

# MECCANO

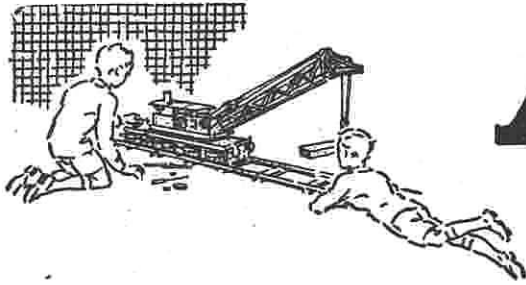
INSTRUCTIONS FOR  
No. 4a ACCESSORY OUTFIT



No.  
46.4a

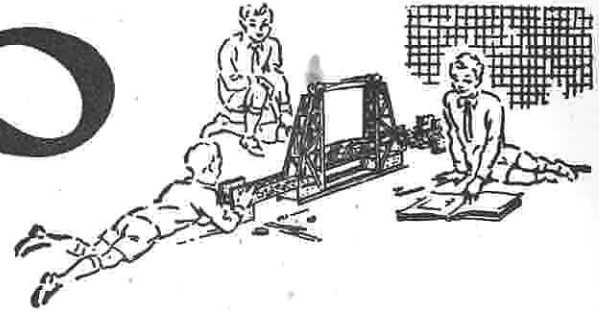






# MECCANO

*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.

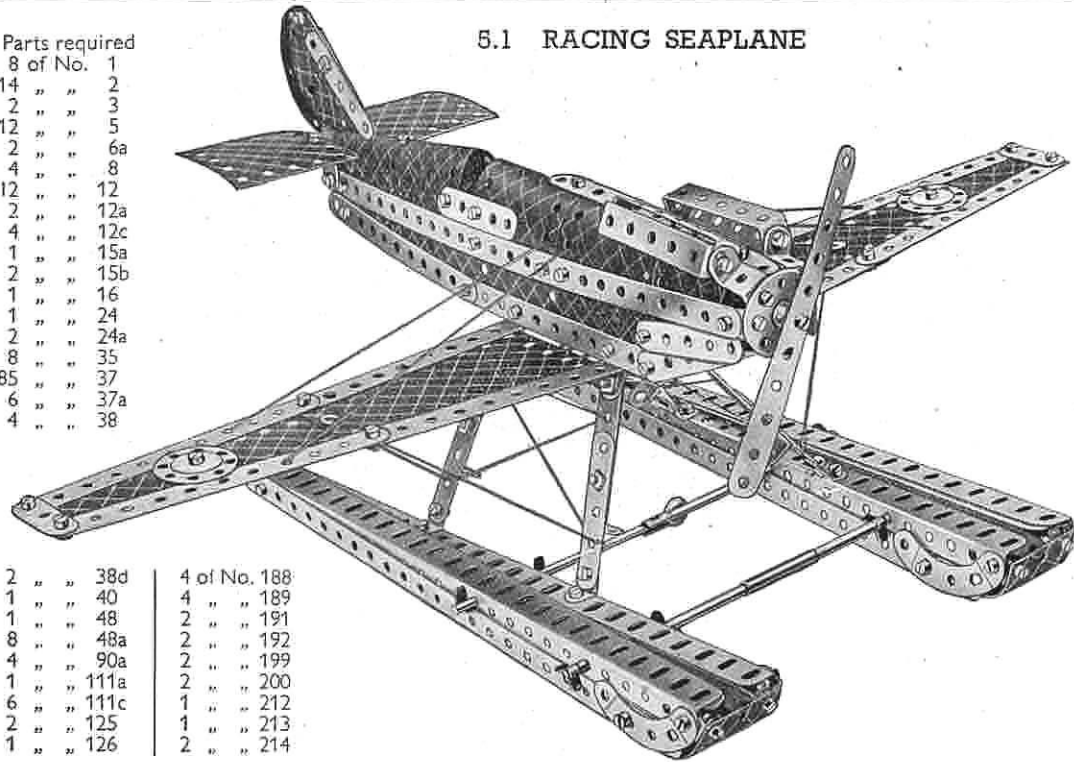


**THE FINEST HOBBY IN THE WORLD FOR BOYS**

### 5.1 RACING SEAPLANE

Parts required

8	of No.	1
14	" "	2
2	" "	3
12	" "	5
2	" "	6a
4	" "	8
12	" "	12
2	" "	12a
4	" "	12c
1	" "	15a
2	" "	15b
1	" "	16
1	" "	24
2	" "	24a
8	" "	35
85	" "	37
6	" "	37a
4	" "	38



2	" "	38d	4	of No.	188
1	" "	40	4	" "	189
1	" "	48	2	" "	191
8	" "	48a	2	" "	192
4	" "	90a	2	" "	199
1	" "	111a	2	" "	200
6	" "	111c	1	" "	212
2	" "	125	1	" "	213
1	" "	126	2	" "	214

A  $2\frac{1}{2}'' \times 1\frac{1}{4}''$  Flexible Plate is bolted to Angle Brackets underneath the nose, but it is removed in Fig. 5.1a to show the construction of the fuselage. The rudder is bolted to a  $3\frac{1}{2}''$  Strip, which is held upright between four spacing Washers (two on each side) on the  $\frac{1}{2}''$  Bolt that holds the  $12\frac{1}{2}''$  Strips together at the tail.

The leading edge of the wing is fastened to the fuselage by a Trunnion, and the trailing edge is fixed to a  $1\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strip that spaces the underside of the fuselage. The floats are attached by Obtuse Angle Brackets bolted to the wings. The front tie rod of the floats is made up of two 4" Rods joined by a Rod Connector, and the rear tie rod consists of a  $4\frac{1}{2}''$  Rod and a  $3\frac{1}{2}''$  Rod joined by a Rod and Strip Connector. A  $12\frac{1}{2}''$  Strip is bolted between the two  $12\frac{1}{2}''$  Angle Girders that form the top of each float.

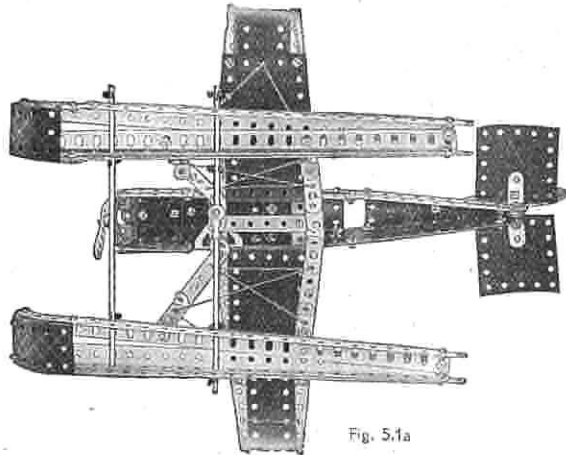
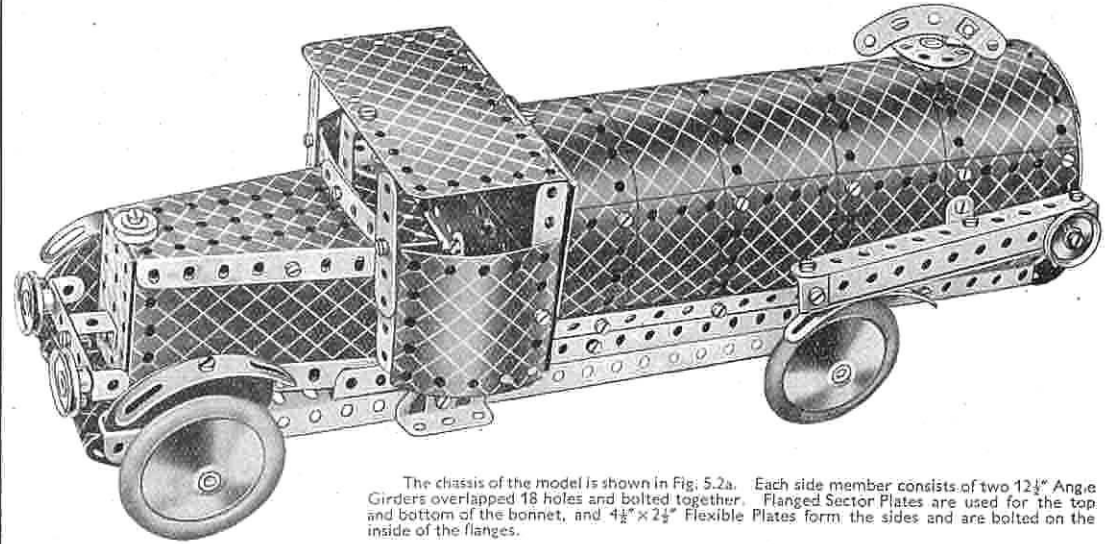


Fig. 5.1a

### 5.2 PETROL TANK LORRY



The chassis of the model is shown in Fig. 5.2a. Each side member consists of two  $12\frac{1}{2}''$  Angle Girders overlapped 18 holes and bolted together. Flanged Sector Plates are used for the top and bottom of the bonnet, and  $4\frac{1}{2}'' \times 2\frac{1}{2}''$  Flexible Plates form the sides and are bolted on the inside of the flanges.

The steering wheel is a Wheel Disc carried on a bolt lock-nutted to the Flanged Sector Plate.

The roof and back of the cab consist of a Hinged Flat Plate and two  $2\frac{1}{2}'' \times 1\frac{1}{4}''$  Flexible Plates overlapped one hole. The cab is fastened to the chassis by Angle Brackets, and to the bonnet by the  $1\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strip that forms the central division of the windscreen.

In Fig. 5.2a the tank is opened out to show its construction. The top of the tank consists of four  $5\frac{1}{2}'' \times 2\frac{1}{2}''$  Flexible Plates and a  $5\frac{1}{2}'' \times 1\frac{1}{4}''$  Flexible Plate. It is extended on the rear side by two  $5\frac{1}{2}'' \times 1\frac{1}{4}''$  Flexible Plates, and  $12\frac{1}{2}''$  Strips are bolted to each longitudinal edge. The complete tank is attached to the Angle Girders by four Obtuse Angle Brackets. The tank filler cap is a Bush Wheel fitted with a  $2\frac{1}{2}''$  small radius Curved Strip and is fastened to the shank of the  $\frac{1}{2}''$  Bolt at the top of the tank.

#### Parts required

2	of No.	1	1	of No.	51
7	" "	2	1	" "	52
1	" "	3	2	" "	54
8	" "	5	4	" "	90a
4	" "	8	2	" "	111a
3	" "	11	5	" "	111c
10	" "	12	2	" "	125
2	" "	12a	2	" "	126
4	" "	12c	2	" "	126a
2	" "	15	4	" "	187
3	" "	22	4	" "	188
1	" "	22a	3	" "	189
1	" "	23	4	" "	190
1	" "	24	2	" "	191
1	" "	24a	4	" "	192
4	" "	35	1	" "	198
80	" "	37	2	" "	199
5	" "	37a	2	" "	200
9	" "	38	2	" "	214
1	" "	48	4	" "	215
1	" "	48a			

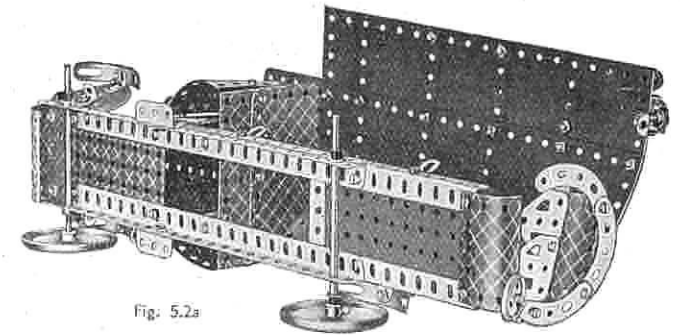
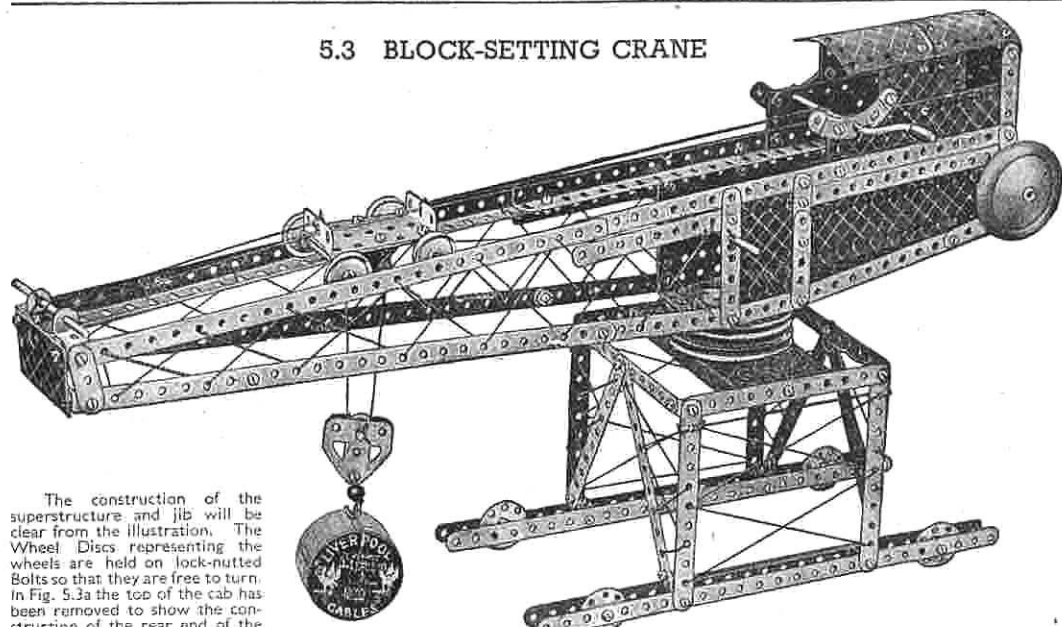


Fig. 5.2a

## 5.3 BLOCK-SETTING CRANE



The construction of the superstructure and jib will be clear from the illustration. The Wheel Discs representing the wheels are held on lock-nutted Bolts so that they are free to turn. In Fig. 5.3a the top of the cab has been removed to show the construction of the rear end of the jib.

A 3" Pulley is bolted to the jib by two  $\frac{3}{4}$ " Bolts, which hold also a  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip fixed along the length of the jib on the underside of the 3" Pulley, so that its ends form a bearing between the two Pulleys. A  $3\frac{1}{2}$ " Rod fastened in the boss of the upper 3" Pulley passes through the boss of the lower 3" Pulley, which is bolted to a  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate forming part of the superstructure. The Rod is retained in position below the Flanged Plate as shown in Fig. 5.3b.

The hoisting carriage is shown in Fig. 5.3c; it runs on rails formed by Angle Girders at the top of the jib. A Cord is tied to the front end of the carriage, and is taken over a  $3\frac{1}{2}$ " Rod at the jib head and wound six times around the Crank Handle. It is then tied to the rear of the carriage.

A second Cord is tied to a Cord Anchoring Spring on the  $3\frac{1}{2}$ " Rod carrying the Bush Wheel and the Road Wheel. The Cord is then led around one of the 1" loose Pulleys in the carriage around the  $\frac{1}{2}$ " loose Pulley in the pulley block, and back over the second 1" loose Pulley. Finally it is tied to the  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flexible Plate at the jib head.

Fig. 5.3a

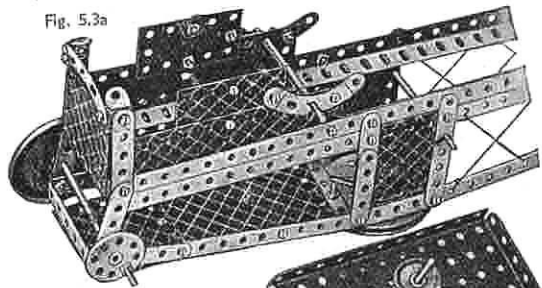


Fig. 5.3c

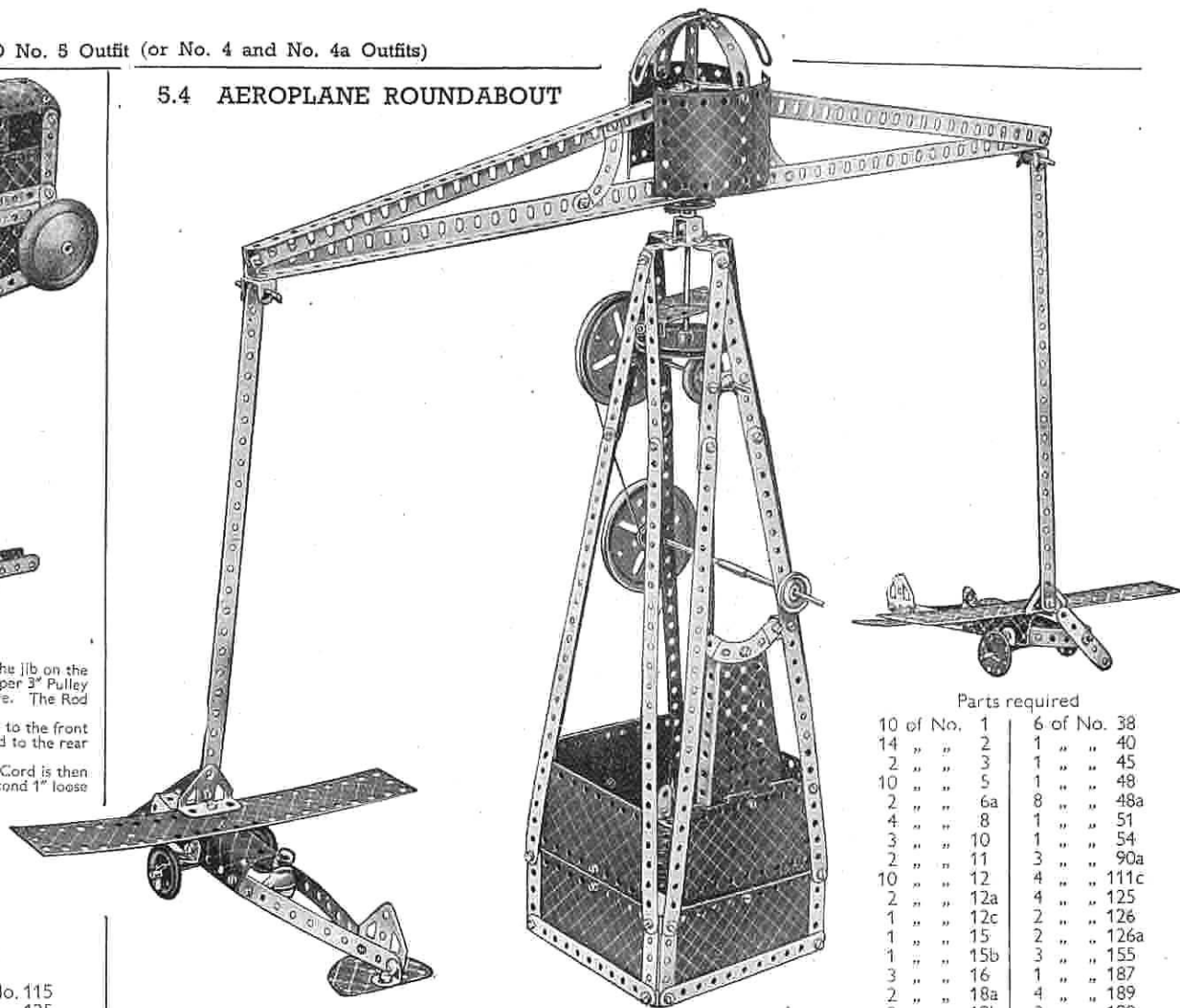


Fig. 5.3b

## Parts required

10 of No. 1	2 of No. 22a	1 of No. 115
14 " " 2	1 " " 23	2 " " 125
2 " " 3	1 " " 24	2 " " 126
12 " " 5	4 " " 24a	2 " " 126a
2 " " 6a	10 " " 35	1 " " 176
4 " " 8	85 " " 37	1 " " 187
4 " " 11	6 " " 37a	1 " " 188
12 " " 12	11 " " 38	3 " " 188
2 " " 12a	1 " " 40	4 " " 189
4 " " 12c	1 " " 45	4 " " 190
1 " " 15b	1 " " 48	1 " " 191
3 " " 16	7 " " 48a	2 " " 200
2 " " 17	1 " " 51	
1 " " 18a	1 " " 52	
1 " " 18b	3 " " 57c	
2 " " 19b	3 " " 90a	
1 " " 19g	1 " " 111a	
5 " " 22	6 " " 111c	

## 5.4 AEROPLANE ROUNDABOUT



## Parts required

10 of No. 1	6 of No. 38
14 " " 2	1 " " 40
2 " " 3	1 " " 45
10 " " 5	1 " " 48
2 " " 6a	8 " " 48a
4 " " 8	1 " " 51
3 " " 10	1 " " 54
2 " " 11	3 " " 90a
10 " " 12	4 " " 111c
2 " " 12a	4 " " 125
1 " " 12c	2 " " 126
1 " " 15	2 " " 126a
1 " " 15b	3 " " 155
3 " " 16	1 " " 187
2 " " 18a	4 " " 189
2 " " 19b	2 " " 190
1 " " 19g	2 " " 191
3 " " 22	4 " " 192
2 " " 22a	1 " " 198
1 " " 24	2 " " 199
3 " " 24a	2 " " 200
10 " " 35	1 " " 213
83 " " 37	2 " " 214
4 " " 37a	4 " " 215

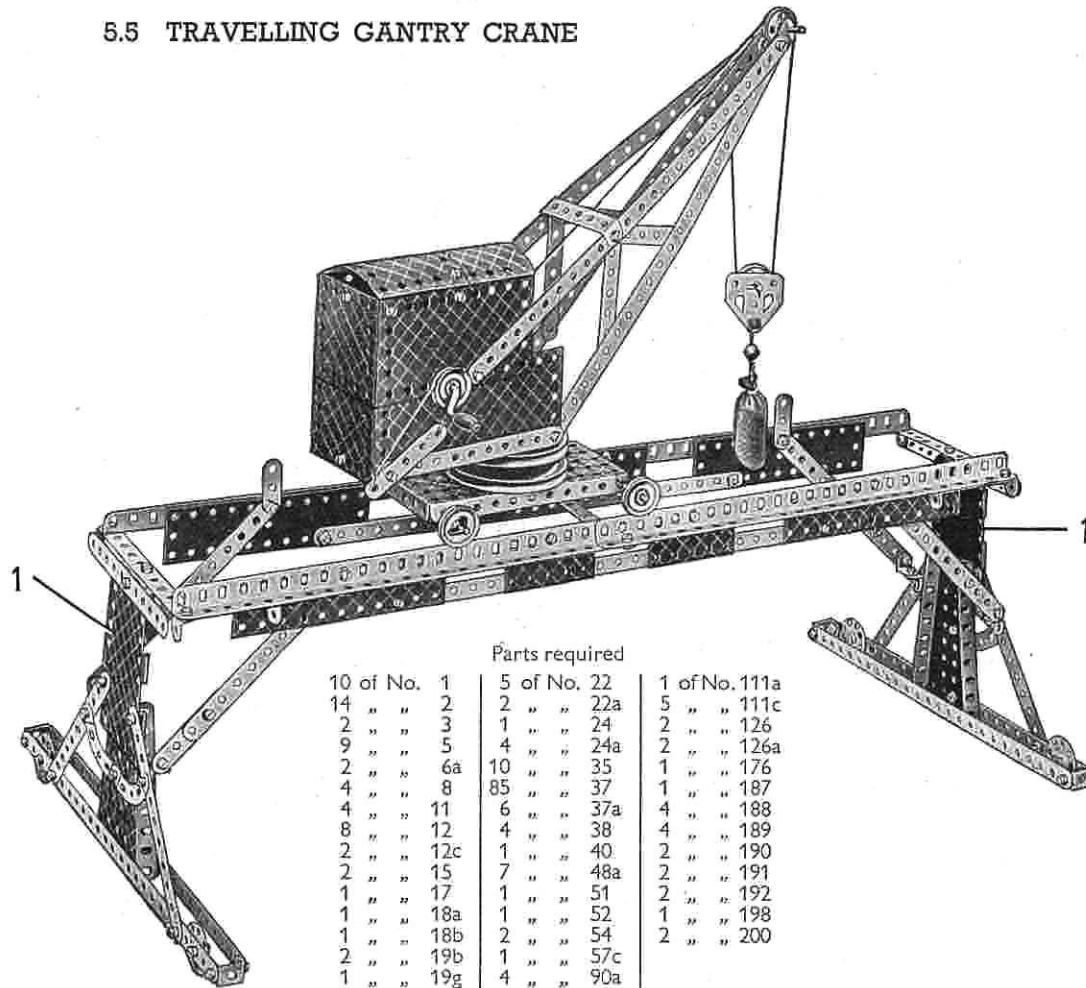
The centre pin is withdrawn from a Hinged Flat Plate and the halves are used as flat plates in the construction of the base.

A Crank Handle is lengthened by joining to it a  $3\frac{1}{2}$ " Rod with a Rod Connector. It carries also a 1" fast Pulley, which is connected by Cord to a second 3" Pulley mounted on a 5" Rod, bearings for which are provided by the centre holes of two  $1\frac{1}{2}$ " Strips near the top of the tower. A 1" Pulley fitted with a Rubber Ring is fastened to this Rod, inside the tower. The Rubber Ring bears against the rim of a Road Wheel fastened on the lower end of the vertical 4" Rod to which the beam carrying the aeroplanes also is fastened.

The beam consists of two  $12\frac{1}{2}$ " Angle Girders bolted to a Bush Wheel and overlapped one hole. The top Girders of the beam are joined together at the centre by an Obtuse Angle Bracket.



### 5.5 TRAVELLING GANTRY CRANE



Parts required	
10 of No. 1	5 of No. 22
14 " " 2	2 " " 22a
2 " " 3	1 " " 24
9 " " 5	4 " " 24a
2 " " 6a	10 " " 35
4 " " 8	85 " " 37
4 " " 11	6 " " 37a
8 " " 12	4 " " 38
2 " " 12c	1 " " 40
2 " " 15	7 " " 48a
1 " " 17	1 " " 51
1 " " 18a	1 " " 52
1 " " 18b	2 " " 54
2 " " 19b	1 " " 57c
1 " " 19g	4 " " 90a
1 of No. 111a	5 " " 111c
	2 " " 126
	2 " " 126a
	1 " " 176
	1 " " 187
	4 " " 188
	4 " " 189
	2 " " 190
	2 " " 191
	2 " " 192
	1 " " 198
	2 " " 200

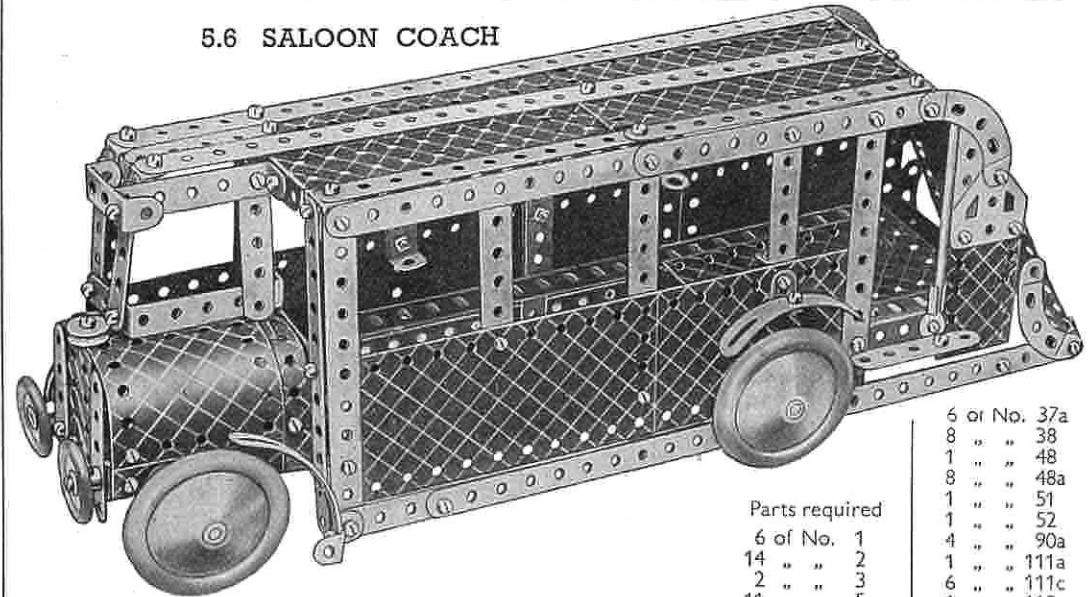
The pin has been withdrawn from a Hinged Flat Plate and the halves are used as flat plates 1 in the construction of the supports for the gantry. Four Wheel Discs are fastened to the 12½" Strips by lock-nutted Bolts, so that the gantry can travel along the ground. Each of the rails along which the crane runs consists of two 12½" Angle Girders, overlapped three holes and joined across by 5½" Strips. Trunnions connect the rails to the supports.

A 5½" x 2½" Flanged Plate fitted with a 3" Pulley forms the base of the crane, and the 1" Pulleys are fastened on 5" Rods journalled in the end holes of the Flanged Plate.

The cab of the crane consists of Flexible Plates fastened together by 2½" x ½" Double Angle Strips, and a Crank Handle fitted with a 1" Pulley and a Road Wheel is passed through the sides. The Bolts that hold the lower 12½" Strips of the jib carry also a 2½" x 1½" Flanged Plate that has a second 3" Pulley fixed to it. A 2" Rod in the boss of this Pulley passes through the lower Pulley and Flanged Plates, and is retained in position beneath it by a Bush Wheel.

A Cord is tied to a Cord Anchoring Spring on the shaft of the Crank Handle, and after passing over the 1" loose Pulleys at the jib head and in the pulley block, is fastened to the jib as shown.

### 5.6 SALOON COACH



Parts required	
6 of No. 1	4 or No. 37a
14 " " 2	8 " " 38
2 " " 3	1 " " 48
11 " " 5	8 " " 48a
2 " " 6a	1 " " 51
3 " " 8	1 " " 52
2 " " 10	4 " " 90a
3 " " 11	1 " " 111a
12 " " 12	6 " " 111c
2 " " 12c	1 " " 115
1 " " 15	2 " " 125
1 " " 15a	2 " " 126a
1 " " 16	2 " " 155
3 " " 22	4 " " 187
1 " " 23	4 " " 188
1 " " 35	3 " " 189
85 " " 37	2 " " 190
	2 " " 191
	4 " " 192
	2 " " 199
	2 " " 200
	1 " " 212
	4 " " 215

Two 12½" Angle Girders joined by 3½" Strips at each end comprise the chassis, and to this the Flexible Plates forming the sides are bolted. Supports for the roof are provided by 5½" Strips, to which a 5½" x 2½" Flanged Plate and two 5½" x 1½" Flexible Plates are fastened by Angle Brackets. The curved back of the coach is formed by two 1½" radius Curved Plates, a 5½" x 1½" Flexible Plate, and a 5½" x 2½" Flexible Plate. The Flexible Plates are curved and bolted to the 1½" radius Curved Plates so that they overlap three holes.

The tail lamp is a 1" Pulley, which is secured to a Threaded Pin fastened to one of the Flexible Plates.

The bonnet is built up from two U-section Curved Plates and a 2½" x 1½" Flexible Plate. The radiator is a 2½" x 1½" Flanged Plate.

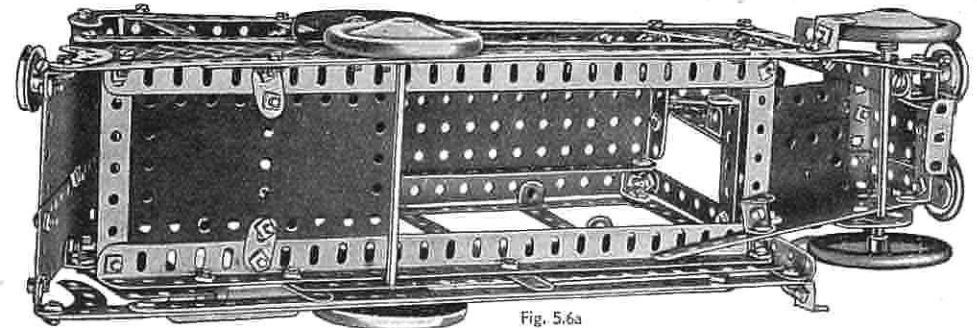


Fig. 5.6a

## 5.7 MERRY-GO-ROUND

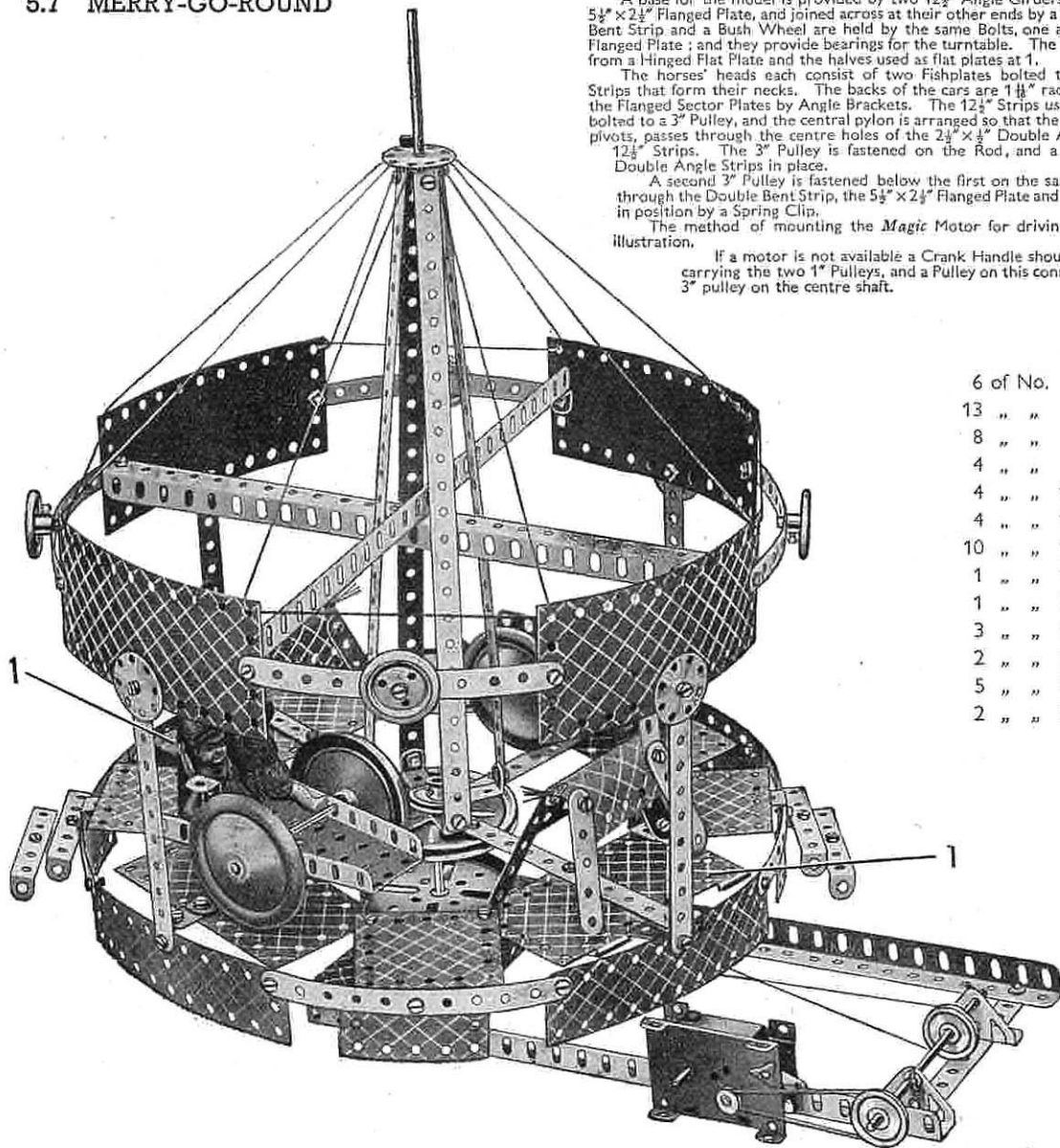
A base for the model is provided by two  $12\frac{1}{2}$ " Angle Girders bolted to the end flanges of a  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate, and joined across at their other ends by a  $5\frac{1}{2}$ " Strip as shown. A Double Bent Strip and a Bush Wheel are held by the same Bolts, one above and the other below the Flanged Plate; and they provide bearings for the turntable. The centre pin has been withdrawn from a Hinged Flat Plate and the halves used as flat plates at 1.

The horses' heads each consist of two Fishplates bolted to the  $2\frac{1}{2}$ " small radius Curved Strips that form their necks. The backs of the cars are  $1\frac{1}{2}$ " radius Curved Plates, attached to the Flanged Sector Plates by Angle Brackets. The  $12\frac{1}{2}$ " Strips used for bracing the platform are bolted to a 3" Pulley, and the central pylon is arranged so that the 4" Rod, on which the turntable pivots, passes through the centre holes of the  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strips at the ends of the  $12\frac{1}{2}$ " Strips. The 3" Pulley is fastened on the Rod, and a 1" Pulley clamps the  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strips in place.

A second 3" Pulley is fastened below the first on the same Rod, and the Rod is passed through the Double Bent Strip, the  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate and the Bush Wheel. It is retained in position by a Spring Clip.

The method of mounting the *Magic Motor* for driving the model is clear from the illustration.

If a motor is not available a Crank Handle should be substituted for the Rod carrying the two 1" Pulleys, and a Pulley on this connected by a Driving Band to the 3" pulley on the centre shaft.



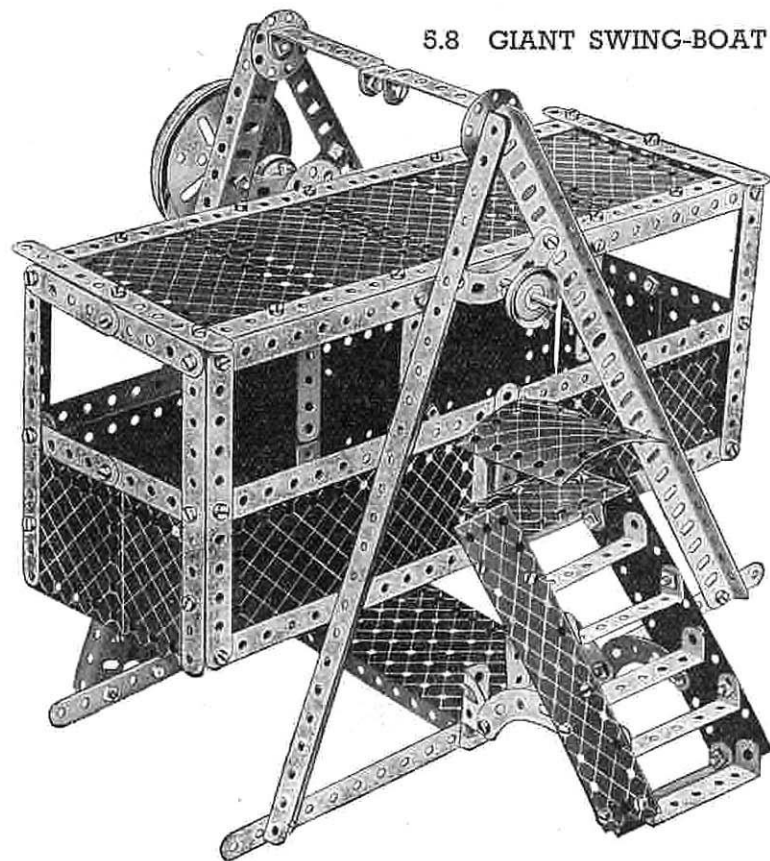
## Parts required

6 of No.	1	1 of No.	24
13 " "	2	4 " "	24a
8 " "	5	5 " "	35
4 " "	8	85 " "	37
4 " "	10	2 " "	37a
4 " "	11	2 " "	38
10 " "	12	1 " "	40
1 " "	15	1 " "	45
1 " "	15b	8 " "	48a
3 " "	16	1 " "	52
2 " "	19b	2 " "	54
5 " "	22	4 " "	90a
2 " "	22a	2 " "	111c

4 " "	125
2 " "	126
4 " "	155
4 " "	187
4 " "	188
4 " "	189
4 " "	190
2 " "	191
4 " "	192
1 " "	198
2 " "	199
2 " "	200

1 *Magic Motor*  
(not included  
in Outfit.)

## 5.8 GIANT SWING-BOAT



## Parts required

10 of No.	1	3 of No.	22	1 of No.	111a
12 " "	2	1 " "	24	6 " "	111c
2 " "	3	2 " "	24a	2 " "	126
2 " "	5	3 " "	35	2 " "	126a
12 " "	8	85 " "	37	1 " "	147b
4 " "	11	6 " "	37a	3 " "	188
4 " "	12	6 " "	38	2 " "	189
6 " "	12a	1 " "	45	4 " "	190
2 " "	15	8 " "	48a	2 " "	191
1 " "	16	1 " "	51	4 " "	192
1 " "	17	1 " "	52	1 " "	198
2 " "	19b	2 " "	54	1 " "	200
2 " "	19g	4 " "	90a	1 " "	213

1 *Magic Motor* (not included in Outfit.)

### 5.8 GIANT SWING-BOAT—continued

The main supports for the swing-boat are formed by 12½" Angle Girders, which are bolted to a base made by fastening two 12½" Strips to a 5½" x 2½" Flanged Plate. The steps are supported by two 2½" small radius Curved Strips, bolted to the sides of the staircase and to two Trunnions fastened to the base. The platform at the top consists of a 2½" x 1½" Flexible Plate held in position by two 1" x 1" Angle Brackets.

The 1½" radius Curved Plate is fastened to a Double Bent Strip bolted to one end of a 5½" Strip, the other end of which is fastened to the base.

The swing-boat is pivoted on a compound rod consisting of a 5" Rod and a 3½" Rod joined by a Rod Connector. The compound rod is held in the boss of a Bush Wheel bolted to the side of the swing-boat.

The Model is driven by means of a Crank Handle journalled in holes in two Flanged Sector Plates as shown in Fig. 5.8a below. The Sector Plates are bolted at their lower ends to a 2½" x 1½" Flanged Plate and to two Double Brackets. The Crank Handle carries a 1" Pulley, which is connected by a Driving Band to a 3" Pulley fixed on a 2" Rod also journalled in the Flanged Sector Plates. A 5½" Strip is attached to a Pivot Bolt, fixed in the 3" Pulley, and its other end is pivoted on a ½" bolt lock-nutted to but spaced by Washers from another 3" Pulley fixed on the pivot rod of the swing-boat.

If desired a Motor can be used to drive the model, and the method of fixing it in place is shown in Fig. 5.8a. The Motor should be bolted direct to the base, and the Pulley on its driving shaft then connected by a Driving Band to a second 1" Pulley mounted on the Crank Handle.

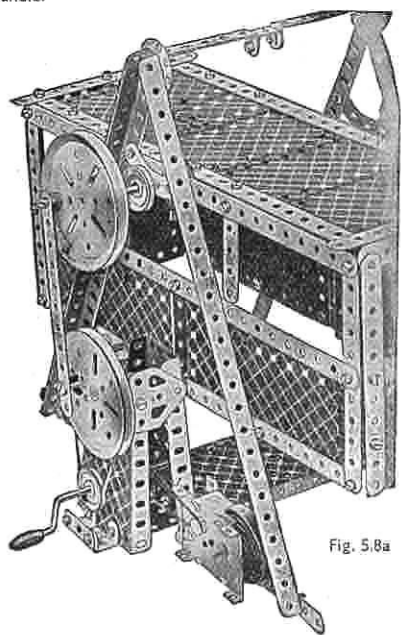
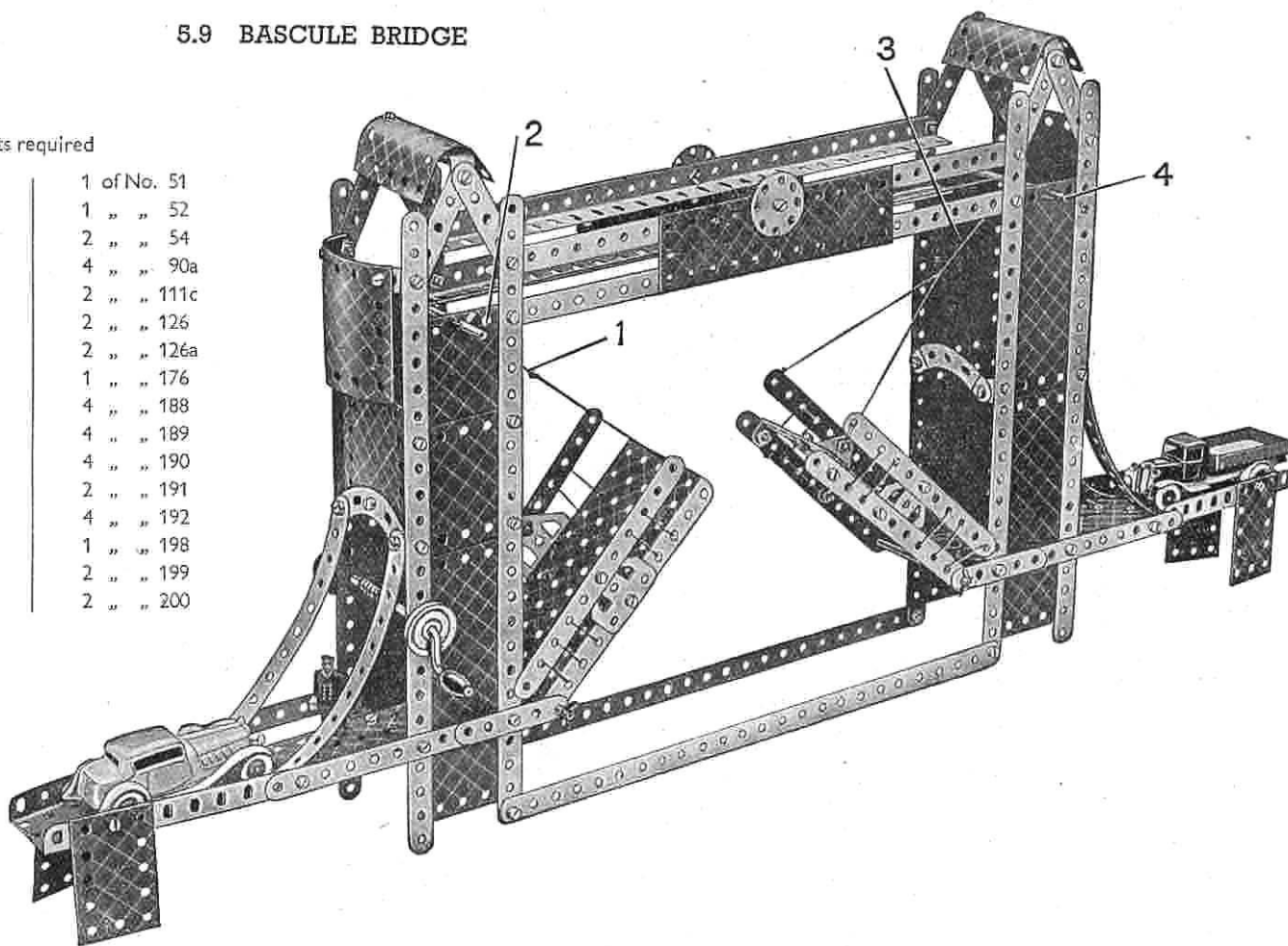


Fig. 5.8a

### 5.9 BASCULE BRIDGE

#### Parts required

10 of No. 1	1 of No. 51
14 " " 2	1 " " 52
12 " " 5	2 " " 54
4 " " 8	4 " " 90a
10 " " 12	2 " " 111c
4 " " 12c	2 " " 126
4 " " 16	2 " " 126a
1 " " 19g	1 " " 176
2 " " 22	4 " " 188
2 " " 24a	4 " " 189
8 " " 35	4 " " 190
84 " " 37	2 " " 191
4 " " 37a	4 " " 192
8 " " 38	1 " " 198
1 " " 40	2 " " 199
8 " " 48a	2 " " 200



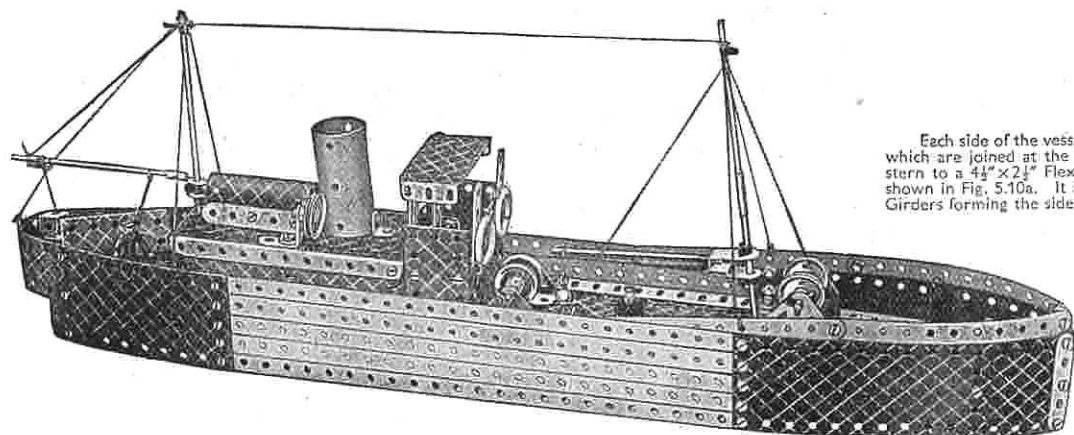
The centre pin has been withdrawn from a Hinged Flat Plate, and one of the halves is used in the construction of the side of one of the towers. Each of the main towers consists of four 12½" Strips to which are bolted Flexible Plates as shown. The 12½" Strips are braced across by the 2½" x ½" Double Angle Strips that support the approach roadway, the 2½" small radius Curved Strips, and a further Double Angle Strip at the top of the tower. The U-Section Curved Plates are spaced from the 2½" x ½" Double Angle Strips by three Washers. The two towers are joined across at the top by four Angle Girders, and at the bottom by two 12½" Strips.

Four 2½" Strips form bearings for the 3½" Rods on which the halves of the span are pivoted. The left-hand half is a 5½" x 2½" Flanged Plate fitted with Flat Trunnions and 5½" Strips as shown. The other half of the span is a part of the Hinged Flat Plate, and is connected to two 5½" Strips by a 2½" x ½" Double Angle Strip and Angle Brackets.

The halves of the span are raised and lowered by turning a Crank Handle journalled in the sides of the left-hand tower. Cord 1 passes over Rod 2 and is fastened to a Cord Anchoring Spring on the Crank Handle. Cord 3 passes over Rod 4 and around Rod 2, and is then knotted to Cord 1 inside the tower.



## 5.10 TRAWLER

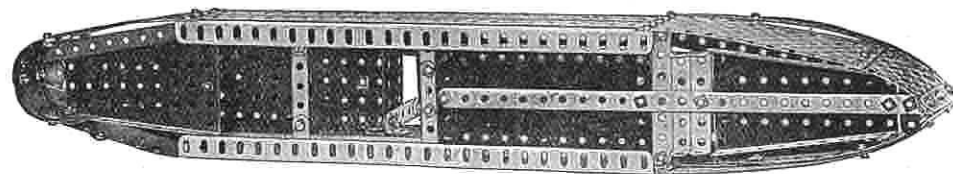


Each side of the vessel consists of three  $1\frac{1}{2}$ " Strips and two Angle Girders, which are joined at the forward end to a  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate, and at the stern to a  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate. The deck of the model is constructed as shown in Fig. 5.10a. It is secured to Strips bolted between two of the Angle Girders forming the sides of the ship.

The sides of the cabin behind the bridge are attached by a  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip and Fishplates to the two Angle Girders in the sides of the ship. The back of the cabin is completed with  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strips. The back of the wheelhouse, a  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate, is bolted to the  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate, the Bolts holding also Angle Brackets and  $2\frac{1}{2}$ " Strips. The front of the wheelhouse is a  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flexible Plate, which is held in position by two Angle Brackets.

The funnel, a  $2\frac{1}{2}$ " Cylinder, is fastened to the top of the cabin by an Angle Bracket.

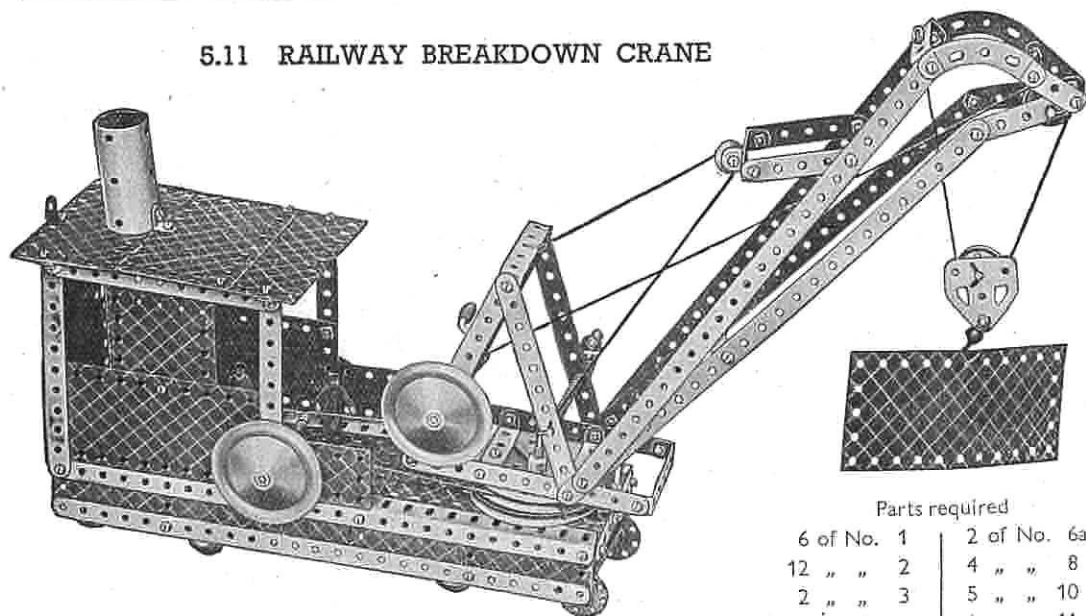
Fig. 5.10a



## Parts required

7 of No. 1	1 of No. 15a	1 of No. 44	2 of No. 155
8 " " 2	2 " " 15b	1 " " 48	1 " " 176
2 " " 3	1 " " 16	5 " " 48a	4 " " 188
9 " " 5	2 " " 17	1 " " 51	3 " " 189
2 " " 6a	4 " " 22	1 " " 52	4 " " 190
4 " " 8	2 " " 22a	2 " " 54	2 " " 191
5 " " 10	1 " " 24	1 " " 57c	3 " " 192
1 " " 11	1 " " 24a	2 " " 111a	2 " " 199
10 " " 12	14 " " 35	6 " " 111c	1 " " 212
2 " " 12a	85 " " 37	2 " " 125	1 " " 213
1 " " 12c	6 " " 37a	2 " " 126	1 " " 216
1 " " 15	1 " " 40	2 " " 126a	

## 5.11 RAILWAY BREAKDOWN CRANE



## Parts required

6 of No. 1	2 of No. 6a
12 " " 2	4 " " 8
2 " " 3	5 " " 10
6 " " 5	1 " " 11

10 of No. 12	1 of No. 52
1 " " 15	2 " " 54
4 " " 16	1 " " 57c
1 " " 17	2 " " 90a
2 " " 18a	2 " " 111a
1 " " 18b	6 " " 111c
2 " " 19b	1 " " 115
1 " " 19g	3 " " 125
5 " " 22	2 " " 126a
2 " " 22a	1 " " 147b
1 " " 23	1 " " 176
1 " " 24	1 " " 186a
4 " " 24a	4 " " 187
14 " " 35	4 " " 188
79 " " 37	4 " " 189
12 " " 37a	4 " " 190
14 " " 38	2 " " 191
1 " " 38d	4 " " 192
1 " " 40	1 " " 198
1 " " 48	1 " " 212
6 " " 48a	1 " " 216

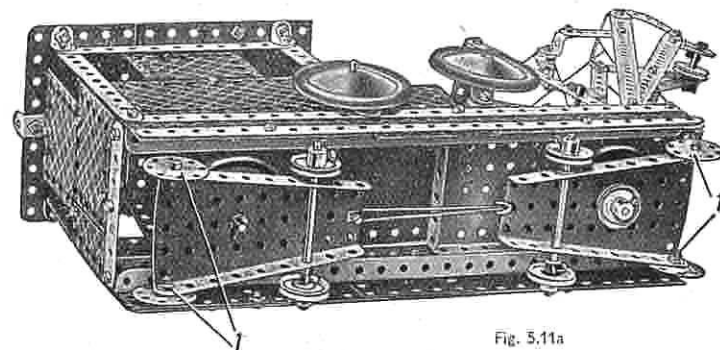


Fig. 5.11a

The chassis of the model consists of two U-section girders, built up from Angle Girders and joined at each end by  $3\frac{1}{2}$ " Strips and Angle Brackets. A  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate and a  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate, overlapping one hole, are attached to the Angle Girders by Fishplates. The framework on which the jib is pivoted is fastened to a 3" Pulley by two  $\frac{3}{8}$ " Bolts, which have two Washers on their shanks for spacing purposes. The 3" Bolts on which the jib luffs are lock-nutted.

The 3" Pulley on the jib swivels on a  $3\frac{1}{2}$ " Rod passed through its boss, and is held in place by a Cord Anchoring Spring.

The front bogie (Fig. 5.11a) pivots on the  $3\frac{1}{2}$ " Rod and is held between a Road Wheel and a 1" Pulley as shown. The rear bogie is similarly pivoted on a 2" Rod, bearings for which are provided by the  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate and two  $2\frac{1}{2}$ " Strips overlapped three holes. The bogies are connected by a Driving Band, and the Bolts 1 are lock-nutted. Luffing of the jib is controlled by the built-up crank handle, consisting of a Double Bracket fitted with an Angle Bracket that carries a Pivot Bolt. The Bolt holding the Angle Bracket clamps the Double Bracket to the Rod.

Hoisting is controlled by the Crank Handle, and the slewing movement is carried out by a belt of Cord passed around the upper 3" Pulley at the base of the jib and then wound several times around the Rod journalled in the sides of the cab.



### 5.12 ELECTRIC LOCOMOTIVE

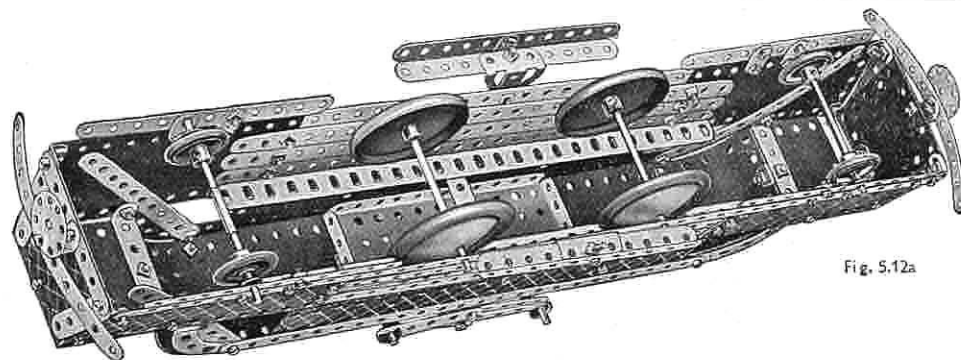
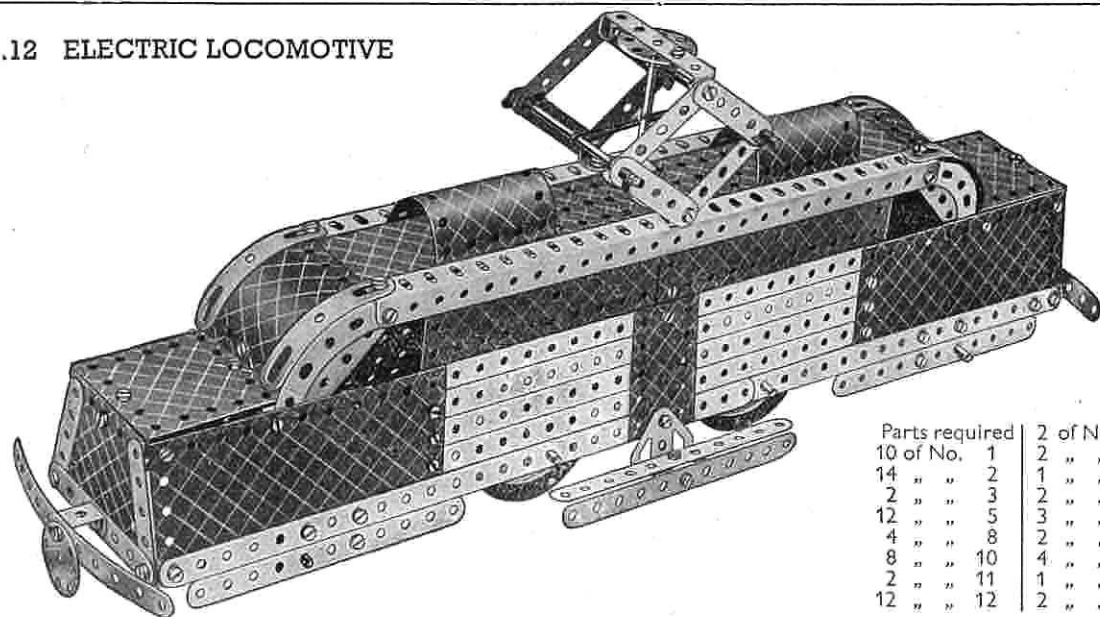


Fig. 5.12a

Parts required	2 of No. 12a	12 of No. 35	6 of No. 111c	2 of No. 191
10 of No. 1	2 " " 12c	83 " " 37	2 " " 126	4 " " 192
14 " " 2	1 " " 15	6 " " 37a	4 " " 155	2 " " 199
2 " " 3	2 " " 15b	4 " " 38	1 " " 176	2 " " 200
12 " " 5	3 " " 16	1 " " 45	1 " " 186	1 " " 213
4 " " 8	2 " " 17	5 " " 48a	4 " " 187	4 " " 215
8 " " 10	4 " " 22	1 " " 52	2 " " 188	
2 " " 11	1 " " 24	4 " " 90a	4 " " 189	
12 " " 12	2 " " 24a	2 " " 111a	4 " " 190	

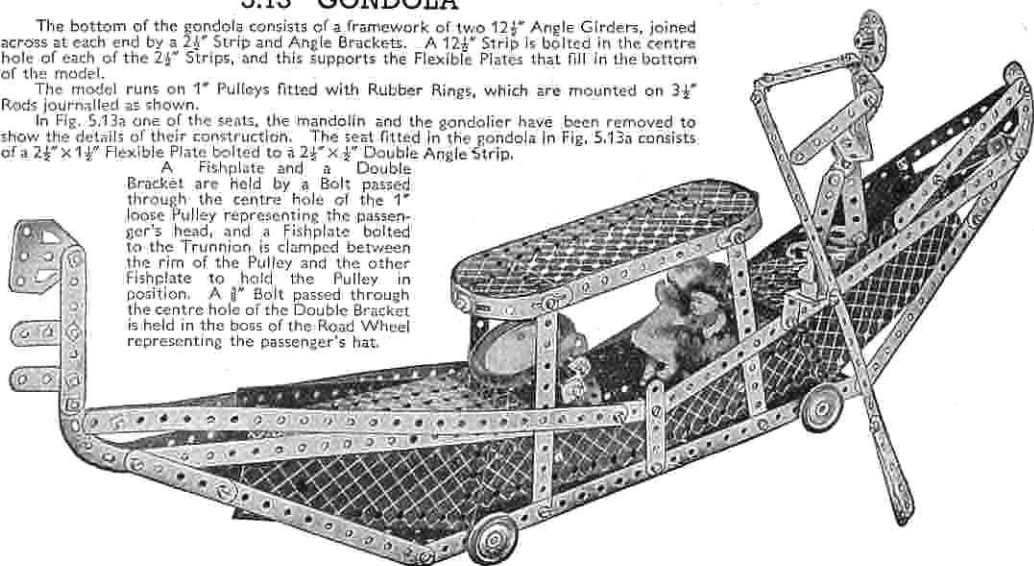
The method of constructing the sides and roof will be clear from the illustrations. The front wheel axle consists of two 2" Rods joined by a Rod Connector.  
 Each side of the current collector consists of 2 1/2" Strips, pairs of which are lock-nutted to an Angle Bracket and a 2 1/2" x 1/2" Double Angle Strip respectively. They are pivoted together on 3 1/2" Rods, and a Driving Band is stretched between the Rods as shown. The Bush Wheel carries in its boss a 5" Rod that passes through a Double Bent Strip and the 5 1/2" x 2 1/2" Flanged Plate.  
 The two U-Section Curved Plates are attached to the roof by Obtuse Angle Brackets.

### 5.13 GONDOLA

The bottom of the gondola consists of a framework of two 12 1/2" Angle Girders, joined across at each end by a 2 1/2" Strip and Angle Brackets. A 12 1/2" Strip is bolted in the centre hole of each of the 2 1/2" Strips, and this supports the Flexible Plates that fill in the bottom of the model.  
 The model runs on 1" Pulleys fitted with Rubber Rings, which are mounted on 3 1/2" Rods journalled as shown.

In Fig. 5.13a one of the seats, the mandolin and the gondolier have been removed to show the details of their construction. The seat fitted in the gondola in Fig. 5.13a consists of a 2 1/2" x 1 1/2" Flexible Plate bolted to a 2 1/2" x 1/2" Double Angle Strip.

A Fishplate and a Double Bracket are held by a Bolt passed through the centre hole of the 1" loose Pulley representing the passenger's head, and a Fishplate bolted to the Trunnion is clamped between the rim of the Pulley and the other Fishplate to hold the Pulley in position. A 3/8" Bolt passed through the centre hole of the Double Bracket is held in the boss of the Road Wheel representing the passenger's hat.



Parts required	7 of No. 1	3 of No. 48a
14 " " 2	1 " " 51	1 " " 52
2 " " 3	1 " " 54	2 " " 90a
12 " " 5	4 " " 111c	1 " " 115
2 " " 6a	1 " " 125	3 " " 126
2 " " 8	2 " " 126	2 " " 126a
7 " " 10	2 " " 155	1 " " 187
3 " " 11	4 " " 188	1 " " 189
5 " " 12	1 " " 190	2 " " 191
1 " " 12a	1 " " 192	4 " " 199
4 " " 12c	2 " " 214	4 " " 215
2 " " 16		
1 " " 18a		
4 " " 22		
1 " " 22a		
1 " " 24		
1 " " 24a		
2 " " 35		
85 " " 37		
6 " " 37a		
6 " " 38		
1 " " 44		
1 " " 48		

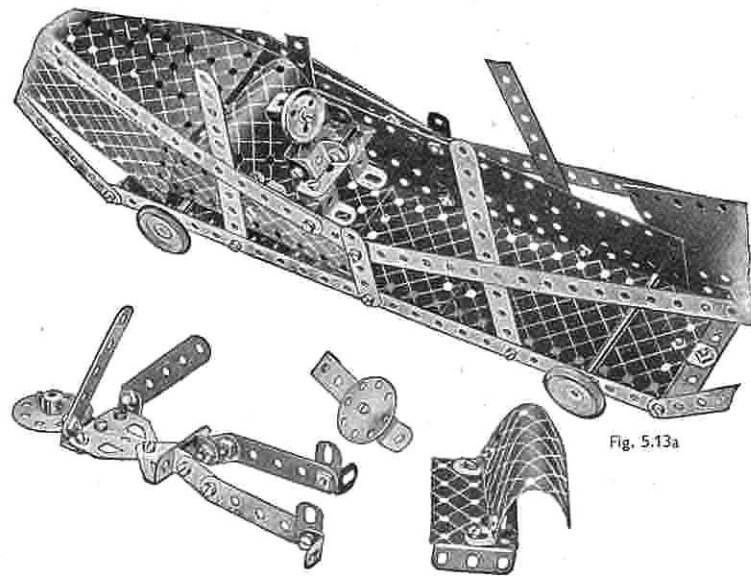


Fig. 5.13a

## 5.14 MARINE ENGINE

Bearings for the crankshaft are provided on the rear side by a Flat Trunnion and a Reversed Angle Bracket bolted to it, and on the other side by a second Flat Trunnion and a Wheel Disc. A  $3\frac{1}{2}$ " Rod is held in the rear bearings by a 1" Pulley and a Spring Clip, and in the other bearings is a 2" Rod, which is retained in place by a Bush Wheel and a Spring Clip.

To the inner ends of these Rods are fastened 3" Pulleys that form the crank webs. A 2" Rod is pushed through the outer hole of one of these and then into a Reversed Angle Bracket bolted to the second Pulley. The Rod is held in place by four Spring Clips.

The main connecting rod consists of two  $5\frac{1}{2}$ " Strips overlapped seven holes. Two  $5\frac{1}{2}$ " Strips bolted together provide a guide for the piston rod, and the crosshead is a Double Bracket pivoted to the connecting rod by a  $1\frac{1}{2}$ " Rod. Two  $3\frac{1}{2}$ " Rods joined by a Rod Connector form the slide valve, which is held in the Stepped Bent Strip 2, by a Cord Anchoring Spring and a 1" Pulley. The  $5\frac{1}{2}$ " Strip forming the valve connecting rod is carried on a Bolt 1 lock-nutted to the Bush Wheel.

Parts required	7 of No. 48a	4 of No. 188
6 of No. 1	1 " " 52	4 " " 189
12 " " 2	1 " " 54	4 " " 190
1 " " 3	1 " " 80c	2 " " 191
6 " " 5	2 " " 111c	4 " " 192
1 " " 6a	3 " " 125	1 " " 212
4 " " 8	2 " " 126	1 " " 213
4 " " 11	2 " " 126a	2 " " 214
11 " " 12	1 " " 176	4 " " 215
1 " " 12a	3 " " 187	1 " " 216
2 " " 15		
3 " " 16		
2 " " 17		
2 " " 18a		
2 " " 19b		
4 " " 22		
1 " " 24		
2 " " 24a		
9 " " 35		
85 " " 37		
5 " " 37a		
3 " " 38		
1 " " 44		
1 " " 48		

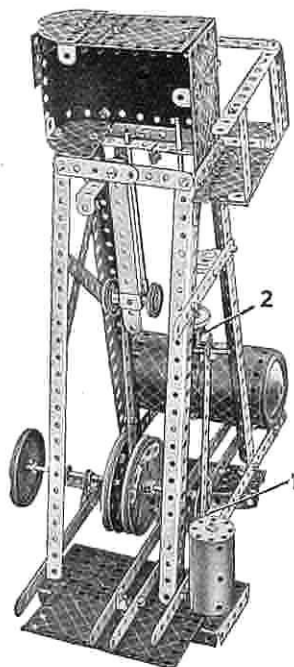
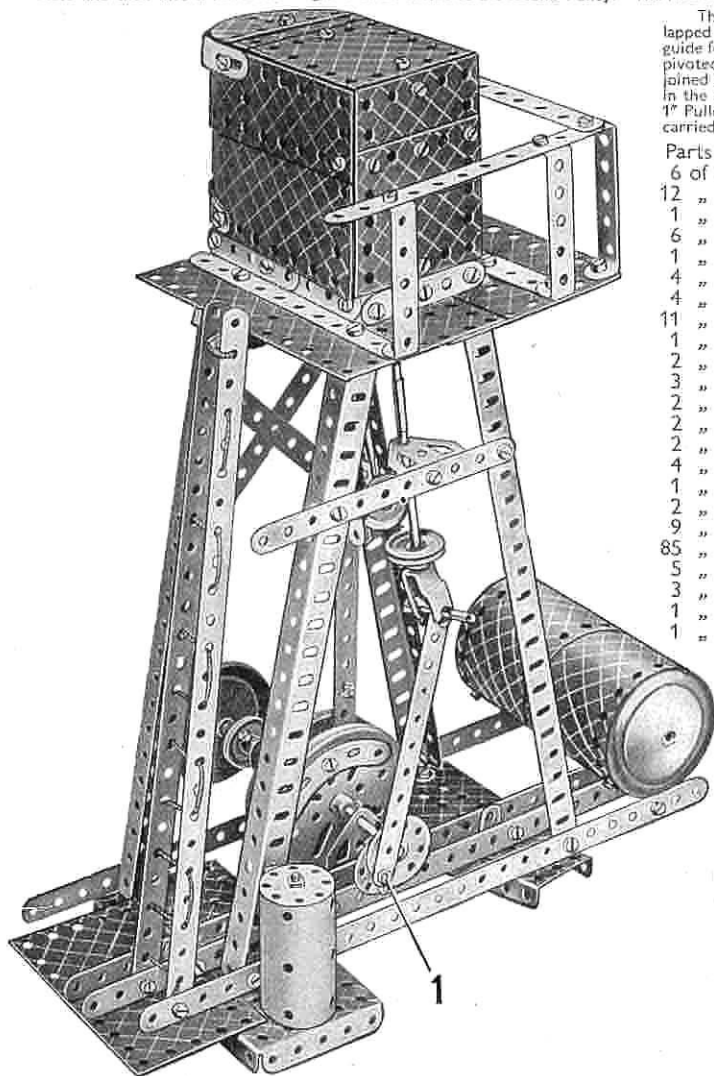
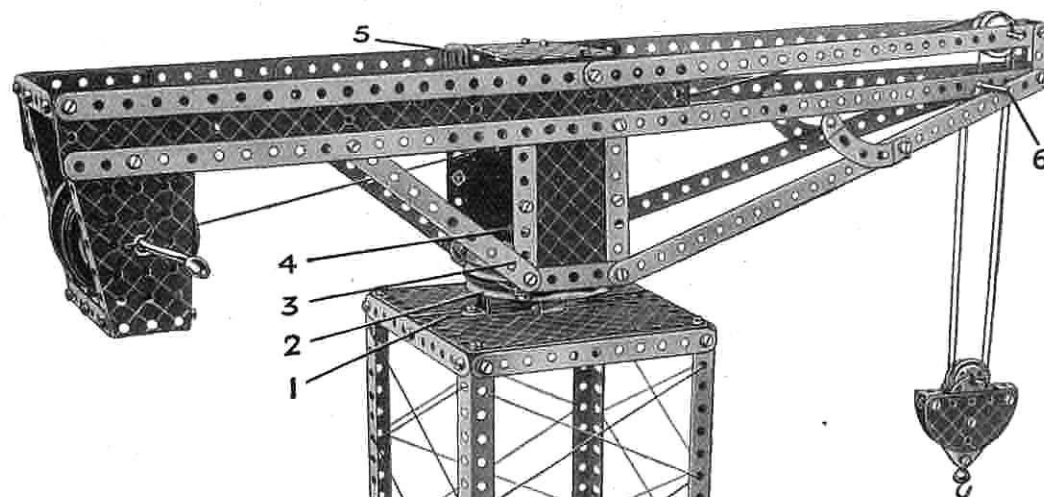


Fig. 5.14a

## 5.15 HAMMERHEAD CRANE



The top of the tower is filled in with a  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate 1 extended on each side by a  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate. The 3" Pulley 2 on which the jib swivels is bolted to the tower by four Reversed Angle Brackets, and in its boss is secured a 2" Rod on which the 3" Pulley 3 is free to turn. A 1" Pulley 4 fitted with a Rubber Ring is fastened at the upper end of the 2" Rod and retains the jib in position on its pivot.

The  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flanged Plate 5 is connected to the other side of the jib by a  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip, on top of which is bolted a  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate.

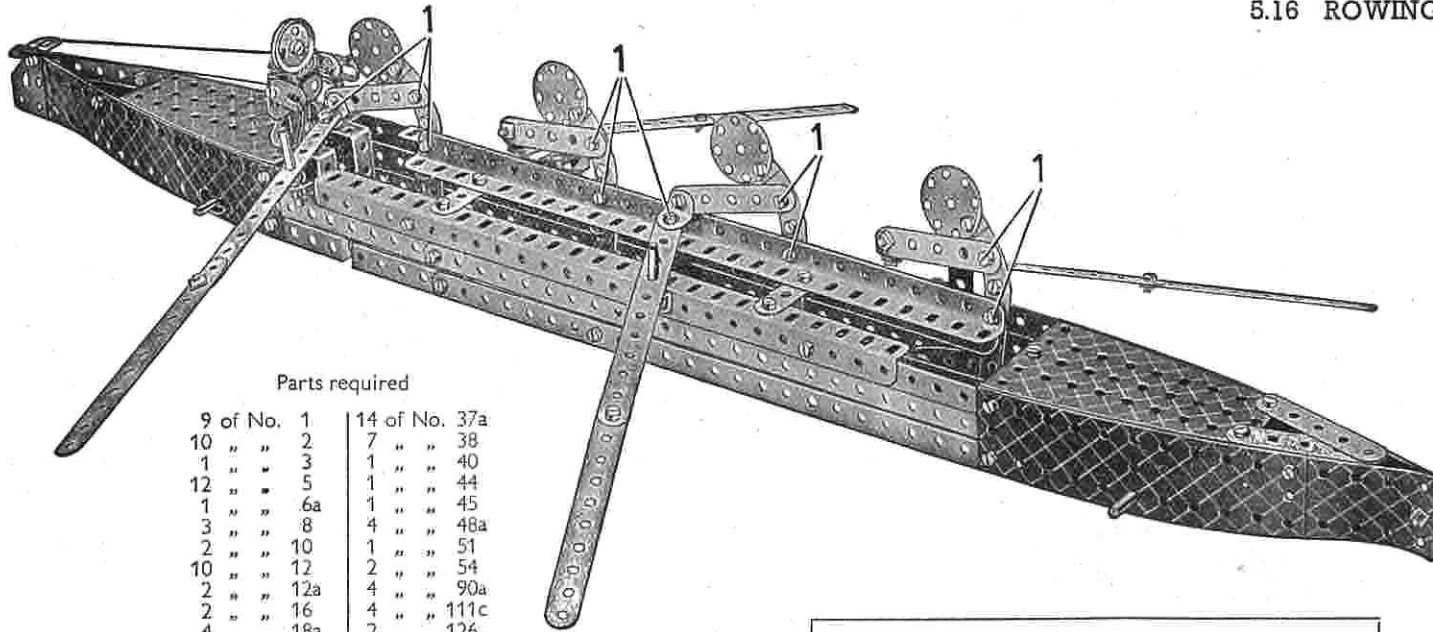
The hoisting Cord is tied to the Crank Handle journalled in the Flanged Sector Plates at the rear end of the jib. It is then taken over one of two 1" Pulleys mounted at the front end of the jib, then down and around one of the 1" loose Pulleys in the pulley block, up and over the other 1" fast Pulley in the jib and around the other 1" loose Pulley of the Pulley block. Finally it is tied to a Fishplate in the middle of Rod 6.

## Parts required

10 of No. 1	2 of No. 48a
14 " " 2	1 " " 51
2 " " 3	1 " " 52
12 " " 5	2 " " 54
2 " " 6a	1 " " 57c
4 " " 8	2 " " 90a
1 " " 10	1 " " 111a
4 " " 11	4 " " 111c
9 " " 12	4 " " 125
1 " " 16	2 " " 126a
1 " " 17	1 " " 155
3 " " 18a	1 " " 176
2 " " 19b	2 " " 187
1 " " 19g	4 " " 188
4 " " 22	4 " " 189
2 " " 22a	3 " " 190
3 " " 24a	2 " " 191
10 " " 35	4 " " 192
85 " " 37	1 " " 198
5 " " 37a	1 " " 213
9 " " 38	2 " " 214
1 " " 40	



### 5.16 ROWING FOUR



Parts required

9 of No. 1	14 of No. 37a
10 " " 2	7 " " 38
1 " " 3	1 " " 40
12 " " 5	1 " " 44
1 " " 6a	1 " " 45
3 " " 8	4 " " 48a
2 " " 10	1 " " 51
10 " " 12	2 " " 54
2 " " 12a	4 " " 90a
2 " " 16	4 " " 111c
4 " " 18a	2 " " 126
1 " " 18b	2 " " 126a
5 " " 22	1 " " 147b
2 " " 22a	4 " " 155
1 " " 24	1 " " 186
4 " " 24a	4 " " 188
11 " " 35	4 " " 189
77 " " 37	

*Read the "Meccano Magazine" the best of all magazines for boys. Place a regular order now with your Meccano dealer or newsagent.*

Each side of the boat consists of an Angle Girder extended by  $12\frac{1}{2}$ " Strips, the one at the stern overlapping nine holes, and that at the bows overlapping eight holes. Two  $5\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flexible Plates are bolted to the  $12\frac{1}{2}$ " Strips at the bows and stern as shown. The sides are filled in by  $12\frac{1}{2}$ " Strips and  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strips bolted to the  $5\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flexible Plates. Flanged Sector Plates form the deck and are bolted to the sides at their broad ends.

The hull is braced by a  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flanged Plate bolted across it, as shown in Fig. 5.16a. The rowing crew are carried on an Angle Girder bolted to two  $2\frac{1}{2}$ " Strips fastened to the Angle Girders forming the sides. Each member of the crew consists of a  $2\frac{1}{2}$ " small radius Curved Strip overlapping a  $2\frac{1}{2}$ " Strip three holes. A further  $2\frac{1}{2}$ " Strip fitted with an Angle Bracket and bolted to the "body" forms the arms, and a Wheel Disc represents the head. The four figures are pivotally attached to the Angle Girder in the positions shown. The lower end of the  $2\frac{1}{2}$ " Strip forming part of the body of each figure is also pivotally attached to a  $12\frac{1}{2}$ " Strip underneath the boat. The oars are pivotally attached to the Angle Brackets and they also are pivoted on  $1\frac{1}{2}$ " Rods as shown.

The Nuts on Bolts 1 are left sufficiently loose to enable the oars to move easily, but for better working they should all be lock-nutted. To do this seven nuts more than are included in the Outfit will be required.

The drive is taken from the Pulleys on which the model runs to the Rod carrying the Bush Wheel (Fig. 5.16a). The Bush Wheel is connected to the Pivot Bolt on the  $12\frac{1}{2}$ " Strip by a  $3\frac{1}{4}$ " Strip. The Pivot Bolt carries six Washers on its shank. Bolt 2 should be lock-nutted.

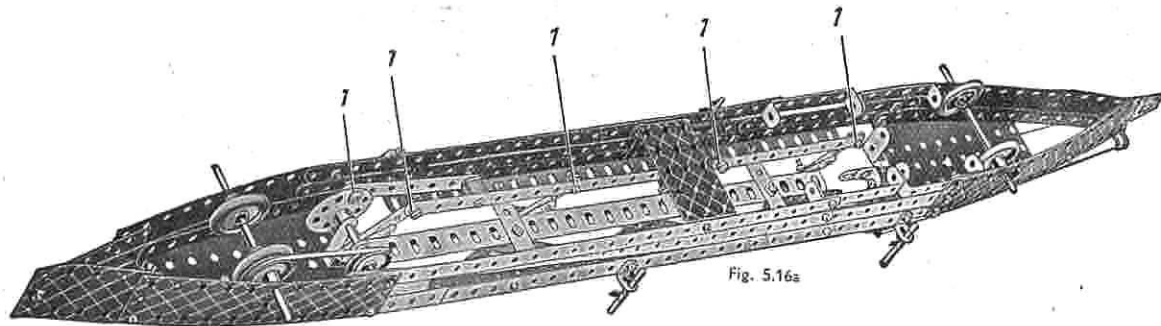


Fig. 5.16a

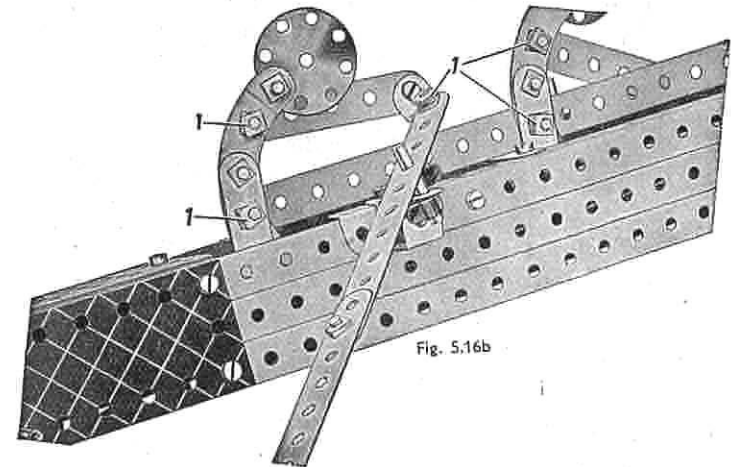
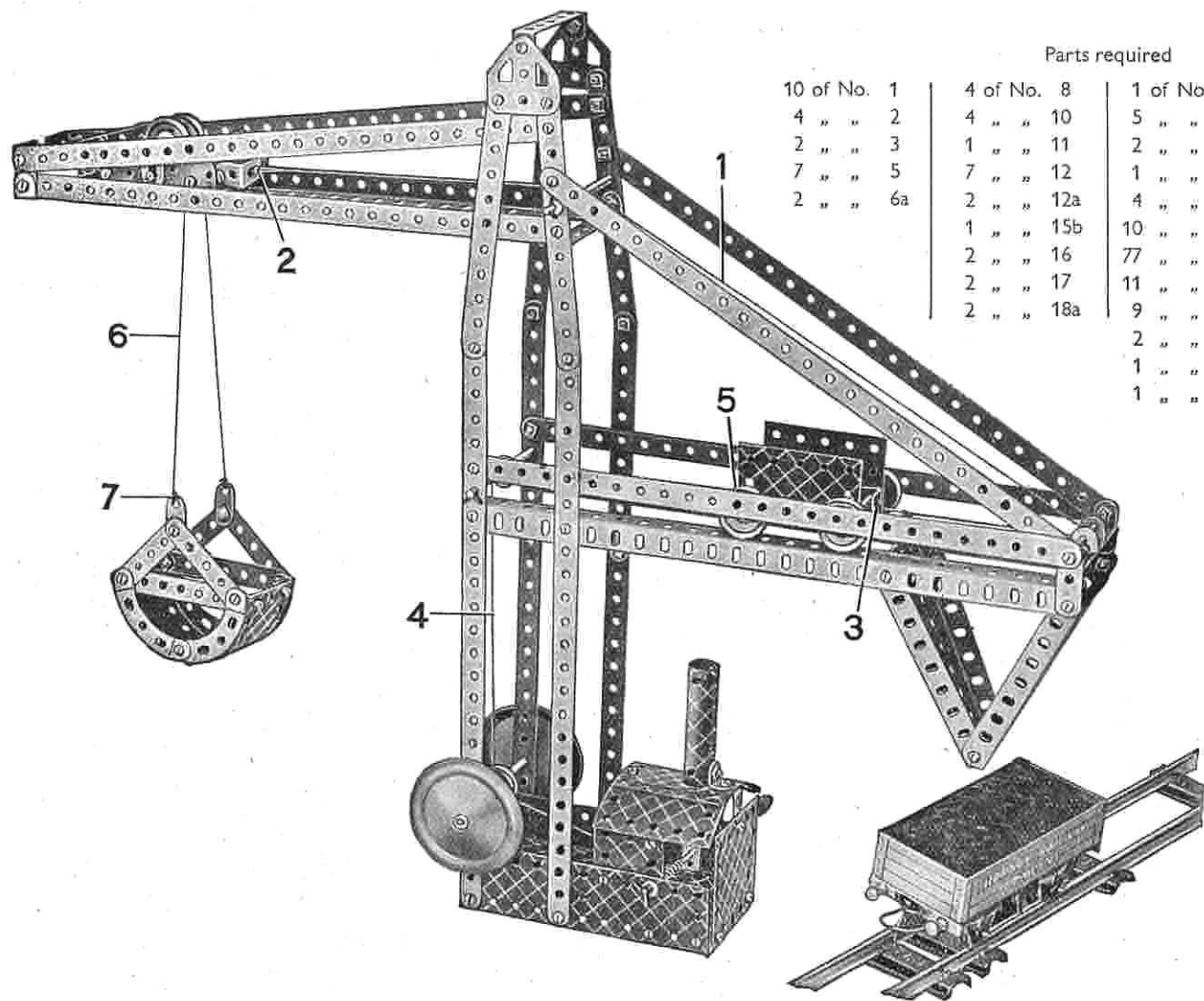


Fig. 5.16b

## 5.17 AUTOMATIC SHIP-COALER



## Parts required

10 of No. 1	4 of No. 8	1 of No. 19g	1 of No. 48
4 " " 2	4 " " 10	5 " " 22	8 " " 48a
2 " " 3	1 " " 11	2 " " 22a	1 " " 51
7 " " 5	7 " " 12	1 " " 23	1 " " 52
2 " " 6a	2 " " 12a	4 " " 24a	2 " " 54
	1 " " 15b	10 " " 35	4 " " 90a
	2 " " 16	77 " " 37	5 " " 111c
	2 " " 17	11 " " 37a	4 " " 125
	2 " " 18a	9 " " 38	2 " " 126a
		2 " " 38d	2 " " 187
		1 " " 40	4 " " 188
		1 " " 45	3 " " 189
			1 " " 190
			1 " " 199
			2 " " 200

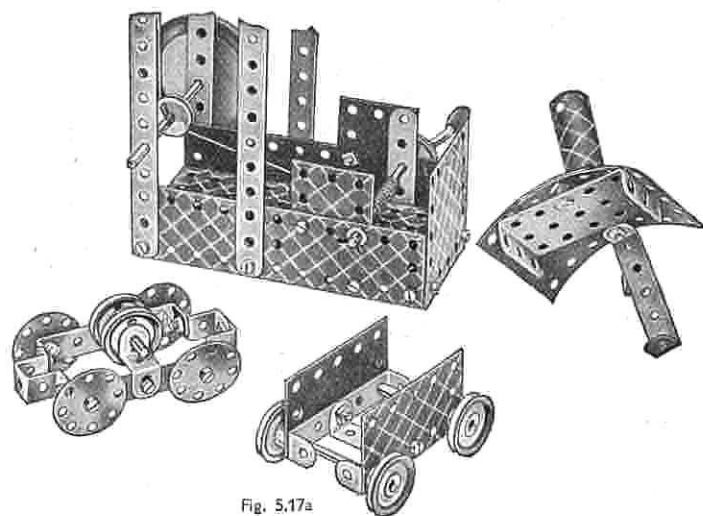


Fig. 5.17a

The construction of the control cabin, hoisting carriage and truck is shown in Fig. 5.17a. The  $2\frac{1}{2} \times 1\frac{1}{2}$ " Flanged Plate is lock-nutted to the  $1\frac{1}{8}$ " radius Curved Plates, which are overlapped three holes. The chimney is a U-Section Curved Plate, bent to shape. The built-up pulley on the same 4" Rod as the Road Wheels consists of two  $\frac{3}{8}$ " Washers spaced by two Washers, and is retained in position by two Spring Clips.

The rails on which the grab hoist and truck run are Angle Girders. Those forming the rails for the grab hoist are bolted at their inner ends to the rear pair of  $5\frac{1}{2}$ " Strips at the top of the tower, but are not connected to the second pair of Strips. This enables the hoist to travel the full length of the rails. The Wheel Discs that form the wheels of the grab hoist revolve on Bolts lock-nutted to the  $2\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strips.

The grab consists of  $2\frac{1}{2}$ " small radius Curved Strips bolted to  $3\frac{1}{2}$ " and  $2\frac{1}{2}$ " Strips, and the  $5\frac{1}{2} \times 1\frac{1}{2}$ " Flexible Plate is attached to them by Angle Brackets.

The operating Cords are arranged as follows. Cord 1 is tied at 2 to the grab hoist, passed over a  $3\frac{1}{2}$ " Rod in the tower, and then around a  $1\frac{1}{4}$ " Rod held by Spring Clips in a Double Bracket. Finally it is tied to the rear of the truck at 3. Cord 4 is fastened to the truck at 5, led over a  $\frac{1}{2}$ " loose Pulley on a  $3\frac{1}{2}$ " Rod halfway up the tower, and around the built-up pulley on the Rod that carries the Road Wheels. It is then wound around the Crank Handle.

Cord 6 is fastened to Fishplate 7 on the grab, and is taken over one of the 1" loose Pulleys on the grab hoist. It then passes through the end holes of the  $1 \times 1$ " Angle Brackets at the end of the jib, and is led over the second 1" loose Pulley and finally tied to the other Fishplate on the grab.

The length of the grab operating Cord should be adjusted so that the grab reaches the tower at the same time as the truck reaches the inner end of the rails.



### 5.18 RACING YACHT

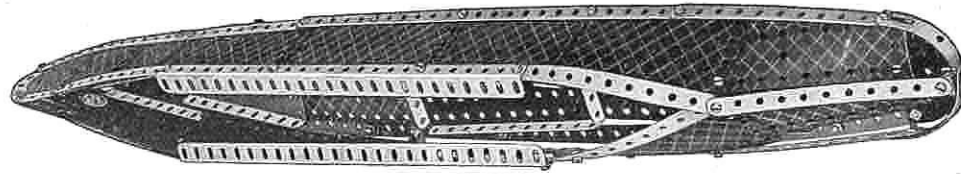


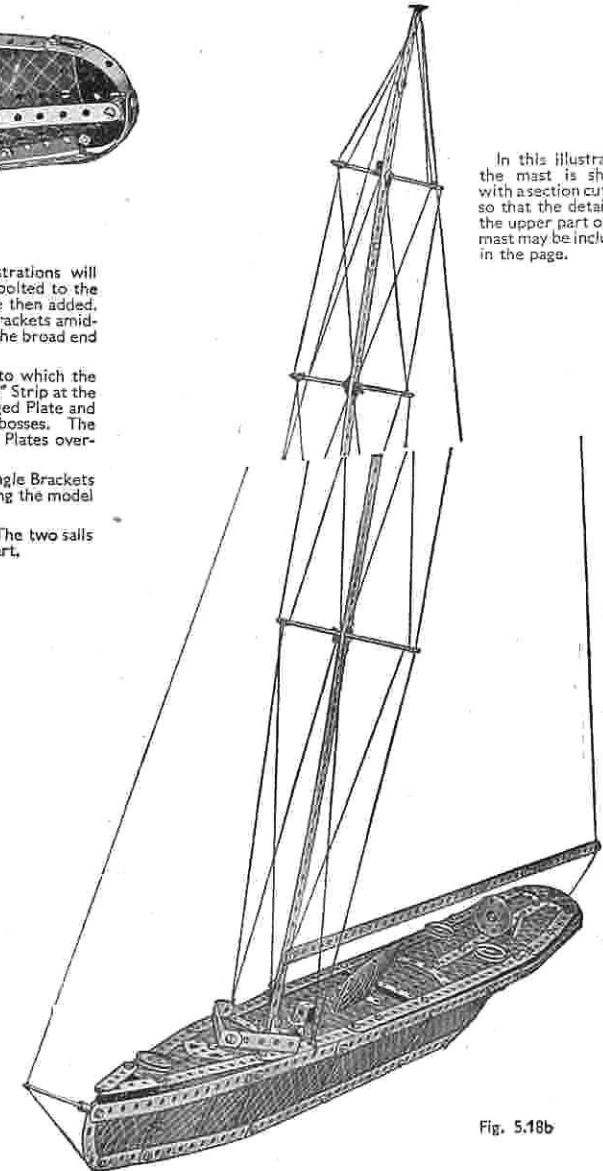
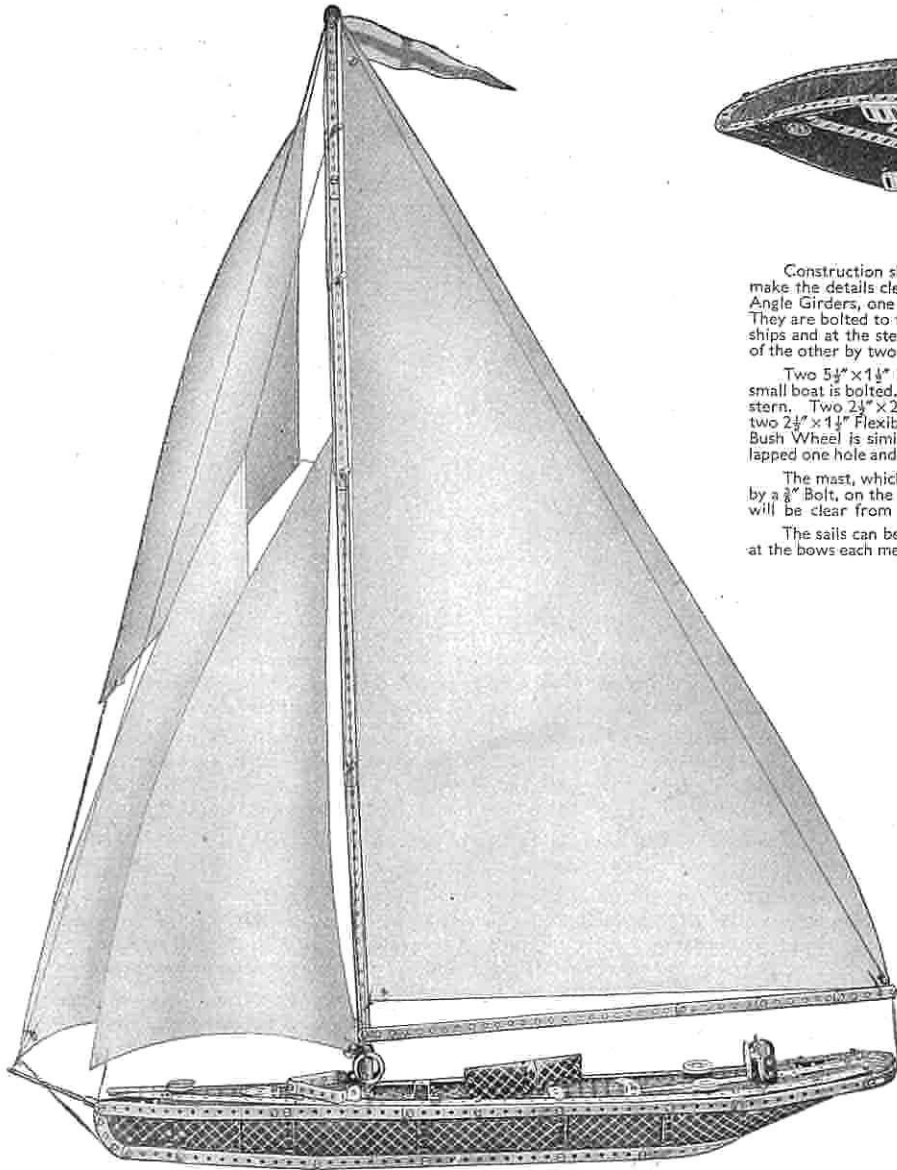
Fig. 5.18a

Construction should be commenced by building up the sides of the hull, and reference to the illustrations will make the details clear. The pin has been withdrawn from a Hinged Flat Plate, and the two parts are bolted to the Angle Girders, one at each side of the hull near the stern. The Strips along the sides of the deck are then added. They are bolted to two Flanged Sector Plates forming the forward part of the deck, and to two Angle Brackets amidships and at the stern. The Flanged Sector Plates are bolted so that the narrow end of one overlaps the broad end of the other by two holes.

Two  $5\frac{1}{2}'' \times 1\frac{1}{4}''$  Flexible Plates connect the rear Flanged Sector Plate to a  $5\frac{1}{2}'' \times 2\frac{1}{4}''$  Flanged Plate, to which the small boat is bolted. Two  $5\frac{1}{2}''$  Strips overlapped three holes are fastened to the Flanged Plate and to a  $2\frac{1}{2}''$  Strip at the stern. Two  $2\frac{1}{2}'' \times 2\frac{1}{4}''$  Flexible Plates are bolted to this compound strip, together with a  $2\frac{1}{2}'' \times 1\frac{1}{4}''$  Flanged Plate and two  $2\frac{1}{2}'' \times 1\frac{1}{4}''$  Flexible Plates. The  $1''$  Pulleys are secured by Bolts that pass through the deck into their bosses. The Bush Wheel is similarly fastened to the Trunnion. The small boat consists of two U-Section Curved Plates overlapped one hole and attached to the deck by an Angle Bracket.

The mast, which consists of three  $12\frac{1}{2}''$  Strips, a  $5\frac{1}{2}''$  Strip and a  $2\frac{1}{2}''$  Strip, is fastened between two Angle Brackets by a  $\frac{3}{8}''$  Bolt, on the shank of which are four Washers between the Angle Brackets. The method of rigging the model will be clear from Fig. 5.18b.

The sails can be cut from white cardboard or stiff paper. The mainsail measures  $20'' \times 38'' \times 43''$ . The two sails at the bows each measure  $10'' \times 22'' \times 25''$ . The topsail is  $12'' \times 14'' \times 24''$ , and is  $6''$  in width at its widest part.



In this illustration the mast is shown with a section cut out so that the details of the upper part of the mast may be included in the page.

#### Parts required

10 of No. 1	8 of No. 35	1 of No. 126a
14 " " 2	85 " " 37	3 " " 155
2 " " 3	4 " " 37a	1 " " 176
12 " " 5	14 " " 38	4 " " 188
1 " " 6a	1 " " 40	4 " " 189
2 " " 8	1 " " 45	4 " " 190
2 " " 10	3 " " 48a	2 " " 191
10 " " 12	1 " " 51	4 " " 192
2 " " 12a	1 " " 52	1 " " 198
2 " " 15	2 " " 54	2 " " 199
1 " " 15b	3 " " 90a	2 " " 200
2 " " 16	2 " " 111a	1 " " 212
3 " " 22	6 " " 111c	1 " " 214
1 " " 24	1 " " 126	2 " " 215

Fig. 5.18b

## 5.19 MILITARY TANK

Angle Girders form the main members of the model and the upper pair are connected by three  $5\frac{1}{2}$ " Strips, the lower pair comprising the chassis being connected by a  $5\frac{1}{2}$ " Strip near the front and by two  $2\frac{1}{2}$ " Strips, overlapped one hole, at the rear. At 1 (Fig. 5.19a) the halves of a Hinged Flat Plate are used separately as flat plates. Flat Trunnions are bolted to the  $2\frac{1}{2}$ " Strips that soace the upper and lower pairs of Angle Girders at the rear of the tank, and they form part of the creeper track covers.

The revolving gun turret is shown in Fig. 5.19a. The rear gun is a  $3\frac{1}{2}$ " Rod which is fitted with a Reversed Angle Bracket on the inside of the Flanged Plate and is retained in position by Spring Clips. A  $5$ " Rod is fixed in the boss of the  $3$ " Pulley to which the turret is bolted, and a Road Wheel is secured to its top end. The lower end of the Rod passes through the  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate and through a Double Bent Strip. A  $1$ " Pulley retains the complete unit in position. The Flanged Sector Plate shown in the upper illustration is bolted to a second Flanged Sector Plate, and overlaps it by eight holes.

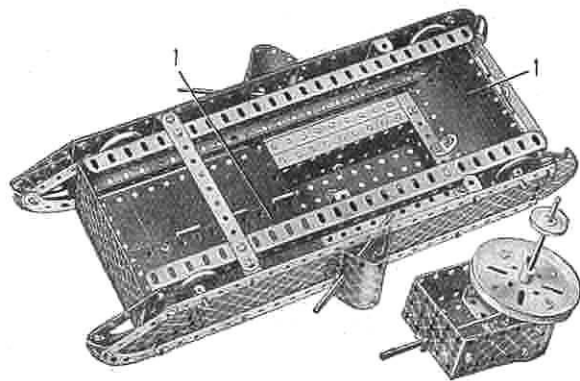


Fig. 5.19a

Parts required		Parts required	
4 of No.	1	1 of No.	187
8 "	2	3 "	188
11 "	5	4 "	189
4 "	8	3 "	190
6 "	12	2 "	191
1 "	12c	4 "	192
2 "	15	1 "	198
1 "	15b	2 "	199
2 "	16	2 "	214
4 "	18a	4 "	215
1 "	19b		
5 "	22		
8 "	35		
83 "	37		
2 "	38		
1 "	45		
6 "	48a		
1 "	51		
1 "	52		
2 "	54		
4 "	90a		
1 "	125		
2 "	126		
2 "	126a		
4 "	155		

## 5.20 DERRICK CRANE

Reference to the illustrations will make clear the construction of the base and cabin. Each side of the jib consists of three  $12\frac{1}{2}$ " Strips, which are joined across at the lower ends by a  $1\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip, in the centre by a  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip, and at the top by a Stepped Bent Strip. A  $1\frac{1}{2}$ " Rod locked in the boss of the upper  $3$ " Pulley passes through a second  $3$ " Pulley bolted to the base, and is held in position by a Spring Clip. The Double Bracket at the upper ends of the  $12\frac{1}{2}$ " Strips is lock-nutted to the  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flanged Plate.

The  $5$ " Rod 1, which controls the swivelling of the jib, has a belt of Cord wound around it several times. The Cord is taken round the  $3$ " Pulley at the bottom of the jib. Crank Handle 2 controls the hoisting movement. Cord is wound a few turns around the shaft of the Crank Handle, then passed under a  $2$ " Rod at the base of the jib, and over a  $1$ " loose Pulley on a  $1\frac{1}{2}$ " Rod at the top of the jib. The Cord is then led through the pulley block and tied to an Angle Bracket bolted to the jib. The  $3\frac{1}{2}$ " Rod 3 carries a Bush Wheel, to which a Threaded Pin is fitted to form a handle for controlling the luffing movement of the jib.

Cord is tied to a Fishplate on the  $2$ " Rod in the jib post and is taken around a  $1$ " Pulley in the jib. It is then passed around a  $\frac{1}{2}$ " loose Pulley on the  $2$ " Rod and led over a second Pulley on the same Rod as the first  $1$ " Pulley. Finally it is led back over the  $2$ " Rod and wound around Rod 3.

Parts required	1 of No. 23	2 of No. 54	1 of No. 198
10 of No.	1	1 "	24
10 "	2	2 "	24a
2 "	3	4 "	35
2 "	5	1 "	37
3 "	8	2 "	37a
1 "	10	2 "	38
1 "	11	1 "	40
6 "	12	1 "	44
2 "	12a	1 "	48
4 "	12c	1 "	48a
1 "	15	1 "	51
3 "	16	1 "	52
2 "	17		
2 "	18a		
1 "	18b		
2 "	19b		
1 "	19g		
5 "	22		
2 "	22a		

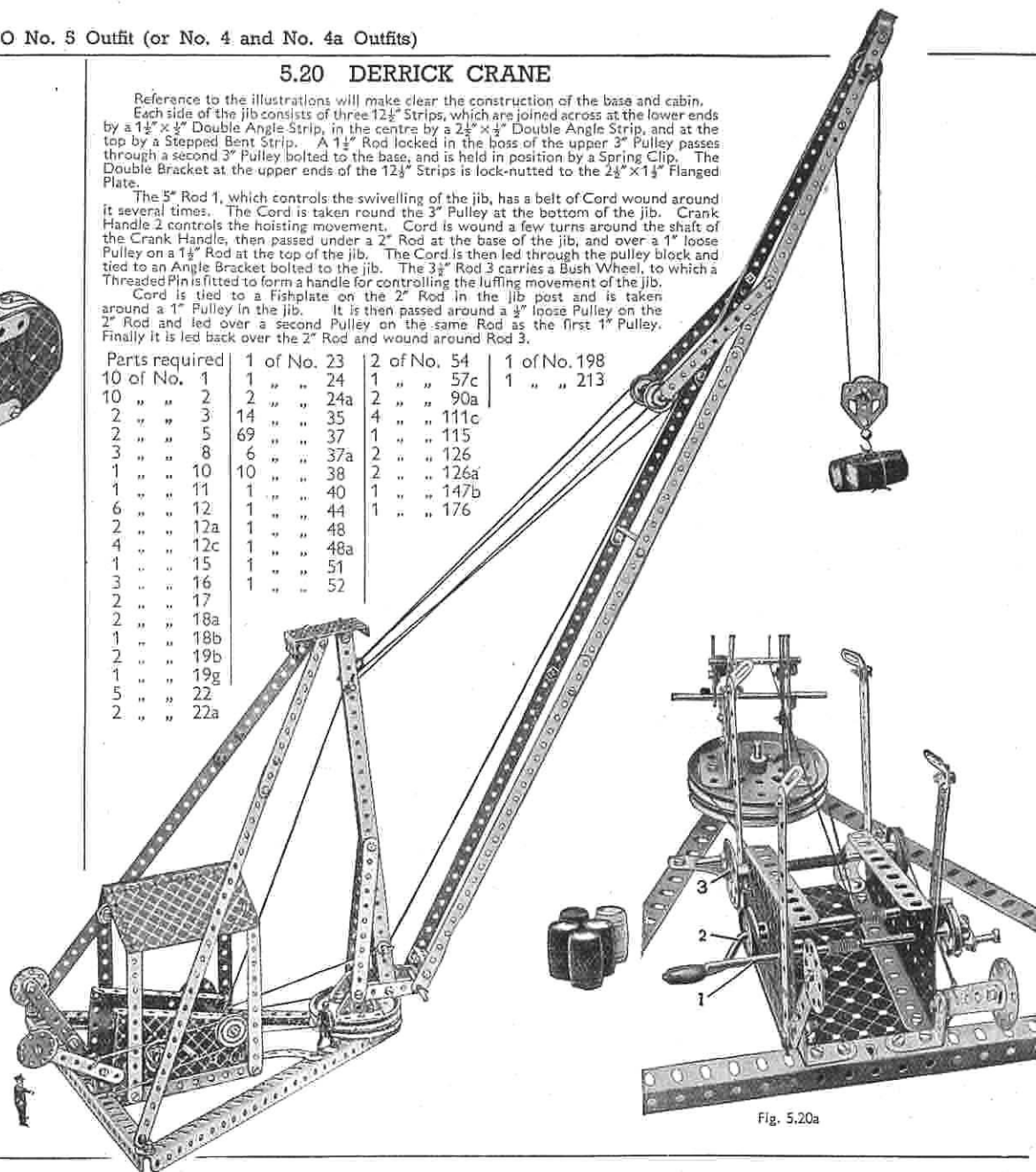
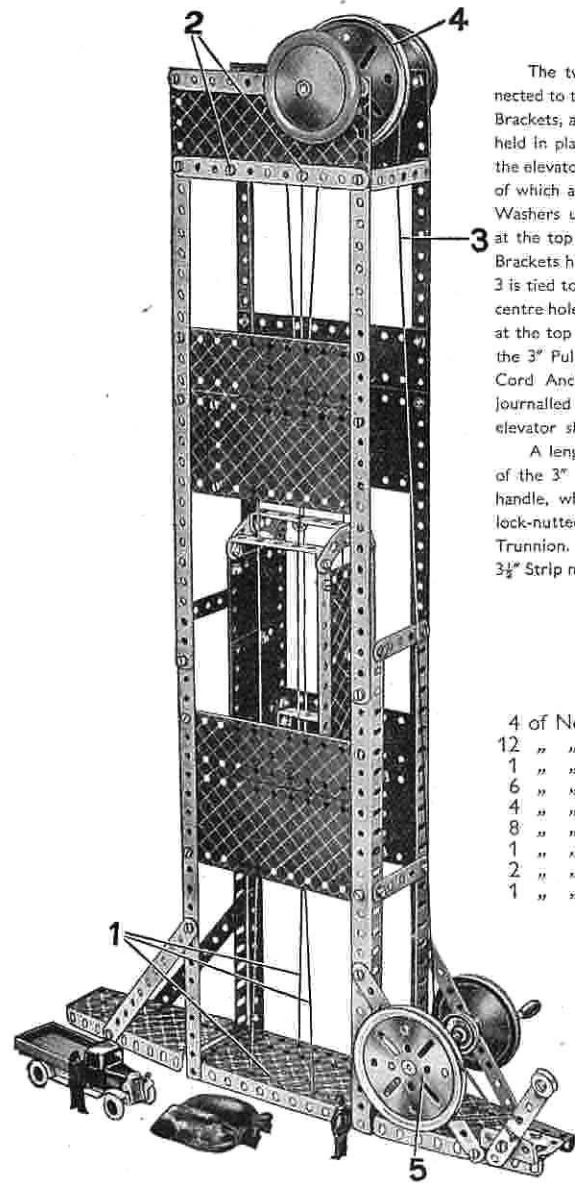


Fig. 5.20a



### 5.21 ELEVATOR



The two Flanged Sector Plates are connected to the  $5\frac{1}{2}'' \times 2\frac{1}{2}''$  Flanged Plate by Angle Brackets, and the four  $12\frac{1}{2}''$  Angle Girders are held in place by the same Bolts. Guides for the elevator are provided by four Cords, three of which are shown at 1. These are tied to Washers underneath the Flanged Plate, and at the top of the shaft are fastened to Angle Brackets held by Bolts 2 on each side. Cord 3 is tied to a Washer, and passes through the centre-hole of the  $2\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strip at the top of the elevator. It then passes over the  $3''$  Pulley 4, and finally is fastened to a Cord Anchoring Spring on a Crank Handle journalled in the  $5\frac{1}{2}''$  Strips that brace the elevator shaft.

A length of Cord passes around the rim of the  $3''$  Pulley 5 and is tied to the brake handle, which is a  $3\frac{1}{2}''$  Strip. This Strip is lock-nutted to a Trunnion fastened to a Flat Trunnion. The  $\frac{1}{2}''$  loose Pulley bolted to the  $3\frac{1}{2}''$  Strip maintains the brake band in tension.

#### Parts required

4 of No. 1	2 of No. 22
12 " " 2	1 " " 23
1 " " 3	83 " " 37
6 " " 5	2 " " 37a
4 " " 8	7 " " 38
8 " " 12	1 " " 40
1 " " 15b	7 " " 48a
2 " " 19b	1 " " 52
1 " " 19g	2 " " 54
	2 " " 90a
	1 " " 111c
	1 " " 126
	1 " " 126a
	1 " " 176
	3 " " 187
	2 " " 188
	4 " " 189
	4 " " 190
	2 " " 191
	4 " " 192

### 5.22 BIG WHEEL

The base of this fine model is formed by bolting  $5\frac{1}{2}''$  Strips to the shorter flanges of a  $5\frac{1}{2}'' \times 2\frac{1}{2}''$  Flanged Plate, and then extending the length of the Flanged Plate by bolting a Flanged Sector Plate to its front end.

To each end of the  $5\frac{1}{2}''$  Strips a  $12\frac{1}{2}''$  Angle Girder is bolted vertically as shown, and these form the pillars that support the axle of the wheel. A  $5\frac{1}{2}'' \times 2\frac{1}{2}''$  Flexible Plate is bolted across the Angle Girders at each side of the base in the positions shown.

Each rim of the wheel consists of four  $12\frac{1}{2}''$  Strips bolted so that they overlap three holes. The rims are connected by  $4''$  compound strips consisting of  $2\frac{1}{2}''$  Strips overlapped and bolted together, and are secured by  $6\frac{1}{2}''$  compound strips to a Bush Wheel and the inner holes of a  $3''$  Pulley on the supporting shaft. This shaft is a  $5''$  Rod and a  $4''$  Rod joined end to end by a Rod Connector, and is journalled in the centre holes of two Wheel Discs secured to the ends of the two  $12\frac{1}{2}''$  Angle Girders bolted to the base.

The drive is taken by means of a Cord belt from a  $1''$  Pulley on the shaft of a Crank Handle to a  $3''$  Pulley on the shaft of the wheel. The Crank Handle is journalled in the holes of a Stepped Bent Strip bolted to the Flanged Sector Plate and also in the upper hole of a  $1\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strip fixed vertically to the  $5\frac{1}{2}'' \times 2\frac{1}{2}''$  Flanged Plate.

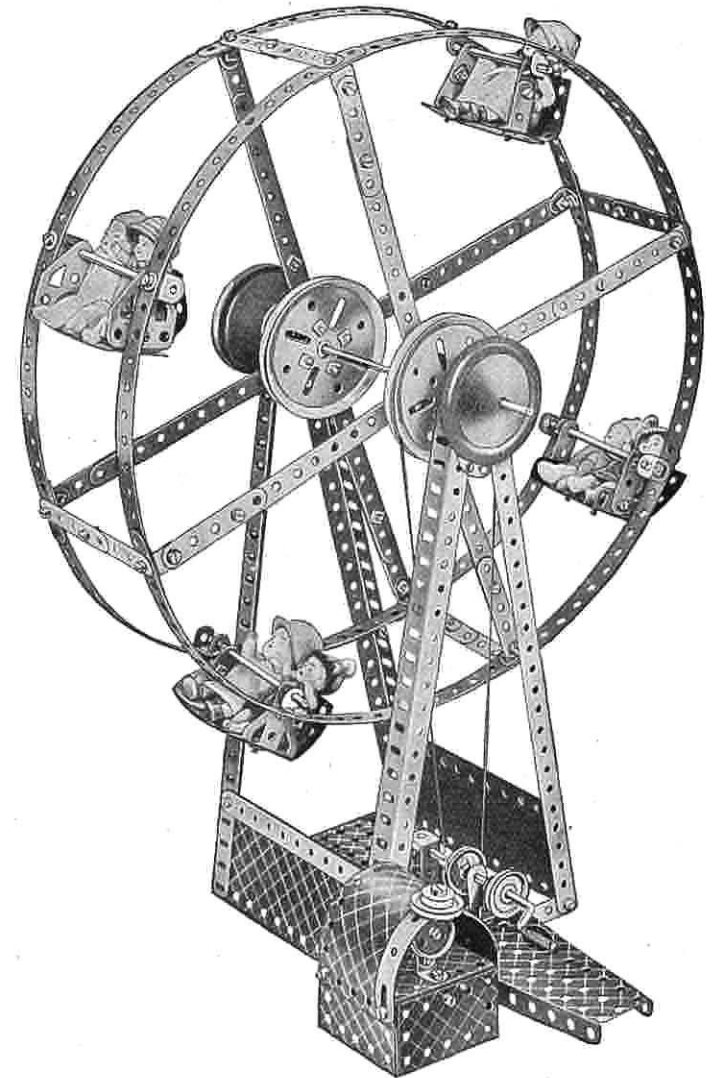
The construction of the cars can be seen from the illustration and it will be noticed that their details vary from each other. In one of the cars the sides are formed from Flat Trunnions, while in the second Trunnions are used for this purpose. In a third car the sides are  $1\frac{1}{2}''$  Strips while in the fourth they are formed by  $1'' \times 1''$  Angle Brackets to which Fishplates are bolted.

The pay-box is built up as follows. Three  $2\frac{1}{2}'' \times 1\frac{1}{2}''$  Flexible Plates form the sides of the base. They are joined together and secured to the framework of the model by  $2\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strips. The Plate forming the counter is held to the front Plate by means of an Angle Bracket. The roof and upper portions of the sides of the box consist of a  $5\frac{1}{2}'' \times 2\frac{1}{2}''$  Flexible Plate bent as shown and edged at the front with two  $3''$  Formed Slotted Strips.

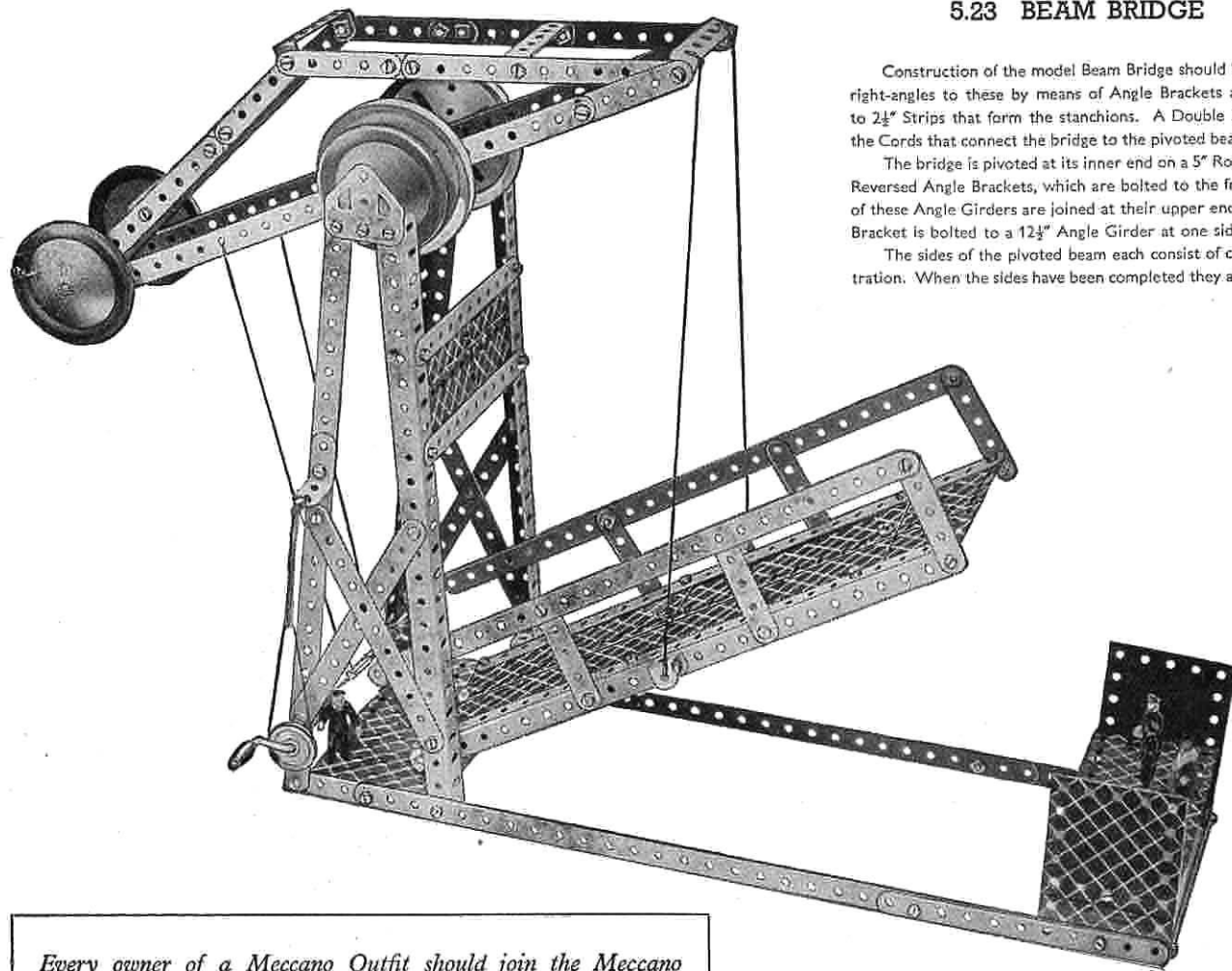
A decorative effect is provided by a  $1''$  loose Pulley and a  $\frac{1}{2}''$  loose Pulley fixed to the roof by means of a Pivot Bolt and nut.

#### Parts required

8 of No. 1	3 of No. 22	1 of No. 54
14 " " 2	2 " " 22a	3 " " 111c
2 " " 3	1 " " 23	1 " " 125
11 " " 5	1 " " 24	2 " " 126
2 " " 6a	4 " " 24a	2 " " 126a
4 " " 8	9 " " 35	1 " " 147b
5 " " 10	85 " " 37	2 " " 187
4 " " 11	3 " " 37a	4 " " 188
12 " " 12	12 " " 38	2 " " 190
2 " " 12a	1 " " 40	3 " " 192
1 " " 15	1 " " 44	2 " " 199
1 " " 15b	1 " " 48	2 " " 200
4 " " 16	4 " " 48a	1 " " 213
2 " " 19b	1 " " 51	1 " " 214
1 " " 19g	1 " " 52	2 " " 215



## 5.23 BEAM BRIDGE



Construction of the model Beam Bridge should be commenced with the lifting span. The sides of this consist of  $12\frac{1}{2}$ " Strips. Further  $12\frac{1}{2}$ " Strips are secured at right-angles to these by means of Angle Brackets and they serve to support the roadway which consists of Flexible Plates. The handrails are  $12\frac{1}{2}$ " Strips bolted to  $2\frac{1}{2}$ " Strips that form the stanchions. A Double Bracket is bolted to each side of the bridge in the position indicated. These provide means of attachment for the Cords that connect the bridge to the pivoted beam.

The bridge is pivoted at its inner end on a 5" Rod, which is pushed through the lower  $12\frac{1}{2}$ " Strips in the second holes from their inner ends and also through two Reversed Angle Brackets, which are bolted to the front pair of  $12\frac{1}{2}$ " Angle Girders that form the vertical supporting columns for the beam. The front and rear pairs of these Angle Girders are joined at their upper ends by a Flat Trunnion, and they are braced by two  $5\frac{1}{2}$ " Strips arranged at each side as shown. A  $1" \times 1"$  Angle Bracket is bolted to a  $12\frac{1}{2}$ " Angle Girder at one side of the bridge in the position shown in the illustration.

The sides of the pivoted beam each consist of compound strips. The lengths and arrangement of the Strips used in making these are best followed from the illustration. When the sides have been completed they are joined together by means of  $2\frac{1}{2}" \times \frac{1}{2}"$  Double Angle Strips. Two Road Wheels, which act as counterweights are secured to a 4" Rod pushed through holes in the side members at the rear end of the beam. It should be noted that the beam is pivoted  $1"$  (2 holes) out of centre towards the front of the model, on a 5" Rod which is supported in holes in two Reversed Angle Brackets bolted to the insides of the two Flat Trunnions at the tops of the side columns.

The bridge is raised or lowered by turning a Crank Handle, which is journalled near the lower ends of the rear beam supports. The Crank Handle is lengthened by joining to it a  $3\frac{1}{2}"$  Rod by means of a Rod Connector. A piece of Cord is attached to a Spring Clip on the Crank Handle wound a few turns around its shaft then through the side Strips of the beam and back to the Crank Handle, where it is finally made fast.

A further Cord is tied to the front end of the beam at each side, and its other end made fast to the Double Brackets bolted to the Bridge as already mentioned.

In order to keep the Crank Handle stationary when not in use the model is fitted with a band brake. This consists of a piece of Cord looped around a 1" fast Pulley on the Crank Handle and tensioned by means of a Driving Band, which is connected to it and to the  $1" \times 1"$  Angle Bracket fixed to the rear of the beam supports.

## Parts required

10 of No. 1	1 of No. 15b	4 of No. 125
13 " " 2	1 " " 16	2 " " 126a
2 " " 3	2 " " 19b	1 " " 186a
10 " " 5	1 " " 19g	4 " " 187
4 " " 8	1 " " 22	2 " " 188
5 " " 10	4 " " 35	2 " " 189
2 " " 11	82 " " 37	4 " " 190
8 " " 12	1 " " 40	2 " " 191
1 " " 12a	7 " " 48a	4 " " 192
2 " " 15	1 " " 52	1 " " 213

Every owner of a Meccano Outfit should join the Meccano Guild. This is a world-wide guild for boys, started at the request of boys and as far as possible conducted by boys. Write for full particulars and an application form to the Meccano Guild Secretary, Binns Road, Liverpool 13.



### 5.24 PITHEAD GEAR

This model is based on the usual type of headgear installed at the top of coal mine shafts, where it is used for supporting the huge wheels over which pass the wire ropes for raising and lowering the cage. From the pit-head wheels hauling cables pass down to a powerful winding engine installed in a power house near the pit-head. The engine is often electrically driven, but steam driven plants are used in many collieries and it is one of these that is represented in the Meccano model. The engine is fitted with powerful brakes and speed retarding devices, which automatically reduce the speed of the cage and bring it to rest smoothly at either the surface or the bottom of the shaft.

Construction of the model is commenced by bolting together two 12½" Angle Girders overlapped to make a compound angle girder 19½" long. Two such compound girders are required to form the long sides of the base.

The near side of the engine house is a 5½" x 2½" Flanged Plate bolted to one of the compound 19½" girders, and the rear side consists of a Flanged Sector Plate and a 2½" x 1½" Flanged Plate, which are bolted to the rear 19½" compound angle girder.

The steam cylinder of the engine is represented by a 2½" Cylinder, which is lock-nutted so that it is free to pivot on the 5½" x 2½" Flanged Plate. The Cylinder ends are Wheel Discs held in place by passing a 3" Screwed Rod through holes in their circumference and screwing nuts on each end of it. The cylinder is fitted with a piston rod consisting of a 4½" Rod, which carries at its outer end a Rod and Strip Connector. The Rod and Strip Connector pivots on a Threaded Pin, fixed in a hole of a Bush Wheel, mounted on a 5" Rod journaled in the sides of the engine house, and is retained in position on the Pin by a Cord Anchoring Spring.

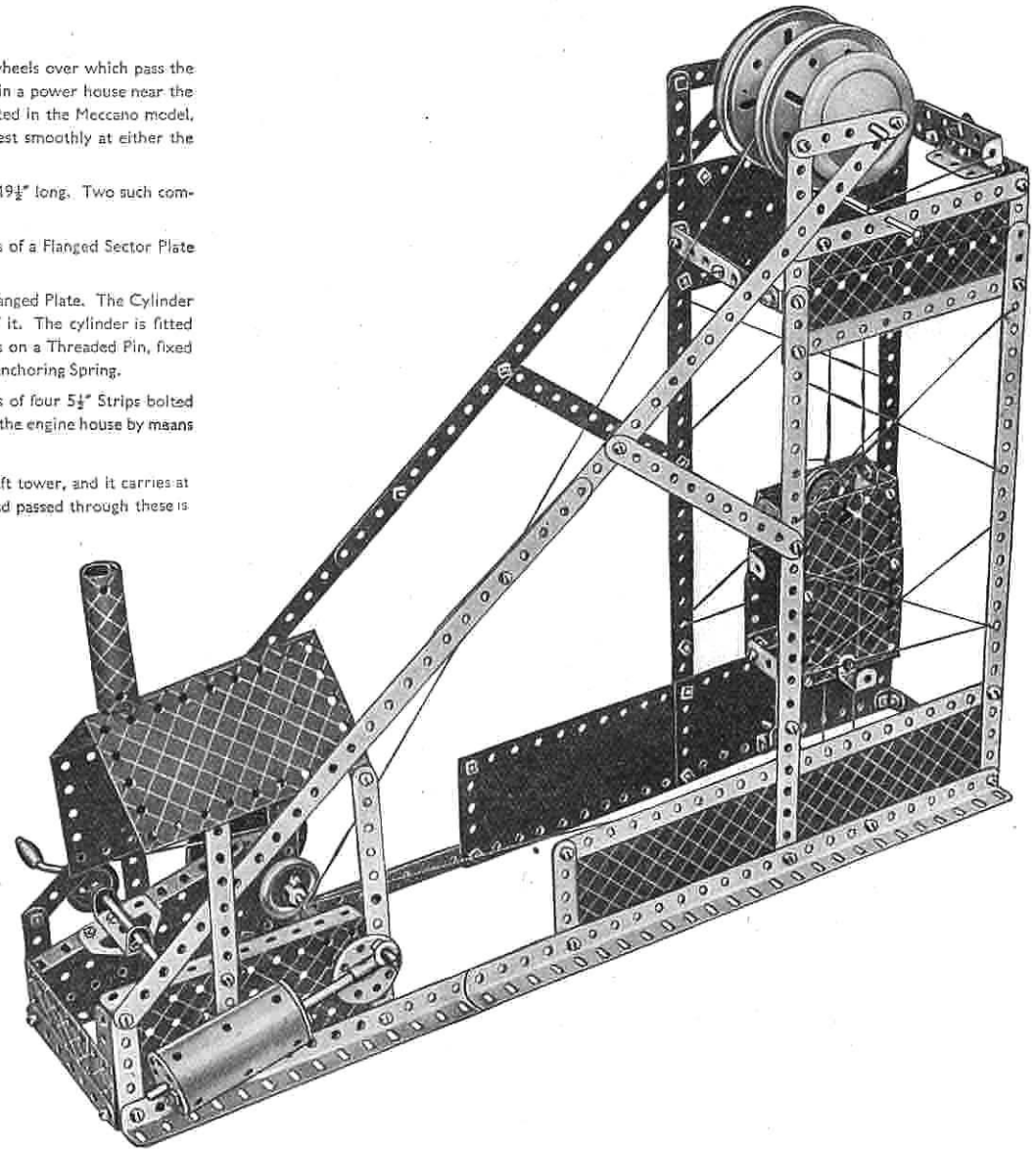
The roof of the engine house consists of a Hinged Flat Plate, which is attached by means of Obtuse Angle Brackets to the upper ends of four 5½" Strips bolted vertically to the 12½" Angle Girders of the base. The chimney is a Flexible Plate bent in the form of a cylinder and attached to the roof of the engine house by means of an Angle Bracket.

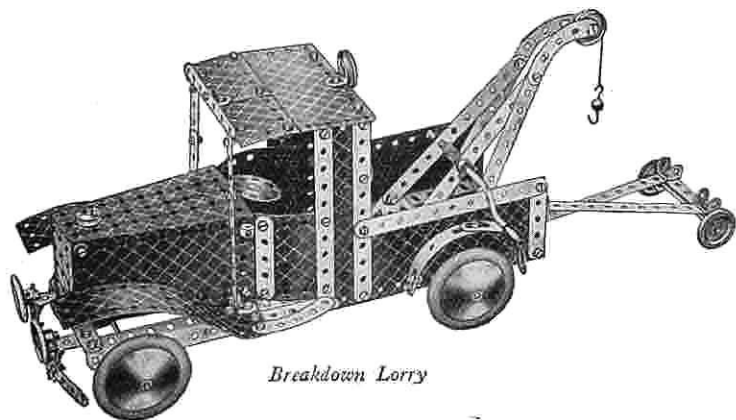
The pulley gear at the pit-head is arranged as follows. A 5" Rod is journaled in the holes of the two 2½" Strips at the top of the shaft tower, and it carries at its centre a 1" fast Pulley. On each side of this Pulley are a 3" Pulley and a Road Wheel. Just below the 2½" Strips are two 5½" Strips and passed through these is a 4" Rod, which is held in place by Spring Clips. Directly beneath this Rod, at the bottom of the tower, is a 3½" Rod, which is supported in the holes of two Reversed Angle Brackets. This Rod carries a ½" loose Pulley held in place between two Spring Clips.

The Cords that form guides for the rising and falling cage are arranged as seen in the illustration.

The arrangement of the cage winding cord is as follows. A length of Cord is tied through one of the holes in a 1" loose Pulley mounted on a Rod at the top of the cage, and then is passed over the 1" fast Pulley placed between the two 3" Pulleys at the top of the tower. It is then wound for about six turns around the 5" Rod in the engine house, and then led around the ½" loose Pulley at the bottom of the shaft. Finally the Cord is made fast in another hole of the 1" loose pulley in the cage.

Parts required				
10 of No. 1	2 of No. 12a	5 of No. 22	1 of No. 40	1 of No. 115
14 " " 2	4 " " 12c	1 " " 22a	1 " " 48	2 " " 125
2 " " 3	2 " " 15	1 " " 23	7 " " 48a	1 " " 126
11 " " 5	1 " " 15a	1 " " 24	1 " " 51	1 " " 126a
1 " " 6a	1 " " 15b	2 " " 24a	1 " " 52	2 " " 155
4 " " 8	1 " " 16	9 " " 35	1 " " 54	1 " " 176
2 " " 10	1 " " 17	85 " " 37	1 " " 80c	1 " " 186
2 " " 11	2 " " 19b	4 " " 37a	1 " " 111a	3 " " 187
5 " " 12	1 " " 19g	10 " " 38	3 " " 111c	3 " " 188
				4 " " 189
				4 " " 190
				1 " " 191
				4 " " 192
				1 " " 198
				1 " " 199
				1 " " 212
				1 " " 212
				1 " " 216

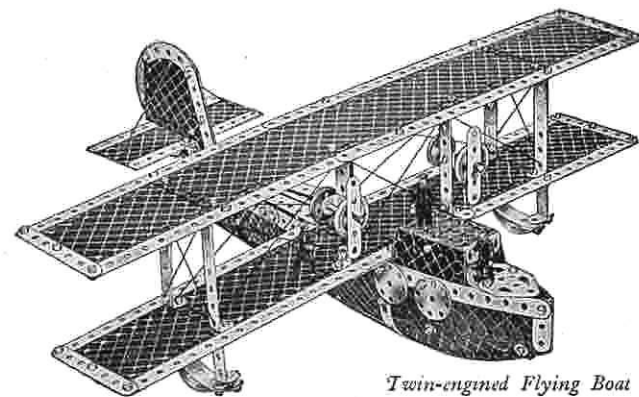
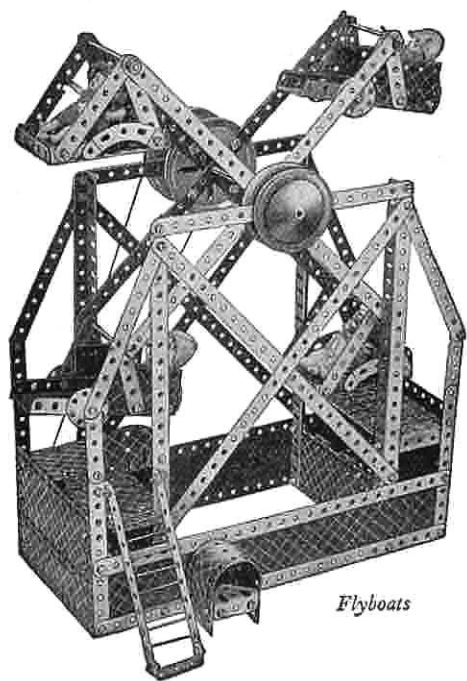
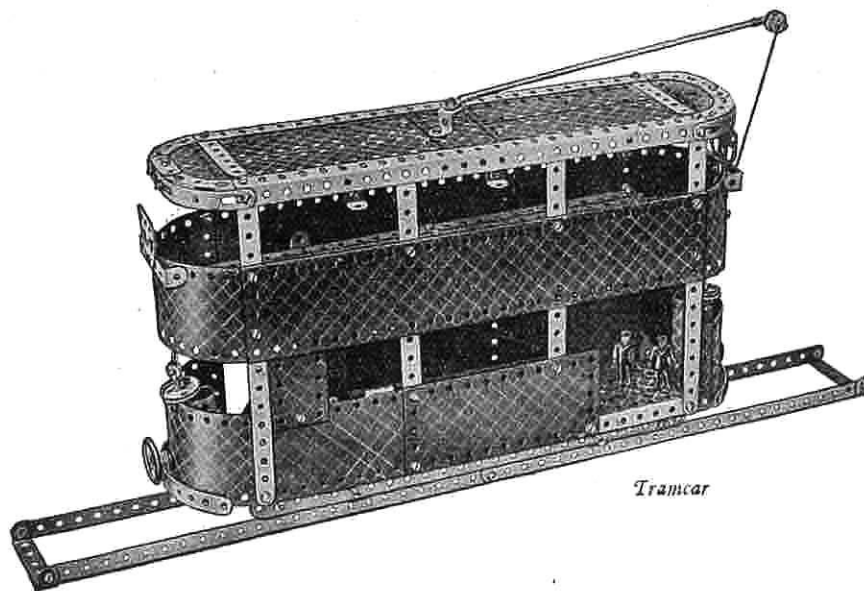
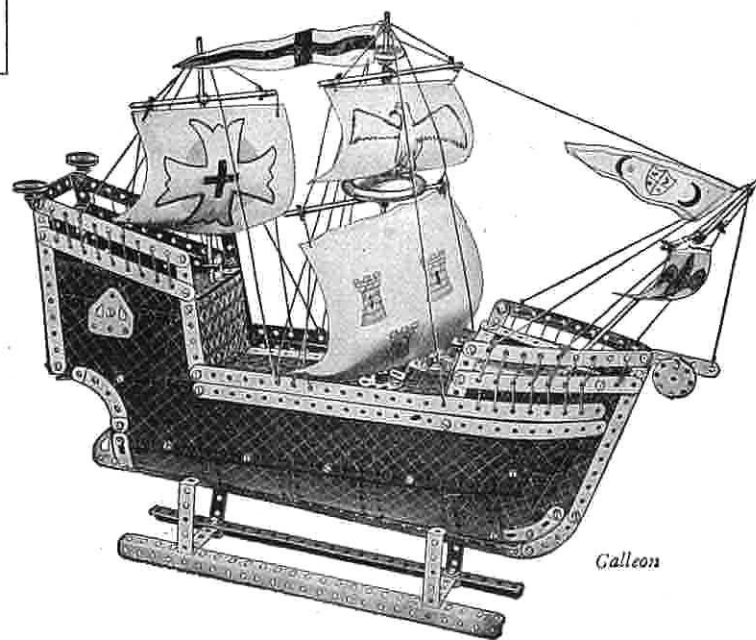


*Breakdown Lorry*

### 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. 5a Accessory Outfit containing all the parts required to convert your No. 5 into a No. 6 Outfit. You will thus be able to build the full range of No. 6 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.

*Twin-engined Flying Boat**Flyboats**Tramcar**Galleon*





# MECCANO PARTS



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



122. Miniature Loaded Sacks



123. Cone Pulleys,  $1\frac{1}{4}$ ", 1" and  $\frac{3}{4}$ " diam.



124. Reversed Angle Brackets, 1"  
125. " " " "  $\frac{3}{4}$ "



126. Trunnions



126a. Flat Trunnions



127. Bell Cranks



128. Bell Cranks, with Boss



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



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



131. Dredger Buckets



132. Flywheels, 2 $\frac{3}{4}$ " diam.



133. Corner Brackets,  $1\frac{1}{4}$ "  
133a. " " " " 1"



No. 134. Crank Shafts, 1" stroke



136. Handrail Supports  
136a. Handrail Couplings



137. Wheel Flanges



136A



138a. Ships' Funnels

138<sup>a</sup>



139. Flanged Brackets (right)  
139a. " " (left)

139



140. Universal Couplings

140



142. Rubber Rings (to fit 3" diam. rims)  
142a. Motor Tyres (to fit 2" diam. rims)

142



142A

142b. " " " " " "  
142c. " " " " " "  
142d. " " " " " "



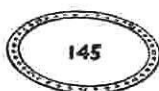
143. Circular Girders, 5 $\frac{1}{2}$ " diam.

143



No. 144. Dog Clutches

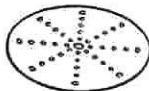
144



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

146. " " Plates, 6" "

146a. " " " " 4" "



146



147. Pawls, with Pivot Bolt and Nuts  
147a. Pawls  
147b. Pivot Bolts with 2 Nuts  
147c. Pawls without boss  
148. Ratchet Wheels

147 & 148



151. Pulley Blocks, Single Sheave  
152. " " Two " "  
153. " " Three " "

151



154a. Corner Angle Brackets,  $\frac{1}{2}$ " (right-hand)  
154b. Corner Angle Brackets,  $\frac{1}{2}$ " (left-hand)  
155. Rubber Rings (for 1" Pulleys)

154<sup>a</sup> & 154<sup>b</sup>

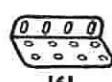


157. Fans, 2" diam.

157



160



161. Girder Brackets, 2" x 1" x  $\frac{1}{4}$ "

161



163



162



164

No. 162. Boilers, complete, 5" long x 2 $\frac{1}{4}$ " diam.  
162a. " " Ends, 2 $\frac{1}{4}$ " diam x  $\frac{1}{16}$ "  
162b. " " without ends, 4 $\frac{1}{2}$ " long x 2 $\frac{1}{4}$ " diam.  
163. Sleeve Pieces, 1 $\frac{1}{2}$ " long x  $\frac{1}{16}$ " diam.  
164. Chimney Adaptors,  $\frac{3}{8}$ " diam. x  $\frac{1}{2}$ " high



165. Swivel Bearings



166. End  
167b. Flanged Ring, 9 $\frac{1}{2}$ " diam



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.

168



171. Socket Couplings

171



175. Flexible Coupling Units

175



176. Anchoring Springs for Cord

176



179. Rod Sockets



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

180



No. 185. Steering Wheels, 1 $\frac{1}{2}$ " diam.  
186. Driving Bands, 2 $\frac{1}{4}$ " (Light)  
186a. " " " " " "  
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.

187



192. Flexible Plates.

188. 2 $\frac{1}{2}$ " x 1 $\frac{1}{2}$ "  
189. 5 $\frac{1}{2}$ " x 1 $\frac{1}{2}$ "  
190. 3 $\frac{1}{2}$ " x 2 $\frac{1}{2}$ "  
190a. 3 $\frac{1}{2}$ " x 2 $\frac{1}{2}$ "



197. Strip Plates.

191. 4 $\frac{1}{2}$ " x 2 $\frac{1}{2}$ "  
192. 5 $\frac{1}{2}$ " x 2 $\frac{1}{2}$ "  
196. 9 $\frac{1}{2}$ " x 2 $\frac{1}{2}$ "  
197. 12 $\frac{1}{2}$ " x 2 $\frac{1}{2}$ "



198. Hinged Flat Plates, 4 $\frac{1}{2}$ " x 2 $\frac{1}{2}$ "



199. Curved Plates, U-Section  
200. " " " " 2 $\frac{1}{2}$ " x 2 $\frac{1}{2}$ " x  $\frac{1}{16}$ " radius  
" " " " 2 $\frac{1}{2}$ " x 2 $\frac{1}{2}$ " x 1 $\frac{1}{16}$ " radius



199



211a. Helical Gear  $\frac{1}{4}$ " | Can only be  
211b. " " " " 1 $\frac{1}{2}$ " | used together

211B



212. Rod and Strip Connectors



213. Rod Connectors



214. Semi-Circular Plates 2 $\frac{1}{2}$ "  
215. Formed Slotted Strips 3"



214

215



216. Cylinders, 2 $\frac{1}{2}$ " long, 1 $\frac{1}{4}$ " diam.

216