

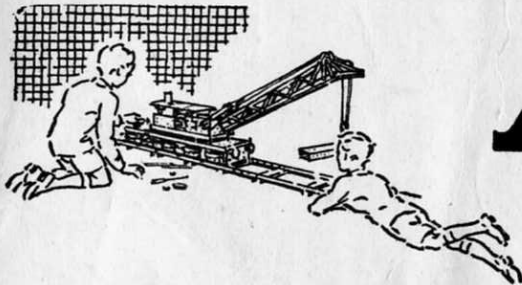
# MECCANO

INSTRUCTIONS FOR  
No. 6 OUTFIT

No.  
47.6

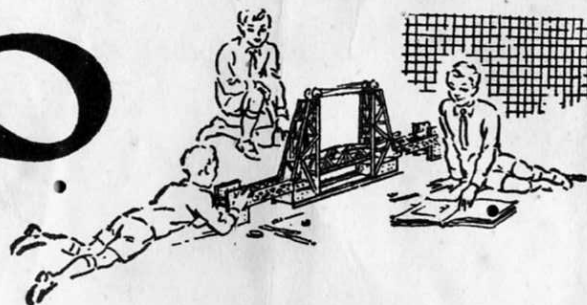






# MECCANO

*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

## HOW TO BEGIN THE FUN

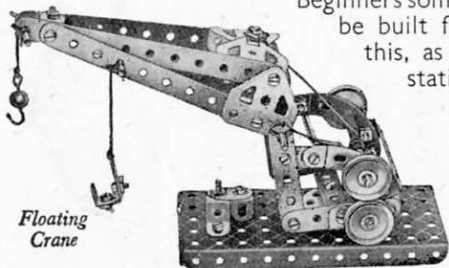
### THE MOST FASCINATING OF ALL HOBBIES

Meccano model-building is the most fascinating of all hobbies, because it never becomes dull. There is always something new to be done. First of all there is the fun of building a new model, and watching it take shape as part after part is added. Then, when the model is complete, comes the thrill of setting it to work just like the real structure it represents, by means of a Meccano Motor. This wonderful process can be repeated indefinitely, for there is no end to the number of Meccano models that can be built. Another point is that models built with Meccano are real engineering structures in miniature, and the keen model-builder has wonderful opportunities for learning the working of machines and mechanisms of all kinds. So he acquires practical engineering knowledge without special study.

It is so simple to build Meccano models that operations can be started as soon as the first Outfit is opened. Different boys build in different ways, but in the end they all reach the same splendid results. The following hints are given with the object of showing boys who are just starting the wonderful Meccano hobby how to get the greatest possible fun.

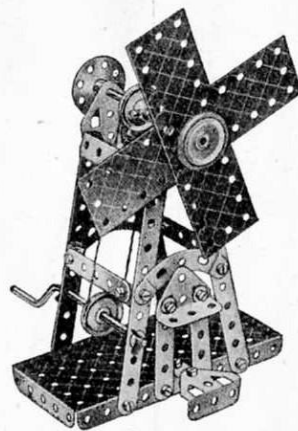
### A FEW USEFUL HINTS

It will be noticed that with each model shown in this Manual of Instructions is given a list of the parts required to build it. For the first few models it is a good plan to lay out on the table all the parts required for the one it is proposed to build, and put the remainder of the Outfit on one side. To help you to pick out the correct parts for your model a complete list of Meccano parts is given at the back of this Manual, and all the principal parts are illustrated. In the list the parts are all numbered, and in most cases, their measurements are given. There is no need, however, to measure the parts to find out which is which, as the size is easily found from the number of holes. All Meccano holes are spaced  $\frac{1}{2}$ " apart, so that by counting two holes to the inch the size of a part can be found at once. For instance, Part No. 2 is listed as a  $5\frac{1}{2}$ " Perforated Strip, so you look in your Outfit for a Strip with eleven holes. Similarly No. 192 is a  $5\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flexible Plate, so you look for a Flexible Plate eleven holes in length and five holes in width. By the time a few models have been built the names of the parts will have become familiar.



Floating Crane

Beginners sometimes wonder which section of a model should be built first. There cannot be any definite rule for this, as it depends on the design of the model. In stationary models the base usually should be built first. In most of the smaller models a  $5\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plate forms an important part of the structure, and often the best plan is to start building by bolting parts to this Plate. For other models a good general rule is that the sections that form supports for a number of other parts should be built first.



Windmill

### THE IMPORTANCE OF "LOCK-NUTTING"

In building models in which Rods revolve in the holes of other parts it is important to make sure that such holes are exactly in line with one another. This can be done very easily by pushing through the holes a Drift, Part No. 36c, before the Bolts holding the various parts are tightened up.

In some models it is necessary to join certain parts together so that, although they cannot come apart, they are free to pivot or move in relation to one another. To do this the parts are bolted together as usual but the nut is not screwed up tightly, so that the parts are not gripped. Then, to prevent the nut from unscrewing, a second nut is screwed up tightly against it, the first nut being held with a spanner. This method of using a second nut is known as lock-nutting.

During the construction of a model it is best to screw up the nuts with the fingers, followed by just a light turn with the screwdriver, leaving the final tightening with spanner and screwdriver until all the parts are connected up.

### MOTORS AND GEARING

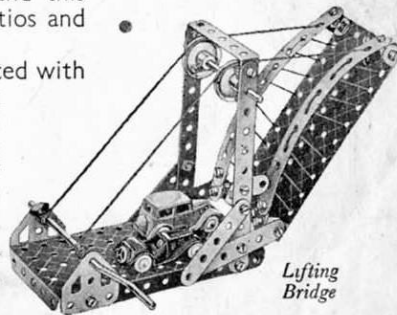
Models can be operated by means of either clockwork or electric motors.

Clockwork motors have the advantage of being self-contained and extremely simple, if only a small amount of power is needed, the model may be driven direct from the driving spindle of the motor or through a belt running over two pulleys of the same size, giving what is described as a 1:1 (one-to-one) ratio. Greater power can be obtained by a reduction in the speed of the drive, which can be produced in a simple manner by connecting a small pulley on the motor to a larger pulley by means of a belt. Thus if a 1" Pulley is made to drive a 3" Pulley, a reduction ratio of approximately 1:3 is obtained. This means that the driven shaft will take about three times the load that the driving shaft would handle, but will rotate at only one-third of the speed. Rubber bands are better than Cord for driving belts for most purposes.

Electric motors have the advantage of giving long continuous runs. Their speed is much higher than that of clockwork motors, and this makes it possible to employ higher reduction ratios and thus obtain greater power.

With the larger Outfits, belt drive can be replaced with advantage by gearing. To operate a slow moving model demanding great power, such as a traction engine, gears that will provide a considerable reduction must be used. For example, a Worm meshed with a  $\frac{1}{2}$ " Pinion will give 1:19 reduction; while a Worm meshed with a 57-teeth Gear will give a 1:57 reduction.

Certain Meccano Clockwork and Electric Motors will be available soon. Ask your dealer for particulars.

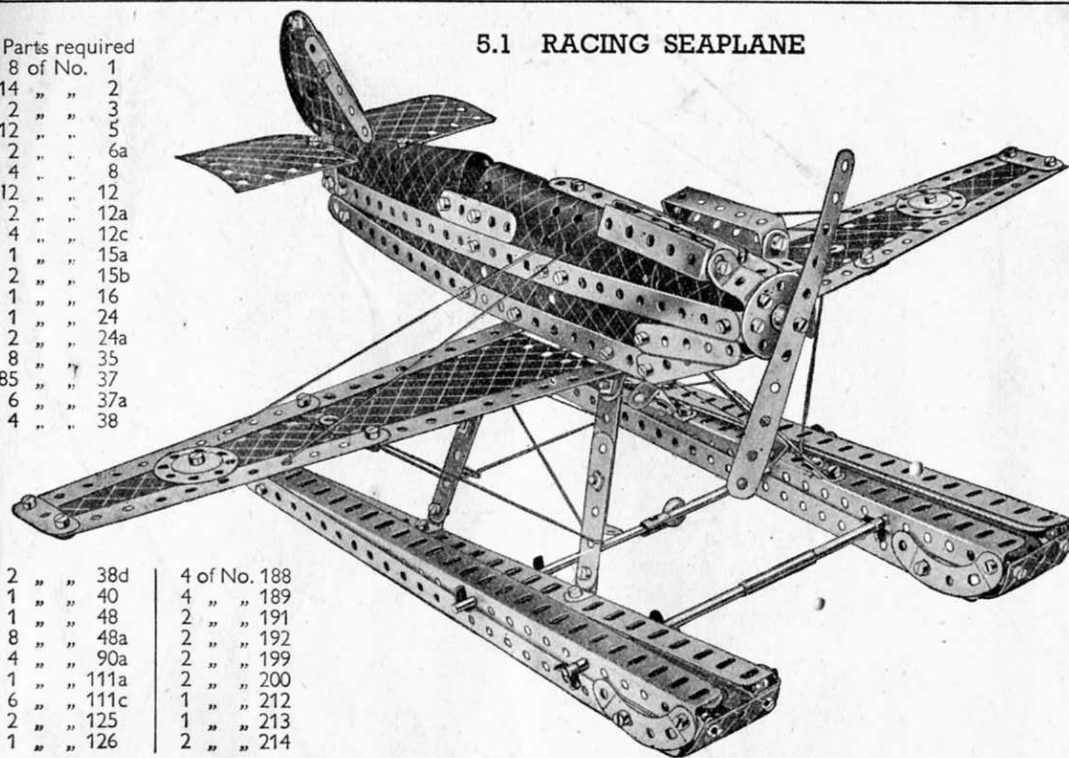


Lifting Bridge



## 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

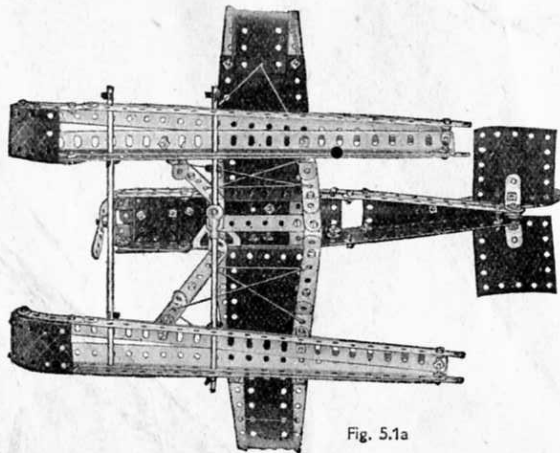
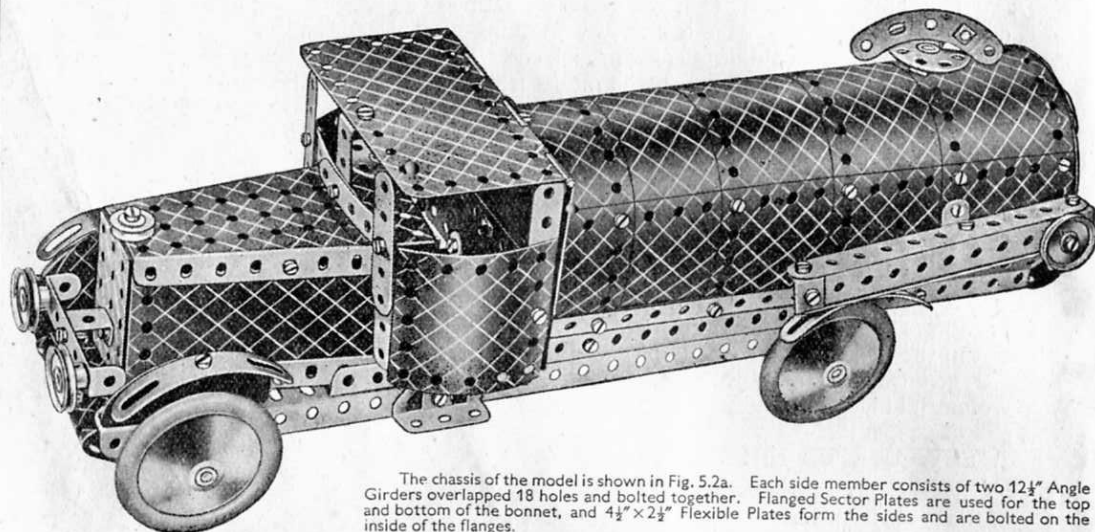


Fig. 5.1a

A  $2\frac{1}{2}" \times 1\frac{1}{2}"$  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.

## 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  $2\frac{1}{2}" \times 1\frac{1}{2}"$  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  $5\frac{1}{2}" \times 1\frac{1}{2}"$  Flexible Plate. It is extended on the rear side by two  $5\frac{1}{2}" \times 1\frac{1}{2}"$  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	

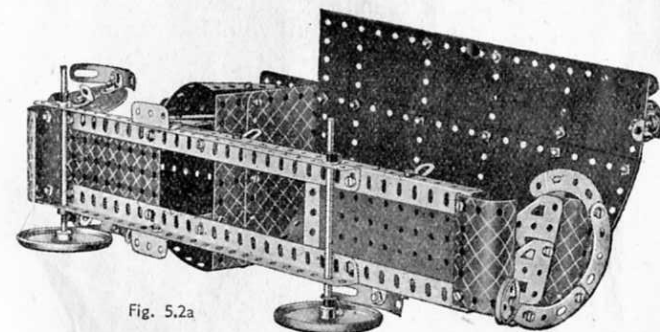
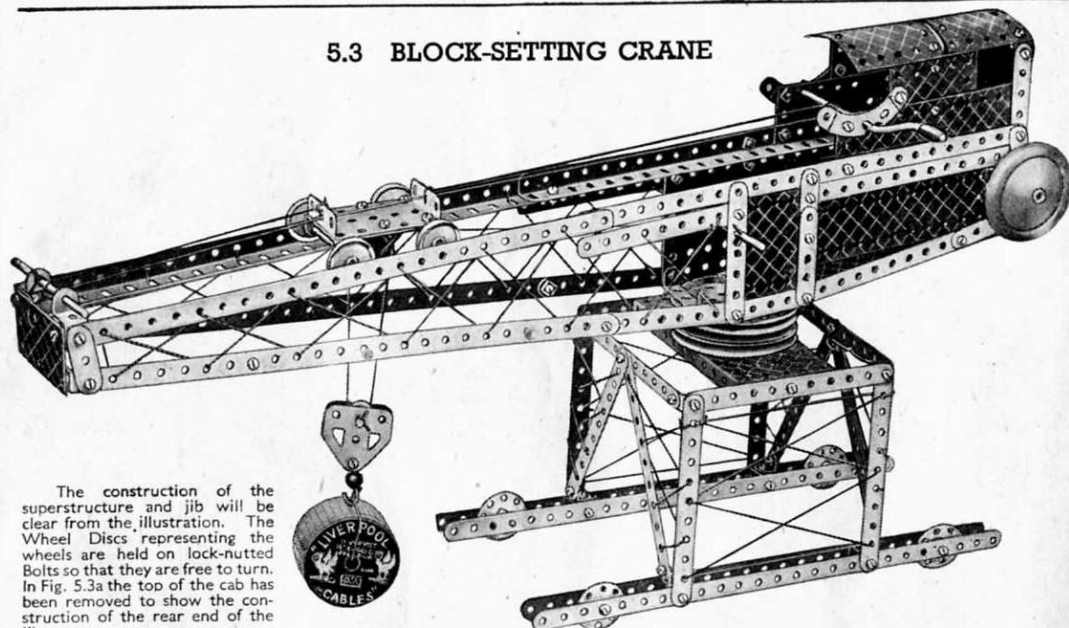


Fig. 5.2a



These Models can be built with MECCANO No. 5 Outfit (or No. 4 and No. 4a Outfits)

### 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 3" Bolts, which hold also a 2½" x ½" 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 3½" Rod fastened in the boss of the upper 3" Pulley passes through the boss of the lower 3" Pulley, which is bolted to a 5½" x 2½" 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 3½" 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 3½" 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 ½" loose Pulley in the pulley block, and back over the second 1" loose Pulley. Finally it is tied to the 2½" x 1½" Flexible Plate at the jib head.

Fig. 5.3a

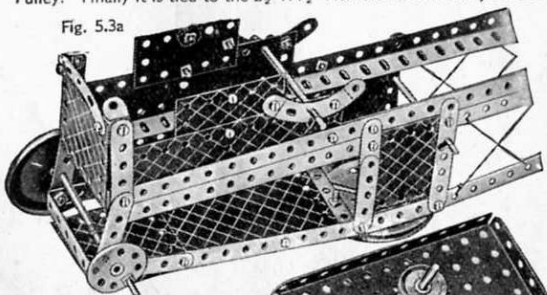


Fig. 5.3c

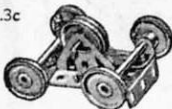
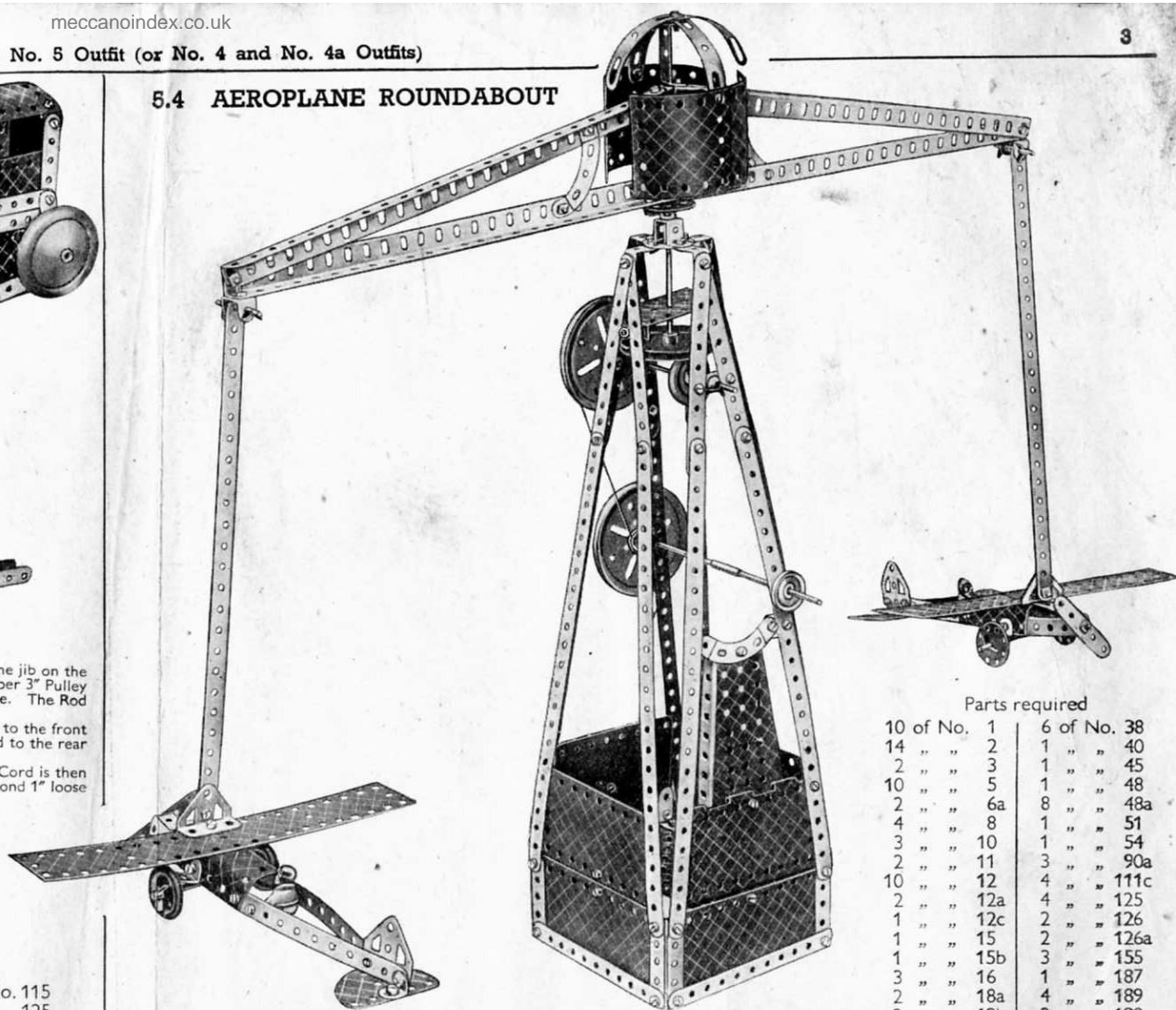


Fig. 5.3b

#### 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 " " 189
2 " " 12a	1 " " 40	4 " " 190
4 " " 12c	1 " " 45	1 " " 191
1 " " 15b	1 " " 48	2 " " 200
3 " " 16	7 " " 48a	
2 " " 17	1 " " 51	
1 " " 18a	1 " " 52	
1 " " 18b	1 " " 57c	
2 " " 19b	3 " " 90a	
1 " " 19g	1 " " 111a	
5 " " 22	6 " " 111c	

### 5.4 AEROPLANE ROUNDABOUT



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 3½" 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 1½" 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 12½" Angle Girders bolted to a Bush Wheel and overlapped one hole. The two Girders of the beam are joined together at the centre by an Obtuse Angle Bracket.

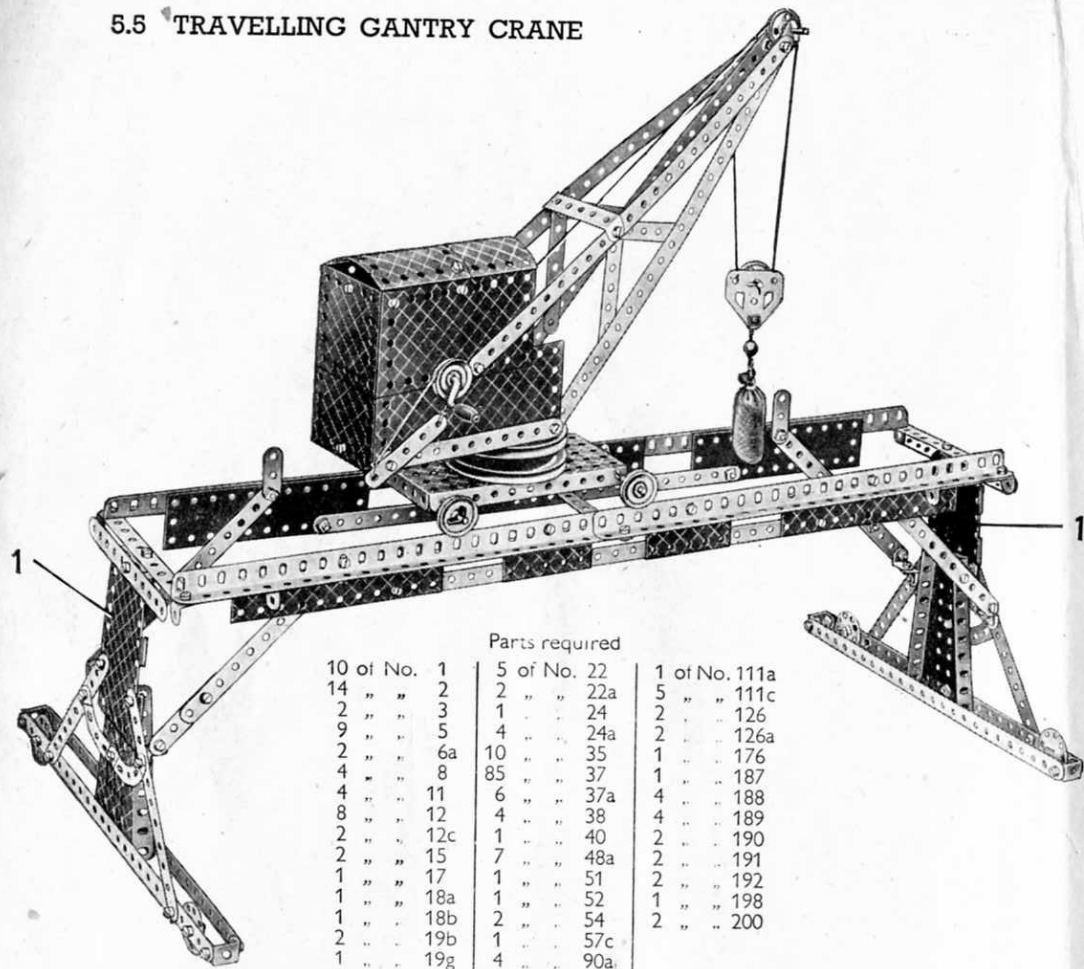
#### Parts required

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	1 " " 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



These Models can be built with MECCANO No. 5 Outfit (or No. 4 and No. 4a Outfits)

## 5.5 TRAVELLING GANTRY CRANE



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

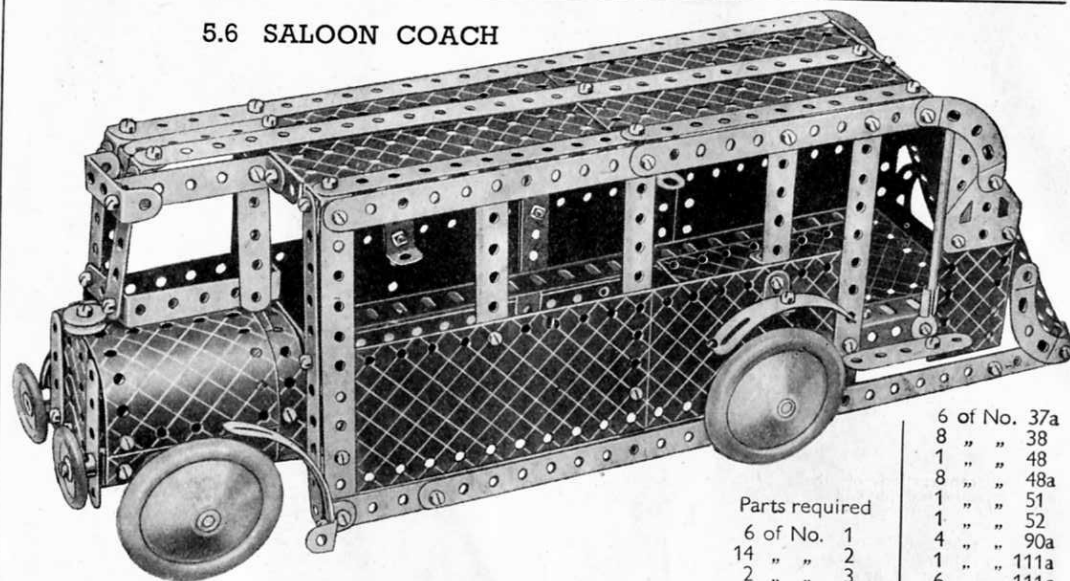
The pin has been withdrawn from a Hinged Flat Plate and the halves are used as flat plates 1 in the construction of the supports for the gantry. Four Wheel Discs are fastened to the 12½" Strips by lock-nutted Bolts, so that the gantry can travel along the ground. Each of the rails along which the crane 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 journaled 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		6 of No. 37a
14 " " 2	1 " " 38	8 " " 48
2 " " 3	1 " " 48a	1 " " 51
11 " " 5	1 " " 52	1 " " 90a
2 " " 6a	1 " " 111a	6 " " 111c
3 " " 8	1 " " 115	2 " " 125
3 " " 10	2 " " 126a	2 " " 155
2 " " 11	4 " " 187	4 " " 188
12 " " 12	4 " " 189	2 " " 190
2 " " 12c	2 " " 191	4 " " 192
1 " " 15	2 " " 199	2 " " 200
1 " " 15a	1 " " 212	4 " " 215
1 " " 16		
3 " " 22		
1 " " 23		
1 " " 35		
85 " " 37		

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.

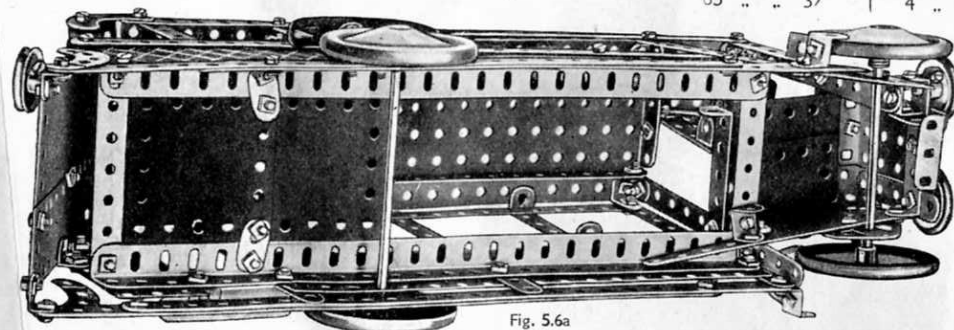


Fig. 5.6a



## 5.7 MERRY-GO-ROUND

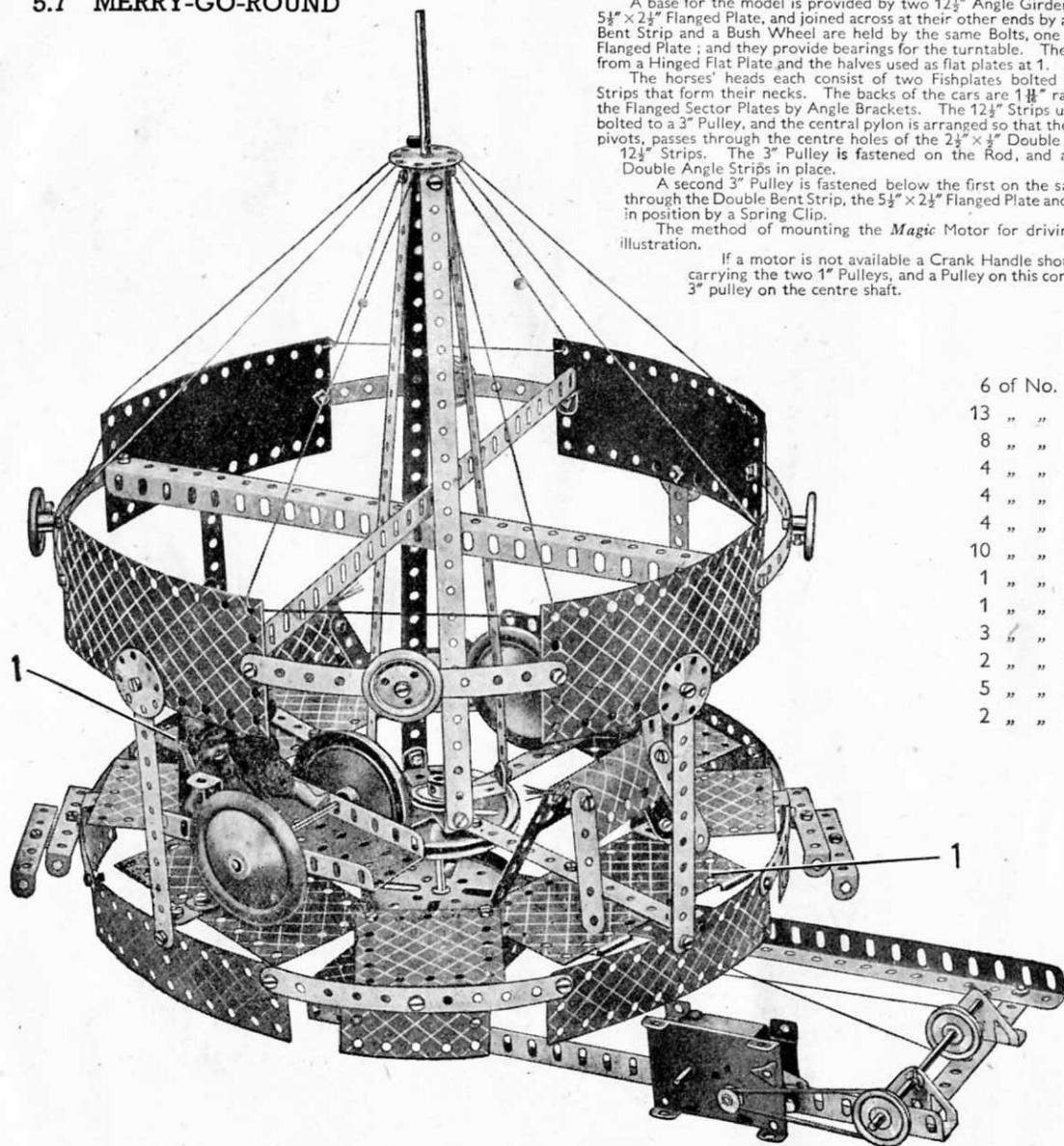
A base for the model is provided by two  $12\frac{1}{2}$ " Angle Girders bolted to the end flanges of a  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate, and joined across at their other ends by a  $5\frac{1}{2}$ " Strip as shown. A Double Bent Strip and a Bush Wheel are held by the same Bolts, one 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  $1\frac{1}{8}$ " 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.

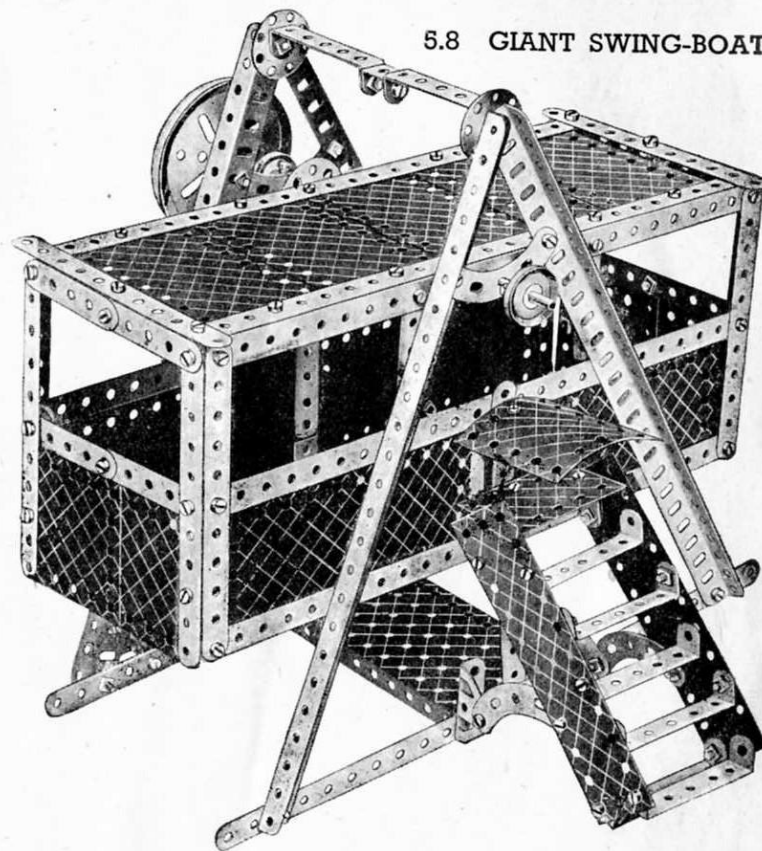
If a motor is not available a Crank Handle should be substituted for the Rod carrying the two 1" Pulleys, and a Pulley on this connected by a Driving Band to the 3" pulley on the centre shaft.



## 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 <i>Magic Motor</i> (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
12 " " 5	3 " " 35	2 " " 126a
4 " " 8	85 " " 37	1 " " 147b
4 " " 11	6 " " 37a	3 " " 188
6 " " 12	6 " " 38	2 " " 189
2 " " 12a	1 " " 45	4 " " 190
1 " " 15	8 " " 48a	2 " " 191
1 " " 16	1 " " 51	4 " " 192
1 " " 17	1 " " 52	1 " " 198
2 " " 19b	2 " " 54	1 " " 200
1 " " 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  $12\frac{1}{2}$ " Angle Girders, which are bolted to a base made by fastening two  $12\frac{1}{2}$ " Strips to a  $5\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plate. The steps are supported by two  $2\frac{1}{2}$ " 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  $2\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " Flexible Plate held in position by two  $1"$   $\times$   $1"$  Angle Brackets.

The  $1\frac{1}{2}$ " radius Curved Plate is fastened to a Double Bent Strip bolted to one end of a  $5\frac{1}{2}$ " 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  $3\frac{1}{2}"$  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 journaled 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  $2\frac{1}{2}"$   $\times$   $1\frac{1}{2}"$  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 journaled in the Flanged Sector Plates. A  $5\frac{1}{2}"$  Strip is attached to a Pivot Bolt, fixed in the  $3"$  Pulley, and its other end is pivoted on a  $\frac{1}{4}"$  bolt lock-nutted to but spaced by Washers from another  $3"$  Pulley fixed on the pivot rod of the swing-boat.

If desired a Magic 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.

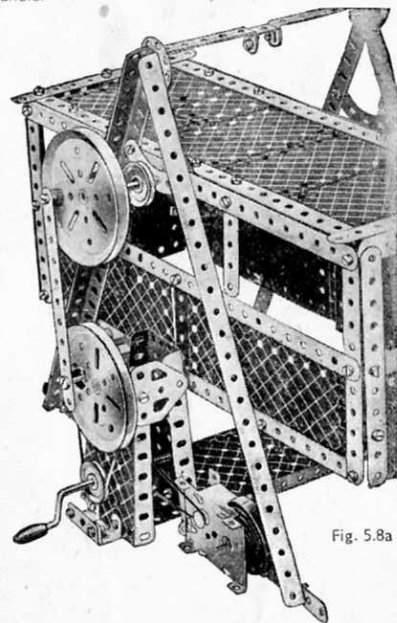
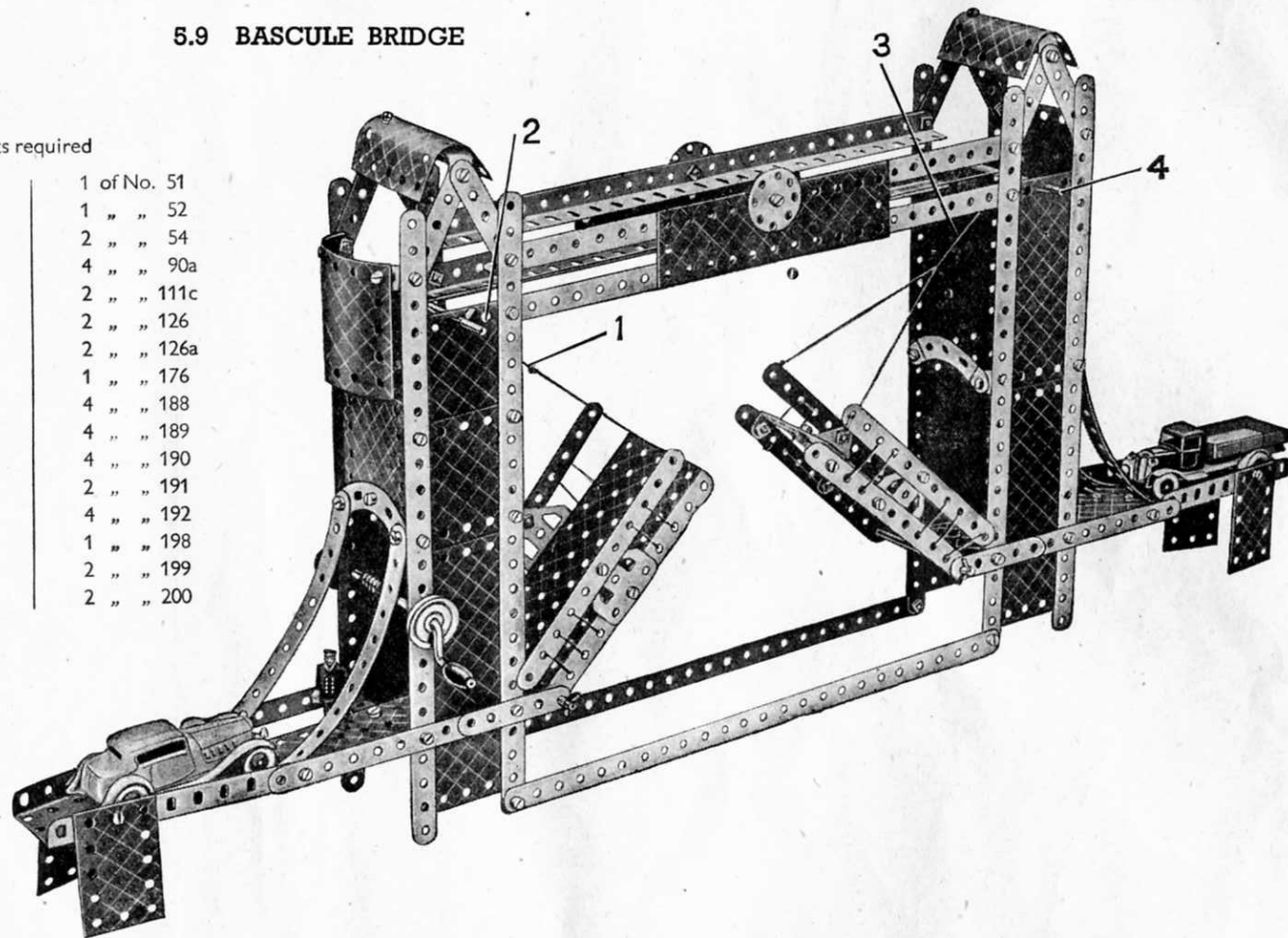


Fig. 5.8a

## 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  $12\frac{1}{2}"$  Strips to which are bolted Flexible Plates as shown. The  $12\frac{1}{2}"$  Strips are braced across by the  $2\frac{1}{2}"$   $\times$   $\frac{1}{2}"$  Double Angle Strips that support the approach roadway, the  $2\frac{1}{2}"$  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  $2\frac{1}{2}"$   $\times$   $\frac{1}{2}"$  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  $12\frac{1}{2}"$  Strips.

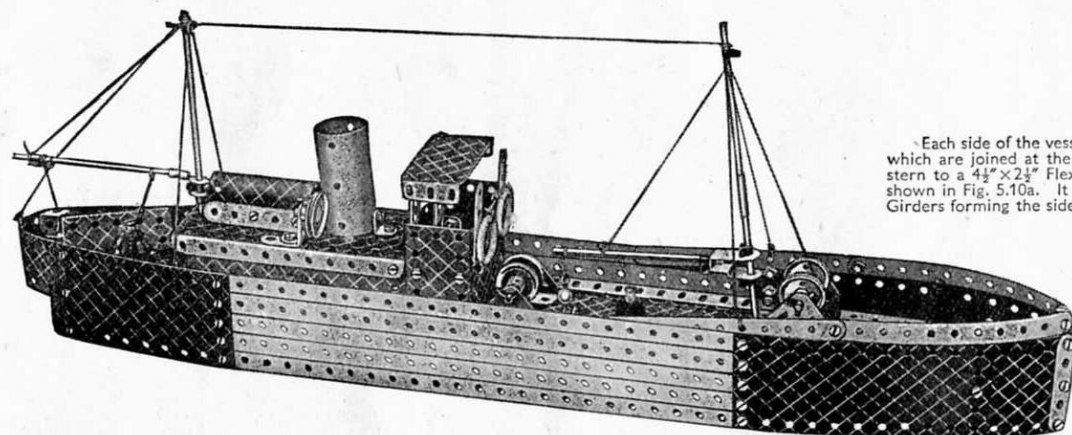
Four  $2\frac{1}{2}"$  Strips form bearings for the  $3\frac{1}{2}"$  Rods on which the halves of the span are pivoted. The left-hand half is a  $5\frac{1}{2}"$   $\times$   $2\frac{1}{2}"$  Flanged Plate fitted with Flat Trunnions and  $5\frac{1}{2}"$  Strips as shown. The other half of the span is a part of the Hinged Flat Plate, and is connected to two  $5\frac{1}{2}"$  Strips by a  $2\frac{1}{2}"$   $\times$   $\frac{1}{2}"$  Double Angle Strip and Angle Brackets.

The halves of the span are raised and lowered by turning a Crank Handle journaled 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.



These Models can be built with MECCANO No. 5 Outfit (or No. 4 and No. 4a Outfits)

## 5.10 TRAWLER

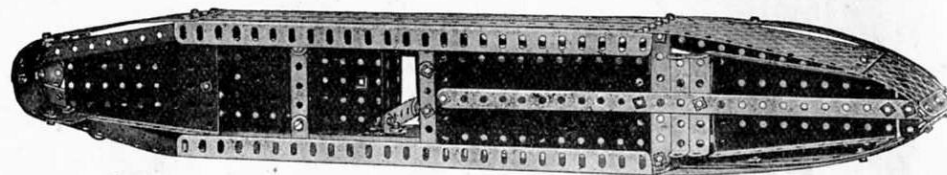


Each side of the vessel consists of three  $1\frac{1}{2}$ " Strips and two Angle Girders, which are joined at the forward end to a  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate, and at the stern to a  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate. The deck of the model is constructed as 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.

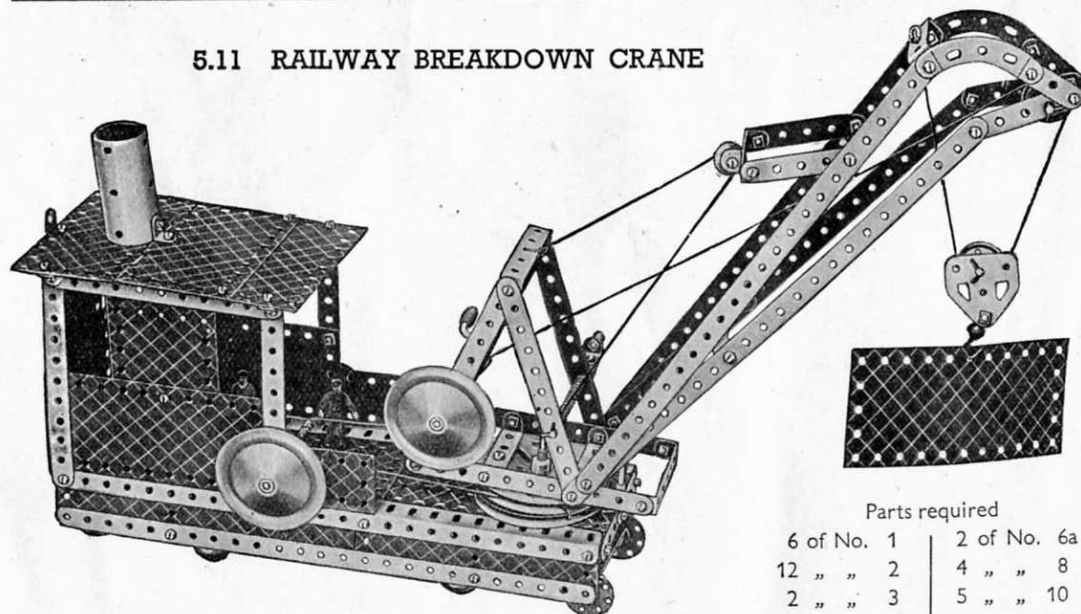
Fig. 5.10a



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	1 of No. 12	1 of No. 52
12 " " 2	4 " " 8	1 " " 15	2 " " 54
2 " " 3	5 " " 10	4 " " 16	1 " " 57c
6 " " 5	1 " " 11	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

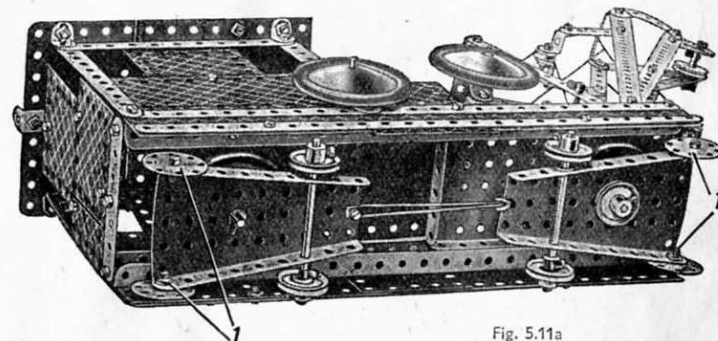


Fig. 5.11a

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  $\frac{1}{2}$ " Bolts, which have two Washers on their shanks for spacing purposes. The  $\frac{1}{2}$ " 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 journaled in the sides of the cab.



## 5.12 ELECTRIC LOCOMOTIVE

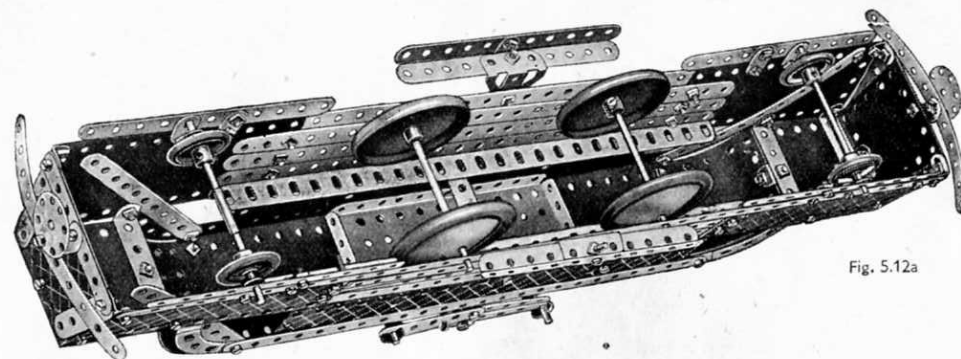
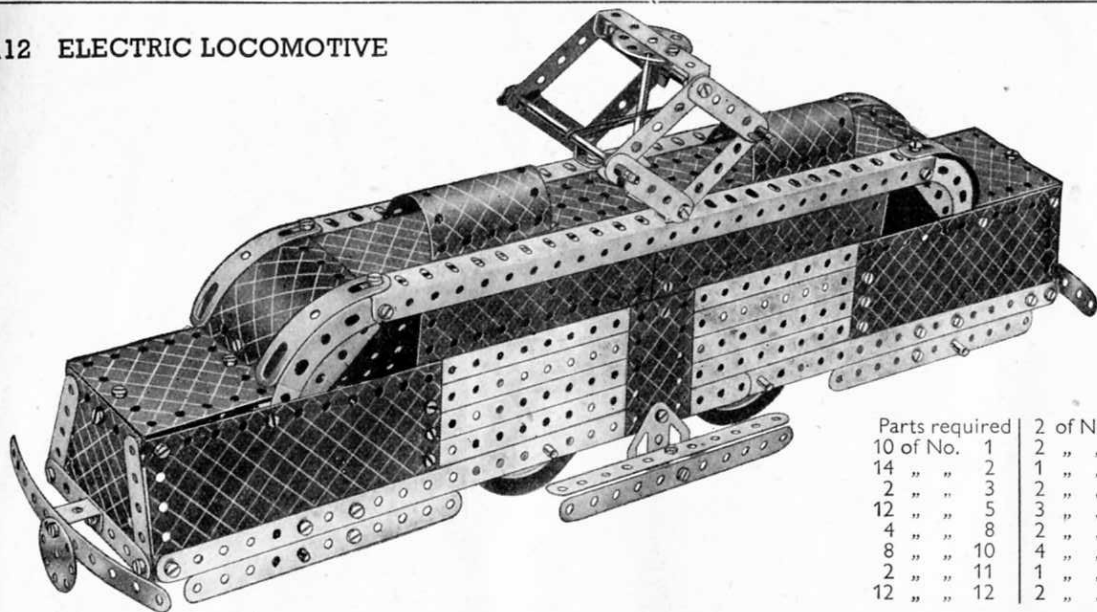


Fig. 5.12a

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 3/8" 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

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

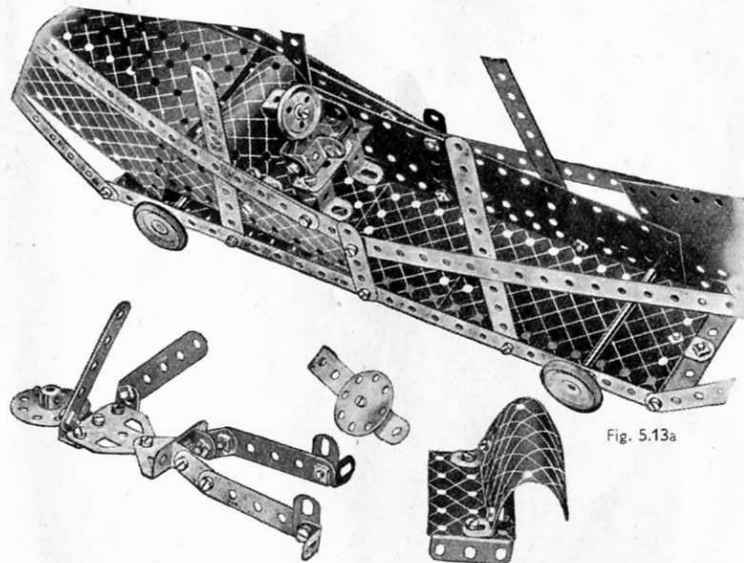


Fig. 5.13a



## 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" 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	1	52	4	189
12 " " 2	2	1	54	4	190
1 " " 3	3	1	80c	2	191
6 " " 5	5	2	111c	4	192
1 " " 6a	6a	3	125	1	212
4 " " 8	8	2	126	1	213
4 " " 11	11	2	126a	2	214
11 " " 12	12	1	176	4	215
1 " " 12a	12a	3	187	1	216
2 " " 15	15				
3 " " 16	16				
2 " " 17	17				
2 " " 18a	18a				
2 " " 19b	19b				
4 " " 22	22				
1 " " 24	24				
2 " " 24a	24a				
9 " " 35	35				
85 " " 37	37				
5 " " 37a	37a				
3 " " 38	38				
1 " " 44	44				
1 " " 48	48				

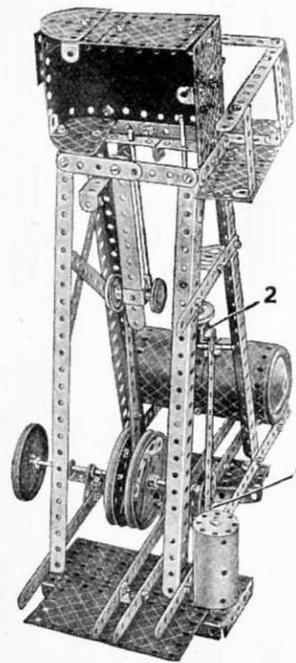
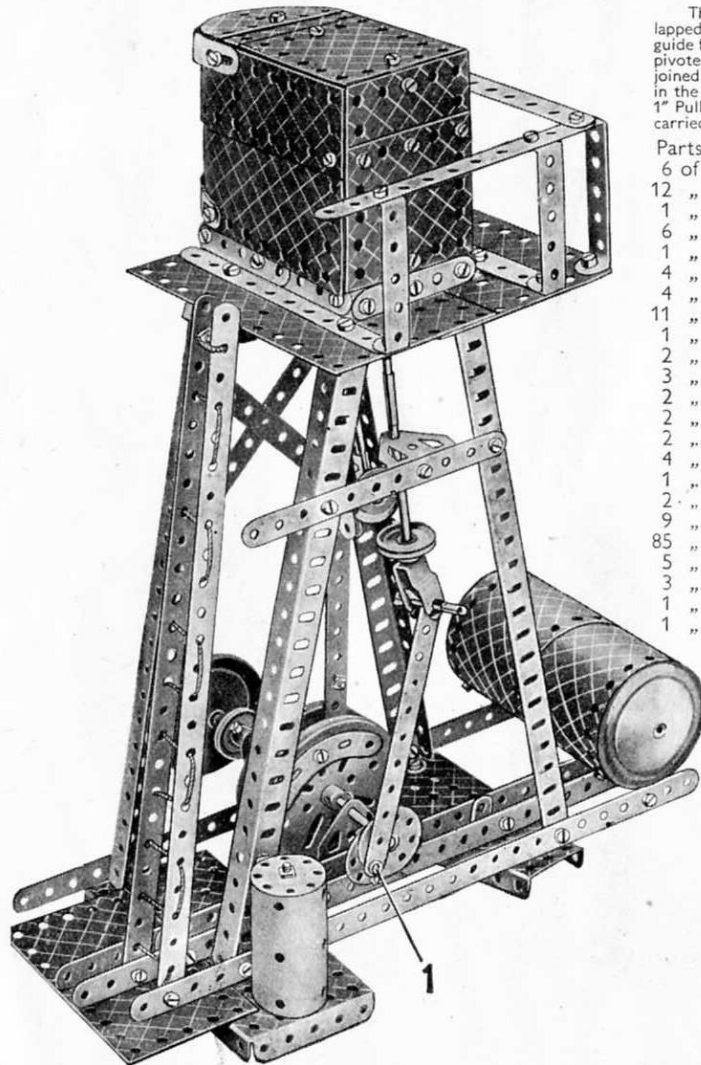
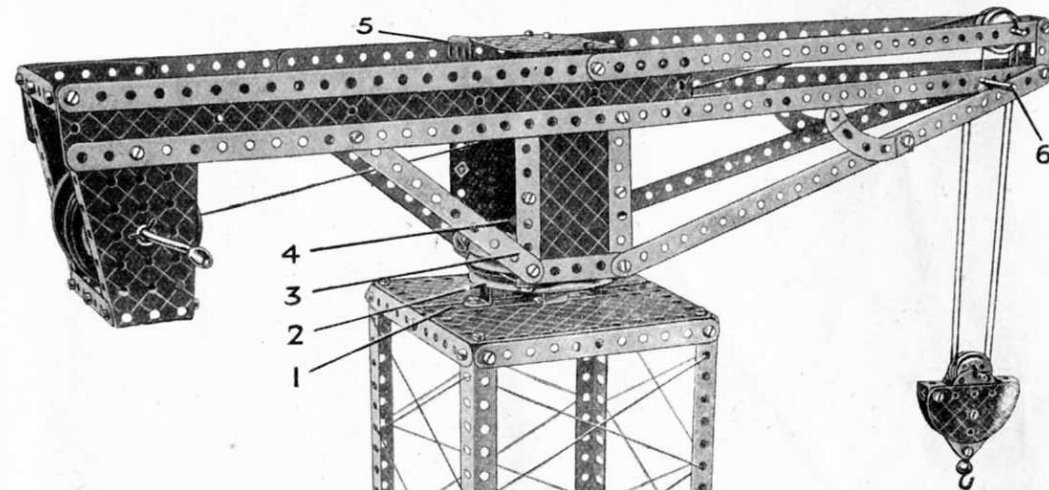


Fig. 5.14a

## 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.

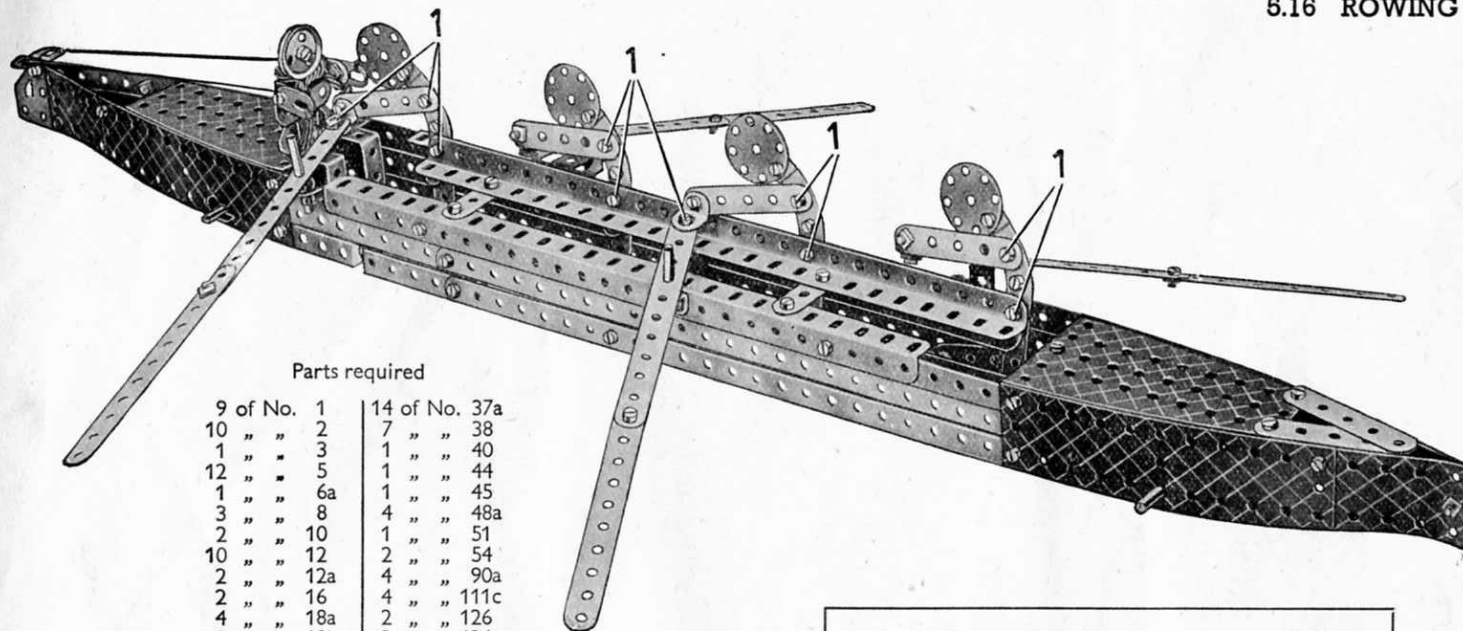
The hoisting Cord is tied to the Crank Handle journalled in the Flanged Sector Plates at the rear end of the jib. It is then taken over one of two 1" Pulleys mounted at the front end of the jib, then down and around one of the 1" loose Pulleys in the pulley block, up and over the other 1" fast Pulley 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	2	1 " " 51	
2 " " 3	3	1 " " 52	
12 " " 5	5	2 " " 54	
2 " " 6a	6a	1 " " 57c	
4 " " 8	8	2 " " 90a	
1 " " 10	10	1 " " 111a	
4 " " 11	11	4 " " 111c	
9 " " 12	12	4 " " 125	
1 " " 16	16	2 " " 126a	
1 " " 17	17	1 " " 155	
3 " " 18a	18a	1 " " 176	
2 " " 19b	19b	2 " " 187	
1 " " 19g	19g	4 " " 188	
4 " " 22	22	4 " " 189	
2 " " 22a	22a	3 " " 190	
3 " " 24a	24a	2 " " 191	
10 " " 35	35	4 " " 192	
85 " " 37	37	1 " " 198	
5 " " 37a	37a	1 " " 213	
9 " " 38	38	2 " " 214	
1 " " 40	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  $5\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " 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  $2\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Double Angle Strips bolted to the  $5\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " Flexible Plates. Flanged Sector Plates form the deck and are bolted to the sides at their broad ends.

The hull is braced by a  $2\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " 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.

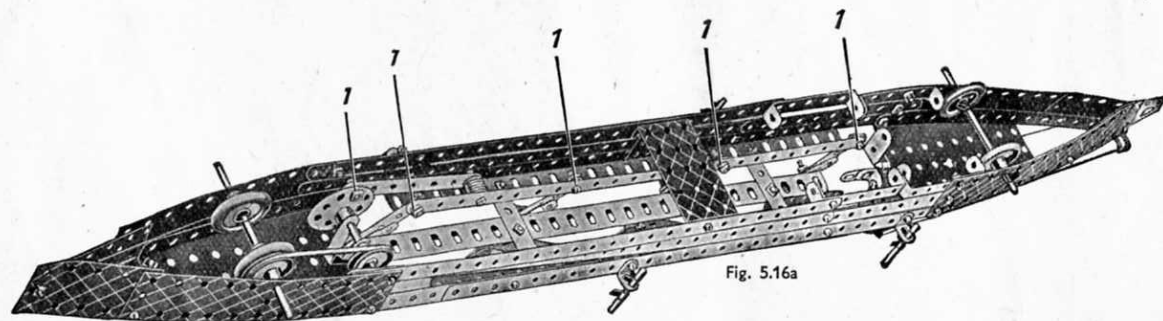


Fig. 5.16a

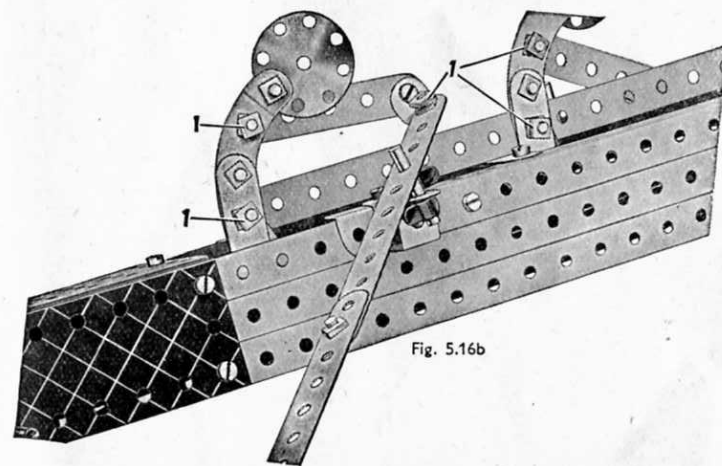


Fig. 5.16b

## 5.17 AUTOMATIC SHIP-COALER

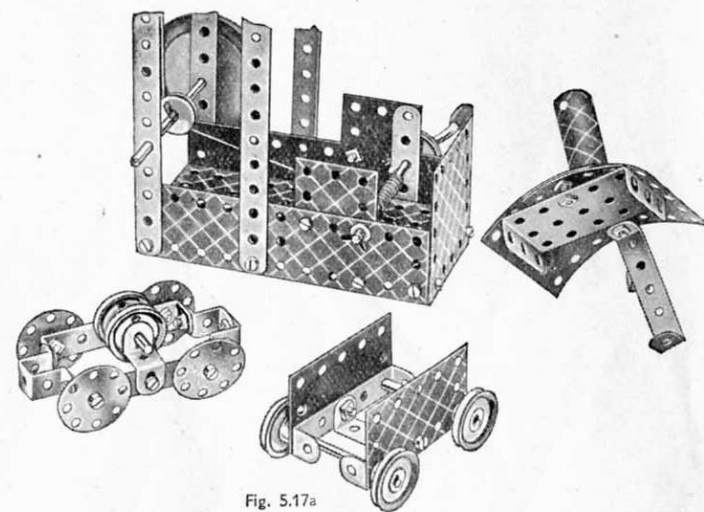
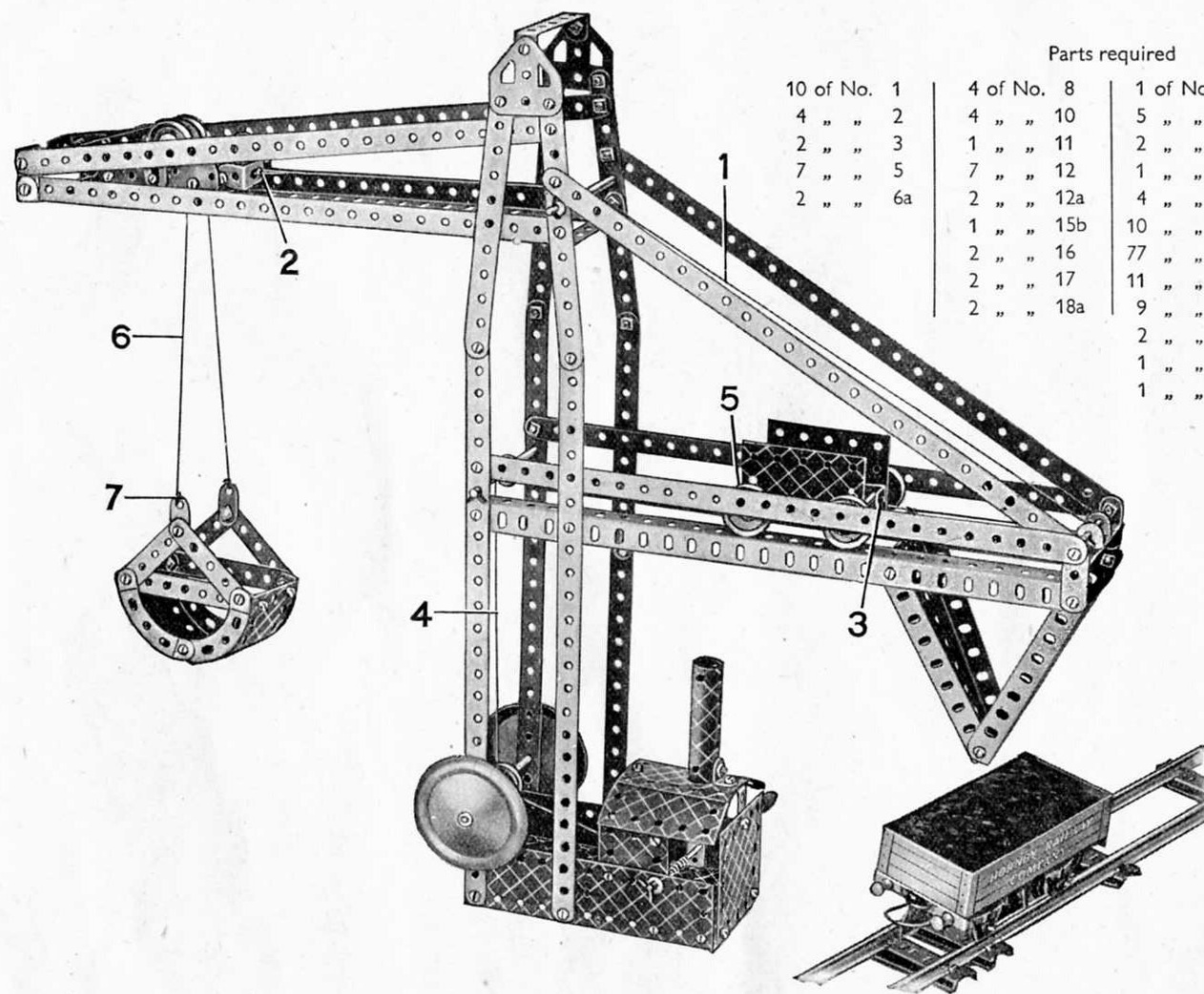


Fig. 5.17a

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  $1\frac{1}{4}$ " 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  $\frac{3}{4}$ " 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  $1\frac{1}{2}$ " 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.



This Model can be built with MECCANO No. 5 Outfit (or No. 4 and No. 4a Outfits)

## 5.18 RACING YACHT

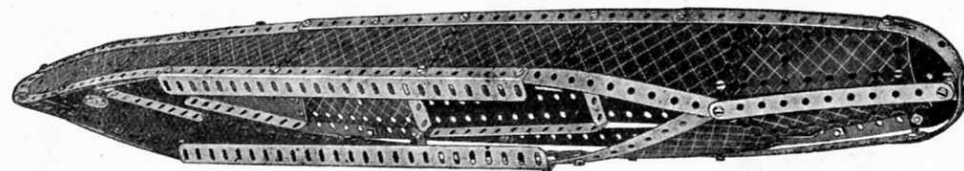


Fig. 5.18a

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.

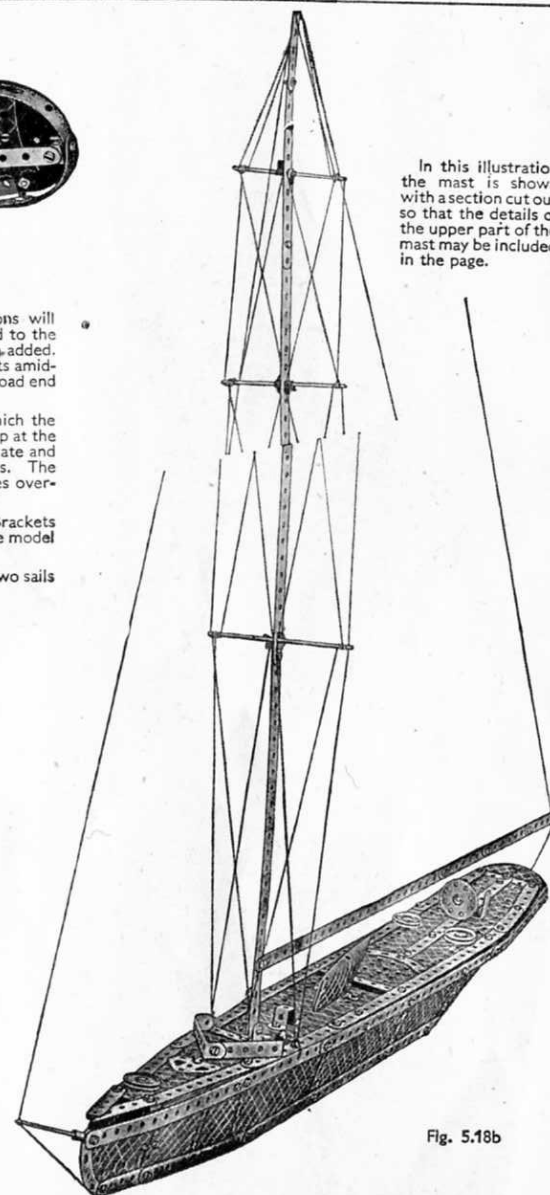
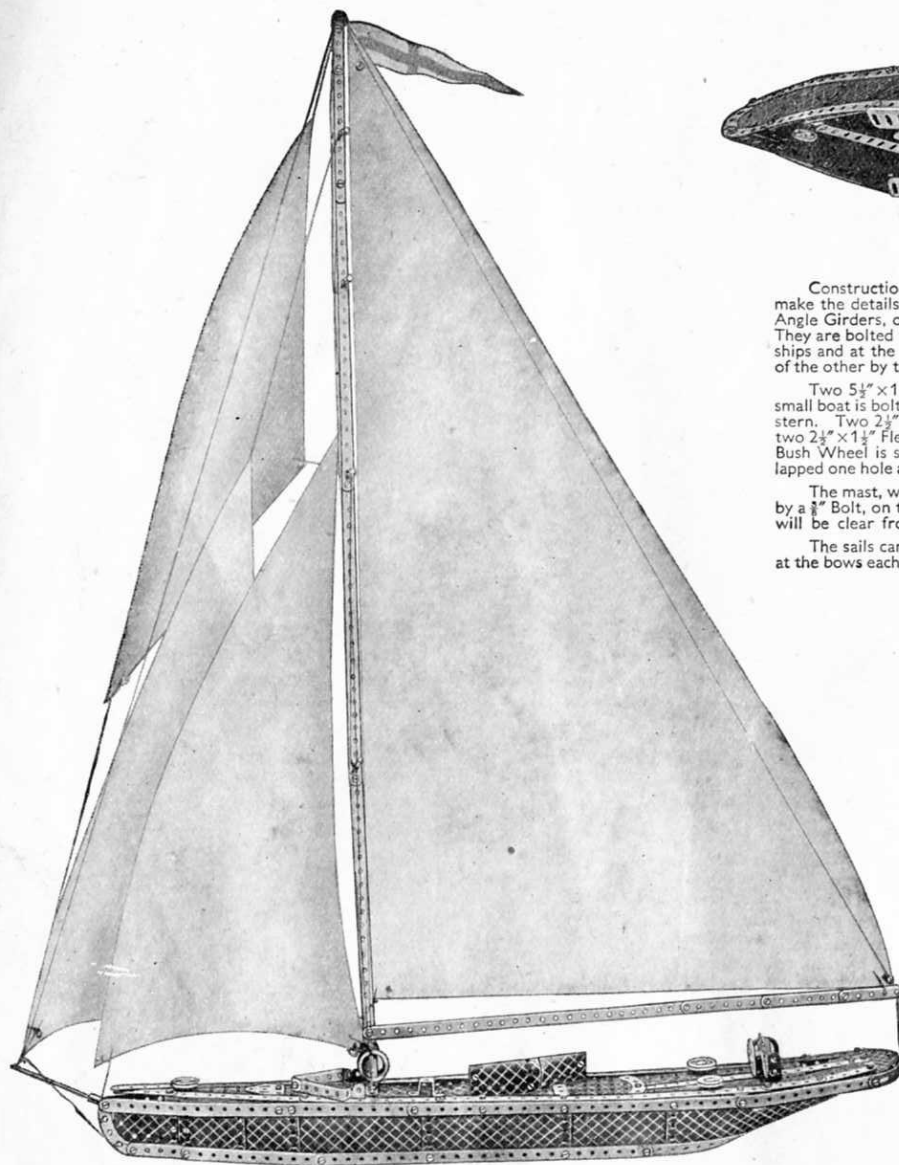
Two  $5\frac{1}{2}'' \times 1\frac{1}{2}''$  Flexible Plates connect the rear Flanged Sector Plate to a  $5\frac{1}{2}'' \times 2\frac{1}{2}''$  Flanged Plate, to which the small boat is bolted. Two  $5\frac{1}{2}''$  Strips overlapped three holes are fastened to the Flanged Plate and to a  $2\frac{1}{2}''$  Strip at the stern. Two  $2\frac{1}{2}'' \times 2\frac{1}{2}''$  Flexible Plates are bolted to this compound strip, together with a  $2\frac{1}{2}'' \times 1\frac{1}{2}''$  Flanged Plate and two  $2\frac{1}{2}'' \times 1\frac{1}{2}''$  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  $\frac{1}{2}''$  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.

### 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



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.

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 space 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  $5\frac{1}{2}$ " Rod is fixed in the boss of the  $3\frac{1}{2}$ " 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  $1\frac{1}{2}$ " 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.

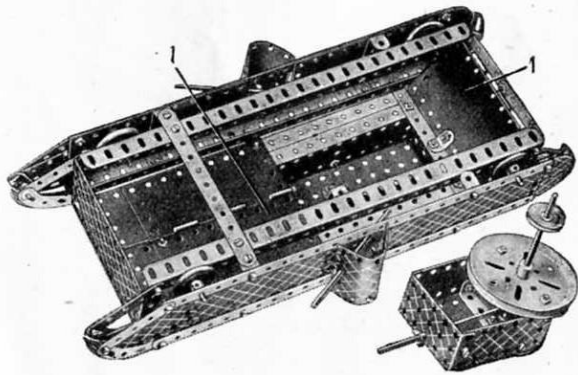


Fig. 5.19a

## Parts required

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  $3\frac{1}{2}$ " Pulley passes through a second  $3\frac{1}{2}$ " 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  $5\frac{1}{2}$ " 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  $3\frac{1}{2}$ " 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  $2\frac{1}{2}$ " Rod at the base of the jib, and over a  $1\frac{1}{2}$ " 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  $2\frac{1}{2}$ " Rod in the jib post and is taken around a  $1\frac{1}{2}$ " Pulley in the jib. It is then passed around a  $\frac{1}{2}$ " loose Pulley on the  $2\frac{1}{2}$ " Rod and led over a second Pulley on the same Rod as the first  $1\frac{1}{2}$ " Pulley. Finally it is led back over the  $2\frac{1}{2}$ " 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	1 " " 57c	1 " " 213
10 " " 2	2 " " 24a	2 " " 90a	
2 " " 3	14 " " 35	4 " " 111c	
2 " " 5	69 " " 37	1 " " 115	
3 " " 8	6 " " 37a	2 " " 126	
1 " " 10	10 " " 38	2 " " 126a	
1 " " 11	1 " " 40	1 " " 147b	
6 " " 12	1 " " 44	1 " " 176	
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			

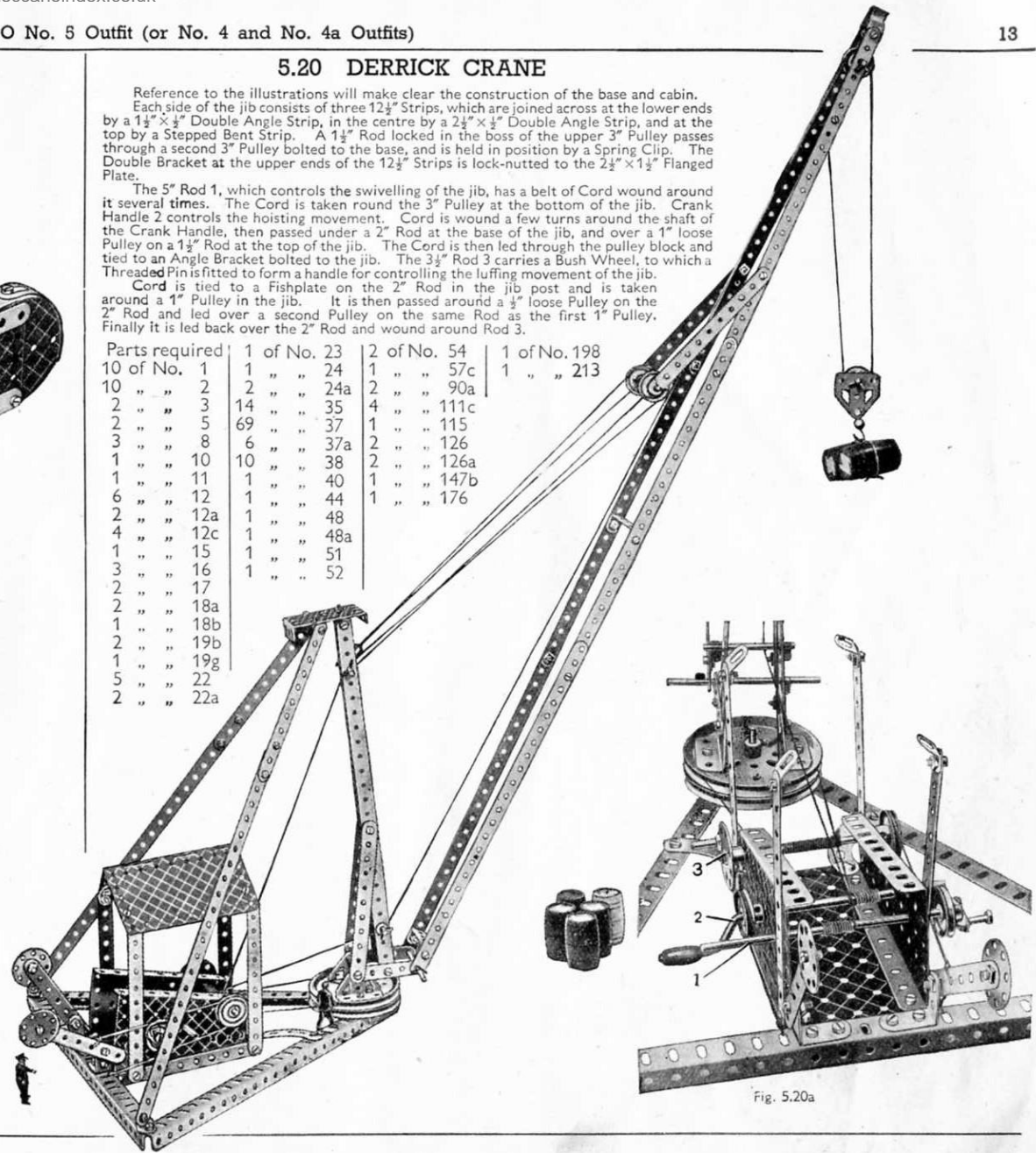
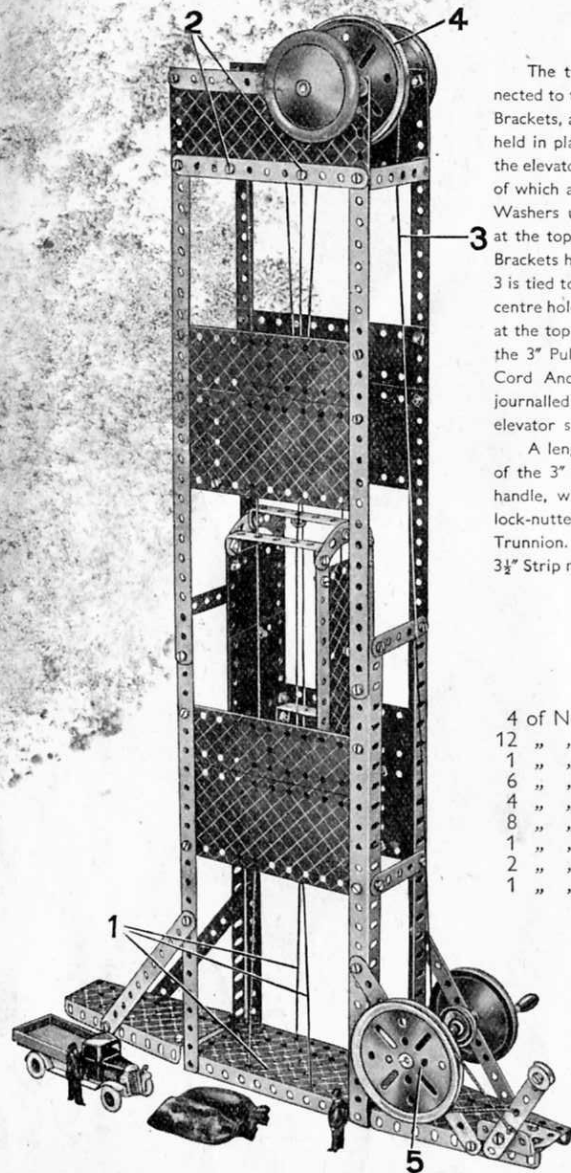


Fig. 5.20a



## 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 journaled 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 journaled 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 journaled 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.

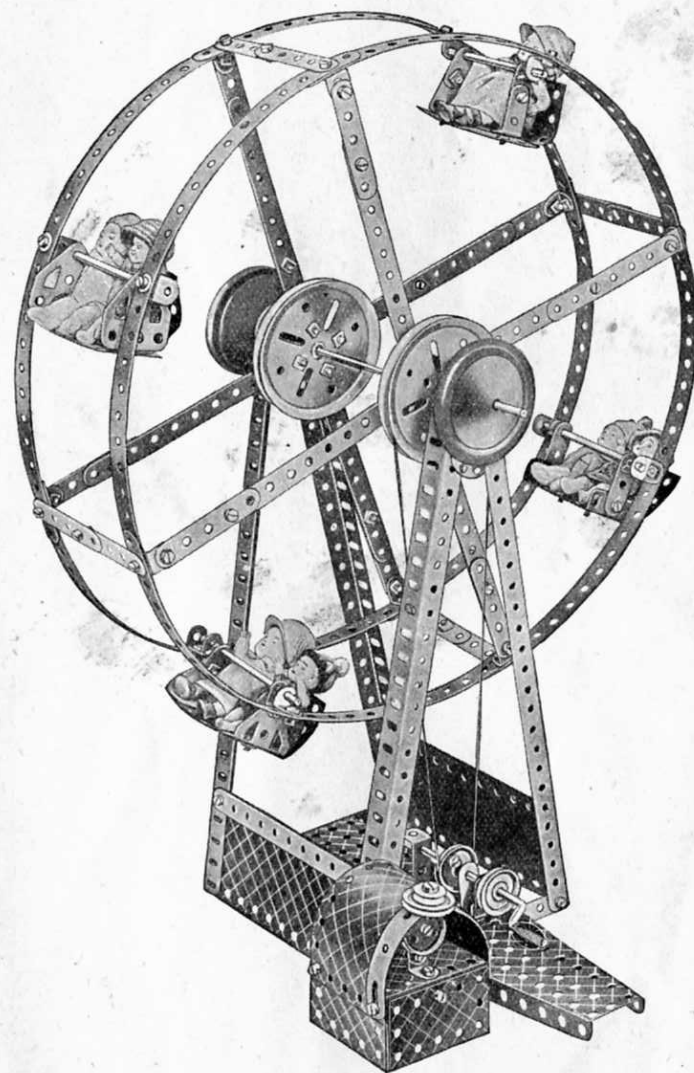
The construction of the cars can be seen from the illustration and it will be noticed that their details vary from each other. In one of the cars the sides are formed from Flat Trunnions, while in the second Trunnions are used for this purpose. In a third car the sides are  $1\frac{1}{2}''$  Strips while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

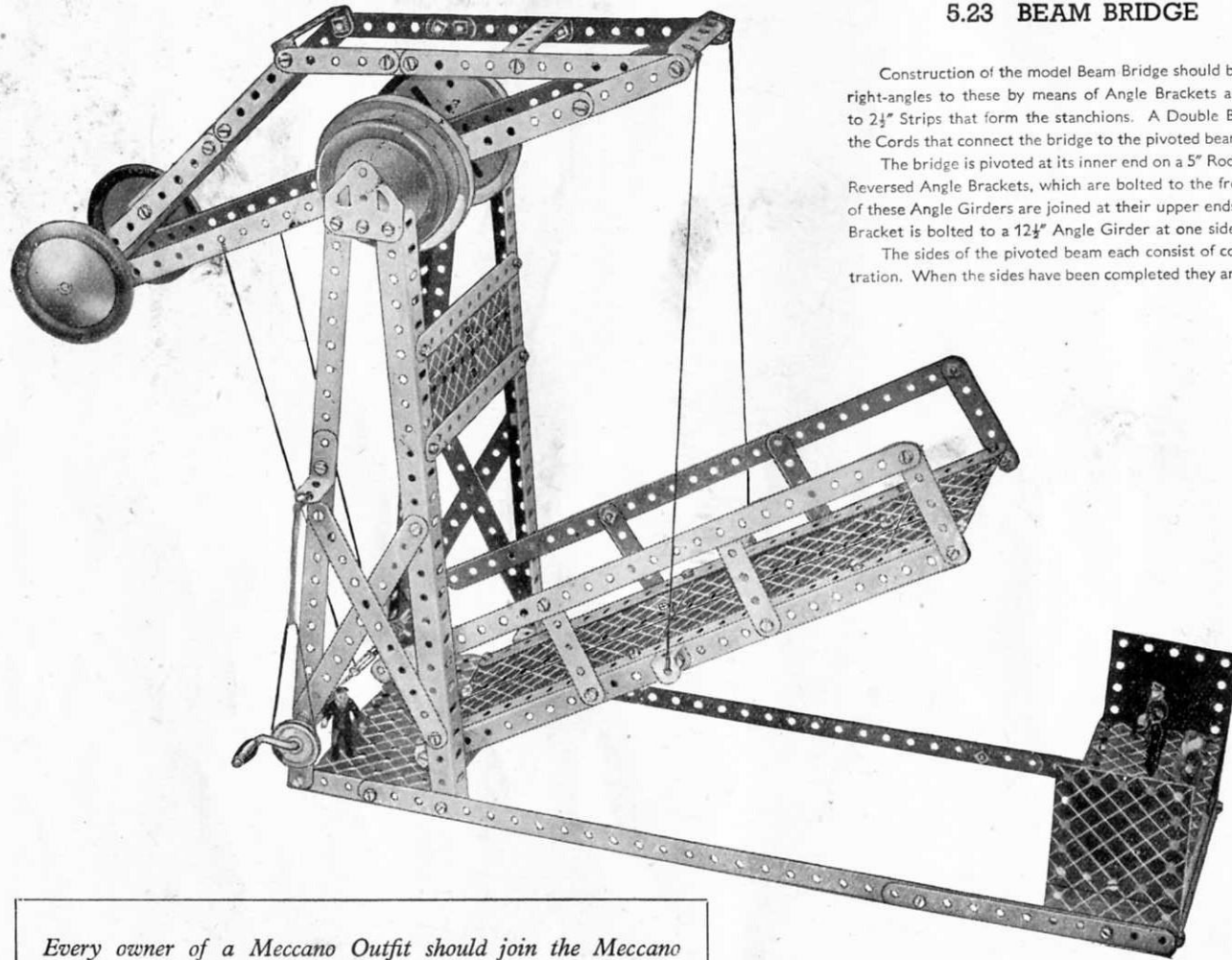
A decorative effect is provided by a 1" loose Pulley and a  $\frac{1}{2}''$  loose Pulley fixed to the roof by means of a Pivot Bolt and nut.

## 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



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.

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 journaled 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.

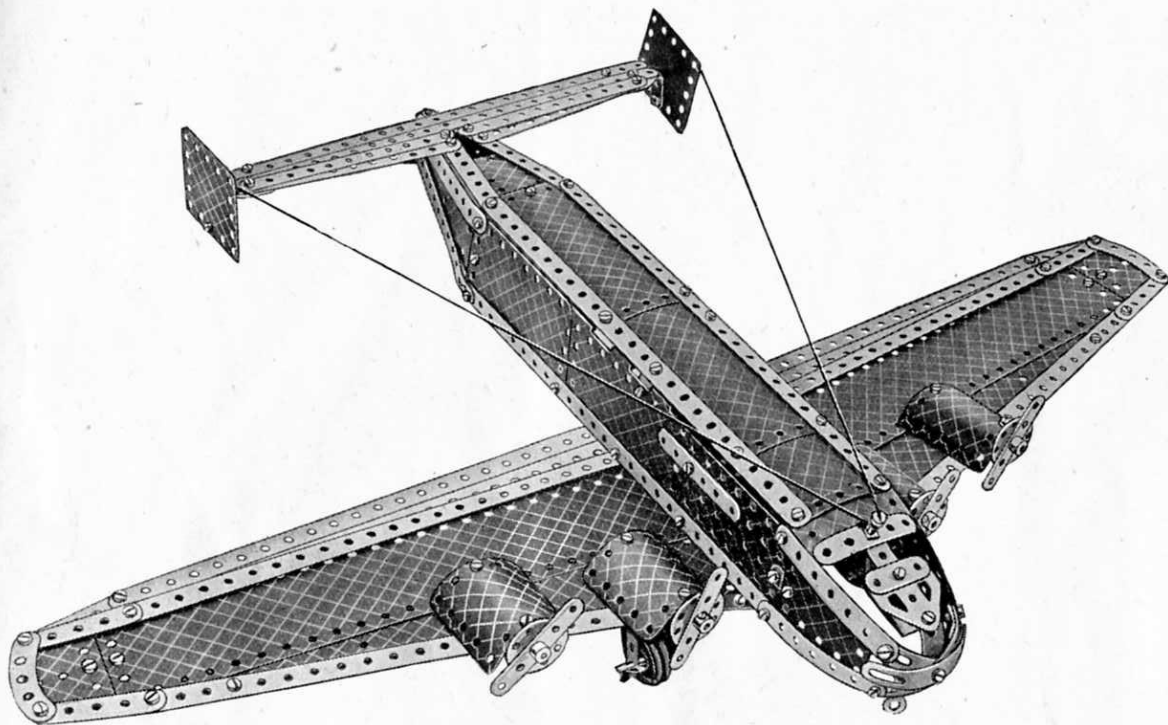
In order to keep the Crank Handle stationary when not in use the model is fitted with a band brake. This consists of a piece of Cord looped around a 1" fast Pulley on the Crank Handle and tensioned by means of a Driving Band, which is connected to it and to the  $1" \times 1"$  Angle Bracket fixed to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



## 6.1 FOUR-ENGINE 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  $1\frac{1}{8}$ " 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  $1\frac{1}{4}$ " 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

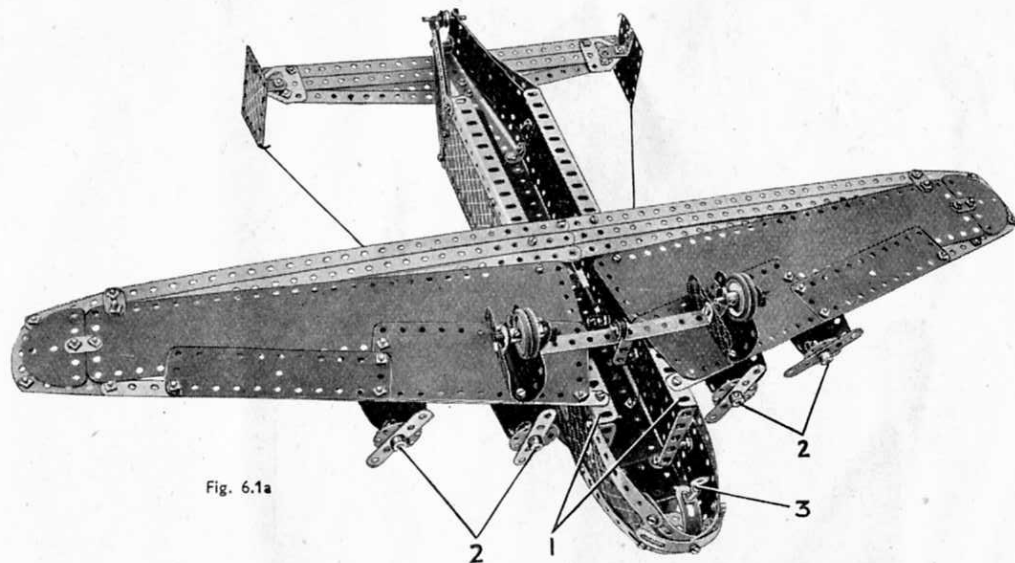
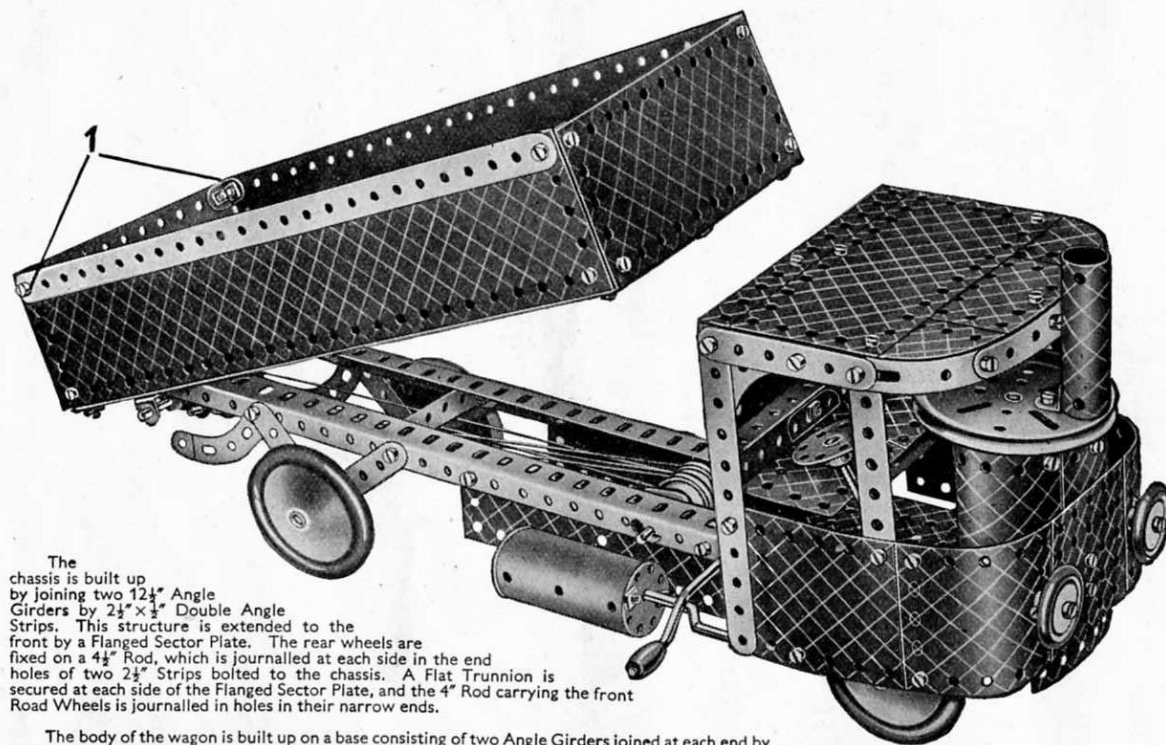


Fig. 6.1a



The chassis is built up by joining two  $12\frac{1}{2}$ " Angle Girders by  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " 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  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate is secured by four Angle Brackets to the front end. The  $\frac{1}{2}$ " Bolts 1, which hold two Angle Brackets supporting the rear  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " 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  $5\frac{1}{2}$ " 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  $1\frac{1}{2}$ " fast Pulley, a  $1\frac{1}{2}$ " 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  $2\frac{1}{2}$ " Rod passed through holes in  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ " Angle Brackets. The  $2\frac{1}{2}$ " Rod carries a Collar, a  $1\frac{1}{2}$ " fast Pulley, a  $1\frac{1}{2}$ " 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),  $1\frac{1}{2}$ " fast Pulley (rear),  $1\frac{1}{2}$ " loose Pulley (front),  $1\frac{1}{2}$ " loose Pulley (rear),  $1\frac{1}{2}$ " 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  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " 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  $3\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate and a  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flexible Plate attached to the Flanged Sector Plate by an Angle Bracket, and each side consists of a  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate and a  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plate, overlapped three holes and bolted together. The sides are secured at the

(Continued on next page)

## 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	

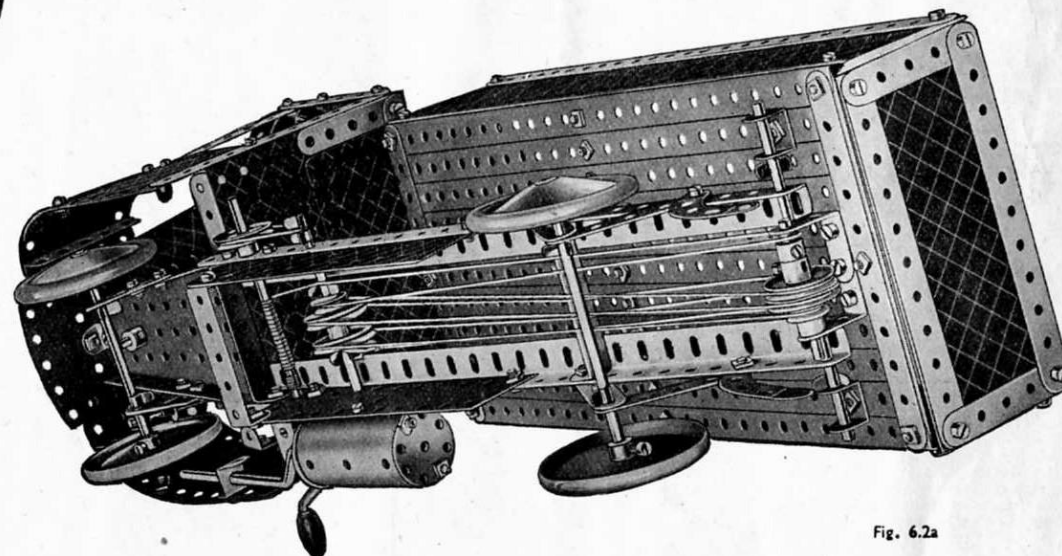


Fig. 6.2a



## 6.3 MARKET GARDENER'S VAN

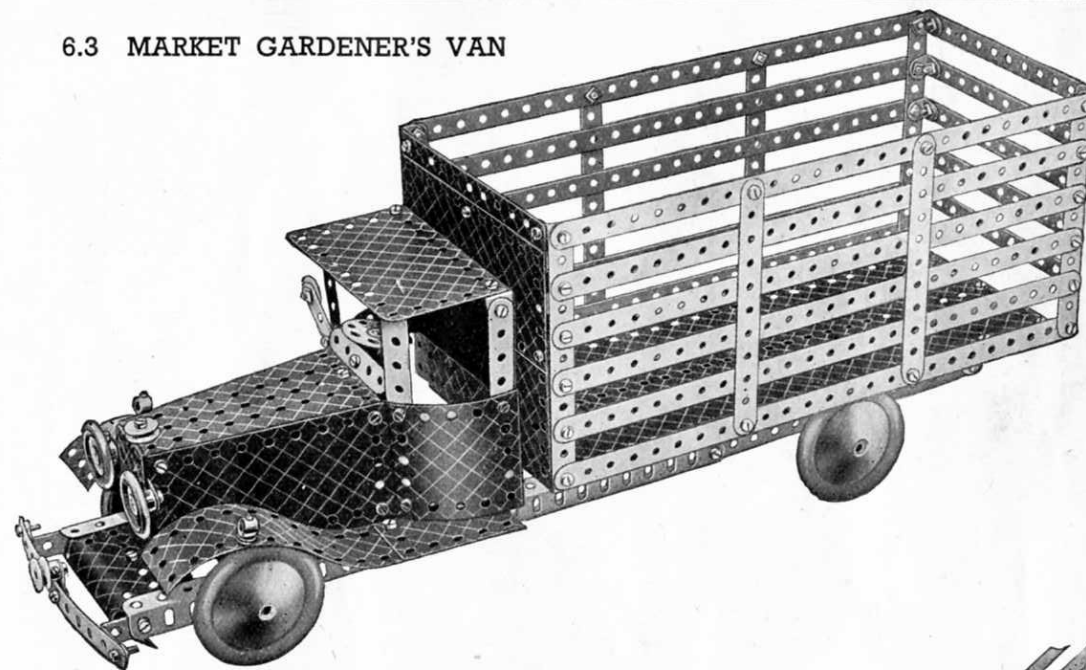
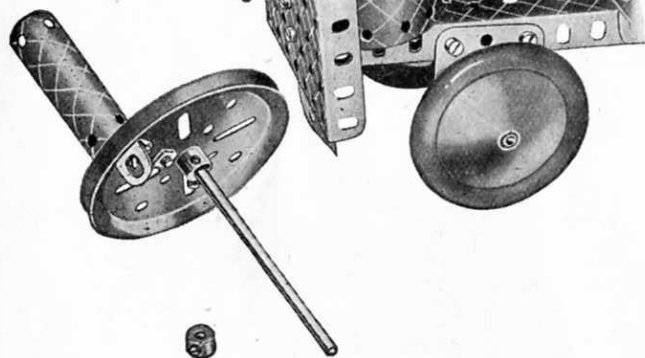


Fig. 6.2b



(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  $1\frac{1}{2}$ " 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.

## 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	

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

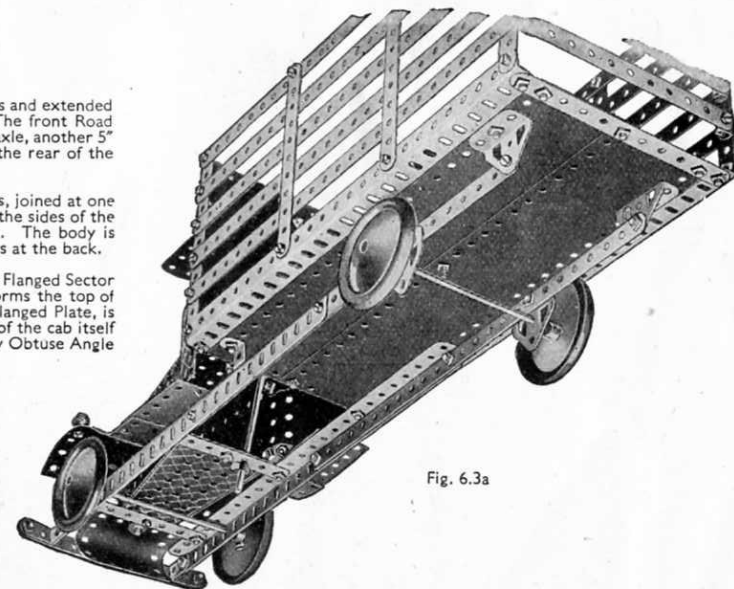
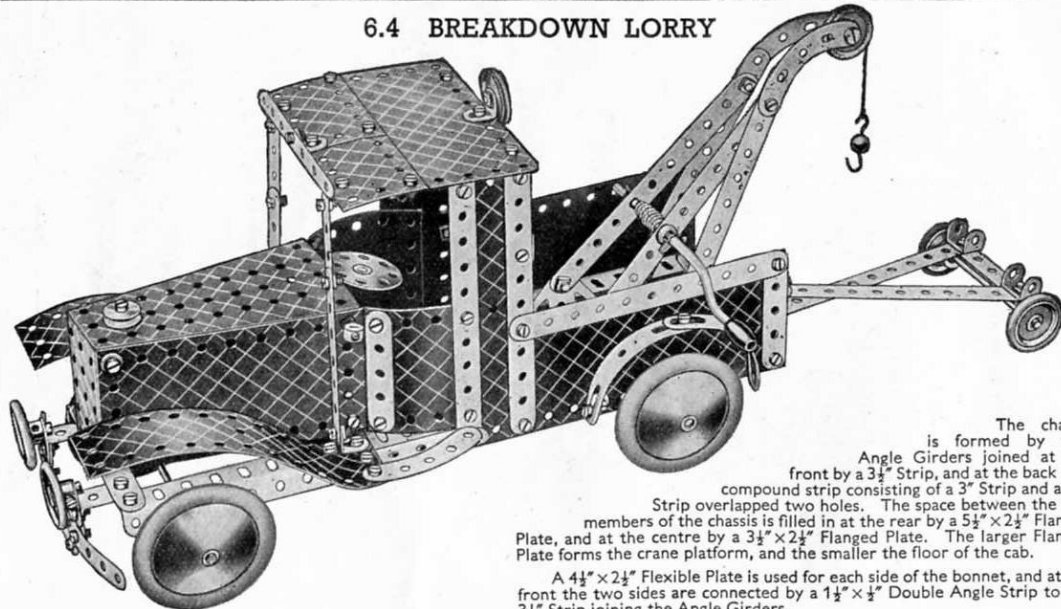


Fig. 6.3a

## 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.

The sides of the cab consist of  $5\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " Flexible Plates, bolted to the chassis, a  $3\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plate being bolted between them to form the lower part of the back. Two  $2\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " Flexible Plates are fastened to a  $3\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Double Angle Strip to fill in the rest of the back, but a small space is left for the window.

The centre pin is withdrawn from a Hinged Flat Plate and one of the halves is used as a flat plate in the construction of the roof. The flat plate is secured by Angle Brackets to the sides of the cab.

Both the front and the rear Road Wheels are fastened on 5" Rods passed through holes in Flat Trunnions bolted to the sides of the chassis.

The steering wheel is a Bush Wheel fastened on a  $3\frac{1}{2}$ " Rod passed through a Reversed Angle Bracket bolted to the top of the bonnet. The Rod also passes through the  $3\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plate forming the floor of the cab.

## 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		

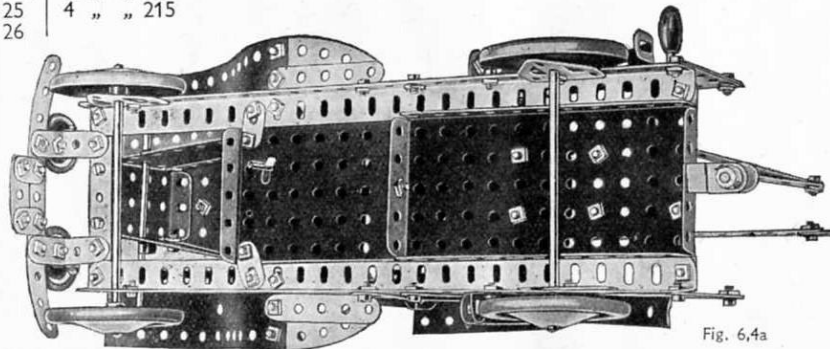
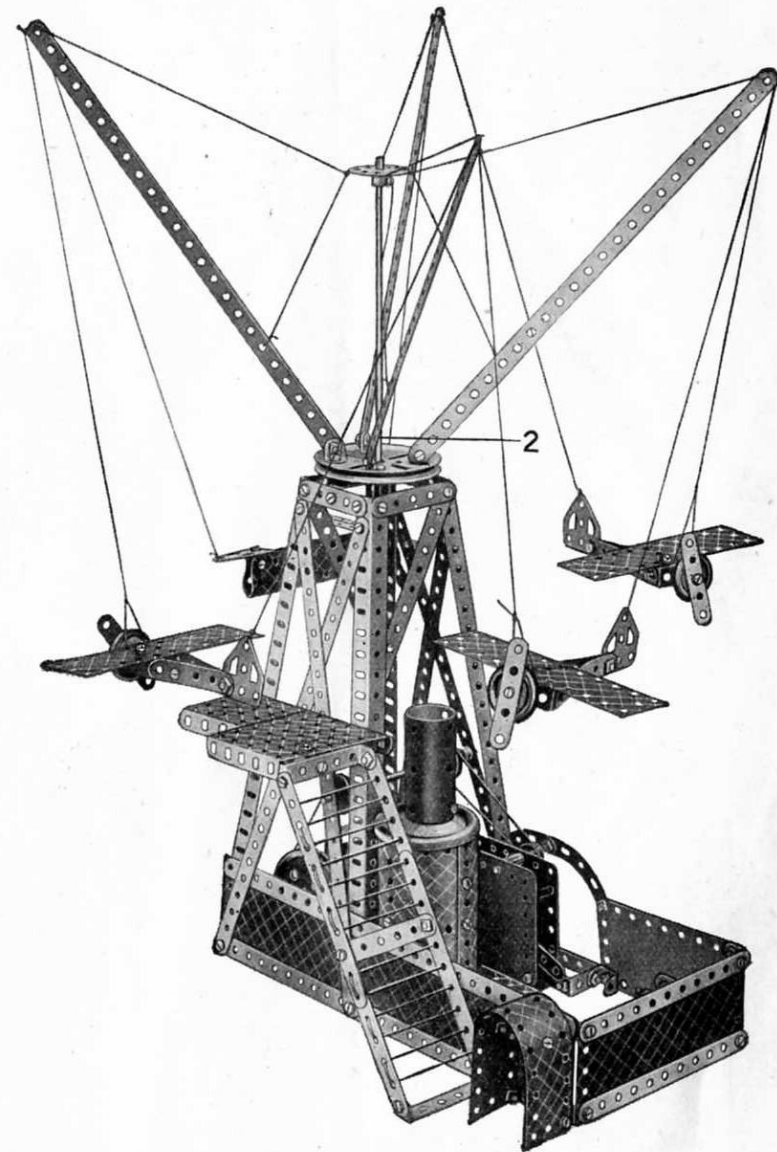


Fig. 6.4a

## 6.5 HIGH FLYERS





## 6.5 HIGH-FLYERS

A base for the model is provided by bolting two  $12\frac{1}{2}"$  Strips to the Angle Girders that form the tower. Two  $5\frac{1}{2}"$  Strips are bolted to the Angle Girders across their lower ends, and between them is fixed a  $5\frac{1}{2}" \times 2\frac{1}{2}"$  Flanged Plate. The Flanged Plate is extended on the inside by a  $3\frac{1}{2}" \times 2\frac{1}{2}"$  Flanged Plate attached to it by a Fishplate. The  $3\frac{1}{2}" \times 2\frac{1}{2}"$  Flanged Plate is attached also to one of the  $12\frac{1}{2}"$  Strips of the base by a  $1" \times 1"$  Angle Bracket and a Double Bracket.

The boiler consists of two  $5\frac{1}{2}" \times 2\frac{1}{2}"$  Flexible Plates bolted together and extended by two  $1\frac{1}{4}"$  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  $1" \times 1"$  Angle Bracket inside the boiler. The  $2\frac{1}{2}"$  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  $5\frac{1}{2}" \times 2\frac{1}{2}"$  Flanged Plate and the  $3\frac{1}{2}" \times 2\frac{1}{2}"$  Flanged Plate. The drive is taken by a Driving Band from a  $\frac{1}{2}"$  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  $3\frac{1}{2}"$  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  $11\frac{1}{2}"$  Rod and a  $6\frac{1}{2}"$  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  $5\frac{1}{2}"$  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
2 " " 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	
2 " " 48	
8 " " 48a	

1 No. 1 Clockwork Motor  
(Not included in Outfit).

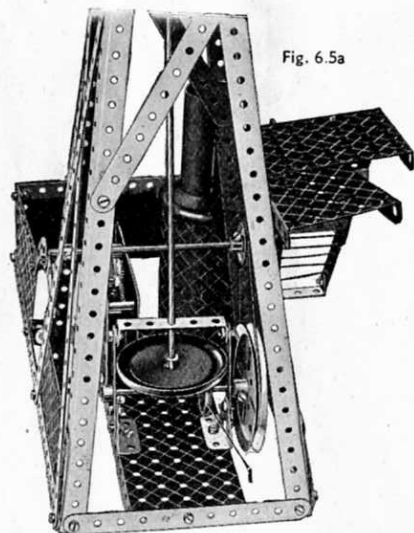


Fig. 6.5a

## 6.6 FURNITURE VAN

The construction of the model is commenced by building the van body, the base of which consists of two  $12\frac{1}{2}"$  Angle Girders joined at each end by a  $5\frac{1}{2}"$  Strip. The lower part of each side consists of a  $12\frac{1}{2}"$  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  $12\frac{1}{2}"$  Strips and  $5\frac{1}{2}"$  Strips, which can be seen in Fig. 6.6a. The top is constructed from  $12\frac{1}{2}"$  Strips clamped at each end between  $5\frac{1}{2}"$  Strips connected to the frame.

The bonnet unit consists of two Flanged Sector Plates, the flanges of which are joined by  $4\frac{1}{2}" \times 2\frac{1}{2}"$  Flexible Plates. The radiator is bolted in position to the two Flanged Sector Plates, the upper Bolt being  $\frac{3}{4}"$  long and carrying a  $\frac{1}{2}"$  loose Pulley to represent the radiator cap. The lower Flanged Sector Plate is bolted to a  $3\frac{1}{2}" \times 2\frac{1}{2}"$  Flanged Plate, which is secured to the chassis. The front bumper is fastened by two Reversed Angle Brackets to the ends of two  $3\frac{1}{2}" \times \frac{1}{2}"$  Double Angle Strips fixed under the bonnet. The headlights are represented by  $1"$  fast Pulleys on the shanks of two  $\frac{3}{4}"$  Bolts, which are passed through a  $2\frac{1}{2}" \times \frac{1}{2}"$  Double Angle Strip bolted to the radiator. Running boards are represented by  $2\frac{1}{2}" \times 1\frac{1}{2}"$  Flexible Plates bolted to the  $3\frac{1}{2}" \times 2\frac{1}{2}"$  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  $3\frac{1}{2}" \times 2\frac{1}{2}"$  Flanged Plate extended by a  $2\frac{1}{2}" \times 2\frac{1}{2}"$  Flexible Plate.

### Parts required

12 of No. 1	1 of No. 24	6 of No. 111c
13 " " 2	1 " " 35	2 " " 125
3 " " 3	2 " " 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

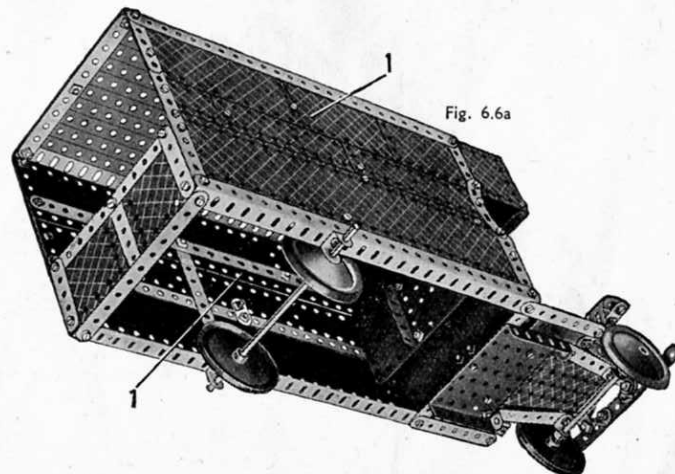
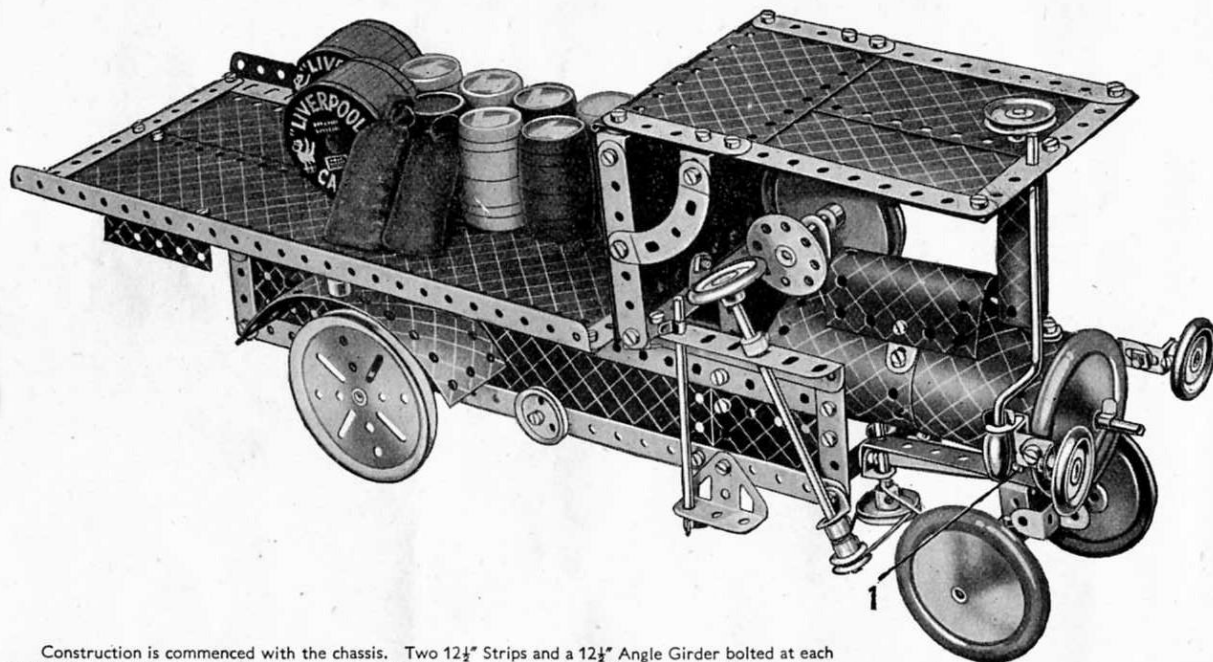


Fig. 6.6a



## 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  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip. The platform is bolted to the chassis by two  $1"$  x  $1"$  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  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flexible Plates extended by two  $1\frac{1}{4}$ " 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  $2\frac{1}{2}$ " x  $\frac{1}{2}$ " 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  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " 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  $3\frac{1}{2}$ " x  $\frac{1}{2}$ " 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  $2\frac{1}{2}$ " x  $\frac{1}{2}"$  Double Angle Strip supporting the front axle.

The rear mudguards are held by  $\frac{1}{2}"$  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.

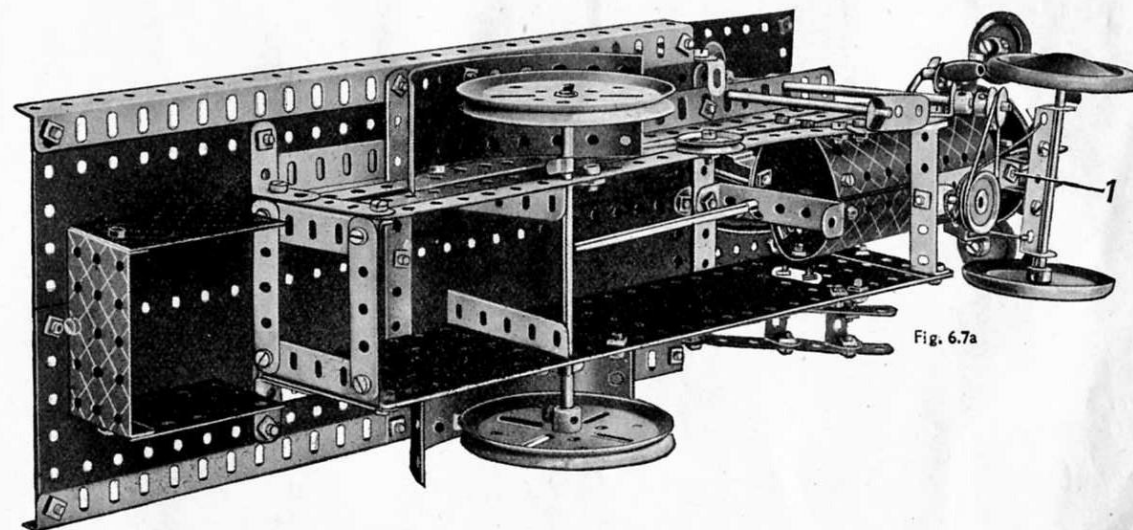
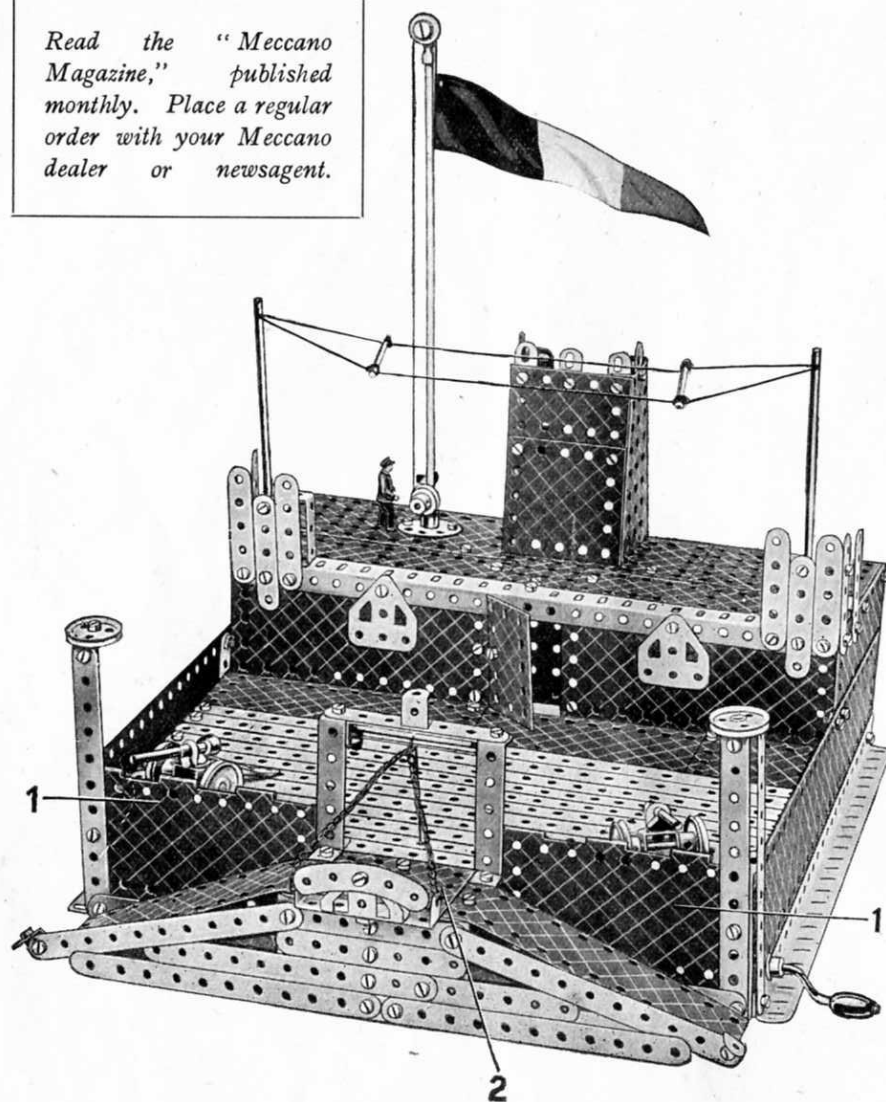


Fig. 6.7a



## 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

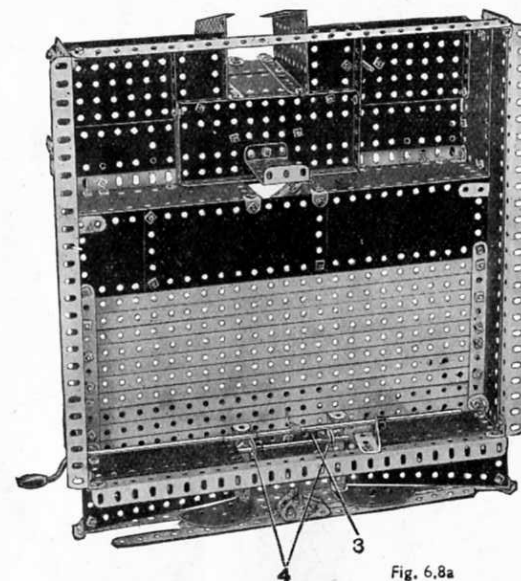


Fig. 6.8a

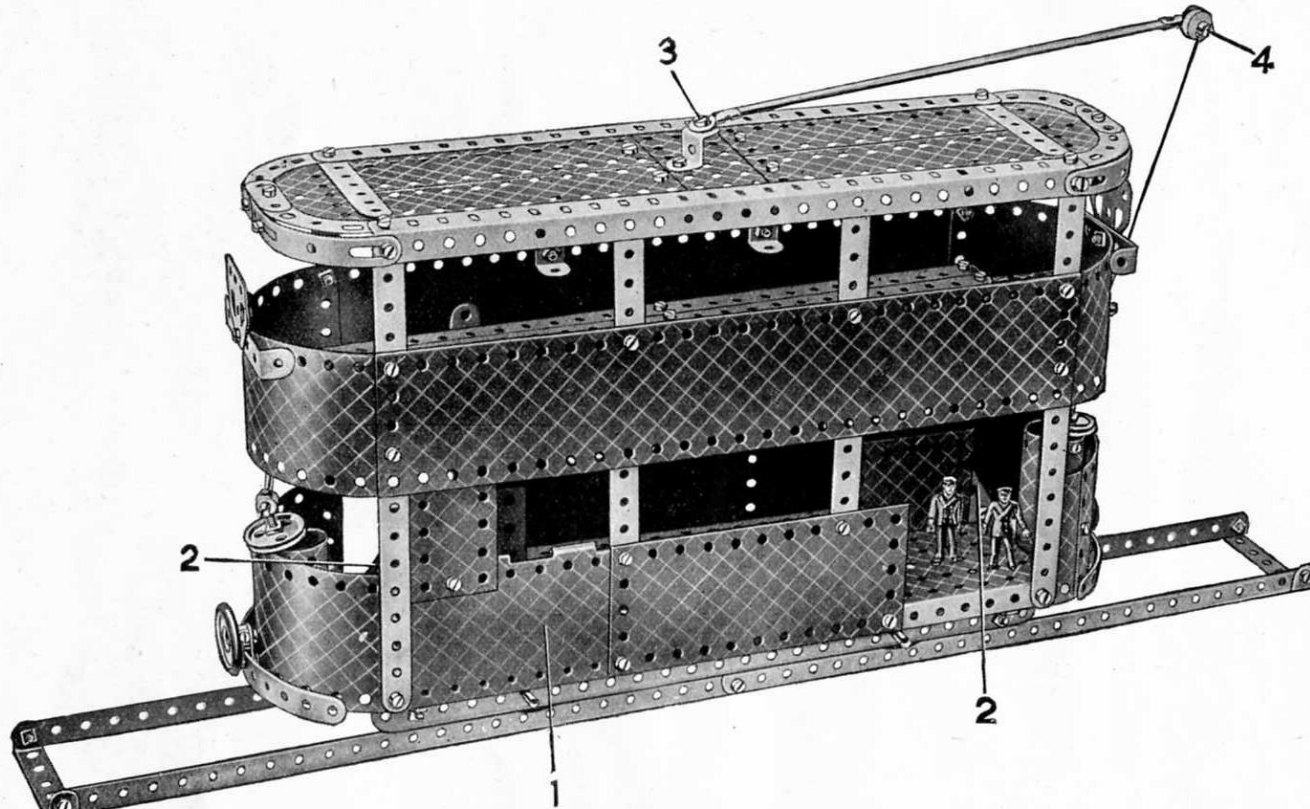
The base of the fort consists of three Angle Girders and a  $12\frac{1}{2}$ " Strip joined at each end by Angle Brackets to  $12\frac{1}{2}$ " Strips. Two  $12\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Strip Plates are bolted to the Angle Girders to form the sides. The  $12\frac{1}{2}$ " Strips that 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 journalled 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	6 " " 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.

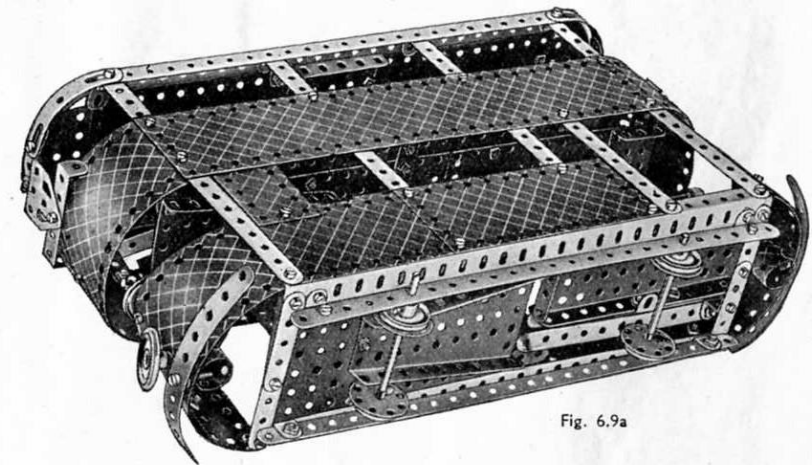
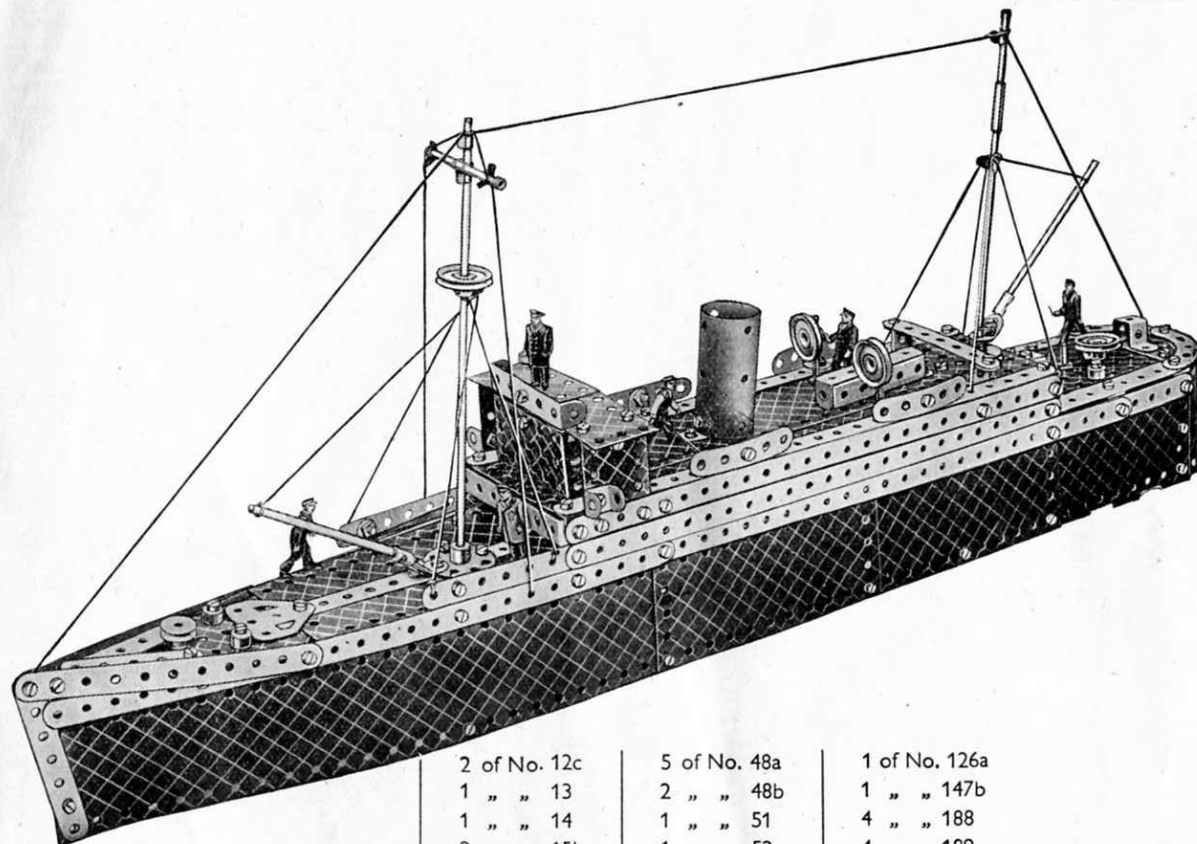


Fig. 6.9a



## 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.

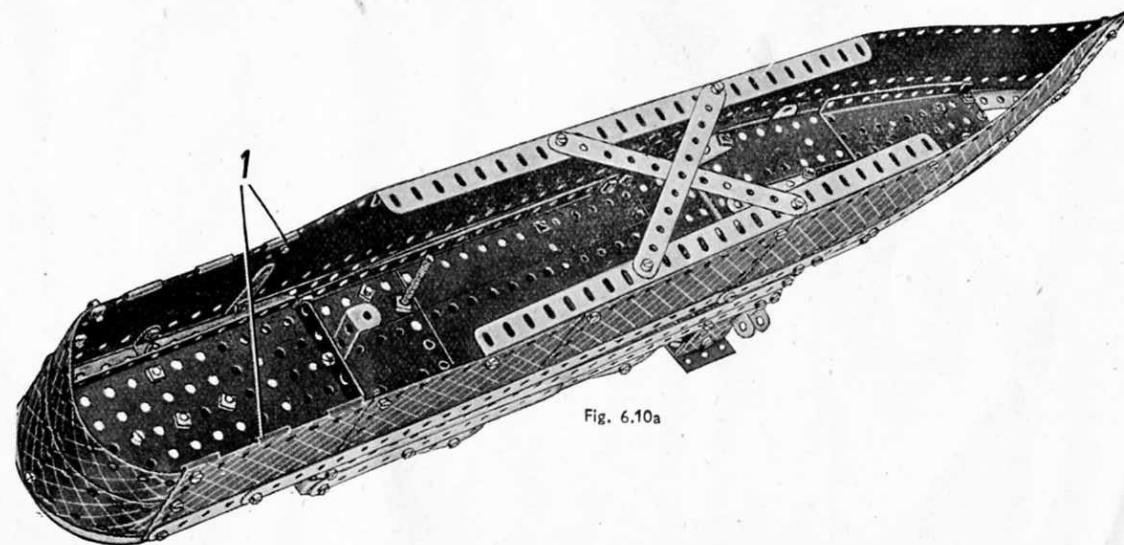
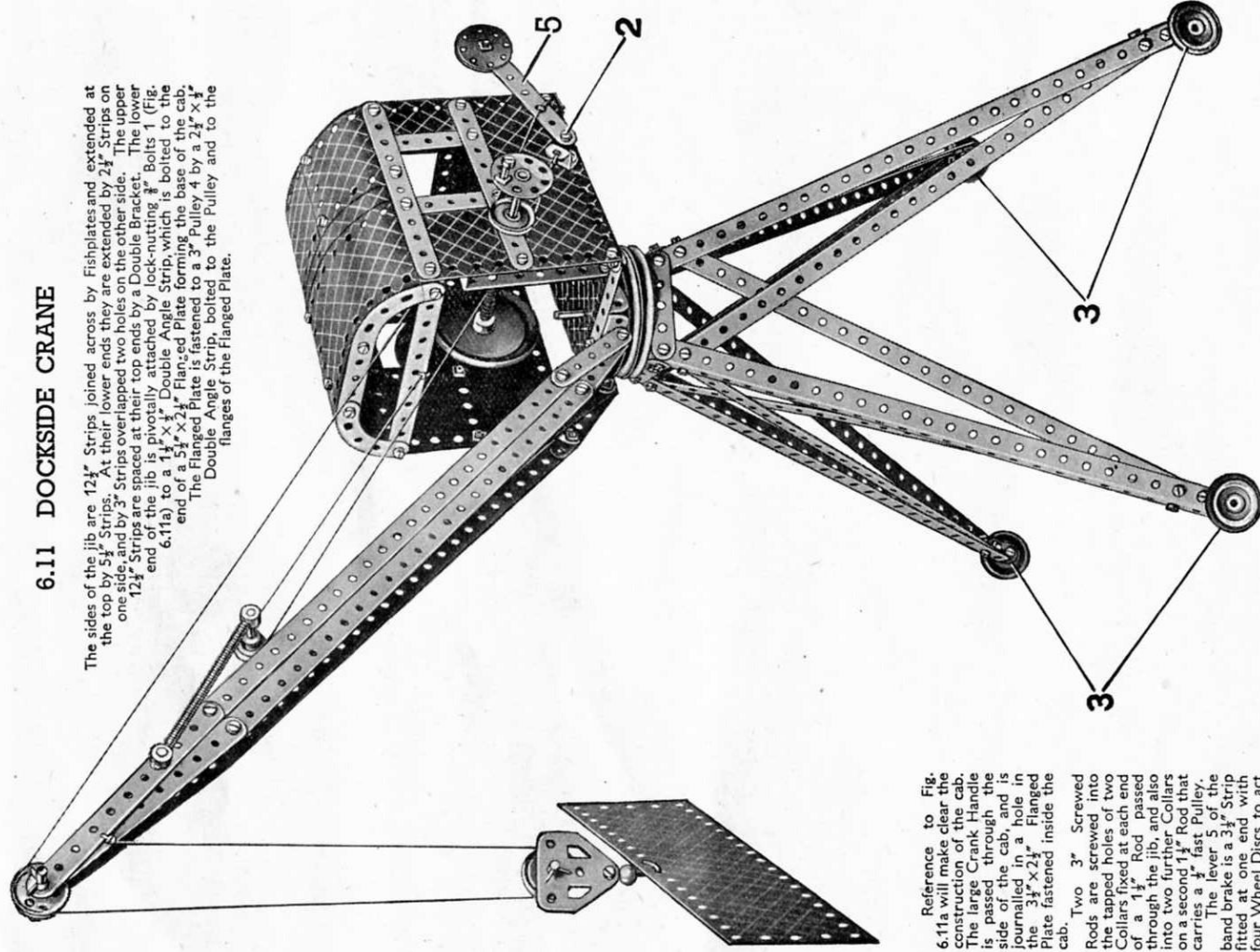


Fig. 6.10a

## 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 on the other side. The upper 12½" Strips are spaced at their top ends by a Double Bracket. The lower end of the jib is pivotally attached by lock-nutting ¾" Bolts 1 (Fig. 6.11a) to a 1½" x ¼" 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 ¼" 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 journalled 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 ¾" 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 ¾" 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 ¾" 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 ¾" 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.

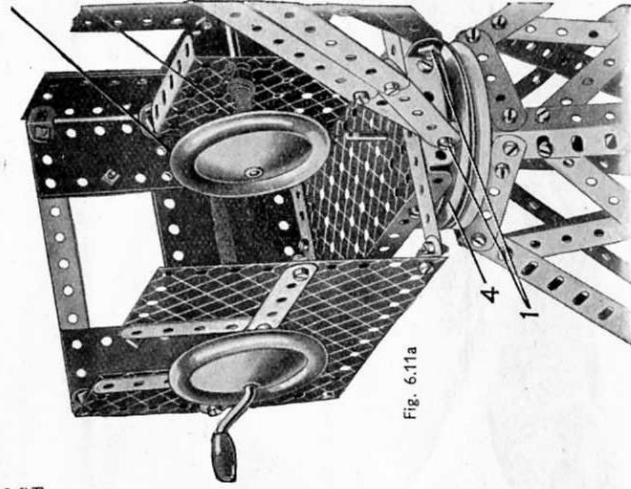


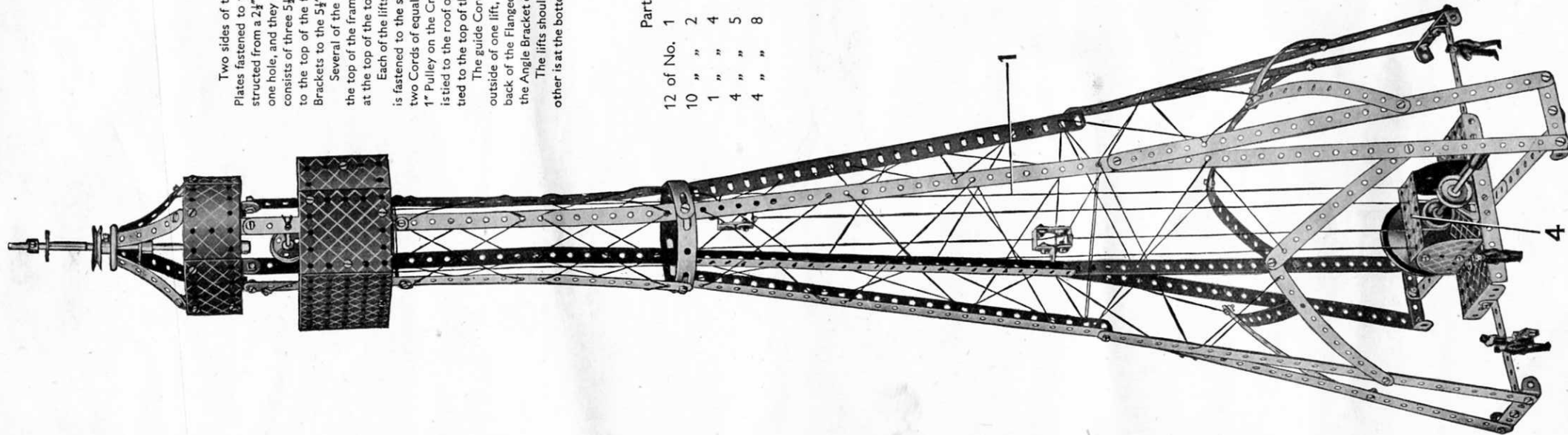
Fig. 6.11a

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 " 2 of No. 191	4 of No. 192				



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

## 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 of 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.

Parts required		4 of No. 10	
12 of No. 1	4	4	11
10 " 2	4	6	12
1 " 4	2	2	12a
4 " 5	4	1	12c
4 " 8	1	1	15
	1	1	16
	1	1	17
	1	1	19g
	3	2	22
	2	1	22a
	1	1	24
	1	1	24a
	4	35	
	92	37	
	1	37a	
	5	38	
	1	38d	
	2	40	
	8	48a	
	2	48b	
	1	51	
	1	52	
	2	53	
	2	59	
	1	111	
	4	125	
	2	126	
	1	155	
	1	187	
	1	188	
	3	189	
	2	190	
	1	213	
	2	214	
	4	215	

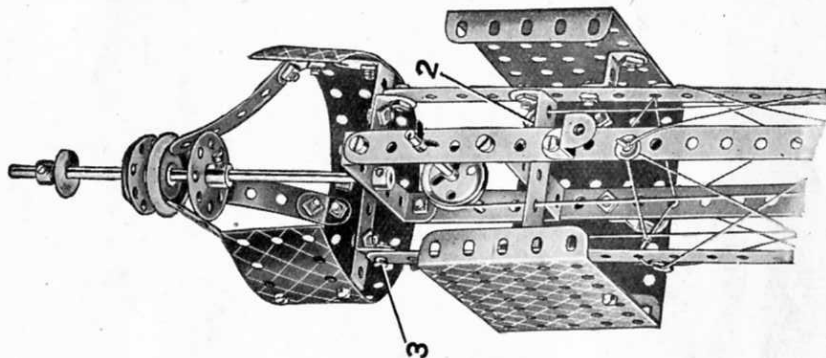


Fig. 6.12a

## 6.13 MECHANICAL HORSE AND TRAILER

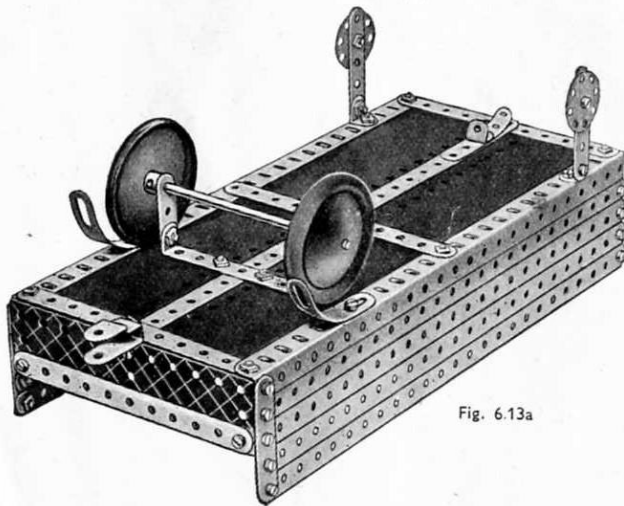
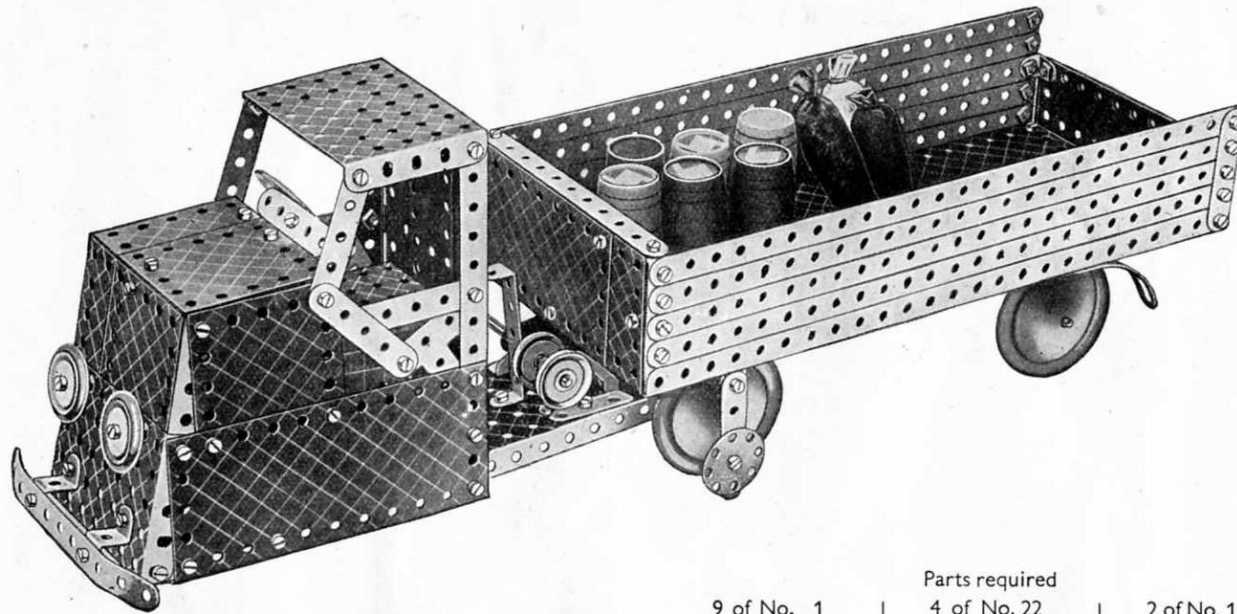


Fig. 6.13a

Parts required		
9 of No. 1	4 of No. 22	2 of No. 111
10 " " 2	1 " " 24	2 " " 111a
3 " " 3	2 " " 24a	4 " " 111c
2 " " 4	5 " " 35	4 " " 125
12 " " 5	105 " " 37	2 " " 126
2 " " 6a	6 " " 37a	3 " " 126a
2 " " 8	4 " " 38	1 " " 147b
2 " " 10	2 " " 38d	2 " " 155
16 " " 12	1 " " 44	4 " " 187
2 " " 12a	1 " " 48	4 " " 188
3 " " 12c	5 " " 48a	4 " " 189
2 " " 15	2 " " 48b	6 " " 190
1 " " 15a	1 " " 51	2 " " 191
2 " " 16	1 " " 52	2 " " 192
1 " " 19b	2 " " 53	2 " " 197
1 " " 19g	2 " " 90	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  $3\frac{1}{2}" \times 2\frac{1}{2}"$  Flexible 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  $\frac{1}{2}"$  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 rear  $2\frac{1}{2}"$  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)

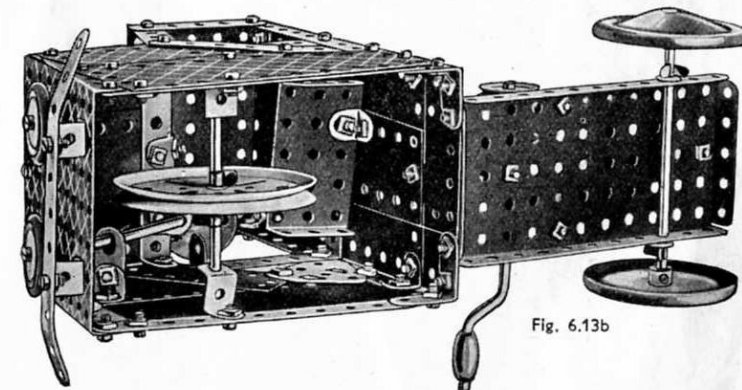


Fig. 6.13b



(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 journalled 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.

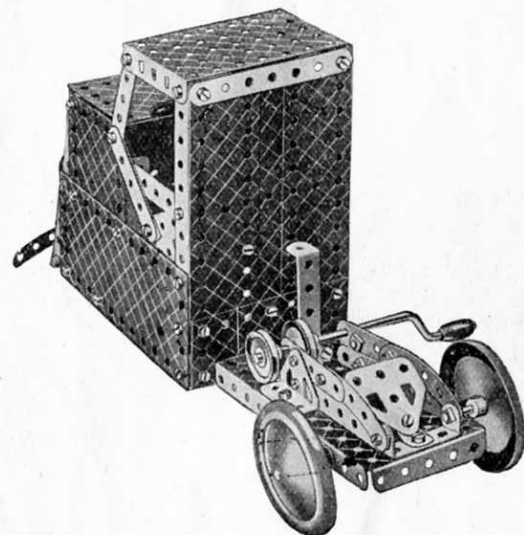
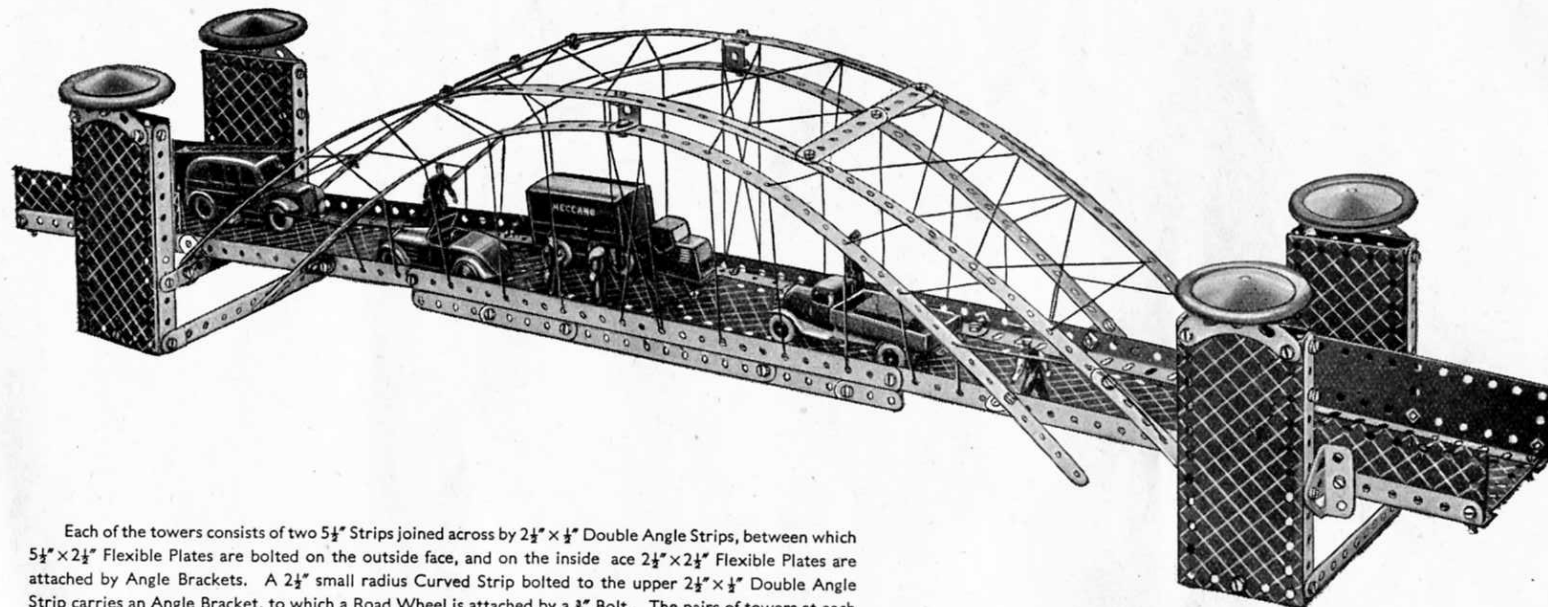


Fig. 6.13c

## 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.

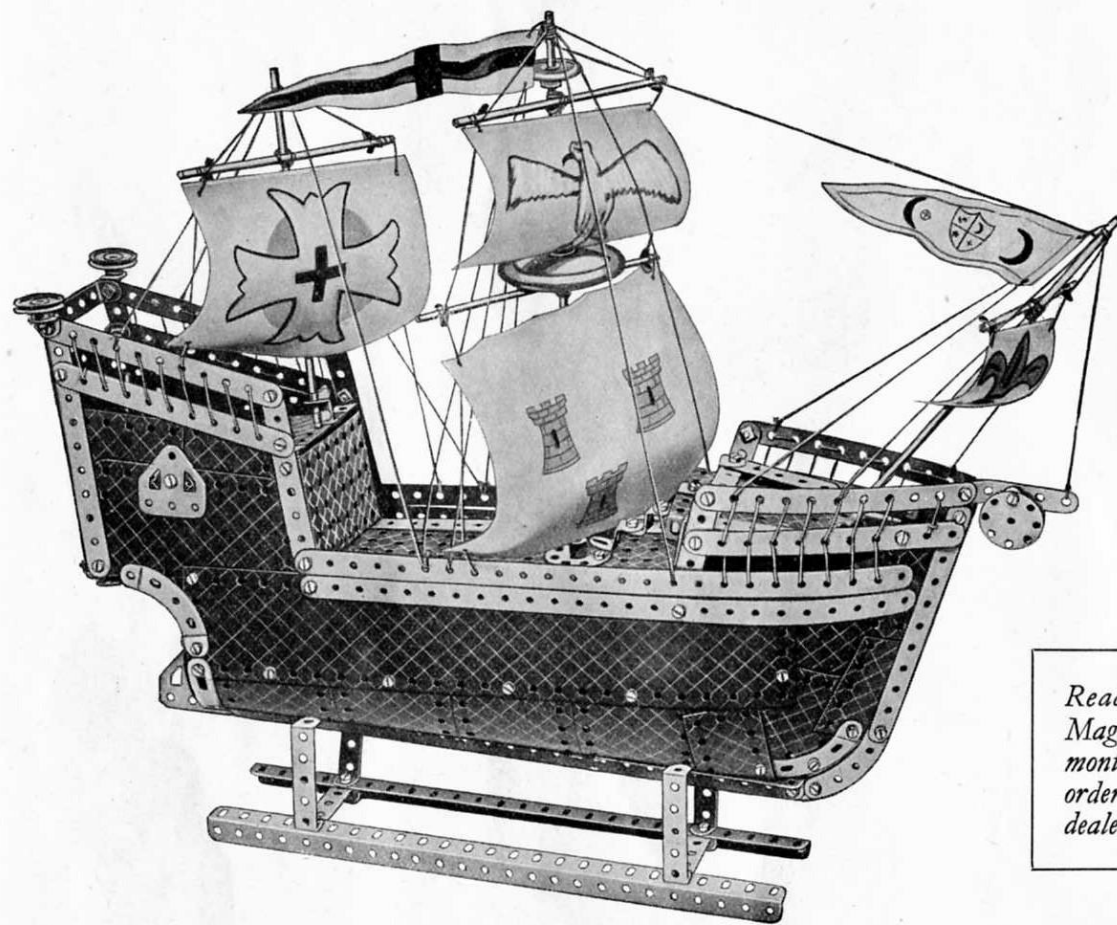
The top of the suspension arch on each side consists of two  $12\frac{1}{2}$ " Strips, bolted together and extended at each end by a  $2\frac{1}{2}$ " Strip. An Obtuse Angle Bracket and an Angle Bracket are bolted to the end of the  $2\frac{1}{2}$ " Strip, the Angle Bracket being attached to the span 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  $3\frac{1}{2}$ " 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	

## 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)

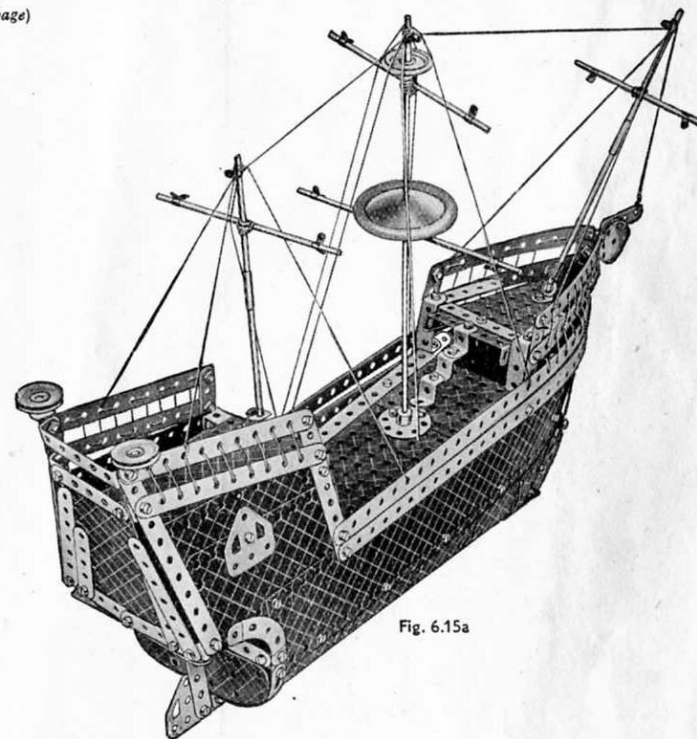


Fig. 6.15a



(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.

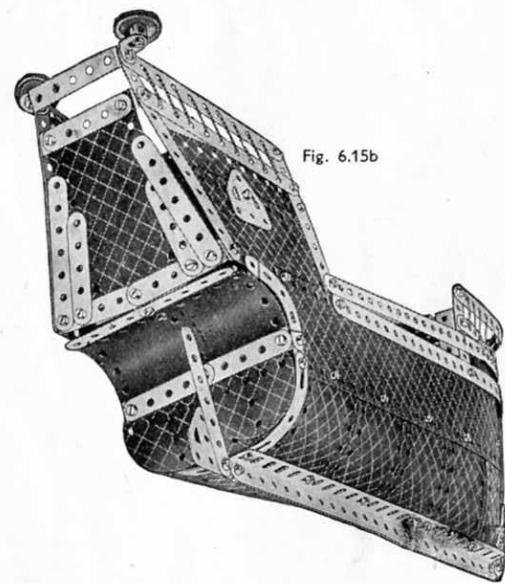
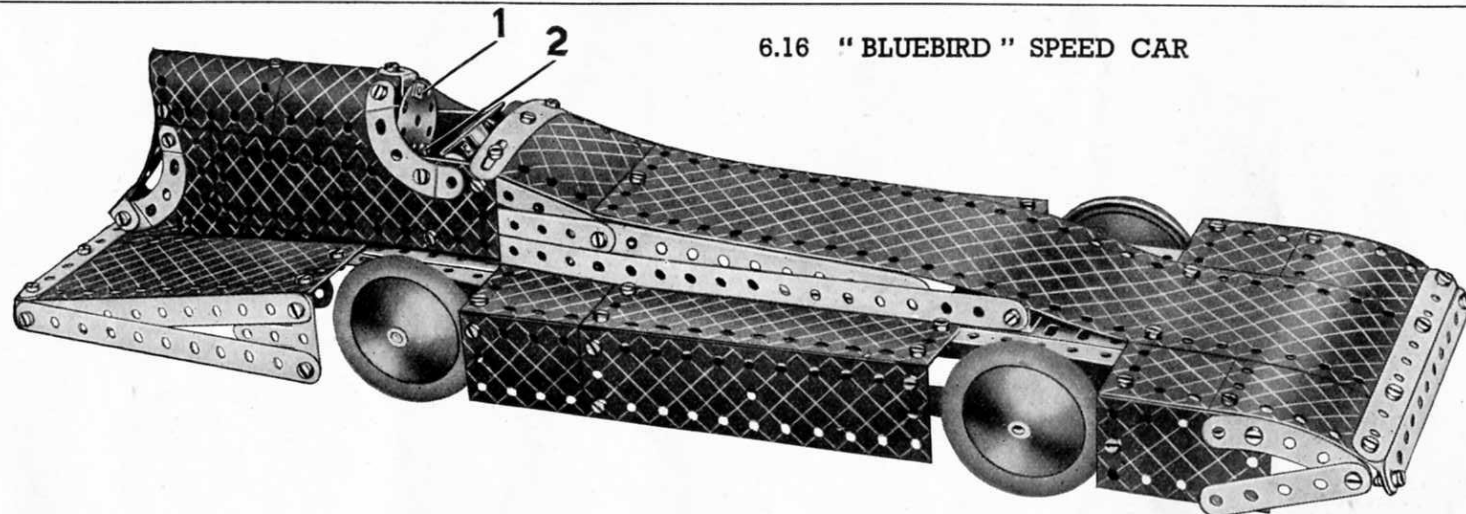


Fig. 6.15b



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 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.

#### 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	

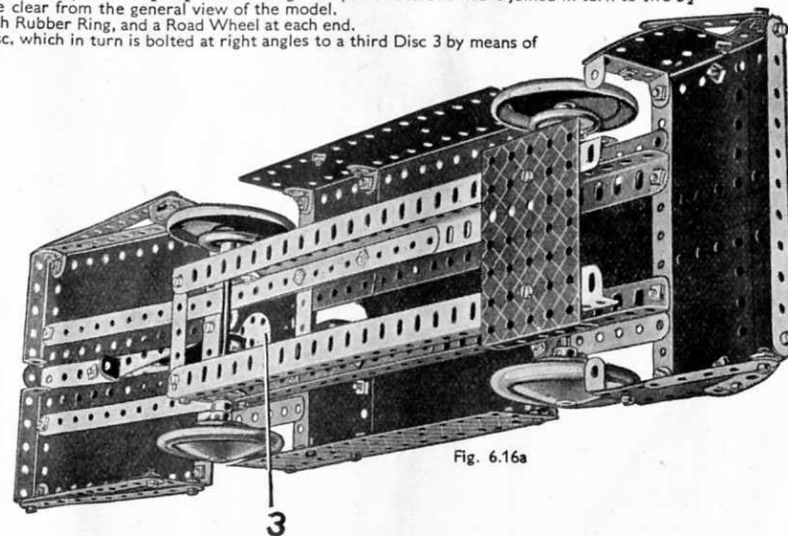


Fig. 6.16a

## 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 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

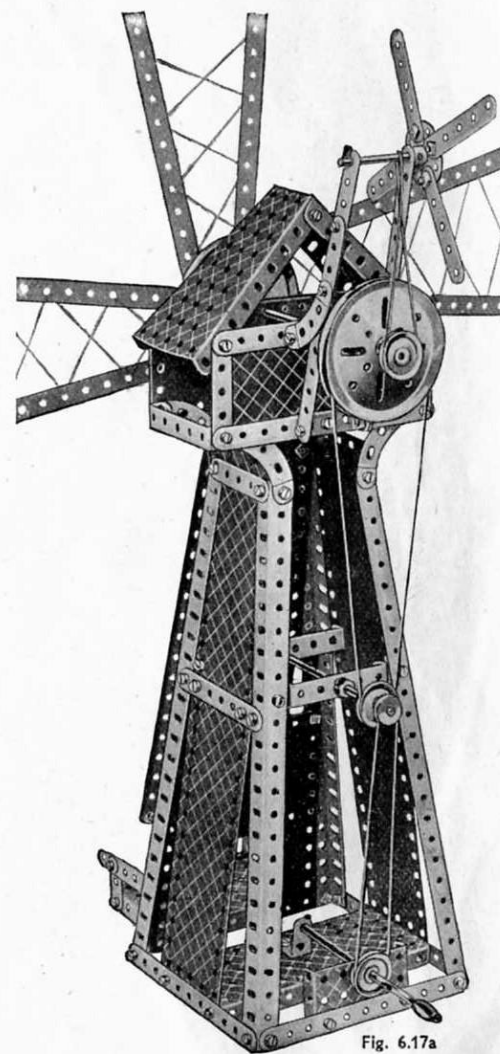
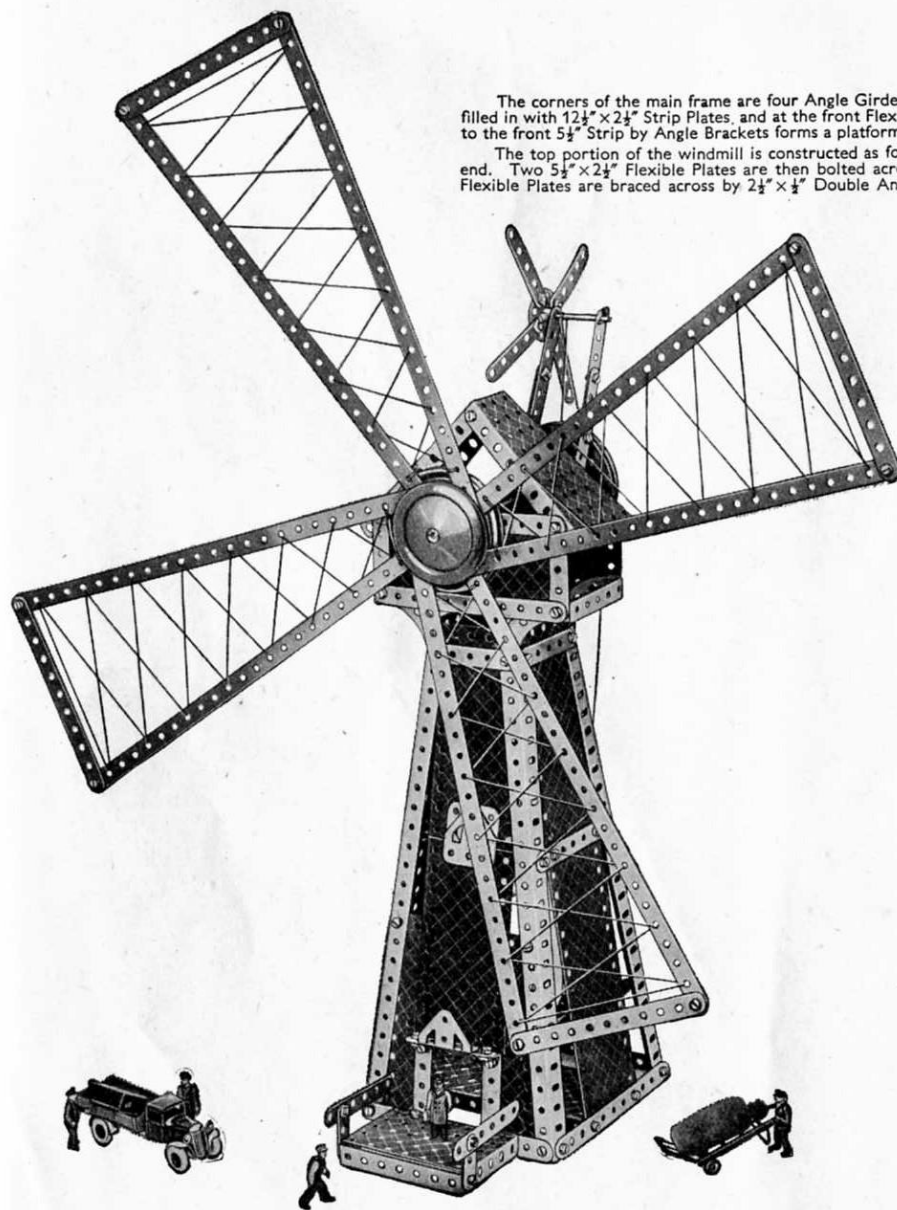


Fig. 6.17a



## 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	

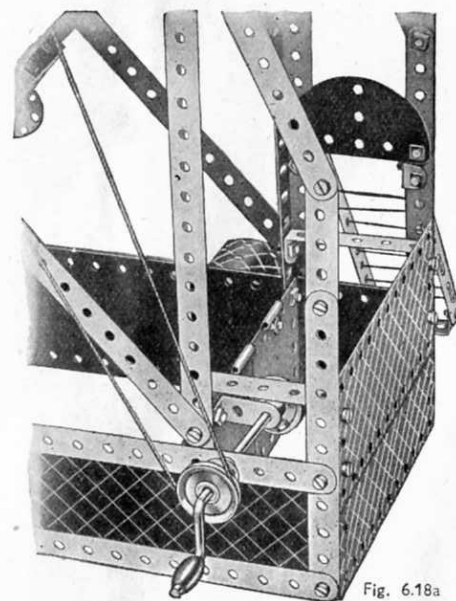
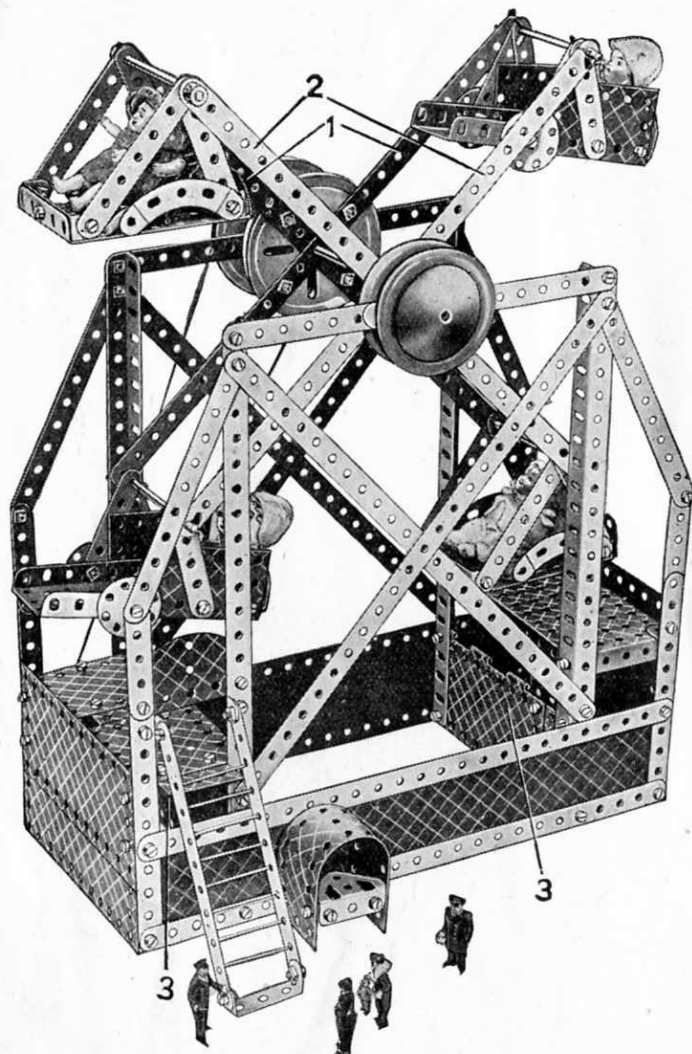


Fig. 6.18a

## 6.19 GIANT DRAGLINE

## Parts required

12 of No. 1	2 of No. 22a	2 of No. 54	2 of No. 187	1 of No. 199
12 " " 2	1 " " 24	1 " " 57c	4 " " 189	2 " " 200
3 " " 3	4 " " 24a	3 " " 59	4 " " 190	1 " " 216
8 " " 5	5 " " 35	1 " " 80c	4 " " 192	
2 " " 6a	97 " " 37	2 " " 90a	2 " " 197	
2 " " 8	14 " " 37a	2 " " 111a	1 " " 198	
2 " " 10	7 " " 38	6 " " 111c		
2 " " 11	1 " " 40	4 " " 125		
3 " " 12	2 " " 48	4 " " 126a		
2 " " 12c	3 " " 48a	1 " " 147b		
1 " " 14	1 " " 48b			
1 " " 15	1 " " 51			
1 " " 15a	1 " " 52			
2 " " 15b	2 " " 53			
2 " " 16				
1 " " 17				
1 " " 18b				
2 " " 19b				
1 " " 19h				
4 " " 22				

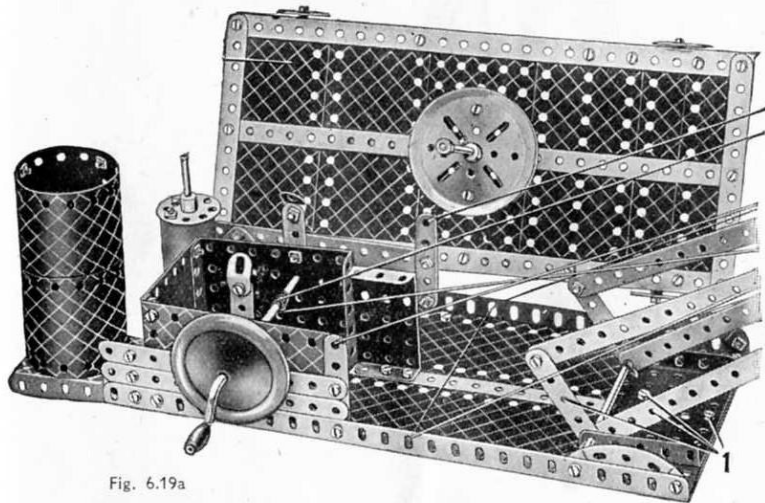
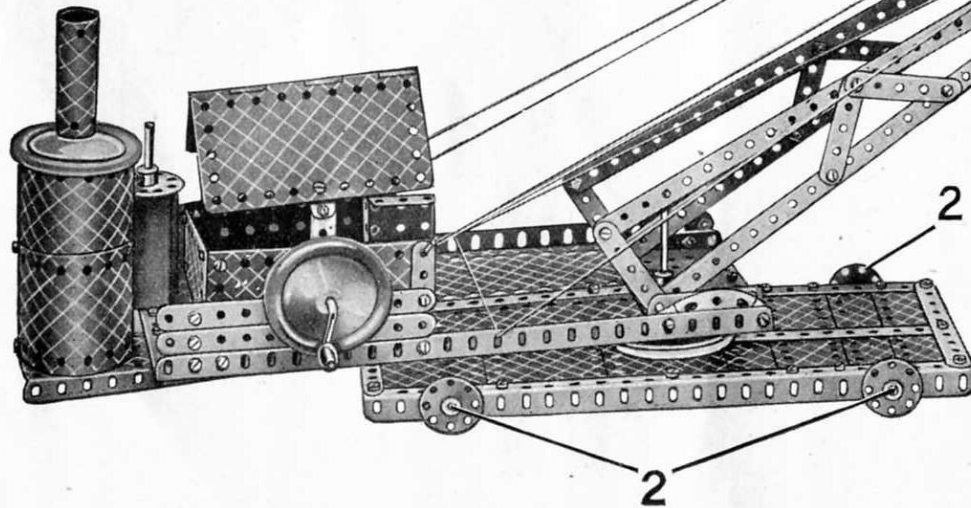


Fig. 6.19a



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 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 near 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  $\frac{1}{4}$ " 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  $1\frac{1}{8}$ " 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.

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The jib is constructed from  $12\frac{1}{2}$ " Strips bolted end to end. It is pivoted at its lower end on a 4" Rod journalled in the flanges of a  $3\frac{1}{2}$ " x  $2\frac{1}{2}$ " 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  $4\frac{1}{2}$ " 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.

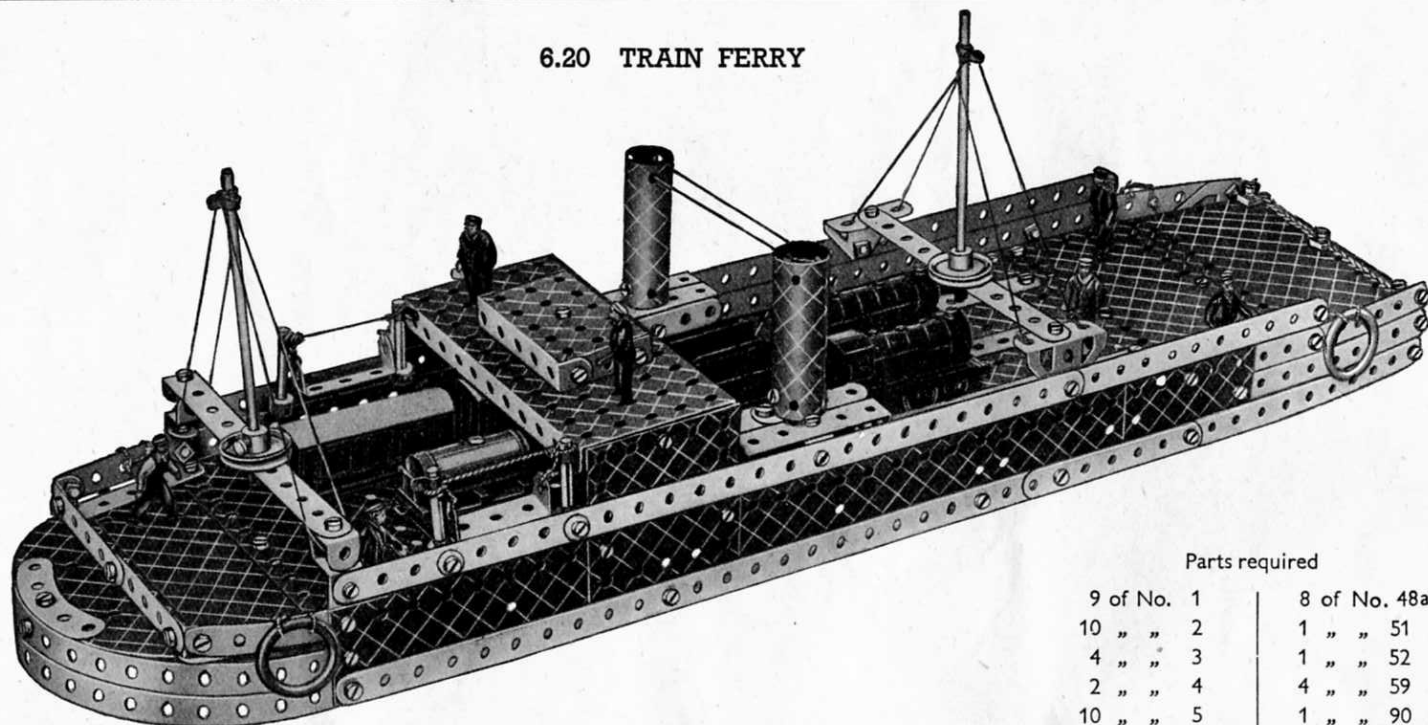
All that the Meccano owner has to do to join the Guild is to fill in the official application form enclosed in his Outfit, or obtained from the Guild Secretary, Binns Rd., Liverpool 13, have his signature witnessed and send the form to the Secretary with the necessary amount in stamps to pay for the 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  $12\frac{1}{2}$ " Angle Girders together to make two  $17\frac{1}{2}$ " compound angle girders, and then connecting them by two  $5\frac{1}{2}$ " Strips. The sides of the ship consist mainly of  $5\frac{1}{2}$ " x  $1\frac{1}{2}$ " and  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Flexible Plates, and are bolted to the framework and strengthened at the bottom by  $12\frac{1}{2}$ " Strips.

The bows are formed by bending  $12\frac{1}{2}$ " 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  $2\frac{1}{2}$ " Strips to form a square end. Fig. 6.20a shows the layout of the Flexible Plates and Strip Plates forming the deck.

A  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ " Flanged Plate is used for the bridge, and is supported by two  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " 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  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " Double Angle Strips and  $2\frac{1}{2}$ " Strips attached to a  $1\frac{1}{2}$ " x  $1\frac{1}{2}$ " Angle Bracket, the complete assembly being attached to the sides of the vessel by Double Brackets.

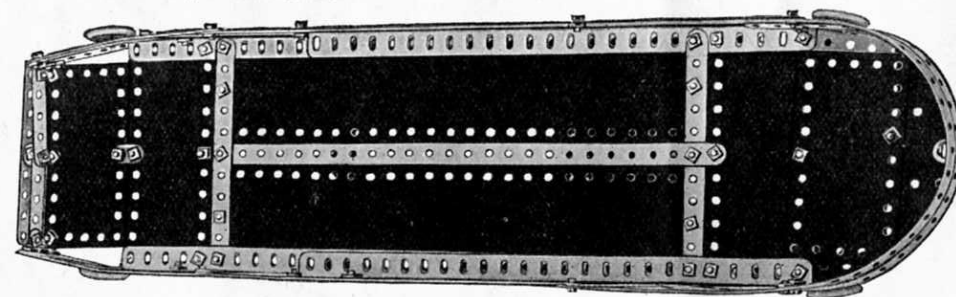
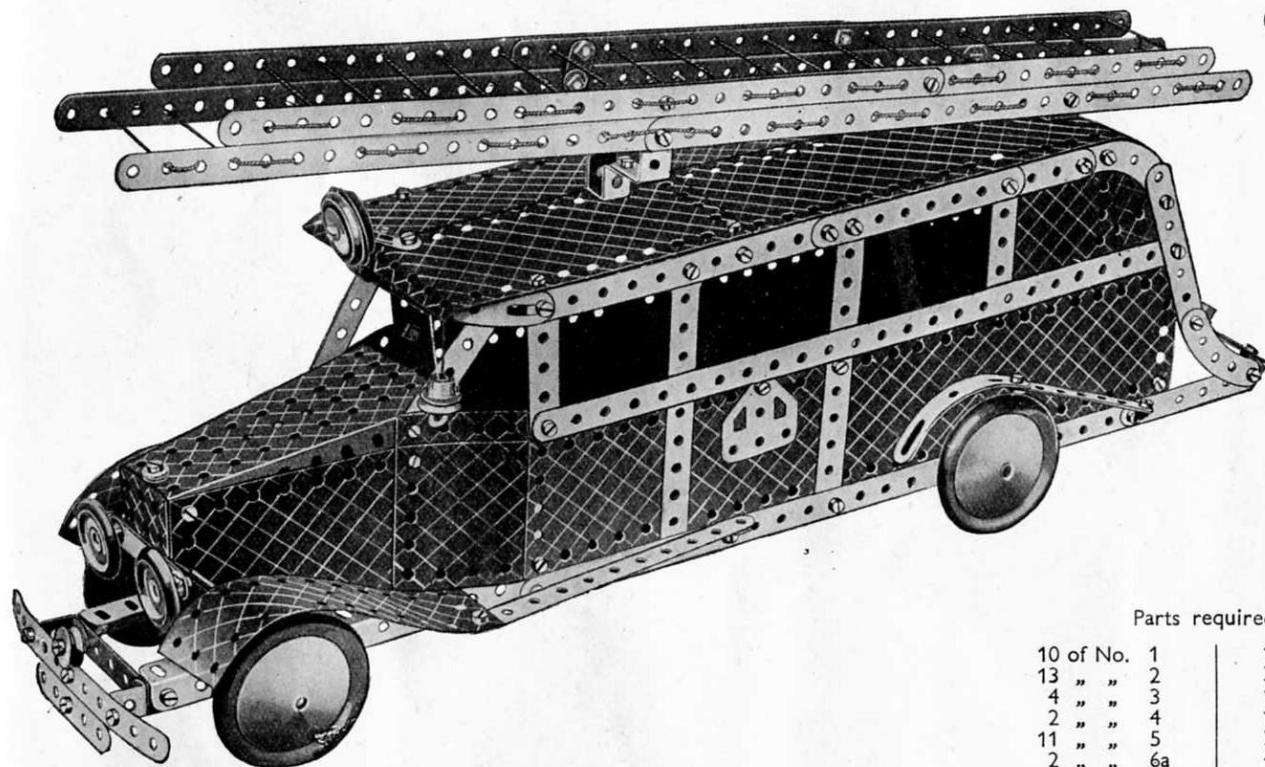


Fig. 6.20a

#### 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 journalled 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

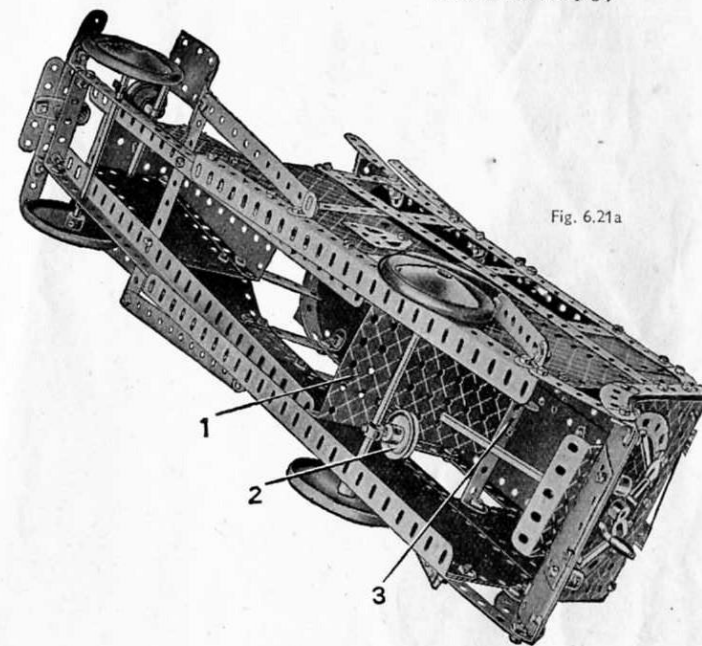


Fig. 6.21a

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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.

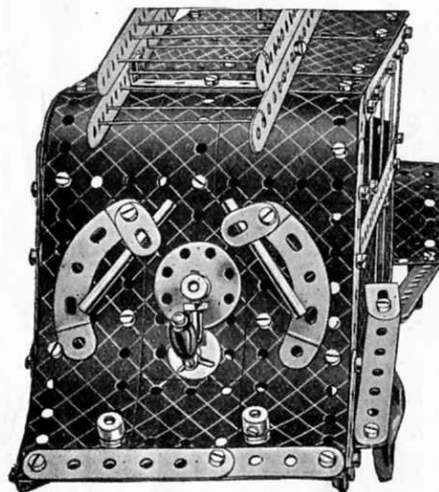
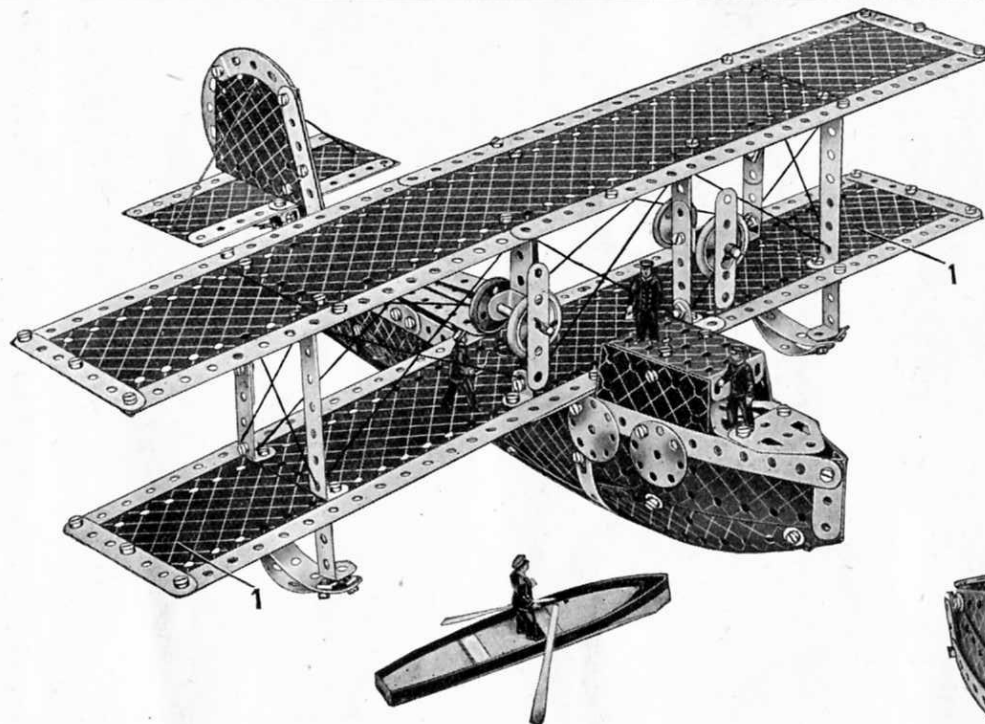


Fig. 6.21b



#### 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.

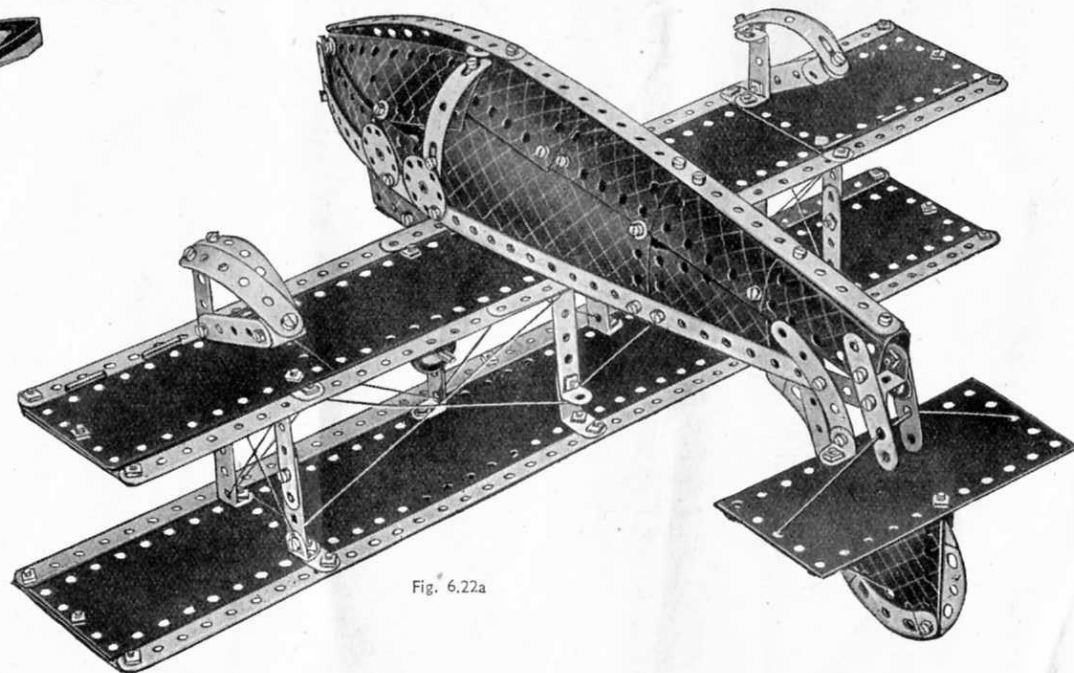
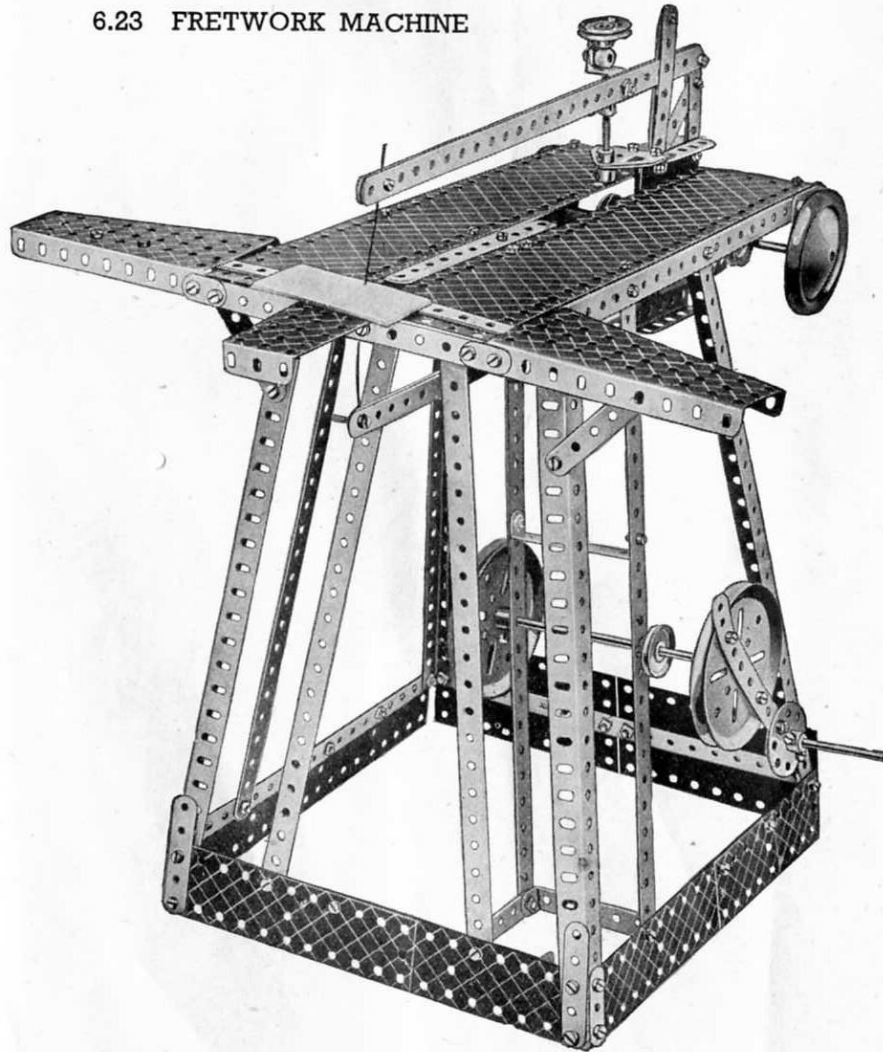


Fig. 6.22a



## 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

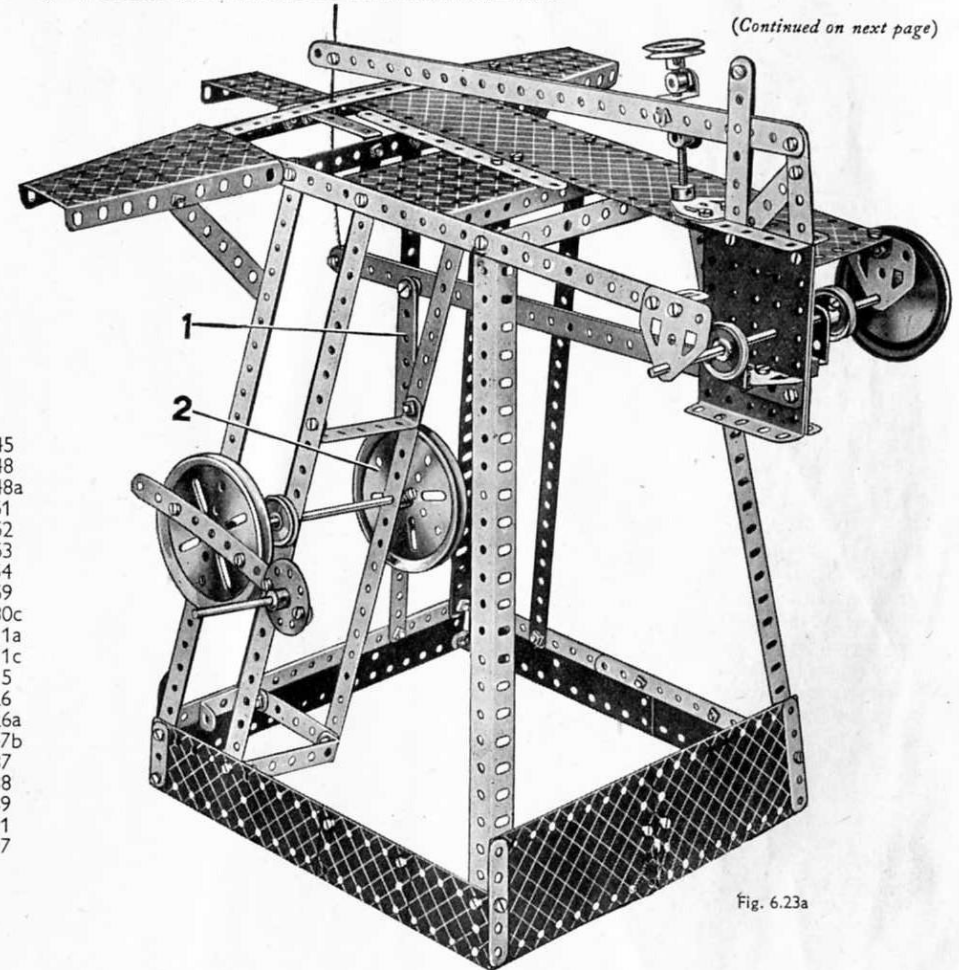


Fig. 6.23a

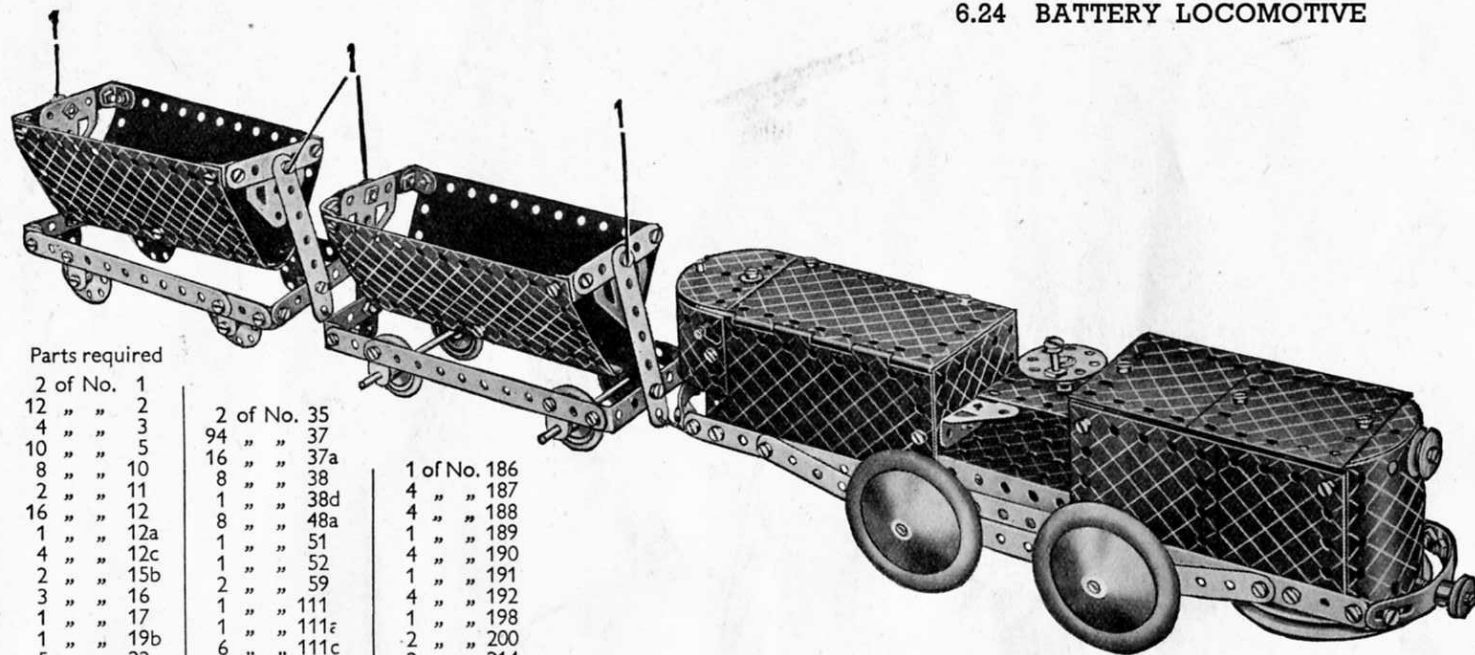
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The saw frame consists of two long arms, each consisting of two  $12\frac{1}{2}$ " Strips bolted together. One of the arms is bolted between two  $3\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plates, and the other is lock-nutted at its end 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	2 of No. 35	1 of No. 186
12 " " 2	94 " " 37	4 " " 187
4 " " 3	16 " " 37a	4 " " 188
10 " " 5	8 " " 38	1 " " 189
8 " " 10	1 " " 38d	4 " " 190
2 " " 11	8 " " 48a	1 " " 191
16 " " 12	1 " " 51	4 " " 192
1 " " 12a	1 " " 52	1 " " 198
4 " " 12c	2 " " 59	2 " " 200
2 " " 15b	1 " " 111	2 " " 214
3 " " 16	1 " " 111a	2 " " 215
1 " " 17	6 " " 111c	
1 " " 19b	1 " " 115	
5 " " 22	1 " " 126	
1 " " 23	4 " " 126a	
1 " " 23a	1 " " 147b	
1 " " 24	4 " " 155	
4 " " 24a		

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.

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

## 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	

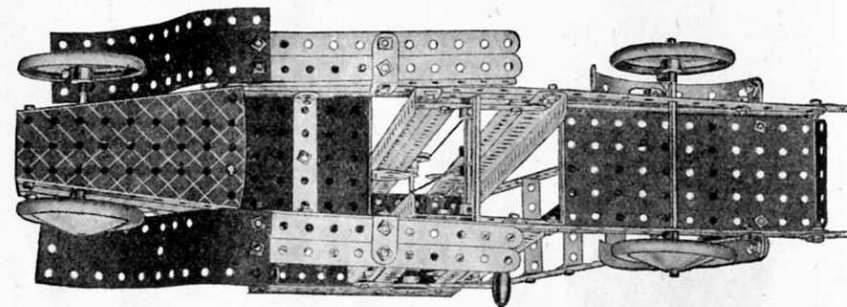
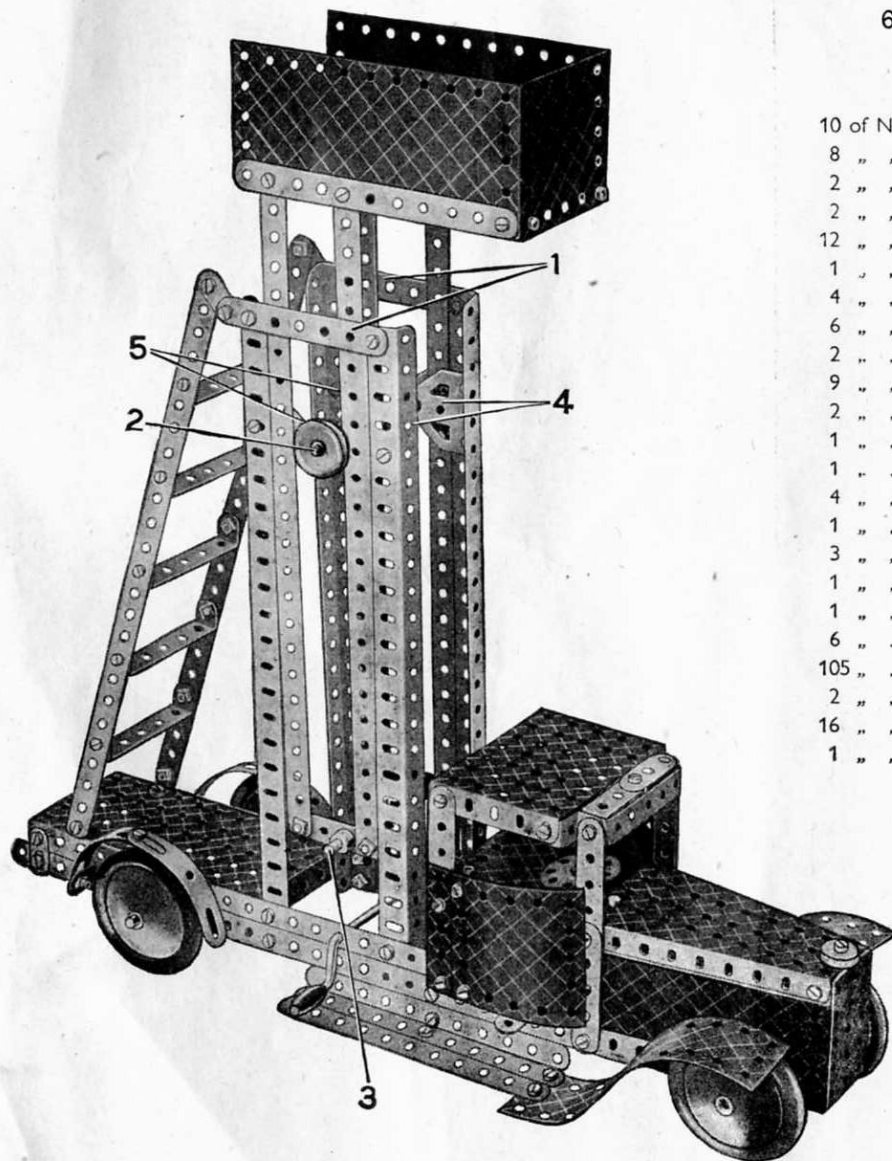


Fig. 6.25a

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  $\frac{3}{8}$ " long and carrying a  $\frac{1}{4}$ " loose Pulley to represent the radiator cap.

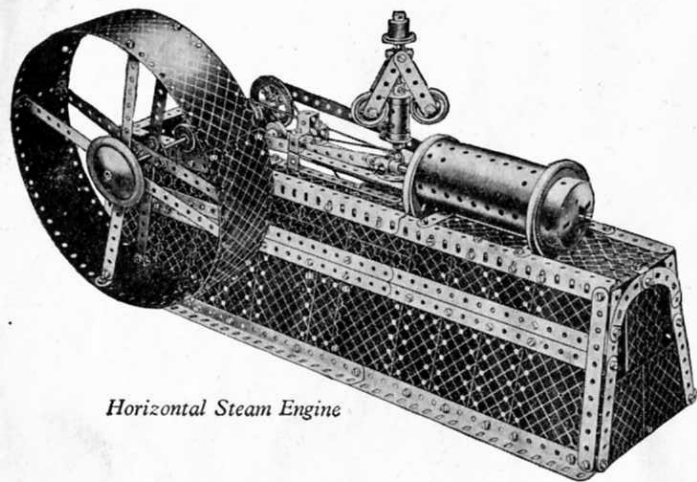
A  $3\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plate forms the base for the cab, and is secured to the chassis by a  $2\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Double Angle Strip (Fig. 6.25a). The back of the cab consists of two  $2\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " Flexible Plates, 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.

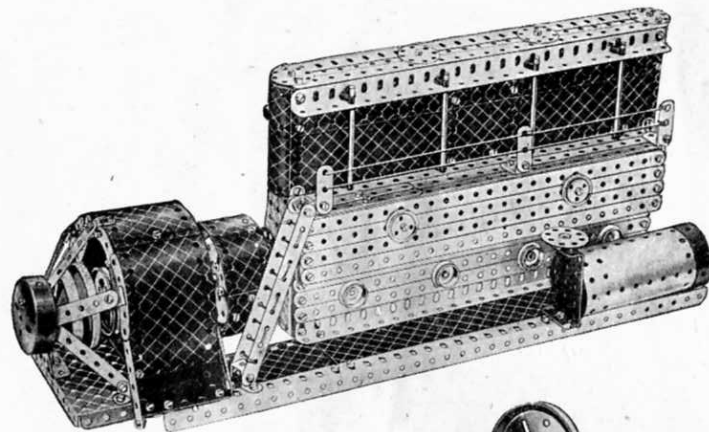
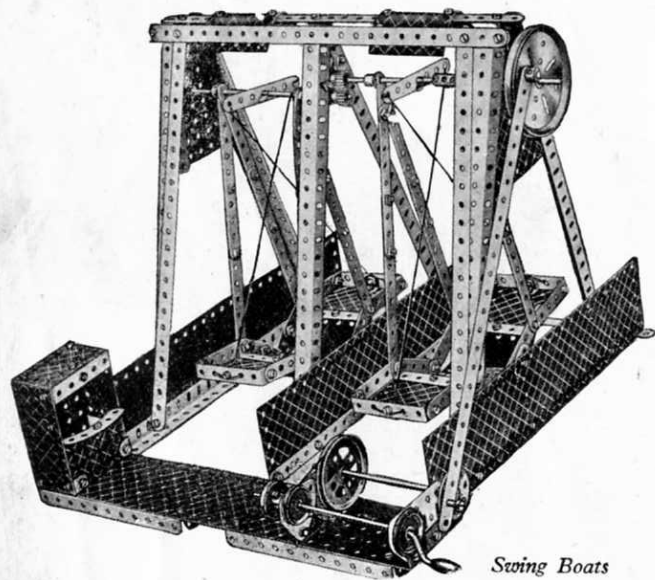
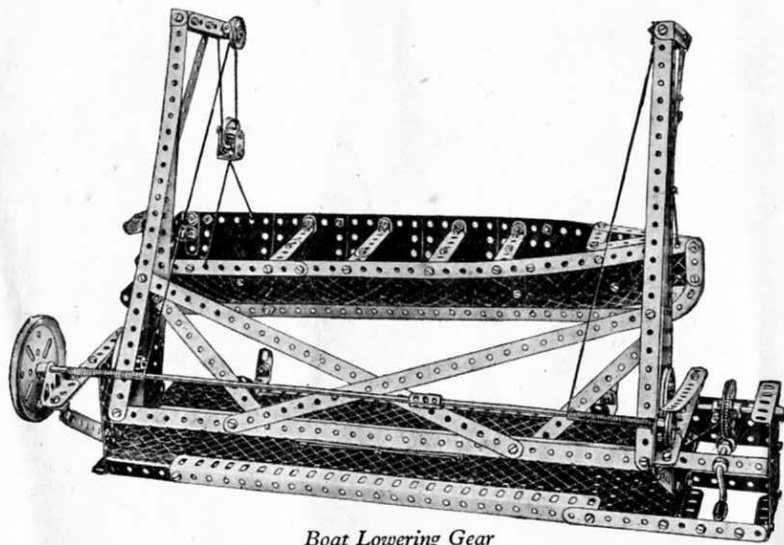
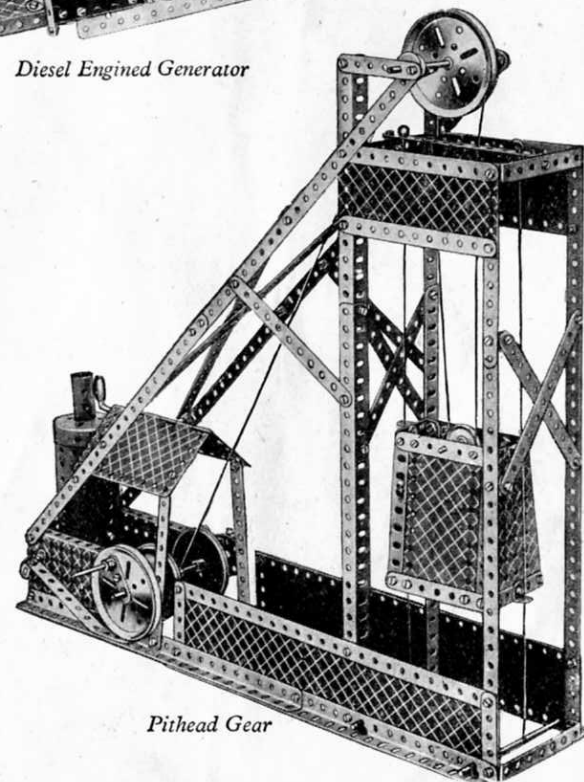
The ladder is constructed by bolting  $2\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Double Angle Strips between two  $12\frac{1}{2}$ " Strips. The latter are fastened at their lower ends to the  $5\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plate by Angle Brackets, and at their upper ends they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



*Horizontal Steam Engine***BUILD BIGGER AND BETTER MODELS.**

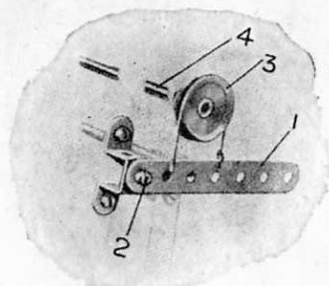
When you have built all the models shown in this Manual you will be keen to build bigger and more elaborate models. Your next step is to purchase a Meccano No. 6a Accessory Outfit containing all the parts required to convert your No. 6 into a No. 7 Outfit. You will thus be able to build the full range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

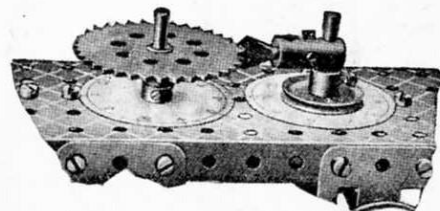
Here are a few simple and interesting movements showing how easily real mechanisms can be reproduced with Meccano.

### STRAP AND LEVER BRAKE



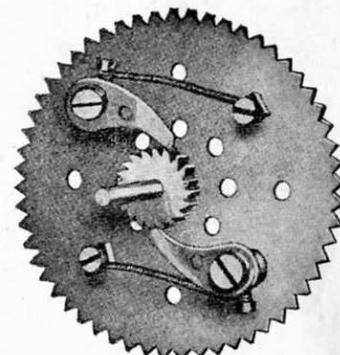
This device will be found very useful as a quick emergency hand-brake. Although it is the simplest of such devices, it is also one of the most valuable and can be used in a great variety of models.

### INTERMITTENT ROTARY MOTION



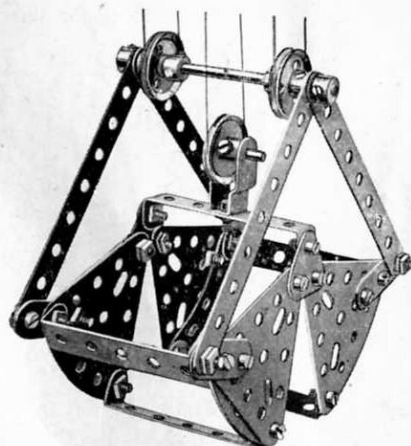
Intermittent rotary motion can be obtained by means of the above device. Such an arrangement is useful in revolution counters, measuring machines, etc. In addition to mechanisms that give true intermittent motion, different types of cams that convert a regular rotary motion into a constant or intermittent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

### PAWL AND RATCHET MOVEMENT



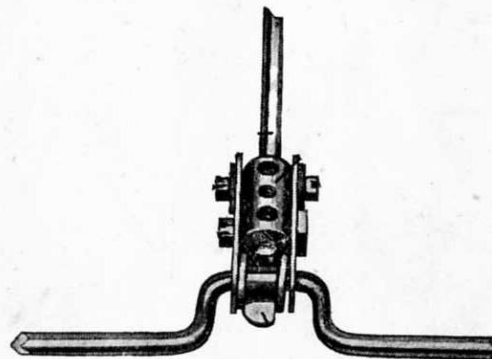
By means of this device it is possible to construct certain types of automatic brakes and free wheels. The illustration shows the method of building up a free-wheel unit.

### GRABS



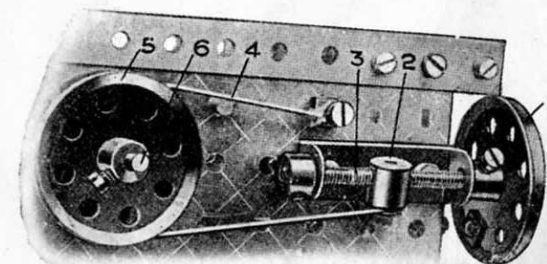
Here is a typical example of the many kinds of grab that can be constructed from Meccano. If the grab is fitted to a model crane ship-coaler, all its movements can be controlled from an operating box built into the frame of the model. The outer sides of the jaws may be filled in with cardboard and the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

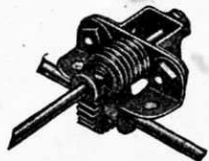
### STRAP AND SCREW BRAKE



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.

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

### WORM AND PINION BEARING

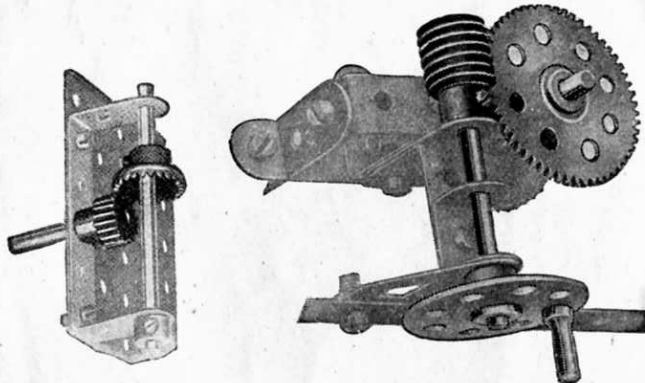


The compact rear axle drive unit illustrated above is intended chiefly for use in small models of motor cars. Two Corner Angle Brackets are secured by Bolts passing through their elongated holes to a  $1\frac{1}{2}$ " Strip, to which a Double Bent Strip also is secured. The Rod carrying the Worm is passed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

The driven Rod is journalled 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.

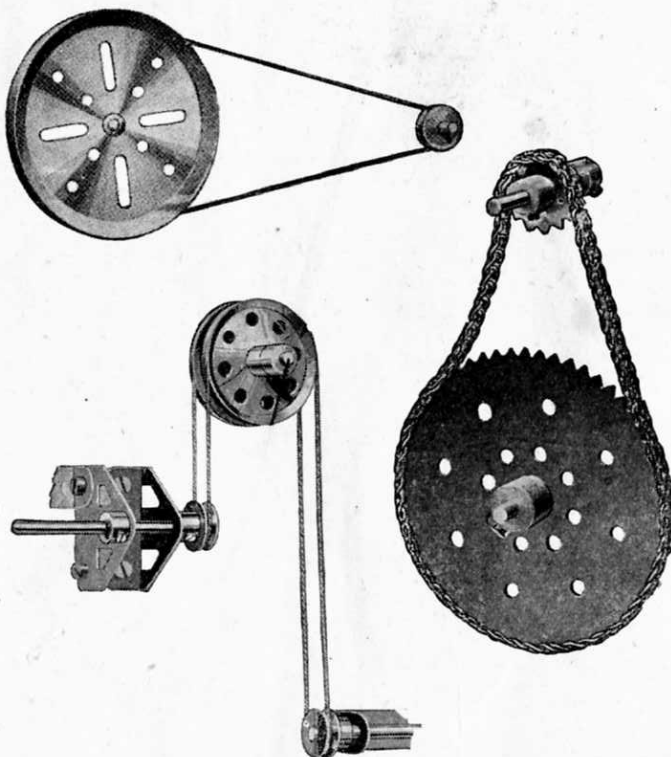
### GEARS



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.

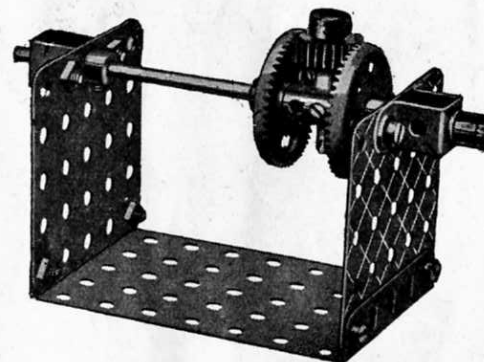
### BELT AND CHAIN DRIVES



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.

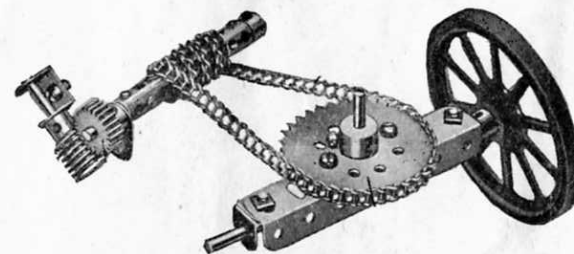
### EPICYCLIC TRANSMISSION GEAR



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.

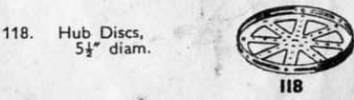
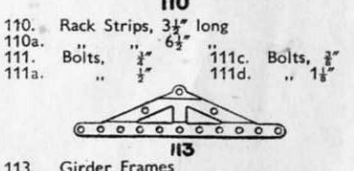
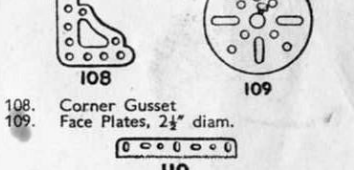
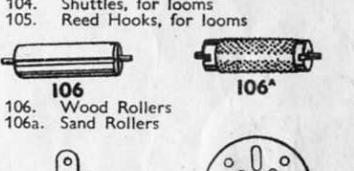
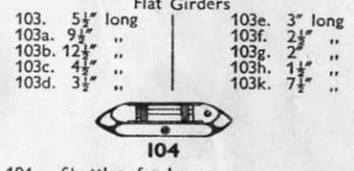
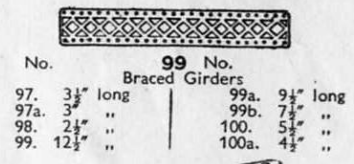
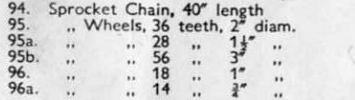
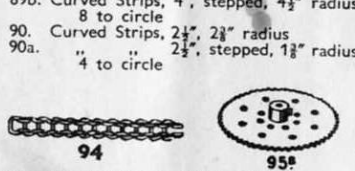
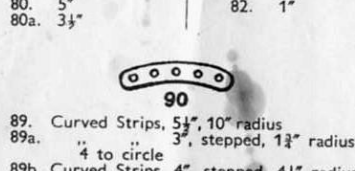
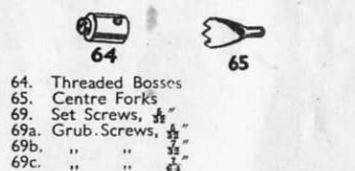
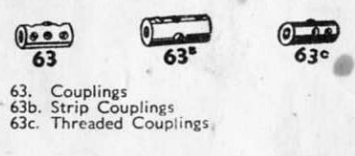
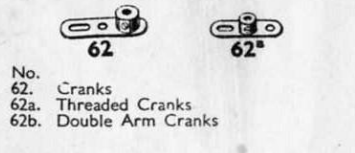
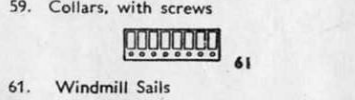
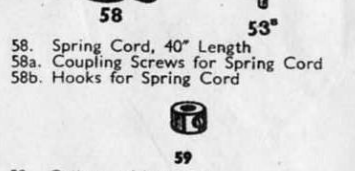
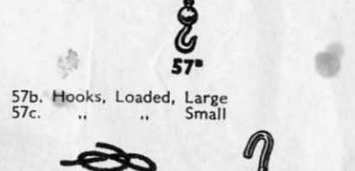
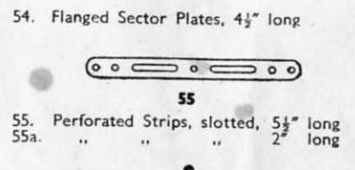
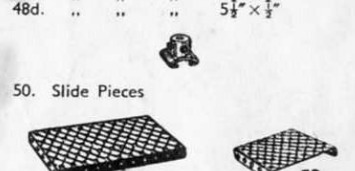
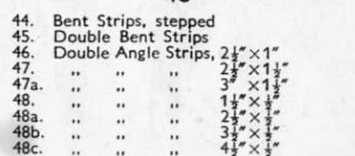
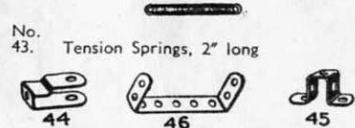
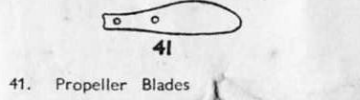
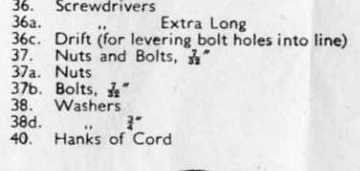
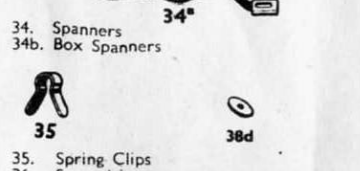
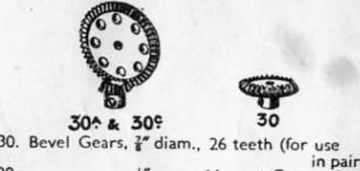
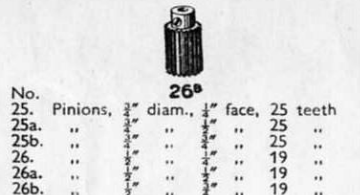
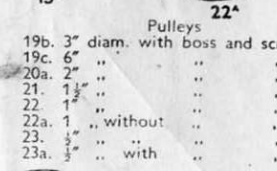
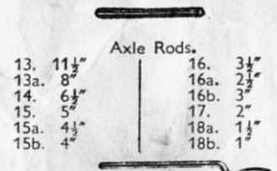
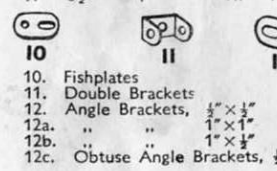
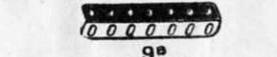
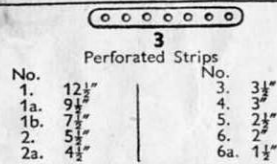


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(Continued on following page)









## MECCANO PARTS

120<sup>a</sup>

- No. 120b. Compression Springs,  $\frac{1}{2}$ " long



122

122. Miniature Loaded Sacks



123



125

123. Cone Pulleys,  $1\frac{1}{2}$ ", 1" and  $\frac{3}{4}$ " diam.  
124. Reversed Angle Brackets,  $1\frac{1}{2}$ "  
125. " " "



126



126a

126. Trunnions 126a. Flat Trunnions



127



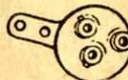
128

127. Bell Cranks  
128. Bell Cranks, with Boss



129

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



130



130a

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



131



132

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



133



133a

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



134

- No. 134. Crank Shafts, 1" stroke



136



137



136a

136. Handrail Supports  
136a. Handrail Couplings  
137. Wheel Flanges



138a

- 138a. Ships' Funnels



139

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



140

140. Universal Coupling



142



142a

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



146

145. Circular Strips, 7 $\frac{1}{2}$ " diam. overall  
146. " Plates, 6" "  
146a. " " 4" "



147 &amp; 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 &amp; 154a

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

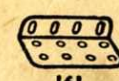


157

157. Fans, 2" diam.



160



161

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



163



162



164

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

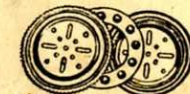


165



166

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



180

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



185



187

- No. 185. Steering Wheels,  $1\frac{1}{2}$ " diam.  
186. Driving Bands,  $2\frac{1}{2}$ " (Light)  
186a. " " 10" "  
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.



192



197

- Flexible Plates.  
188.  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ "  
189.  $5\frac{1}{2}$ " x  $1\frac{1}{2}$ "  
190.  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ "  
190a.  $3\frac{1}{2}$ " x  $2\frac{1}{2}$ "  
191.  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ "  
192.  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ "  
Strip Plates.  
196.  $9\frac{1}{2}$ " x  $2\frac{1}{2}$ "  
197.  $12\frac{1}{2}$ " x  $2\frac{1}{2}$ "



200



198



199

198. Hinged Flat Plates,  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ "  
199. Curved Plates, U-Section  
" "  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " x  $\frac{1}{8}$ " radius  
200. " "  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ " radius



211A

211B

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



212



213

212. Rod and Strip Connectors  
213. Rod Connectors



215



214

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



216

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