
*Horizontal Steam Engine*

BUILD BIGGER AND BETTER MODELS.

When you have built all the models shown in this Manual you will be keen to build bigger and more elaborate models. Your next step is to purchase a Meccano No. 6a Accessory Outfit containing all the parts required to convert your No. 6 into a No. 7 Outfit. You will thus be able to build the full range of No. 7 Outfit models, a selection of which is illustrated on this page.

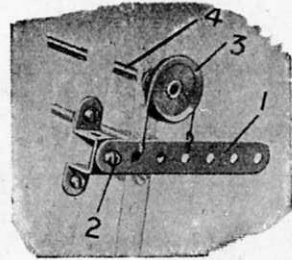
If you prefer to do so, you can build up and develop your Outfit quite easily by adding various parts to it from time to time. The model-building possibilities of the Meccano System are unlimited and the more Meccano parts you have, the bigger and better the models you will be able to build.

*Diesel Engine Generator**Swing Boats**Boat Lowering Gear**Pithead Gear*

*Steam Roller**Windmill Pump**Army Lorry**Builder's Lorry**Tug Boat**Submarine*

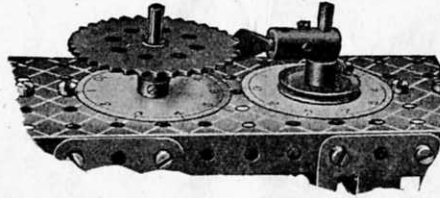
Here are a few simple and interesting movements showing how easily real mechanisms can be reproduced with Meccano.

STRAP AND LEVER BRAKE



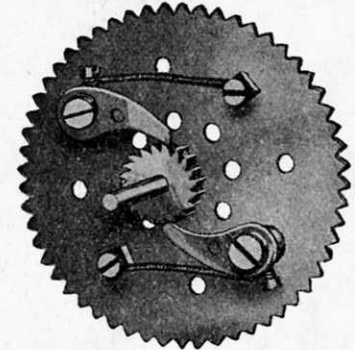
This device will be found very useful as a quick emergency hand-brake. Although it is the simplest of such devices, it is also one of the most valuable and can be used in a great variety of models.

INTERMITTENT ROTARY MOTION



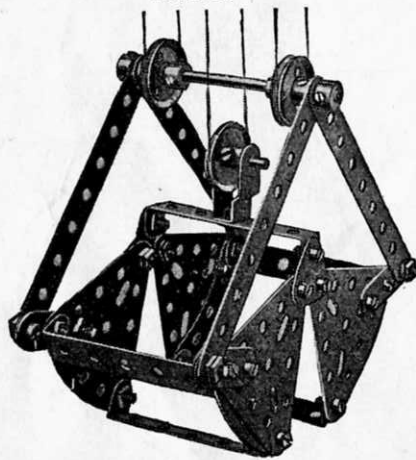
Intermittent rotary motion can be obtained by means of the above device. Such an arrangement is useful in revolution counters, measuring machines, etc. In addition to mechanisms that give true intermittent motion, different types of cams that convert a regular rotary motion into a constant or intermittent reciprocating motion can be constructed.

PAWL AND RATCHET MOVEMENT



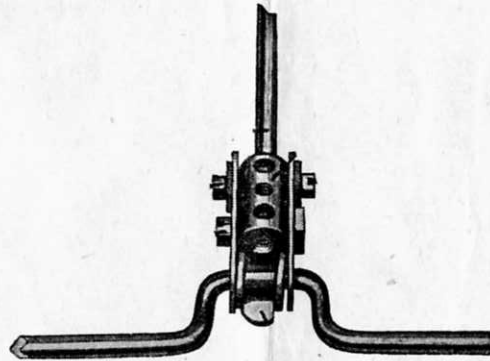
By means of this device it is possible to construct certain types of automatic brakes and free wheels. The illustration shows the method of building up a free-wheel unit.

GRABS



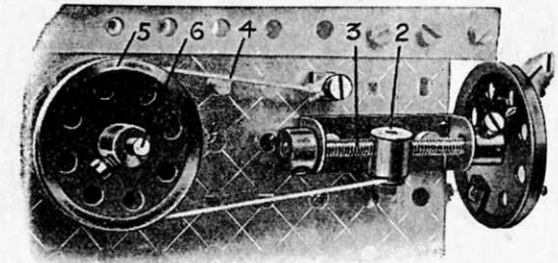
Here is a typical example of the many kinds of grab that can be constructed from Meccano. If the grab is fitted to a model crane ship-coaler, all its movements can be controlled from an operating box built into the frame of the model. The outer sides of the jaws may be filled in with cardboard and the grab can then be used to pick up loads of sand, grain, marbles, etc.

BIG END FOR MECCANO CRANKSHAFT



A Spring Clip is first clipped on to the centre of the cranked portion of the Crankshaft, and on each side of this is carried a Washer. On the outside of each of the Washers is placed a $1\frac{1}{2}$ " Strip, and these are connected together by means of a Coupling. A $\frac{1}{2}$ " Bolt passes completely through the two $1\frac{1}{2}$ " Strips at their centre holes and also through the inner transverse tapped hole of the Coupling. The outer tapped holes are fitted with Set-Screws, under the heads of which a Washer is placed.

STRAP AND SCREW BRAKE

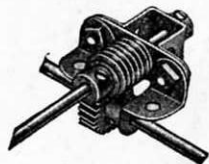


The type of brake shown above is used to apply a constant retarding effect to a rotating shaft. It can thus be utilised in a crane to prevent the load from falling back when the winding spindle is released. An advantage of the brake is that the speed of the shaft to which it is applied can be varied as required; the retarding action of the brake cannot vary when once set unless the hand wheel is turned.

Examples of MECCANO Standard Mechanisms

Here are a few simple and interesting movements showing how easily real mechanisms can be reproduced with Meccano.

WORM AND PINION BEARING

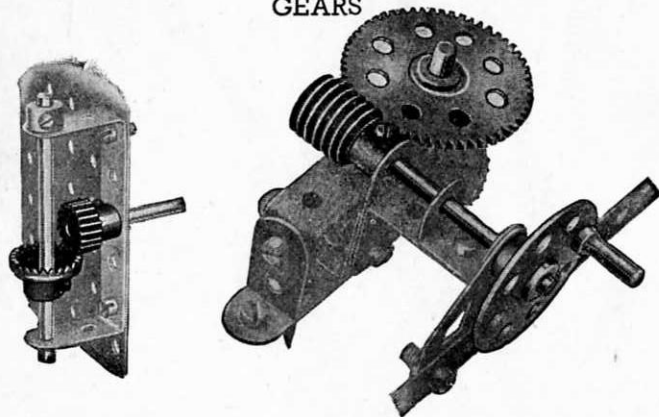


The compact rear axle drive unit illustrated above is intended chiefly for use in small models of motor cars. Two Corner Angle Brackets are secured by Bolts passing through their elongated holes to a $1\frac{1}{2}$ " Strip, to which a Double Bent Strip also is secured. The Rod carrying the Worm is passed through the centre hole of the Strips and held in position by a Collar.

The driven Rod is journaled in the Corner Angle Brackets and carries a Pinion that engages with the Worm.

A feature of this bearing that should not be overlooked is that the useful gear ratio of 25:1 is provided by employing a $\frac{3}{4}$ " Pinion.

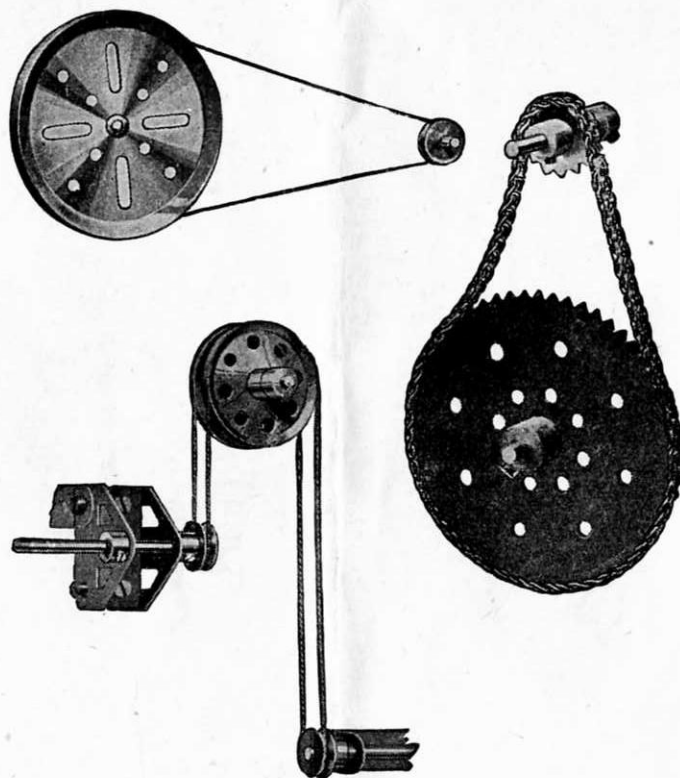
GEARS



The Meccano system includes a wide range of Gear Wheels, Bevel Gears, Pinions, Contrate Wheels and Worms in various sizes. All manner of interesting movements can be obtained by the use of these gears.

How a drive can be transmitted from a vertical to a horizontal shaft, or vice versa, is shown on the left. On the right the Worm engaged with a Gear Wheel gives a very great reduction in shaft speed.

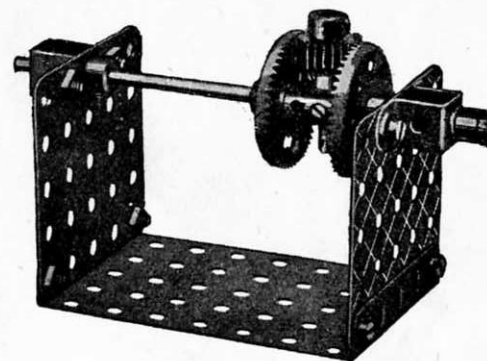
BELT AND CHAIN DRIVES



Above we show examples of belt and chain drive. The movements illustrated require no explanation excepting, perhaps, the lower belt drive, which shows a simple method for transmitting the drive from one shaft to another when the shafts are not in line.

Cords usually take the place of belts in Meccano models but miniature belting can be made from strips of canvas, indiarubber, etc., in which case Flanged Wheels should be used instead of grooved Pulleys.

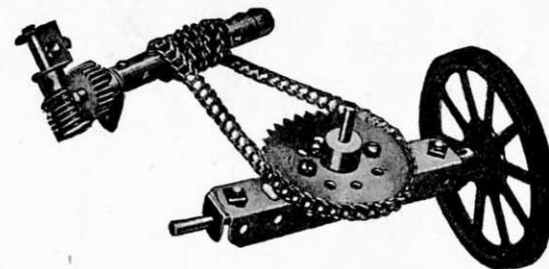
EPICYCLIC TRANSMISSION GEAR



Practically every type of mechanical power transmission gear can be reproduced with Meccano.

The device illustrated is designed to provide a gear ratio between two shafts mounted in direct line with one another. Its chief merit lies in the compactness of its construction and lack of external bearings.

STEERING GEARS



The various types of steering mechanism commonly in use on vehicles of all descriptions can readily be reproduced with Meccano.

In the example illustrated, the road wheels are controlled by an endless Sprocket Chain operated by a Worm and Pinion mechanism.

MECCANO PARTS

- 3**
Perforated Strips
- | | | | | | |
|-----|-------------------|--------------------|-----|-------------------|-------------------|
| No. | 1. | 12 $\frac{1}{2}$ " | No. | 3. | 3 $\frac{1}{2}$ " |
| 1a. | 9 $\frac{1}{2}$ " | | 4. | 3" | |
| 1b. | 7 $\frac{1}{2}$ " | | 5. | 2 $\frac{1}{2}$ " | |
| 2. | 5 $\frac{1}{2}$ " | | 6. | 2" | |
| 2a. | 4 $\frac{1}{2}$ " | | 6a. | 1 $\frac{1}{2}$ " | |
- 9^a**
Angle Girders
- | | | | |
|-----|--------------------|-----|-------------------|
| 7. | 24 $\frac{1}{2}$ " | 9a. | 4 $\frac{1}{2}$ " |
| 7a. | 18 $\frac{1}{2}$ " | 9b. | 3 $\frac{1}{2}$ " |
| 8. | 12 $\frac{1}{2}$ " | 9c. | 3" |
| 8a. | 9 $\frac{1}{2}$ " | 9d. | 2 $\frac{1}{2}$ " |
| 8b. | 7 $\frac{1}{2}$ " | 9e. | 2" |
| 9. | 5 $\frac{1}{2}$ " | 9f. | 1 $\frac{1}{2}$ " |
- 10** **11** **12**
10. Fishplates
11. Double Brackets
12. Angle Brackets, $\frac{1}{2}$ " x $\frac{1}{2}$ "
12a. " " " " 1" x 1"
12b. " " " " 1" x $\frac{1}{2}$ "
12c. Obtuse Angle Brackets, $\frac{1}{2}$ " x $\frac{1}{2}$ "
- 13** **14** **15** **16** **17** **18** **19** **20** **21** **22** **23** **24** **25** **26** **27** **28** **29** **30** **31** **32** **33** **34** **35** **36** **37** **38** **39** **40** **41** **42** **43** **44** **45** **46** **47** **48** **49** **50** **51** **52** **53** **54** **55** **56** **57** **58** **59** **60** **61** **62** **63** **64** **65** **66** **67** **68** **69** **70** **71** **72** **73** **74** **75** **76** **77** **78** **79** **80** **81** **82** **83** **84** **85** **86** **87** **88** **89** **90** **91** **92** **93** **94** **95** **96** **97** **98** **99** **100** **101** **102** **103** **104** **105** **106** **107** **108** **109** **110** **111** **112** **113** **114** **115** **116** **117** **118** **119** **120** **121** **122** **123** **124** **125** **126** **127** **128** **129** **130** **131** **132** **133** **134** **135** **136** **137** **138** **139** **140** **141** **142** **143** **144** **145** **146** **147** **148** **149** **150** **151** **152** **153** **154** **155** **156** **157** **158** **159** **160** **161** **162** **163** **164** **165** **166** **167** **168** **169** **170** **171** **172** **173** **174** **175** **176** **177** **178** **179** **180** **181** **182** **183** **184** **185** **186** **187** **188** **189** **190** **191** **192** **193** **194** **195** **196** **197** **198** **199** **200** **201** **202** **203** **204** **205** **206** **207** **208** **209** **210** **211** **212** **213** **214** **215** **216** **217** **218** **219** **220** **221** **222** **223** **224** **225** **226** **227** **228** **229** **230** **231** **232** **233** **234** **235** **236** **237** **238** **239** **240** **241** **242** **243** **244** **245** **246** **247** **248** **249** **250** **251** **252** **253** **254** **255** **256** **257** **258** **259** **260** **261** **262** **263** **264** **265** **266** **267** **268** **269** **270** **271** **272** **273** **274** **275** **276** **277** **278** **279** **280** **281** **282** **283** **284** **285** **286** **287** **288** **289** **290** **291** **292** **293** **294** **295** **296** **297** **298** **299** **300** **301** **302** **303** **304** **305** **306** **307** **308** **309** **310** **311** **312** **313** **314** **315** **316** **317** **318** **319** **320** **321** **322** **323** **324** **325** **326** **327** **328** **329** **330** **331** **332** **333** **334** **335** **336** **337** **338** **339** **340** **341** **342** **343** **344** **345** **346** **347** **348** **349** **350** **351** **352** **353** **354** **355** **356** **357** **358** **359** **360** **361** **362** **363** **364** **365** **366** **367** **368** **369** **370** **371** **372** **373** **374** **375** **376** **377** **378** **379** **380** **381** **382** **383** **384** **385** **386** **387** **388** **389** **390** **391** **392** **393** **394** **395** **396** **397** **398** **399** **400** **401** **402** **403** **404** **405** **406** **407** **408** **409** **410** **411** **412** **413** **414** **415** **416** **417** **418** **419** **420** **421** **422** **423** **424** **425** **426** **427** **428** **429** **430** **431** **432** **433** **434** **435** **436** **437** **438** **439** **440** **441** **442** **443** **444** **445** **446** **447** **448** **449** **450** **451** **452** **453** **454** **455** **456** **457** **458** **459** **460** **461** **462** **463** **464** **465** **466** **467** **468** **469** **470** **471** **472** **473** **474** **475** **476** **477** **478** **479** **480** **481** **482** **483** **484** **485** **486** **487** **488** **489** **490** **491** **492** **493** **494** **495** **496** **497** **498** **499** **500** **501** **502** **503** **504** **505** **506** **507** **508** **509** **510** **511** **512** **513** **514** **515** **516** **517** **518** **519** **520** **521** **522** **523** **524** **525** **526** **527** **528** **529** **530** **531** **532** **533** **534** **535** **536** **537** **538** **539** **540** **541** **542** **543** **544** **545** **546** **547** **548** **549** **550** **551** **552** **553** **554** **555** **556** **557** **558** **559** **560** **561** **562** **563** **564** **565** **566** **567** **568** **569** **570** **571** **572** **573** **574** **575** **576** **577** **578** **579** **580** **581** **582** **583** **584** **585** **586** **587** **588** **589** **590** **591** **592** **593** **594** **595** **596** **597** **598** **599** **600** **601** **602** **603** **604** **605** **606** **607** **608** **609** **610** **611** **612** **613** **614** **615** **616** **617** **618** **619** **620** **621** **622** **623** **624** **625** **626** **627** **628** **629** **630** **631** **632** **633** **634** **635** **636** **637** **638** **639** **640** **641** **642** **643** **644** **645** **646** **647** **648** **649** **650** **651** **652** **653** **654** **655** **656** **657** **658** **659** **660** **661** **662** **663** **664** **665** **666** **667** **668** **669** **670** **671** **672** **673** **674** **675** **676** **677** **678** **679** **680** **681** **682** **683** **684** **685** **686** **687** **688** **689** **690** **691** **692** **693** **694** **695** **696** **697** **698** **699** **700** **701** **702** **703** **704** **705** **706** **707** **708** **709** **710** **711** **712** **713** **714** **715** **716** **717** **718** **719** **720** **721** **722** **723** **724** **725** **726** **727** **728** **729** **730** **731** **732** **733** **734** **735** **736** **737** **738** **739** **740** **741** **742** **743** **744** **745** **746** **747** **748** **749** **750** **751** **752** **753** **754** **755** **756** **757** **758** **759** **760** **761** **762** **763** **764** **765** **766** **767** **768** **769** **770** **771** **772** **773** **774** **775** **776** **777** **778** **779** **780** **781** **782** **783** **784** **785** **786** **787** **788** **789** **790** **791** **792** **793** **794** **795** **796** **797** **798** **799** **800** **801** **802** **803** **804** **805** **806** **807** **808** **809** **810** **811** **812** **813** **814** **815** **816** **817** **818** **819** **820** **821** **822** **823** **824** **825** **826** **827** **828** **829** **830** **831** **832** **833** **834** **835** **836** **837** **838** **839** **840** **841** **842** **843** **844** **845** **846** **847** **848** **849** **850** **851** **852** **853** **854** **855** **856** **857** **858** **859** **860** **861** **862** **863** **864** **865** **866** **867** **868** **869** **870** **871** **872** **873** **874** **875** **876** **877** **878** **879** **880** **881** **882** **883** **884** **885** **886** **887** **888** **889** **890** **891** **892** **893** **894** **895** **896** **897** **898** **899** **900** **901** **902** **903** **904** **905** **906** **907** **908** **909** **910** **911** **912** **913** **914** **915** **916** **917** **918** **919** **920** **921** **922** **923** **924** **925** **926** **927** **928** **929** **930** **931** **932** **933** **934** **935** **936** **937** **938** **939** **940** **941** **942** **943** **944** **945** **946** **947** **948** **949** **950** **951** **952** **953** **954** **955** **956** **957** **958** **959** **960** **961** **962** **963** **964** **965** **966** **967** **968** **969** **970** **971** **972** **973** **974** **975** **976** **977** **978** **979** **980** **981** **982** **983** **984** **985** **986** **987** **988** **989** **990** **991** **992** **993** **994** **995** **996** **997** **998** **999** **1000**

- 25** **26** **27** **28** **29** **30** **31** **32** **33** **34** **35** **36** **37** **38** **39** **40** **41** **42** **43** **44** **45** **46** **47** **48** **49** **50** **51** **52** **53** **54** **55** **56** **57** **58** **59** **60** **61** **62** **63** **64** **65** **66** **67** **68** **69** **70** **71** **72** **73** **74** **75** **76** **77** **78** **79** **80** **81** **82** **83** **84** **85** **86** **87** **88** **89** **90** **91** **92** **93** **94** **95** **96** **97** **98** **99** **100** **101** **102** **103** **104** **105** **106** **107** **108** **109** **110** **111** **112** **113** **114** **115** **116** **117** **118** **119** **120** **121** **122** **123** **124** **125** **126** **127** **128** **129** **130** **131** **132** **133** **134** **135** **136** **137** **138** **139** **140** **141** **142** **143** **144** **145** **146** **147** **148** **149** **150** **151** **152** **153** **154** **155** **156** **157** **158** **159** **160** **161** **162** **163** **164** **165** **166** **167** **168** **169** **170** **171** **172** **173** **174** **175** **176** **177** **178** **179** **180** **181** **182** **183** **184** **185** **186** **187** **188** **189** **190** **191** **192** **193** **194** **195** **196** **197** **198** **199** **200** **201** **202** **203** **204** **205** **206** **207** **208** **209** **210** **211** **212** **213** **214** **215** **216** **217** **218** **219** **220** **221** **222** **223** **224** **225** **226** **227** **228** **229** **230** **231** **232** **233** **234** **235** **236** **237** **238** **239** **240** **241** **242** **243** **244** **245** **246** **247** **248** **249** **250** **251** **252** **253** **254** **255** **256** **257** **258** **259** **260** **261** **262** **263** **264** **265** **266** **267** **268** **269** **270** **271** **272** **273** **274** **275** **276** **277** **278** **279** **280** **281** **282** **283** **284** **285** **286** **287** **288** **289** **290** **291** **292** **293** **294** **295** **296** **297** **298** **299** **300** **301** **302** **303** **304** **305** **306** **307** **308** **309** **310** **311** **312** **313** **314** **315** **316** **317** **318** **319** **320** **321**

MECCANO PARTS

120^b

No. 120b. Compression Springs, $\frac{1}{4}$ " long



122

122. Miniature Loaded Sacks



123. Cone Pulleys, $1\frac{1}{4}$ ", 1" and $\frac{3}{4}$ " diam.
124. Reversed Angle Brackets, 1"
125. " " " "



126

126. Trunnions

126^a

126a. Flat Trunnions



127

127. Bell Cranks



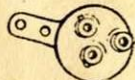
128

128. Bell Cranks, with Boss



129

129. Toothed Segments, $1\frac{1}{2}$ " radius



130

130. Eccentrics, Triple Throw, $\frac{1}{4}$ ", $\frac{3}{8}$ " and $\frac{1}{2}$ "
130a Eccentrics, Single Throw, $\frac{1}{4}$ "



130a



131

131. Dredger Buckets



132

132. Flywheels, $2\frac{1}{2}$ " diam.

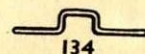


133

133. Corner Brackets, $1\frac{1}{2}$ "

133^a

133a. " " " "



134

No. 134. Crank Shafts, 1" stroke



136

136. Handrail Supports



137

136a. Handrail Couplings
137. Wheel Flanges



136A

138^a

138a. Ships' Funnels



139

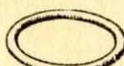
139. Flanged Brackets (right)

139a. " " (left)



140

140. Universal Couplings



142

142. Rubber Rings (to fit 3" diam. rims)



142A

142a. Motor Tyres (to fit 2" diam. rims)

142b. " " " 3" " "

142c. " " " 1" " "

142d. " " " 1 $\frac{1}{2}$ " " "



143

143. Circular Girders, $5\frac{1}{2}$ " diam.



144

No. 144. Dog Clutches

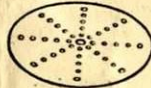


145

145. Circular Strips, $7\frac{1}{2}$ " diam. overall

146. " Plates, 6" " "

146a. " " 4" " "



146



147 & 148

147. Pawls, with Pivot Bolt and Nuts

147a. Pawls

147b. Pivot Bolts with 2 Nuts

147c. Pawls without boss

148. Ratchet Wheels



151

151. Pulley Blocks, Single Sheave

152. " " Two " "

153. " " Three " "

154^a & 154^b

154a. Corner Angle Brackets, $\frac{1}{2}$ "

154b. Corner Angle Brackets, $\frac{1}{2}$ "

(left-hand)

155. Rubber Rings (for 1" Pulleys)



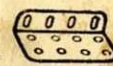
157

157. Fans, 2" diam.



160

160. Channel Bearings, $1\frac{1}{2}$ " x $1\frac{1}{2}$ " x $\frac{1}{2}$ "

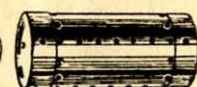


161

161. Girder Brackets, 2" x 1" x $\frac{1}{2}$ "



163



162



164

No. 162. Boilers, complete, 5" long x $2\frac{1}{4}$ " diam.

162a. " Ends, $2\frac{1}{4}$ " diam. x $\frac{3}{4}$ in.

162b. " without ends, $4\frac{1}{2}$ " long x $2\frac{1}{4}$ "

diam.

163. Sleeve Pieces, $1\frac{1}{2}$ " long x $\frac{1}{2}$ " diam.

164. Chimney Adaptors, $\frac{3}{8}$ " diam. x $\frac{1}{2}$ "

high



165

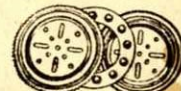
165. Swivel Bearings



166

166. End

167b. Flanged Ring, $9\frac{3}{4}$ " diam



168

168. Ball Bearings, 4" diam.

168a. " Races, flanged discs, $3\frac{1}{2}$ " diam.

168b. " " toothed " 4" diam.

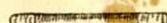
168c. " Cages, $3\frac{1}{2}$ " diam., complete with

balls.



171

171. Socket Couplings



175

175. Flexible Coupling Units



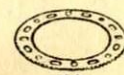
176

176. Anchoring Springs for Cord



179

179. Rod Sockets



180

180. Gear Rings, $3\frac{1}{2}$ " diam. (133 ext. teeth, 95 int.)



185

No. 185. Steering Wheels, $1\frac{1}{2}$ " diam.

186. Driving Bands, $2\frac{1}{2}$ " (Light)

186a. " " 6" " "

186b. " " 10" " "

186c. " " 10" (Heavy)

186d. " " 15" " "

186e. " " 20" " "

187. Road Wheels, $2\frac{1}{2}$ " diam.

187a. Conical Disc, $1\frac{1}{2}$ " diam.

187b. " " " "

187c. " " " "

187d. " " " "

187e. " " " "

187f. " " " "

187g. " " " "

187h. " " " "

187i. " " " "

187j. " " " "

187k. " " " "

187l. " " " "

187m. " " " "

187n. " " " "

187o. " " " "

187p. " " " "

187q. " " " "

187r. " " " "

187s. " " " "

187t. " " " "

187u. " " " "

187v. " " " "

187w. " " " "

187x. " " " "

187y. " " " "

187z. " " " "

187aa. " " " "

187ab. " " " "

187ac. " " " "

187ad. " " " "

187ae. " " " "

187af. " " " "

187ag. " " " "

187ah. " " " "

187ai. " " " "

187aj. " " " "

187ak. " " " "

187al. " " " "

187am. " " " "

187an. " " " "

187ao. " " " "

187ap. " " " "

187aq. " " " "

187ar. " " " "

187as. " " " "

187at. " " " "

187au. " " " "

187av. " " " "

187aw. " " " "

187ax. " " " "

187ay. " " " "

187az. " " " "

187ba. " " " "

187bb. " " " "

187bc. " " " "

187bd. " " " "

187be. " " " "

187bf. " " " "

187bg. " " " "

187bh. " " " "