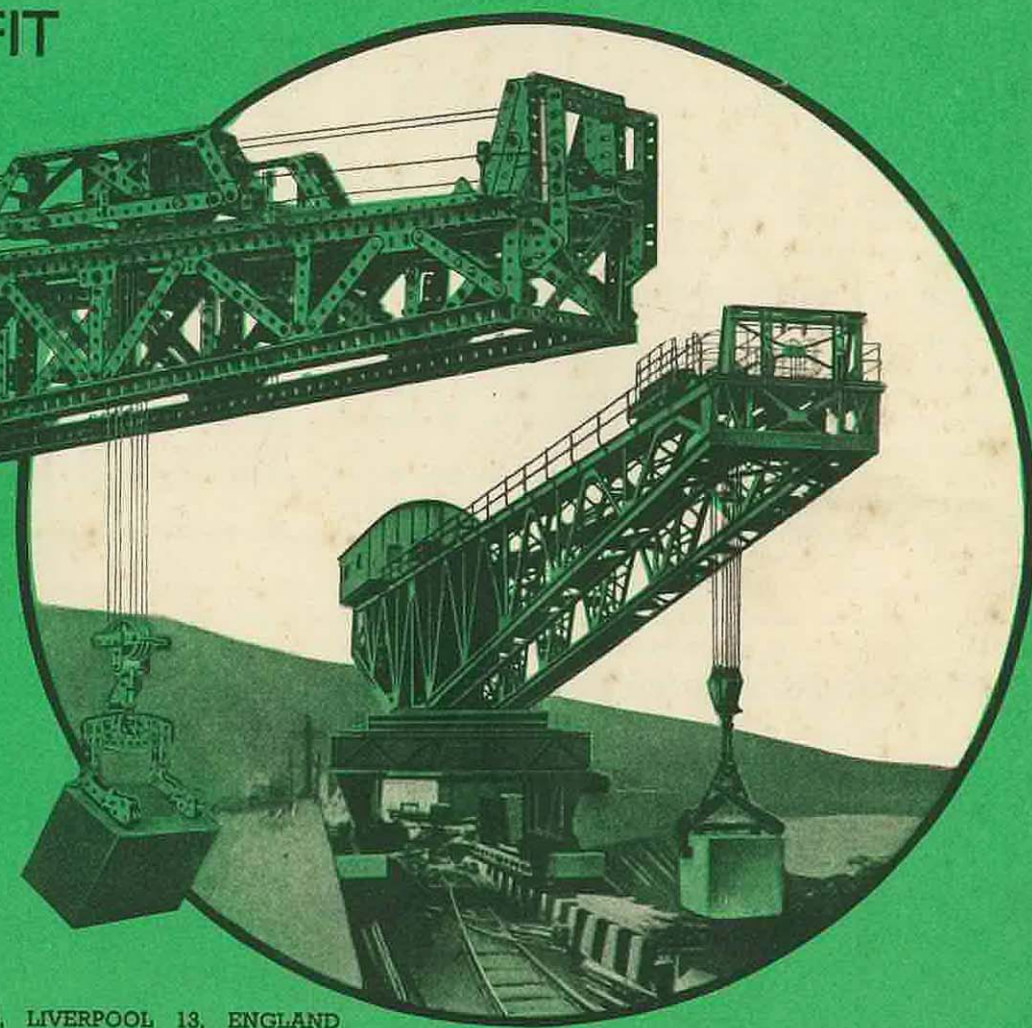


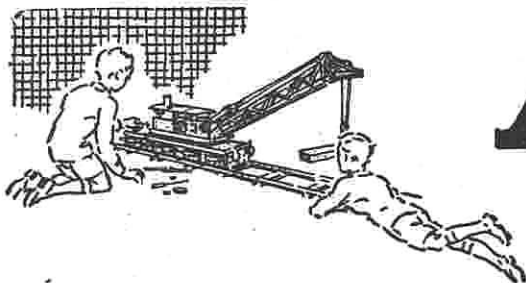
MECCANO

INSTRUCTIONS FOR
No. 5 OUTFIT

No.
47.5

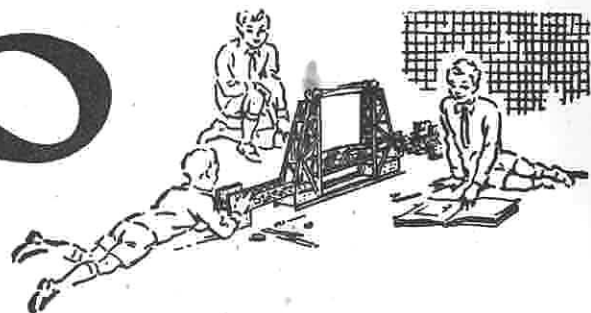


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MECCANO

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

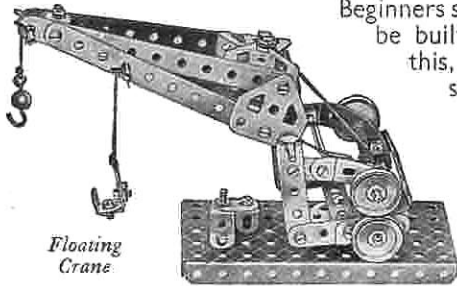
THE MOST FASCINATING OF ALL HOBBIES

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.

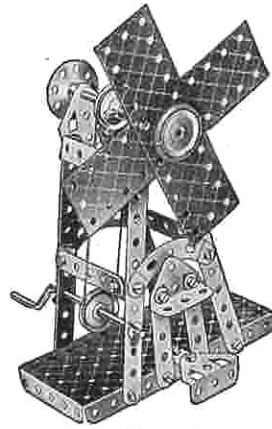
A FEW USEFUL HINTS

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

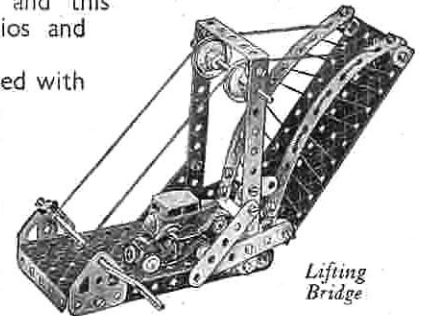
Models can be operated by means of either clockwork or electric motors.

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.

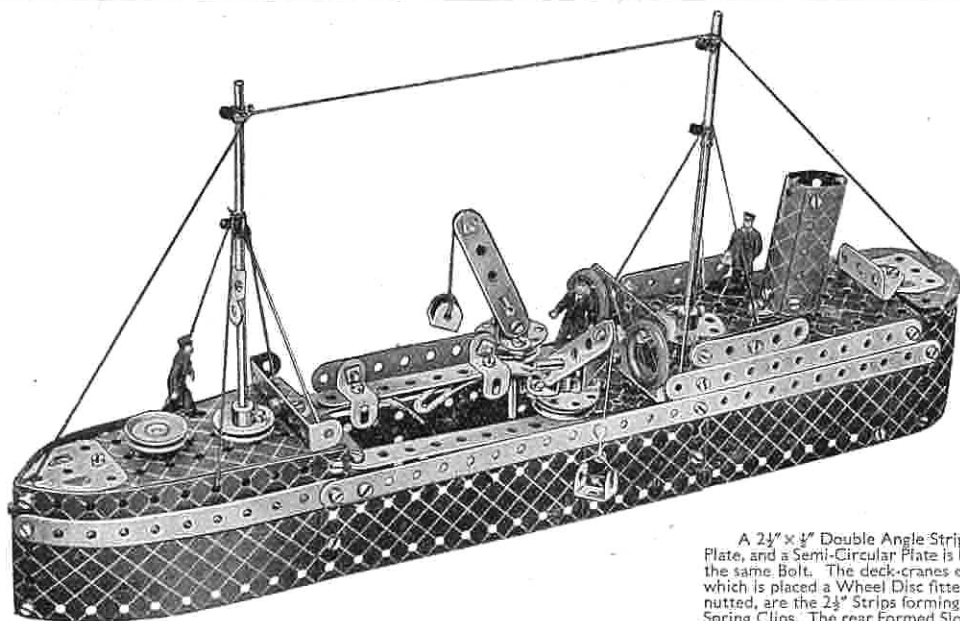
Electric motors have the advantage of giving long continuous runs. Their speed is much higher than that of clockwork motors, and this makes it possible to employ higher reduction ratios and thus obtain greater power.

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 during 1946. Ask your dealer for particulars.



Lifting Bridge



4.1 DREDGER

Parts required

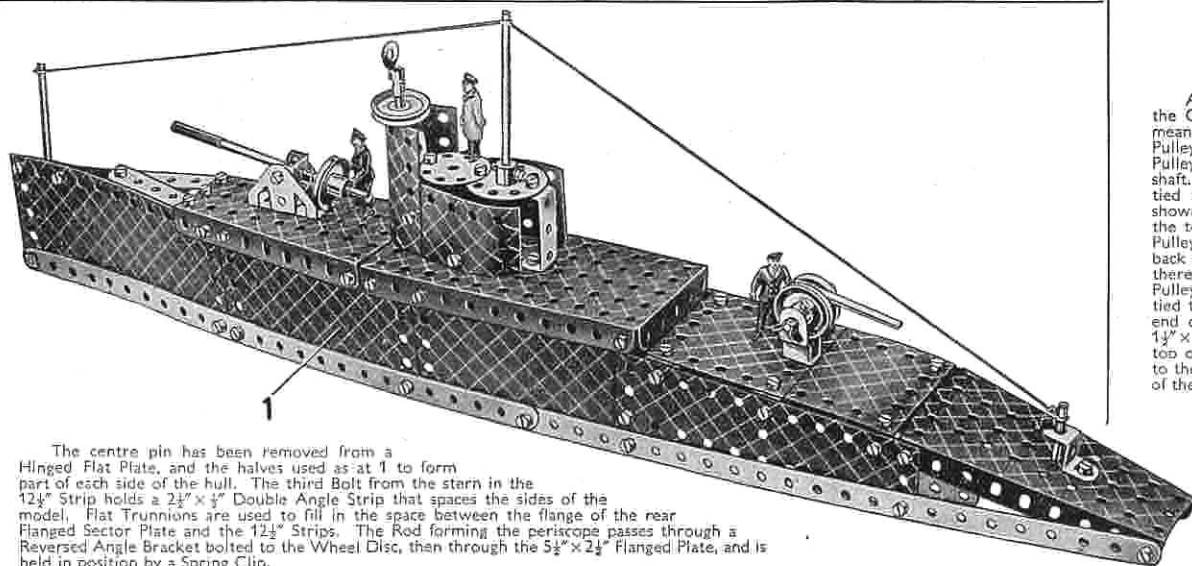
2 of No. 1	3 of No. 48a
6 " " 2	1 " " 51
2 " " 3	1 " " 52
9 " " 5	1 " " 54
4 " " 10	5 " " 111c
2 " " 11	2 " " 125
8 " " 12	1 " " 126
2 " " 12c	2 " " 126a
4 " " 16	2 " " 155
2 " " 17	2 " " 188
2 " " 18a	2 " " 189
4 " " 22	2 " " 190
2 " " 24	2 " " 191
2 " " 24a	2 " " 192
8 " " 35	2 " " 199
70 " " 37	2 " " 200
6 " " 37a	1 " " 212
4 " " 38	1 " " 213
1 " " 40	2 " " 214
	2 " " 215

A $2\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strip is bolted to the front flange of the $5\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate, and a Semi-Circular Plate is held between the flange and the Double Angle Strip by the same Bolt. The deck-crane consists of a 1" Pulley fastened to a 2" Rod, above which is placed a Wheel Disc fitted with Angle Brackets. Bolted to these, and lock-nutted, are the $2\frac{1}{2}$ " Strips forming the jib. The complete units are held in place by Spring Clips. The rear Formed Slotted Strip of the hopper bridge is fastened to the front of the $2\frac{1}{2} \times 1\frac{1}{2}$ " Flanged Plate by an Obtuse Angle Bracket.

4.2 SUBMARINE

Parts required

4 of No. 1	1 of No. 48
3 " " 5	4 " " 48a
1 " " 11	1 " " 52
2 " " 12	2 " " 54
1 " " 15b	2 " " 125
3 " " 16	2 " " 126
1 " " 17	2 " " 126a
1 " " 18a	2 " " 188
1 " " 18b	2 " " 189
4 " " 22	2 " " 190
1 " " 24	2 " " 191
1 " " 24a	2 " " 192
5 " " 35	1 " " 198
64 " " 37	1 " " 199
1 " " 40	1 " " 212
1 " " 44	1 " " 213

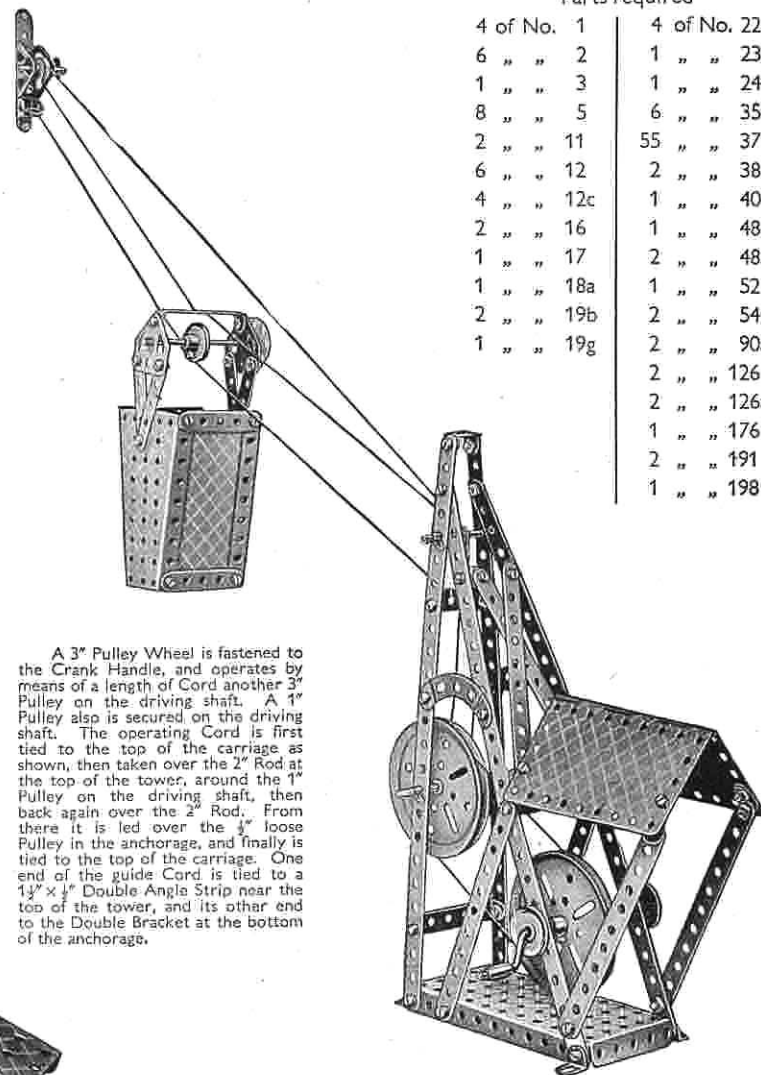


The centre pin has been removed from a Hinged Flat Plate, and the halves used as at 1 to form part of each side of the hull. The third Bolt from the stern in the $12\frac{1}{2}$ " Strip holds a $2\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strip that spaces the sides of the model. Flat Trunnions are used to fill in the space between the flange of the rear Flanged Sector Plate and the $12\frac{1}{2}$ " Strips. The Rod forming the periscope passes through a Reversed Angle Bracket bolted to the Wheel Disc, then through the $5\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate, and is held in position by a Spring Clip.

4.3 TELPHER SPAN

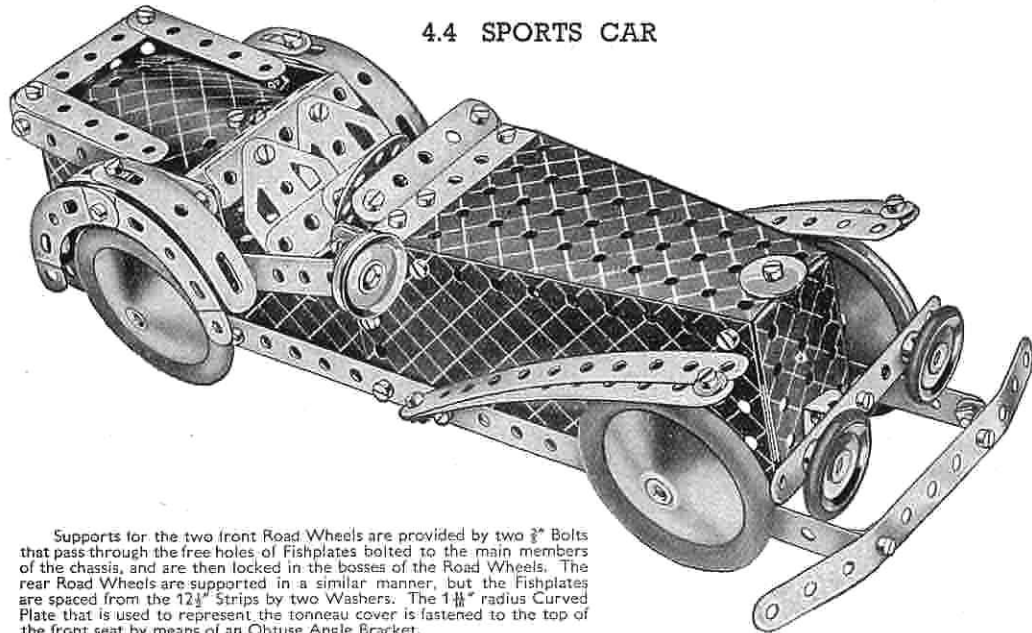
Parts required

4 of No. 1	4 of No. 22
6 " " 2	1 " " 23
1 " " 3	1 " " 24
8 " " 5	6 " " 35
2 " " 11	55 " " 37
6 " " 12	2 " " 38
4 " " 12c	1 " " 40
2 " " 16	1 " " 48
1 " " 17	2 " " 48a
1 " " 18a	1 " " 52
2 " " 19b	2 " " 54
1 " " 19g	2 " " 90a
	2 " " 126
	2 " " 126a
	1 " " 176
	2 " " 191
	1 " " 198



A 3" Pulley Wheel is fastened to the Crank Handle, and operates by means of a length of Cord another 3" Pulley on the driving shaft. A 1" Pulley also is secured on the driving shaft. The operating Cord is first tied to the top of the carriage as shown, then taken over the 2" Rod at the top of the tower, around the 1" Pulley on the driving shaft, then back again over the 2" Rod. From there it is led over the $\frac{1}{2}$ " loose Pulley in the anchorage, and finally is tied to the top of the carriage. One end of the guide Cord is tied to a $1\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strip near the top of the tower, and its other end to the Double Bracket at the bottom of the anchorage.

4.4 SPORTS CAR



Supports for the two front Road Wheels are provided by two $\frac{3}{8}$ " Bolts that pass through the free holes of Fishplates bolted to the main members of the chassis, and are then locked in the bosses of the Road Wheels. The rear Road Wheels are supported in a similar manner, but the Fishplates are spaced from the $12\frac{1}{2}$ " Strips by two Washers. The $1\frac{1}{8}$ " radius Curved Plate that is used to represent the tonneau cover is fastened to the top of the front seat by means of an Obtuse Angle Bracket.

The driving seat is composed of two Trunnions and two Flat Trunnions, and these are bolted to the $2\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strip supported by the sides of the car.

The steering wheel is a Bush Wheel fastened to a 1" Rod that is secured by two Spring Clips in an Angle Bracket bolted under the scuttle.

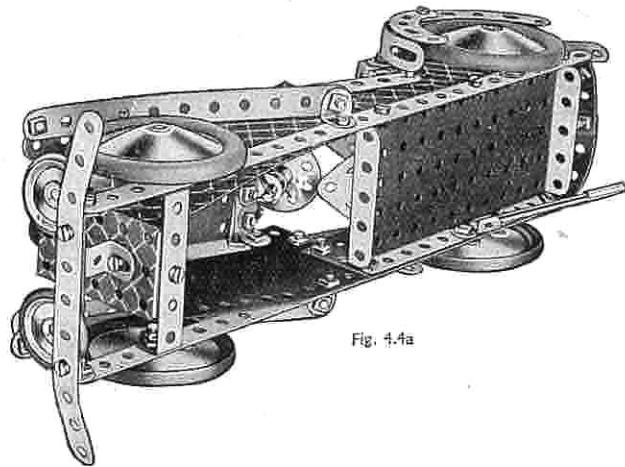
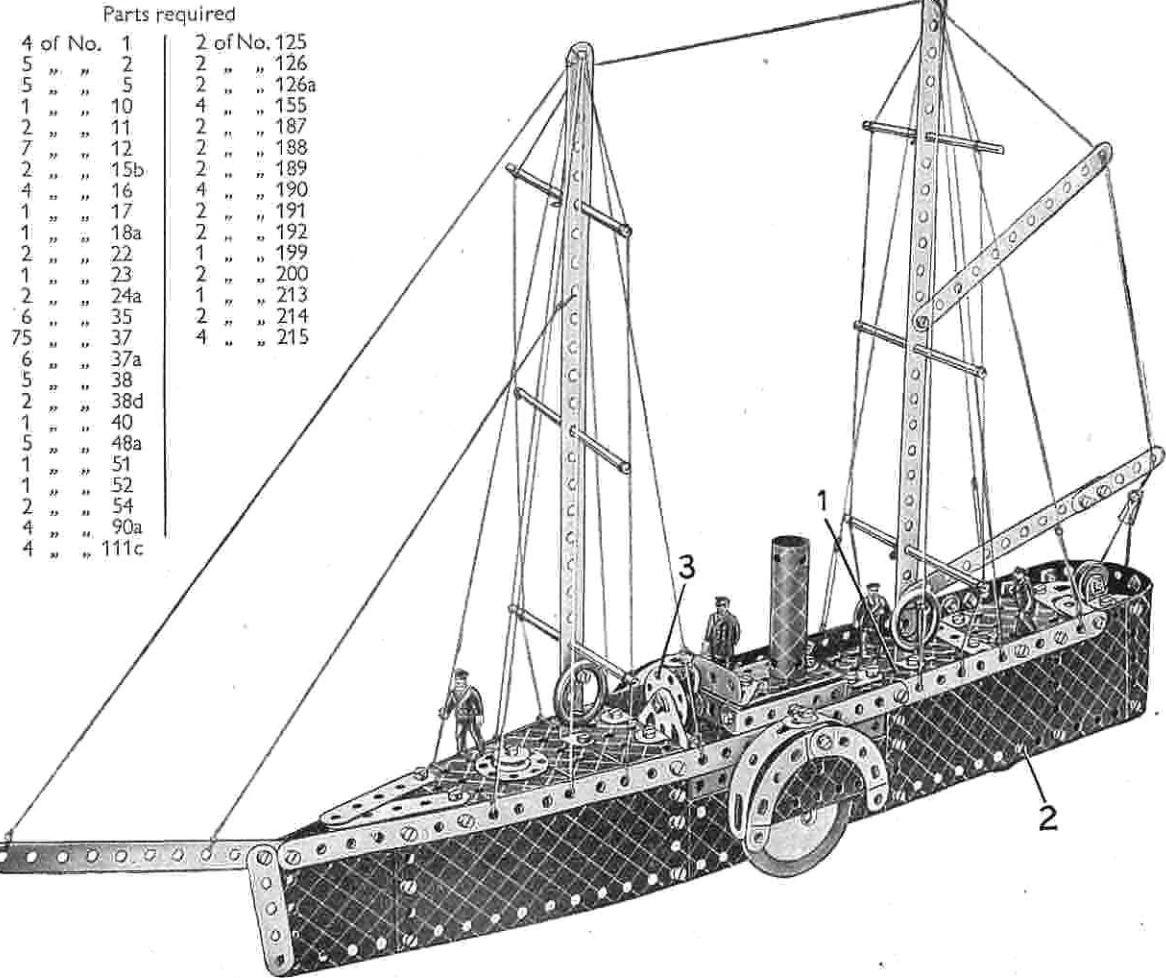


Fig. 4.4a

Parts required

2 of No. 1	6 of No. 48a
5 " " 2	1 " " 51
1 " " 3	1 " " 52
9 " " 5	1 " " 54
4 " " 10	4 " " 90a
2 " " 11	6 " " 111c
6 " " 12	2 " " 125
3 " " 12c	2 " " 126
1 " " 16	2 " " 126a
1 " " 18b	2 " " 155
3 " " 22	4 " " 187
1 " " 24	2 " " 188
2 " " 24a	2 " " 190
2 " " 35	2 " " 192
66 " " 37	2 " " 199
7 " " 38	1 " " 200
1 " " 38d	1 " " 212
1 " " 44	1 " " 213
4 of No. 215	

4.5 EARLY TYPE OF STEAMSHIP



Parts required

4 of No. 1	2 of No. 125
5 " " 2	2 " " 126
5 " " 5	2 " " 126a
1 " " 10	4 " " 155
2 " " 11	2 " " 187
7 " " 12	2 " " 188
2 " " 15b	2 " " 189
4 " " 16	4 " " 190
1 " " 17	2 " " 191
1 " " 18a	2 " " 192
2 " " 22	1 " " 199
1 " " 23	2 " " 200
2 " " 24a	1 " " 213
6 " " 35	2 " " 214
75 " " 37	4 " " 215
6 " " 37a	
5 " " 38	
2 " " 38d	
1 " " 40	
5 " " 48a	
1 " " 51	
1 " " 52	
2 " " 54	
4 " " 90a	
4 " " 111c	

The foredeck consists of a Flanged Sector Plate bolted to the $12\frac{1}{2}$ " Strips that are placed along the sides of the deck. A $5\frac{1}{8}$ " x $2\frac{1}{2}$ " Flanged Plate is used for the central portion of the deck and to the rear end of this a Flanged Sector Plate 1 is fastened by a Fishplate. A $2\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strip is bolted across the Flanged Sector Plate and to the sides of the vessel. Two $2\frac{1}{2}$ " x $1\frac{1}{2}$ " Flexible Plates, overlapped one hole, are bolted to the rear end of the Flanged Sector Plate.

The vessel runs on Road Wheels mounted on a compound rod consisting of a $1\frac{1}{4}$ " and a 2" Rod joined by a Rod Connector, which is journaled in the sides of the hull as shown, and also on 1" Pulleys fitted with Rubber Rings supported inside the hull on $\frac{3}{8}$ " Bolts, one of which is shown at 2. The Bolts 2 pass through holes in the Flexible Plates forming the sides of the ship and are locked in the bosses of the Pulleys. A Wheel Disc 3 is lock-nutted to a Trunnion to form the wheel.

4.6 DRILLING MACHINE

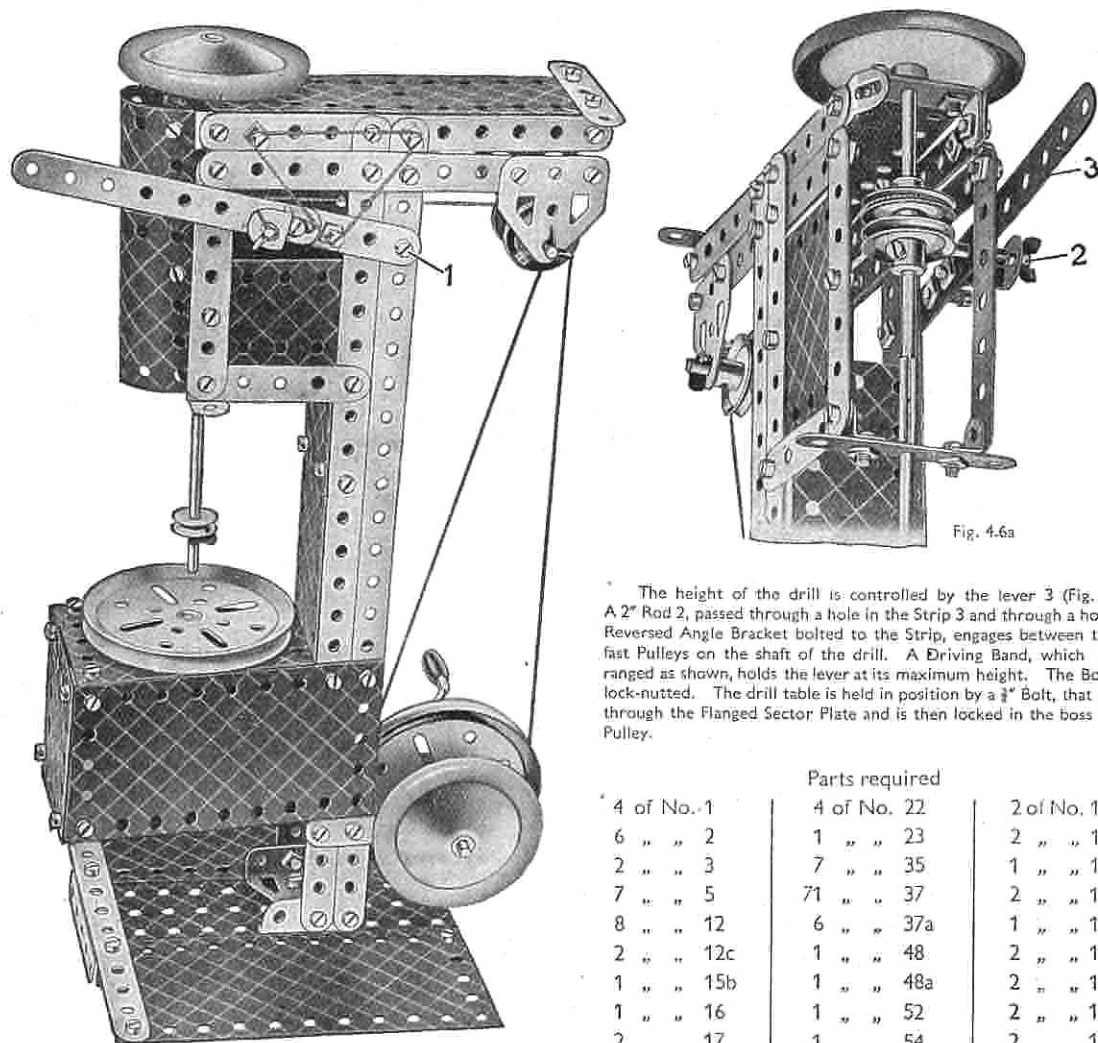


Fig. 4.6a

The height of the drill is controlled by the lever 3 (Fig. 4.6a). A 2" Rod 2, passed through a hole in the Strip 3 and through a hole in a Reversed Angle Bracket bolted to the Strip, engages between two 1" fast Pulleys on the shaft of the drill. A Driving Band, which is arranged as shown, holds the lever at its maximum height. The Bolt 1 is lock-nutted. The drill table is held in position by a $\frac{3}{8}$ " Bolt, that passes through the Flanged Sector Plate and is then locked in the boss of the Pulley.

Parts required		
4 of No. 1	4 of No. 22	2 of No. 126
6 " " 2	1 " " 23	2 " " 126a
2 " " 3	7 " " 35	1 " " 186
7 " " 5	71 " " 37	2 " " 187
8 " " 12	6 " " 37a	1 " " 188
2 " " 12c	1 " " 48	2 " " 189
1 " " 15b	1 " " 48a	2 " " 190
1 " " 16	1 " " 52	2 " " 191
2 " " 17	1 " " 54	2 " " 192
2 " " 19b	4 " " 111c	2 " " 199
1 " " 19g	1 " " 125	1 " " 213

4.7 GIANT EXCAVATOR

The Cord 1 is fastened to a Crank Handle journalled in holes in the sides of the cab, and after passing round the $2\frac{1}{2}$ " \times $\frac{3}{4}$ " Double Angle Strip above the cabin is tied to the jib at 2. This Cord controls the luffing movement of the jib. The Cord 3 is tied to the bucket and is passed over the 1" Pulley 5 and then wound round Rod 6. By turning the handle on the Bush Wheel 7 the bucket is raised or lowered.

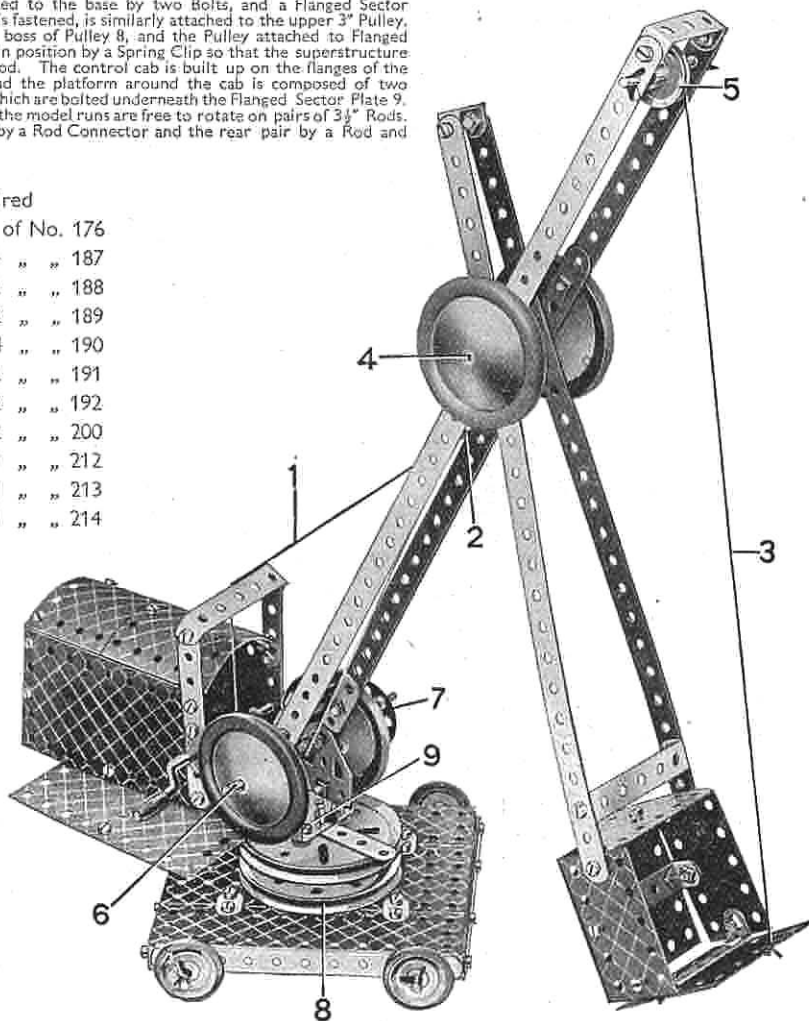
The bucket arm is pivoted on Rod 4, which passes through holes in the $12\frac{1}{4}$ " Strips forming the jib and the bucket arm. Road Wheels fastened at each end of Rod 4 retain it in position.

A 3" Pulley 8 is bolted to the base by two Bolts, and a Flanged Sector Plate 9, to which the cab is fastened, is similarly attached to the upper 3" Pulley. A $1\frac{1}{2}$ " Rod is held in the boss of Pulley 8, and the Pulley attached to Flanged Sector Plate 9 is retained in position by a Spring Clip so that the superstructure is free to swivel on the Rod. The control cab is built up on the flanges of the Flanged Sector Plate, and the platform around the cab is composed of two $5\frac{1}{2}$ " \times $2\frac{3}{4}$ " Flexible Plates, which are bolted underneath the Flanged Sector Plate 9.

The wheels on which the model runs are free to rotate on pairs of $3\frac{1}{2}$ " Rods. The front pair are joined by a Rod Connector and the rear pair by a Rod and Strip Connector.

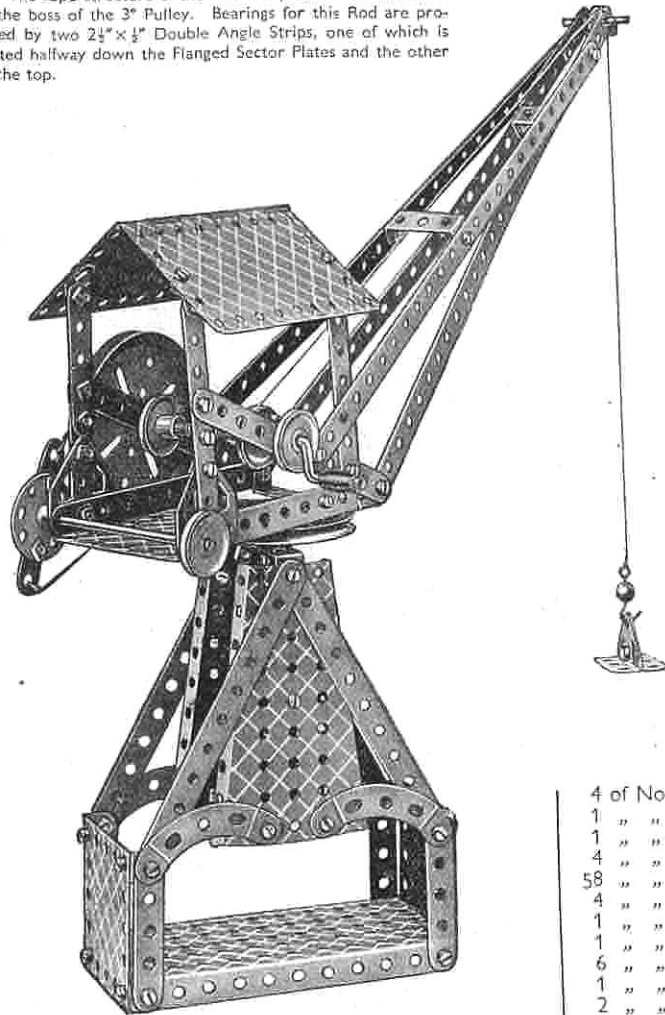
Parts required

4 of No. 1	1 of No. 176
6 " " 2	4 " " 187
5 " " 5	2 " " 188
4 " " 10	2 " " 189
1 " " 11	4 " " 190
6 " " 12	2 " " 191
4 " " 12c	2 " " 192
1 " " 15b	2 " " 200
4 " " 16	1 " " 212
2 " " 17	1 " " 213
1 " " 18a	1 " " 214
2 " " 19b	
1 " " 19g	
5 " " 22	
1 " " 24	
8 " " 35	
73 " " 37	
5 " " 37a	
4 " " 38	
1 " " 40	
1 " " 48	
6 " " 48a	
1 " " 52	
1 " " 54	
5 " " 111c	
2 " " 126	
2 " " 126a	
4 " " 155	



4.8 ELEVATED JIB CRANE

The superstructure of the model is pivoted on a Rod held in the boss of the 3" Pulley. Bearings for this Rod are provided by two 2½" x ½" Double Angle Strips, one of which is bolted halfway down the Flanged Sector Plates and the other at the top.



Parts required

4 of No. 1
8 " " 2
1 " " 3
9 " " 5
1 " " 11

2 of No. 12
3 " " 12c
2 " " 16
1 " " 18a
2 " " 19b
1 " " 19g

4 of No. 22
1 " " 23
1 " " 24
4 " " 35
58 " " 37
4 " " 38
1 " " 40
1 " " 48
6 " " 48a
1 " " 52
2 " " 54
1 " " 57c
4 " " 90a
2 " " 126
2 " " 126a
1 " " 176
3 " " 190
1 " " 198

Parts required

4 of No. 1	6 of No. 37a
6 " " 2	8 " " 38
9 " " 5	1 " " 40
1 " " 10	1 " " 44
1 " " 11	1 " " 48
6 " " 12	4 " " 48a
4 " " 12c	1 " " 51
1 " " 15b	1 " " 52
3 " " 16	2 " " 54
1 " " 18a	1 " " 57c
1 " " 18b	4 " " 90a
2 " " 19b	4 " " 111c
1 " " 19g	2 " " 126a
5 " " 22	3 " " 187
1 " " 23	1 " " 188
1 " " 24	2 " " 189
2 " " 24a	4 " " 190
8 " " 35	2 " " 200
64 " " 37	1 " " 212

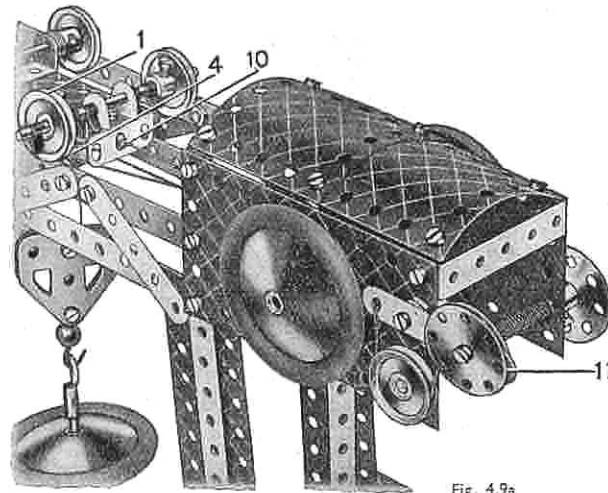
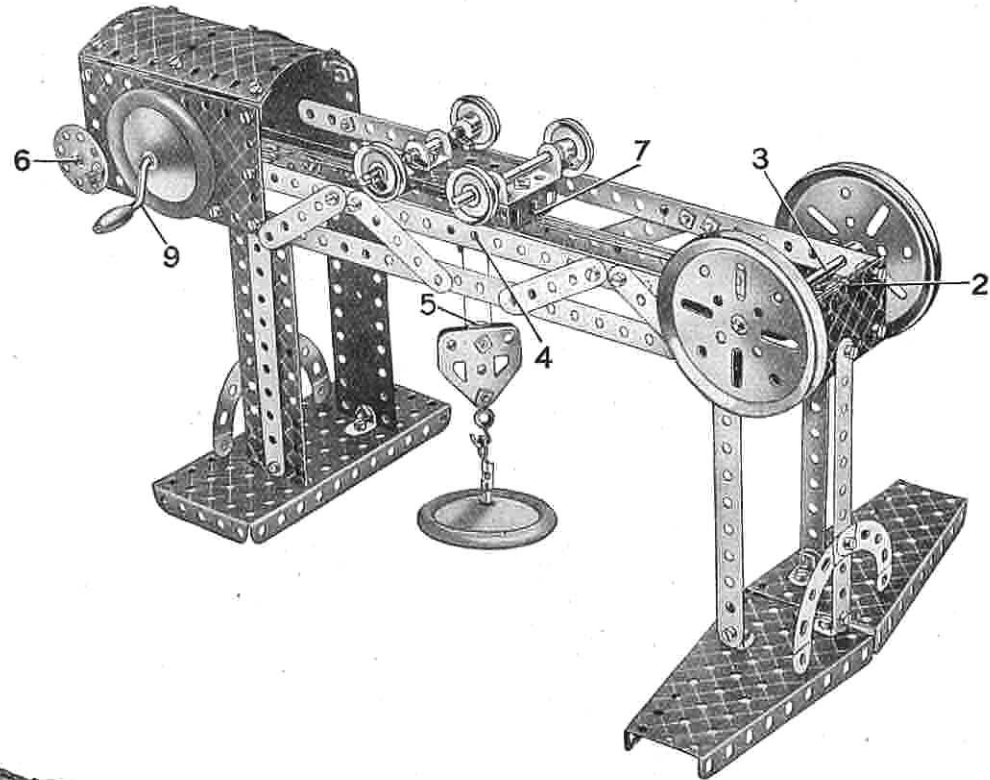


Fig. 4.9a

4.9 GANTRY CRANE



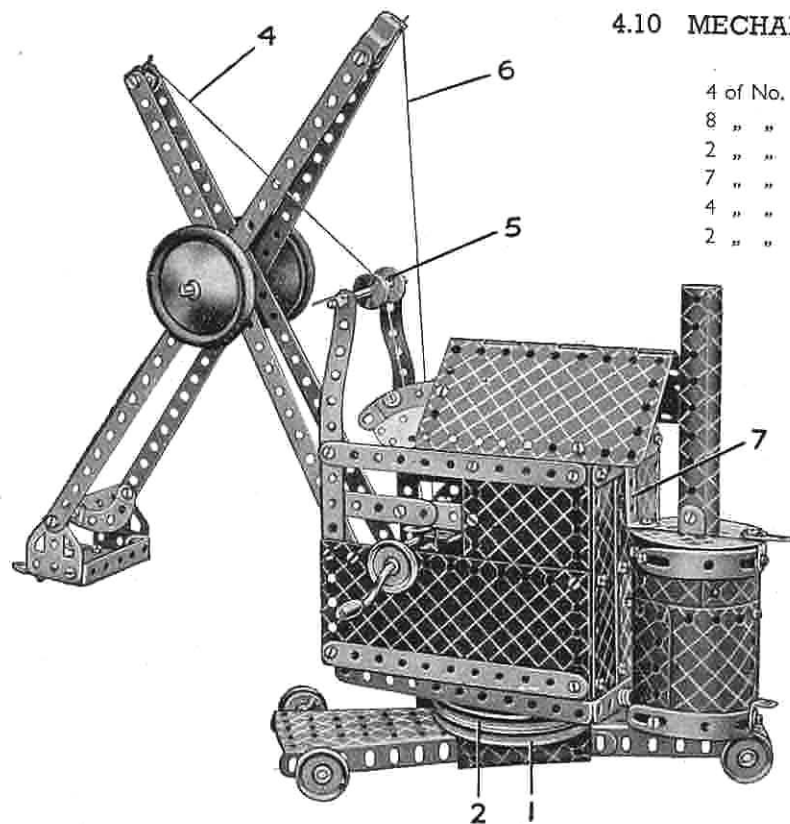
The sides of the cabin each consist of two 2½" x 2½" Flexible Plates overlapped one hole. The top of the cabin, which consists of two 1½" radius Curved Plates 1, is attached to the sides by means of Obtuse Angle Brackets at each corner as shown.

The hoisting carriage is a 2½" x 1½" Flanged Plate 7. Bearings for one of the 3½" Rods carrying the 1" Pulleys are provided by the holes in the turned up ends of a 1½" x ½" Double Angle Strip, and for the other Rod by the holes in a Double Bracket. The Bolt 1 (Fig. 4.9a) secures a Stepped Bent Strip 4 vertically to the underside of the Flanged Plate 7. A 1" Rod passes through the lower holes of the Stepped Bent Strip and is held in position by Spring Clips.

Two Flat Trunnions form the pulley block. They are fastened together at their wide ends by a 3" Bolt, which carries a ½" loose Pulley 5 on its shank between the two Flat Trunnions.

The Cord that operates the hoisting carriage 7 is tied at 10. It is then passed round Rod 3, which carries the two 3" Pulleys, and is taken to the Crank Handle 9. The Cord is wound round the Crank Handle several times to enable it to grip the shaft, and finally is tied to the rear end of the carriage. The hoisting cord is tied to Rod 6 fitted with a Bush Wheel, and wound round it several times. It is then taken over the 1" Rod held in the Stepped Bent Strip 4, round Pulley 5, back over the 1" Rod, and tied at 2. Strip 11 is the lever of a band brake, the cord of which passes around a 1 Pulley on Rod 6.

4.10 MECHANICAL DIGGER



		Parts required		
4 of No. 1	7 of No. 12	1 of No. 48	2 of No. 199	
8 " " 2	4 " " 12c	5 " " 48a	2 " " 200	
2 " " 3	2 " " 15b	1 " " 51	1 " " 212	
7 " " 5	3 " " 16	1 " " 52	1 " " 213	
4 " " 10	2 " " 17	2 " " 54	2 " " 214	
2 " " 11	2 " " 19b	3 " " 90a	4 " " 215	
	1 " " 19g	5 " " 111c		
	5 " " 22	2 " " 125		
	1 " " 23	2 " " 126		
	1 " " 24	2 " " 126a		
	2 " " 24a	1 " " 176		
	8 " " 35	3 " " 187		
	75 " " 37	2 " " 188		
	9 " " 37a	2 " " 189		
	7 " " 38	4 " " 190		
	2 " " 38d	2 " " 191		
	1 " " 40	2 " " 192		
	1 " " 44	1 " " 198		

The bogie is constructed from two Flanged Sector Plates, the flanges of which are connected by two $2\frac{1}{2}$ " Strips. A gap of $\frac{1}{2}$ " is left between the ends of the Plates. A 3" Pulley 1 is then bolted boss downwards, to the Flanged Sector Plates by two $\frac{1}{8}$ " Bolts.

A 2" Rod is locked in the boss of Pulley 1, and on it is placed Pulley 2, boss upward. The base of the cab (Fig. 4.10a) is a $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flanged Plate, which rests on Pulley 2 and is retained on the 2" Rod by a Road Wheel 3.

The construction of the cab is clear from the illustrations. The boiler comprises a cylinder built up from two $1\frac{1}{8}$ " radius Curved Plates, a $4\frac{1}{2}$ " x $2\frac{1}{2}$ " Flexible Plate, and two $5\frac{1}{2}$ " x $1\frac{1}{2}$ " Flexible Plates. The edges of the cylinder are strengthened with Formed Slotted Strips. Semi-Circular Plates are attached to the top of the boiler by a $2\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strip. The chimney is a $4\frac{1}{2}$ " x $2\frac{1}{2}$ " Flexible Plate rolled into a tube and fixed in place by a Double Bracket. The boiler is fastened to the back of the cab by a $1\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strip 7 at the top, and by a $\frac{3}{8}$ " Bolt at the bottom, where it is spaced from the cab by three Washers.

The Cord 4 is taken over the $\frac{1}{2}$ " Pulley 5 and tied to the Double Bracket at the top of the jib, and the other end is wound around a $3\frac{1}{2}$ " Rod, journalled in the side of the cab and a Reversed Angle Bracket. A Bush Wheel is attached to the end of the $3\frac{1}{2}$ " Rod. The $\frac{1}{2}$ " Pulley 5 is clamped loosely between the two $\frac{3}{8}$ " Washers by two Spring Clips to form a deep-grooved pulley.

The Cord 6 is wound around the Crank Handle and is tied to the Stepped Bent Strip at the top of the dipper stick.

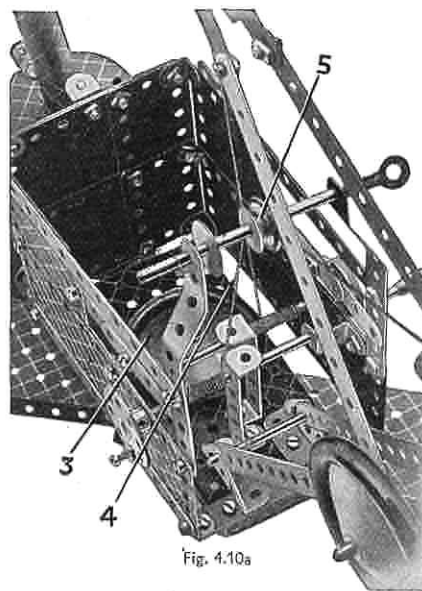
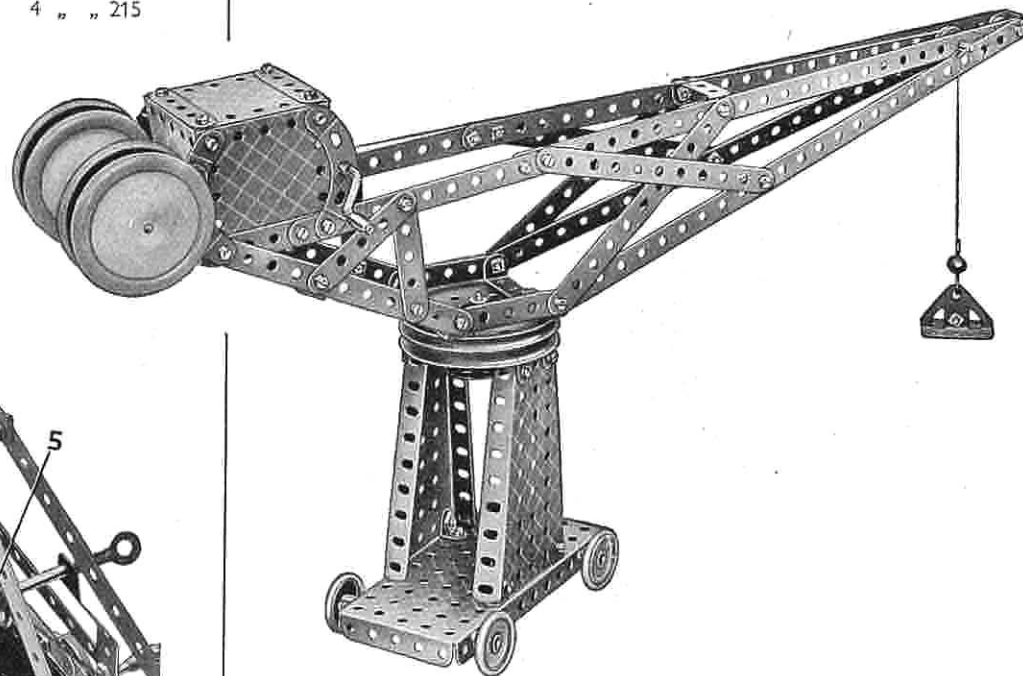


Fig. 4.10a

4.11 HAMMERHEAD CRANE

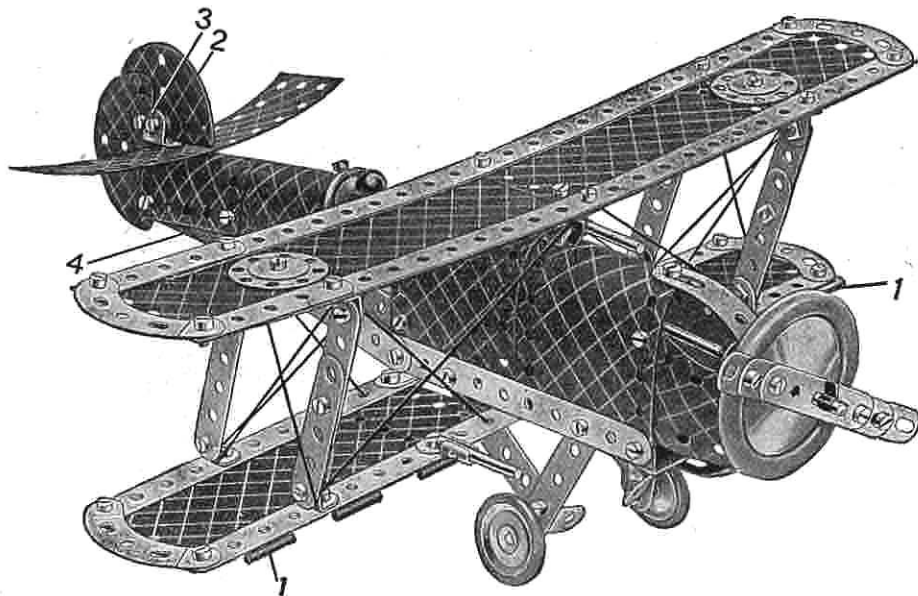
The jib of the crane is bolted to the upper 3" Pulley, and the lower 3" Pulley is bolted to two $2\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strips fastened to the narrow ends of the Flanged Sector Plates. A $1\frac{1}{2}$ " Rod is secured in the boss of the upper Pulley, but is free to rotate in the boss of the lower Pulley. A Bush Wheel fastened to the lower end of the Rod retains the jib in place.

The four Road Wheels are fastened to a 4" Rod that passes through the holes of two Flat Trunnions bolted to the $2\frac{1}{2}$ " small radius Curved Strips.



Parts required			
4 of No. 1	2 of No. 18a	55 of No. 37	4 of No. 90a
8 " " 2	2 " " 19a	1 " " 40	2 " " 126
9 " " 5	1 " " 19g	1 " " 48	2 " " 126a
1 " " 11	4 " " 22	6 " " 48a	4 " " 155
8 " " 12	1 " " 23	1 " " 52	1 " " 176
1 " " 15b	1 " " 24	2 " " 54	4 " " 187
2 " " 16	4 " " 35	1 " " 57c	4 " " 190

4.12 FIGHTING BIPLANE



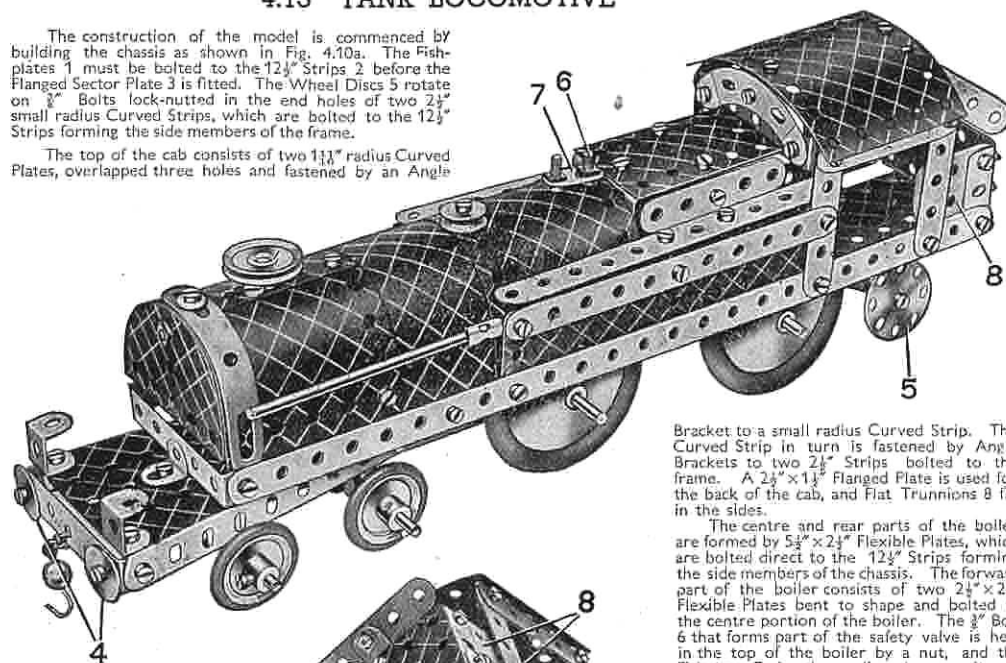
		Parts required			
4 of No. 1	1 of No. 16	5 of No. 38	2 of No. 126a	1 of No. 198	
6 " " 2	2 " " 17	2 " " 38d	2 " " 155	2 " " 199	
2 " " 3	1 " " 18a	1 " " 40	1 " " 187	1 " " 212	
9 " " 5	4 " " 22	1 " " 48	2 " " 188	2 " " 214	
4 " " 10	2 " " 24a	4 " " 48a	1 " " 189	2 " " 215	
2 " " 11	6 " " 35	4 " " 90a	4 " " 190		
8 " " 12	74 " " 37	5 " " 111c	2 " " 191		
3 " " 12c	1 " " 37a	2 " " 125	2 " " 192		

The two 3" Formed Slotted Strips that can be seen in the Illustration, one forming the top and one the underside of the nose of the plane, are joined end to end by a Bolt through their slotted holes. The Bolt holds also a Reversed Angle Bracket inside the nose, and an Obtuse Angle Bracket, which is outside the nose. The 3½" Rod that forms the propeller shaft passes through the free hole of the Obtuse Angle Bracket, through the unoccupied part of the slots in the 3" Formed Slotted Strips, and through the hole of the Reversed Angle Bracket. The Rod is held in position by Spring Clips. The Centre pin of a Hinged Flat Plate has been withdrawn, and the two parts used as flat plates 1, to form part of the lower wing. The Semi-Circular Plate 2 is fastened to the fuselage by means of a Double Bracket 3, and is spaced from the inside of the Bracket by three Washers. Flat Trunnions are used for the sides of the cockpit. The 1" fast Pulleys forming the front and the back of the cockpit are each fastened by a Bolt passing through the top of the U-Section Curved Plates and into the tapped hole of the boss.

4.13 TANK LOCOMOTIVE

The construction of the model is commenced by building the chassis as shown in Fig. 4.10a. The Fish-plates 1 must be bolted to the 12½" Strips 2 before the Flanged Sector Plate 3 is fitted. The Wheel Discs 5 rotate on ½" Bolts lock-nutted in the end holes of two 2½" small radius Curved Strips, which are bolted to the 12½" Strips forming the side members of the frame.

The top of the cab consists of two 1½" radius Curved Plates, overlapped three holes and fastened by an Angle



Bracket to a small radius Curved Strip. The Curved Strip in turn is fastened by Angle Brackets to two 2½" Strips bolted to the frame. A 2½" x 1½" Flanged Plate is used for the back of the cab, and Flat Trunnions 8 fill in the sides.

The centre and rear parts of the boiler are formed by 5½" x 2½" Flexible Plates, which are bolted direct to the 12½" Strips forming the side members of the chassis. The forward part of the boiler consists of two 2½" x 2½" Flexible Plates bent to shape and bolted to the centre portion of the boiler. The ½" Bolt 6 that forms part of the safety valve is held in the top of the boiler by a nut, and the Fishplate 7 is then slipped over it and fastened in position by a further nut. The buffers 4 are lock-nutted to a 2½" x ½" Double Angle Strip bolted to the flanges of the Flanged Sector Plate 3.

Parts required			
4 of No. 1		7 of No. 38	
5 " " 2		2 " " 38d	
9 " " 5		1 " " 44	
5 " " 10		1 " " 48	
2 " " 11		4 " " 48a	
6 " " 12		1 " " 51	
4 " " 12c		1 " " 54	
1 " " 15b		1 " " 57c	
4 " " 16		3 " " 90a	
5 " " 22		5 " " 111c	
1 " " 23		2 " " 125	
2 " " 24a		2 " " 126	
4 " " 35			
70 " " 37			
9 " " 37a			

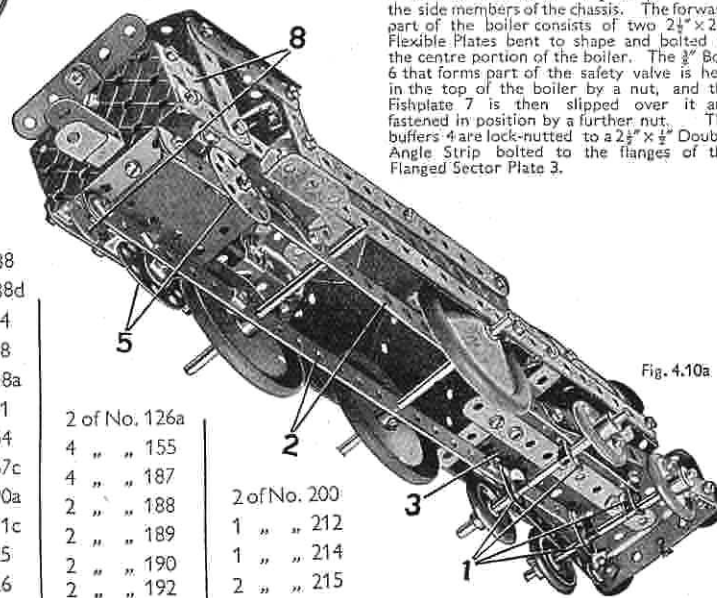


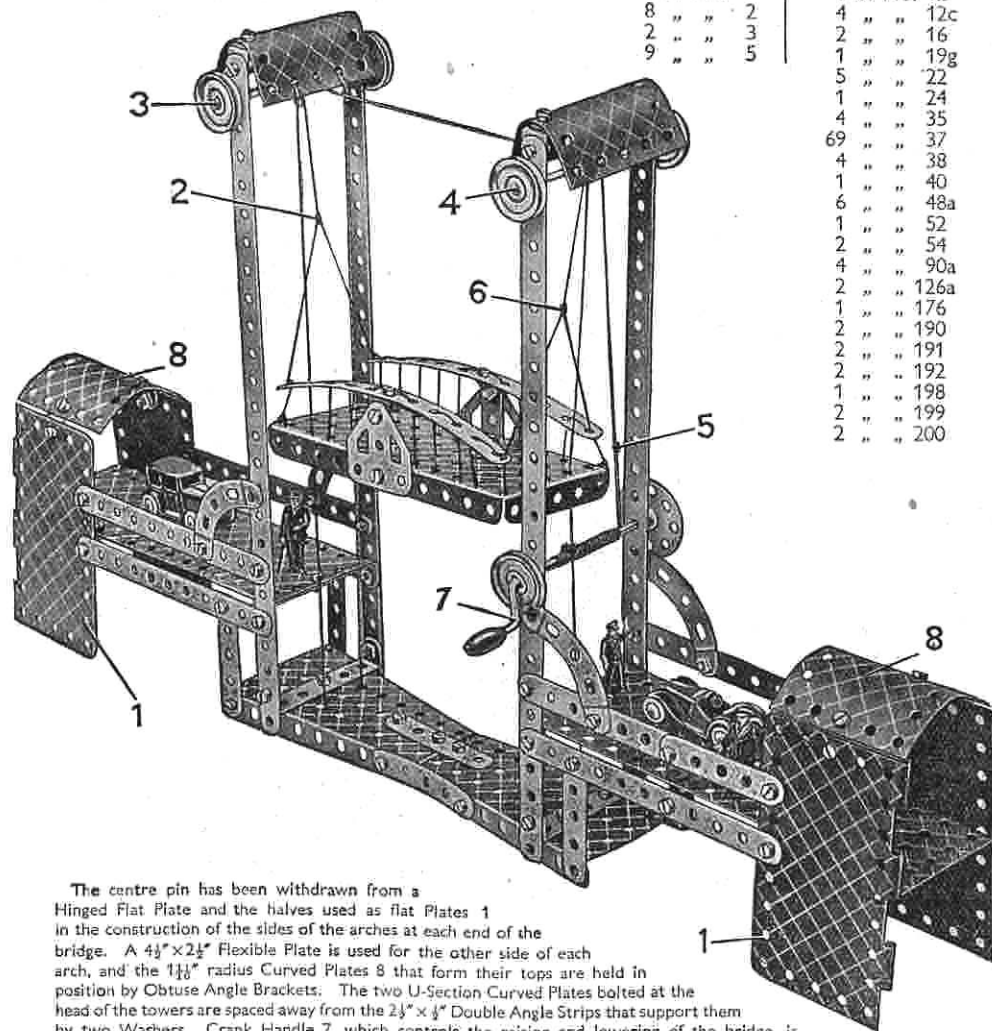
Fig. 4.10a

2 of No. 126a		2 of No. 200	
4 " " 155		1 " " 212	
4 " " 187		1 " " 214	
2 " " 188		2 " " 190	
2 " " 189		2 " " 192	

4.14 LIFTING BRIDGE

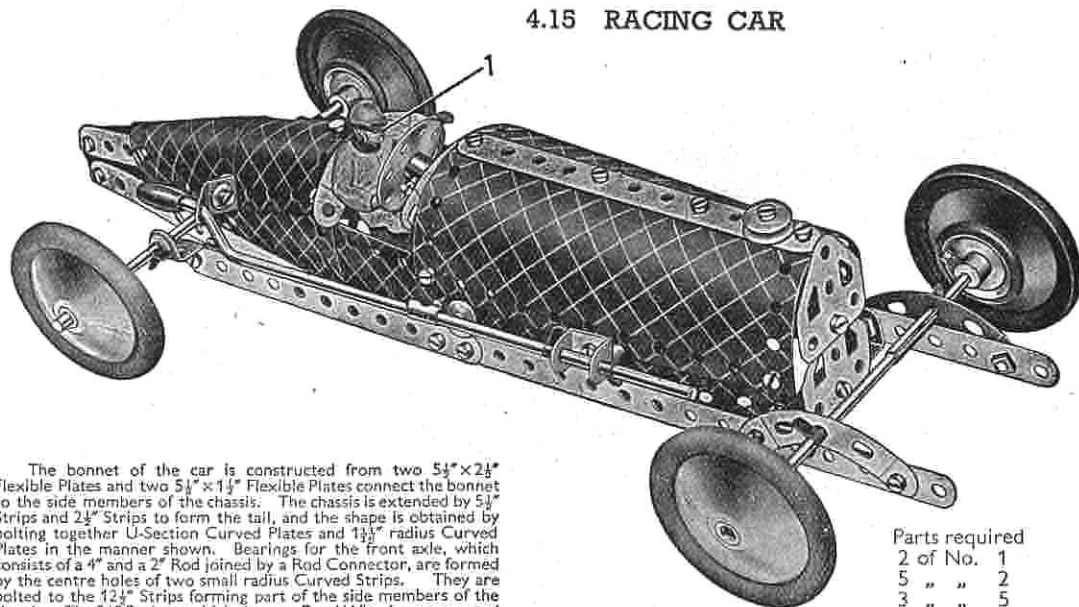
Parts required

4 of No. 1	6 of No. 12
8 " " 2	4 " " 12c
2 " " 3	2 " " 16
9 " " 5	1 " " 19g
	5 " " 22
	1 " " 24
	4 " " 35
	69 " " 37
	4 " " 38
	1 " " 40
	6 " " 48a
	1 " " 52
	2 " " 54
	4 " " 90a
	2 " " 126a
	1 " " 176
	2 " " 190
	2 " " 191
	2 " " 192
	1 " " 198
	2 " " 199
	2 " " 200



The centre pin has been withdrawn from a Hinged Flat Plate and the halves used as flat Plates 1 in the construction of the sides of the arches at each end of the bridge. A $4\frac{1}{2} \times 2\frac{1}{2}$ Flexible Plate is used for the other side of each arch, and the $1\frac{1}{8}$ radius Curved Plates 8 that form their tops are held in position by Obtuse Angle Brackets. The two U-Section Curved Plates bolted at the head of the towers are spaced away from the $2\frac{1}{2} \times \frac{1}{2}$ Double Angle Strips that support them by two Washers. Crank Handle 7, which controls the raising and lowering of the bridge, is retained in position in the sides of the right hand tower by a Bush Wheel and a 1" Pulley. Cord is wound round the shaft of Crank Handle 7, and at 5 a second length of Cord is knotted to it, and both are led over the Rod 4. One of the Cords is led downward and is tied at 6 to the Cords supporting the span; while the other is passed over Rod 3 and is tied at 2 to the other supporting Cords. Guide Cords are tied to Rods 3 and 4, and after passing through holes in the $5\frac{1}{2} \times 2\frac{1}{2}$ Flanged Plate are fastened to the two Flanged Sector Plates forming the base.

4.15 RACING CAR



The bonnet of the car is constructed from two $5\frac{1}{2} \times 2\frac{1}{2}$ Flexible Plates and two $5\frac{1}{2} \times 1\frac{1}{2}$ Flexible Plates connect the bonnet to the side members of the chassis. The chassis is extended by $5\frac{1}{2}$ Strips and $2\frac{1}{2}$ Strips to form the tail, and the shape is obtained by bolting together U-Section Curved Plates and $1\frac{1}{8}$ radius Curved Plates in the manner shown. Bearings for the front axle, which consists of a 4" and a 2" Rod joined by a Rod Connector, are formed by the centre holes of two small radius Curved Strips. They are bolted to the $12\frac{1}{2}$ Strips forming part of the side members of the chassis. The $3\frac{1}{2}$ Rods on which the rear Road Wheels are mounted are not joined, but are carried in bearings on each side of the tail. The bearings consist of a Reversed Angle Bracket bolted to the chassis and a Fishplate fastened to the side of the car. The Rods are held in position by Spring Clips.

Parts required

2 of No. 1
5 " " 2
3 " " 5
4 " " 10
1 " " 11
4 " " 12
1 " " 12c
2 " " 15b
2 " " 16
1 " " 17
1 " " 19g
4 " " 22
1 " " 23
1 " " 24
8 " " 35
42 " " 37
2 " " 37a
7 " " 38
1 " " 48
2 " " 48a
4 " " 90a
4 " " 111c
2 " " 125
2 " " 126
2 " " 126a
4 " " 155
4 " " 187
2 " " 188
2 " " 189
2 " " 192
1 " " 199
2 " " 199

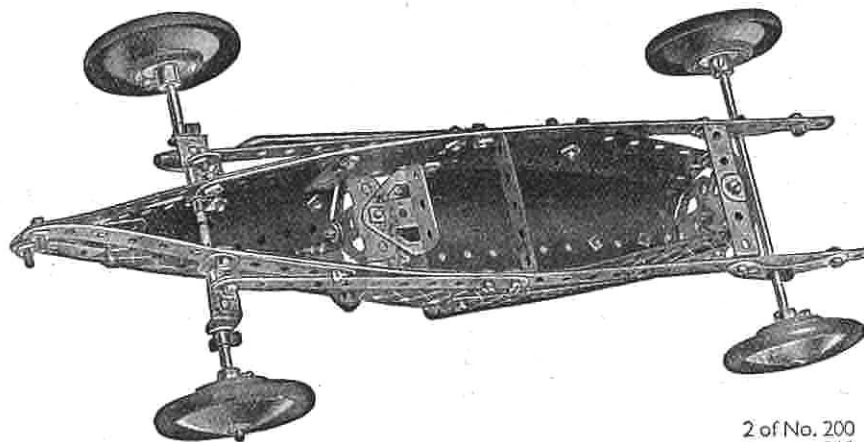
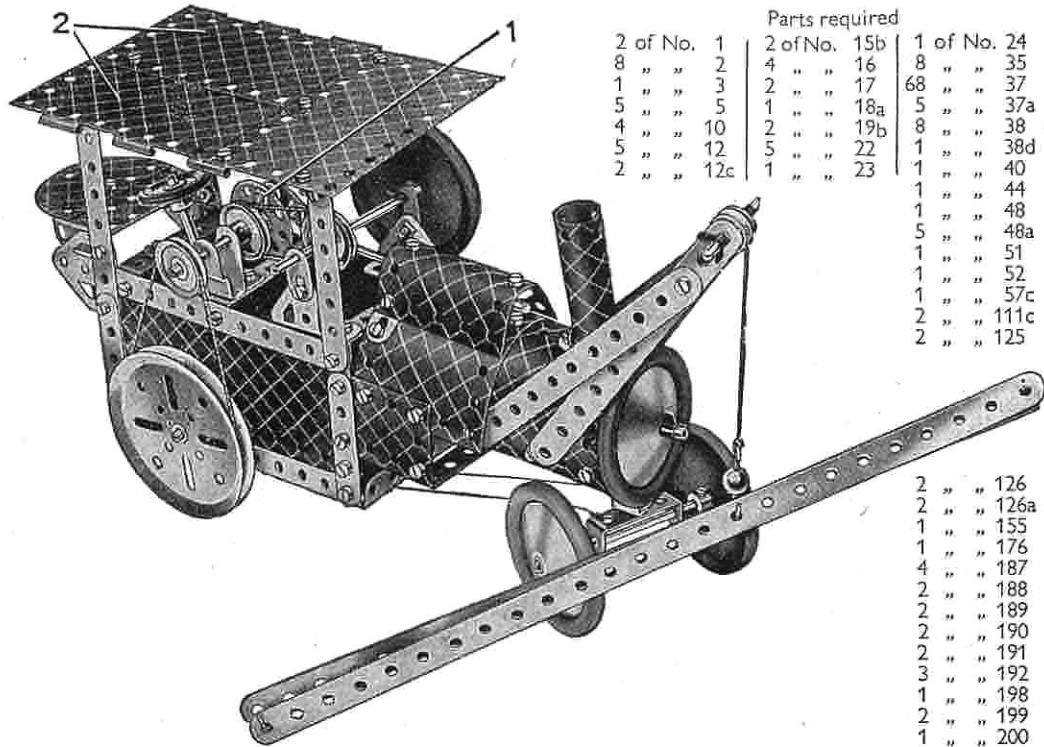


Fig. 4.15a

2 of No. 200
1 " " 212
2 " " 192
1 " " 213

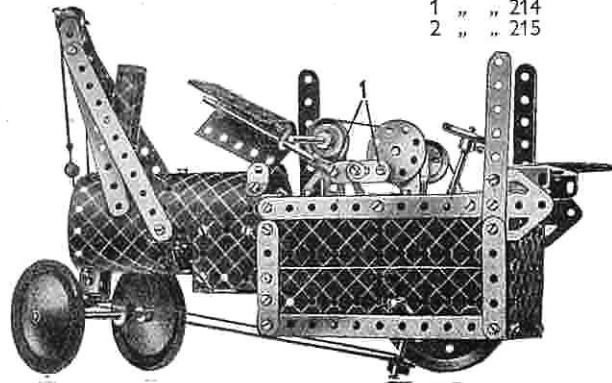
4.16 TRACTION ENGINE



Parts required	
2 of No. 1	2 of No. 15b
8 " " 2	4 " " 16
1 " " 3	2 " " 17
5 " " 5	1 " " 18a
4 " " 10	2 " " 19b
5 " " 12	5 " " 22
2 " " 12c	1 " " 23
	1 of No. 24
	8 " " 35
	68 " " 37
	5 " " 37a
	8 " " 38
	1 " " 38d
	1 " " 40
	1 " " 44
	1 " " 48
	5 " " 48a
	1 " " 51
	1 " " 52
	1 " " 57c
	2 " " 111c
	2 " " 125
2 " " 126	
2 " " 126a	
1 " " 155	
1 " " 176	
4 " " 187	
2 " " 188	
2 " " 189	
2 " " 190	
2 " " 191	
3 " " 192	
1 " " 198	
2 " " 199	
1 " " 200	
1 " " 212	
1 " " 213	
1 " " 214	
2 " " 215	

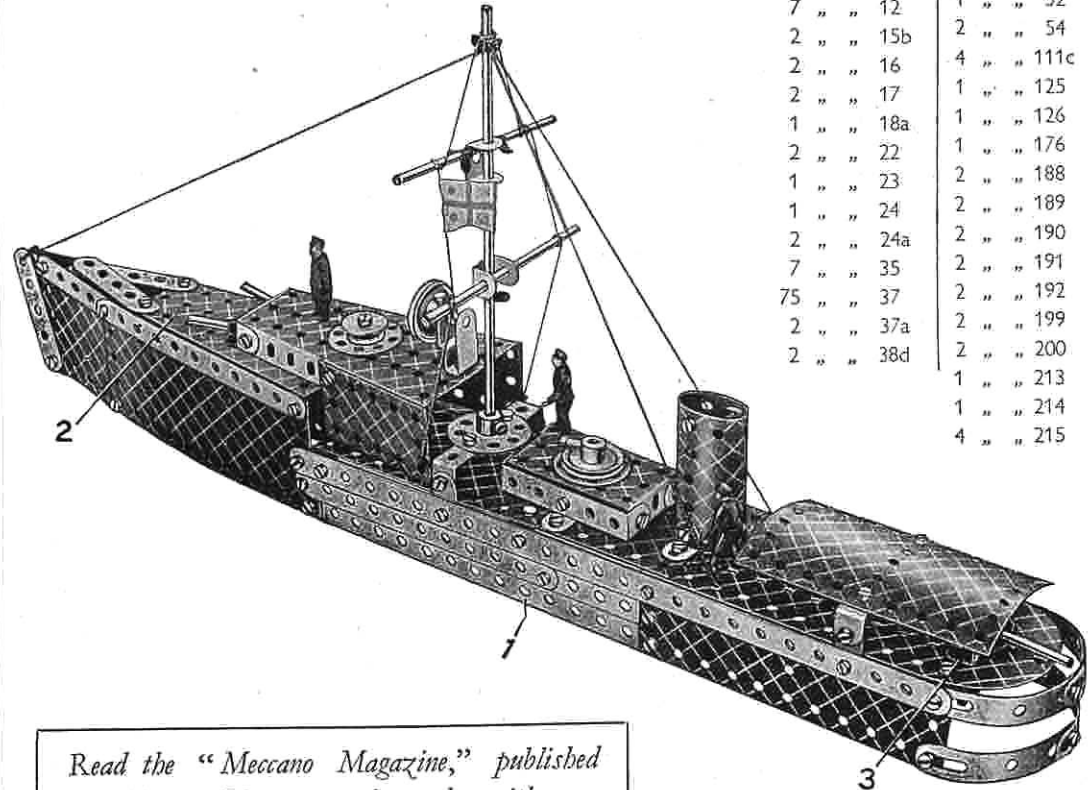
The cylinder consists of a U-Section Curved Plate, fastened to the boiler by Obtuse Angle Brackets. Bearings for the piston rod are formed by the holes of two Angle Brackets, which are held in place by the Bolts that can be seen at the top of the cylinder. The Bolts 1, which pass through a connecting rod consisting of two Fishplates are lock-nutted. A U-Section Curved Plate, bent so that its ends overlap one hole, is used for the chimney. The centre pin of a Hinged Flat Plate has been removed and the two parts used as flat plates 2 in the construction of the roof of the cab.

The $1\frac{1}{4} \times \frac{1}{4}$ Double Angle Strip that supports the front axle is pivotally attached by a lock-nutted Bolt, to the centre hole of a double bent strip, which consists of two Reversed Angle Brackets. The Cord controlling the steering is wound twice around the lower end of the steering column.



4.17 RIVER GUN BOAT

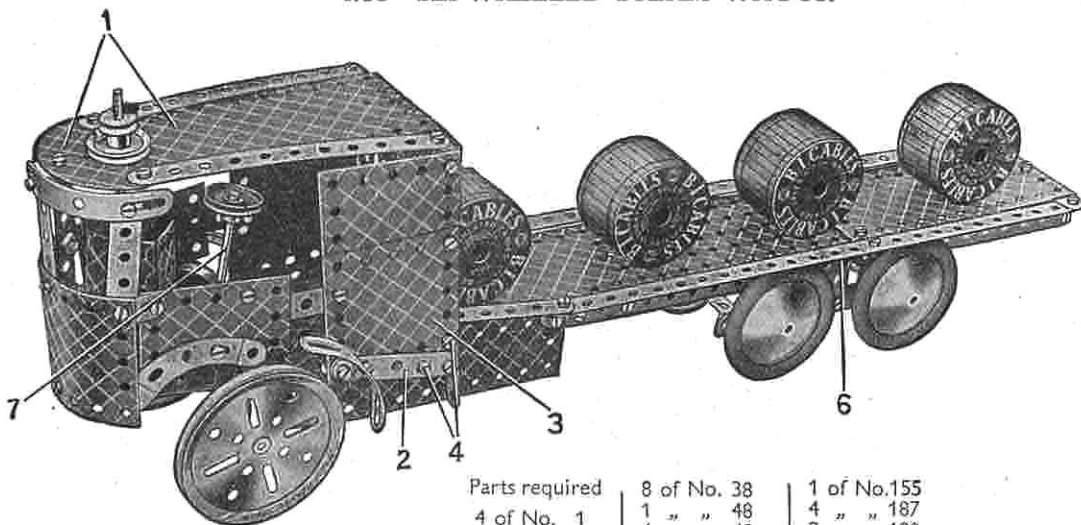
Each side of the forward part of the ship consists of a $2\frac{1}{2} \times 2\frac{1}{2}$ " and a $5\frac{1}{2} \times 2\frac{1}{2}$ " Flexible Plate. These are bolted to the $12\frac{1}{2}$ " Strip 1 and to the Flanged Sector Plate 2. The funnel is represented by two U-Section Curved Plates bent so that their ends overlap two holes at each side, and it is fastened to the deck by two Angle Brackets. The forward gun turret, also a Flanged Sector Plate, is fastened to the raised portion of the deck by means of an $\frac{1}{2} \times \frac{1}{2}$ " Angle Bracket. The guns are represented by two 2" Rods, held by Spring Clips in the holes of a $1\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strip bolted to the narrow end of the Flanged Sector Plate 2. A $1\frac{1}{2}$ " Rod, held by a Spring Clip and Cord Anchoring Spring in a Trunnion 3, forms the rear gun. The gun in front of the funnel is held in place by a $\frac{3}{8}$ " Bolt passed through the centre hole of the Flanged Plate and locked in the boss of the Pulley by the $\frac{3}{8}$ " Bolt representing the gun barrel.



Parts required	
4 of No. 1	1 of No. 40
4 " " 2	1 " " 44
8 " " 5	1 " " 48
4 " " 10	5 " " 48a
2 " " 11	1 " " 51
7 " " 12	1 " " 52
2 " " 15b	2 " " 54
2 " " 16	4 " " 111c
2 " " 17	1 " " 125
1 " " 18a	1 " " 126
2 " " 22	1 " " 176
1 " " 23	2 " " 188
1 " " 24	2 " " 189
2 " " 24a	2 " " 190
7 " " 35	2 " " 191
75 " " 37	2 " " 192
2 " " 37a	2 " " 199
2 " " 38d	2 " " 200
	1 " " 213
	1 " " 214
	4 " " 215

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4.18 SIX-WHEELED STEAM WAGON



In Fig. 4.18a the top of the cab has been removed to show the construction of the boiler and steering wheel. The boiler consists of two U-Section Curved Plates fastened by a $1\frac{1}{2} \times \frac{1}{2}$ Double Angle Strip to the Flanged Sector Plate forming the bottom of the cab. The two 1" Pulleys seen in Fig. 4.18a are fixed to the steering column 7, which passes through the bottom of the cab and is held in the boss of a Bush Wheel carrying a $2\frac{1}{2} \times \frac{1}{2}$ Double Angle Strip. The holes in the turned down ends of the Double Angle Strip support the 4" Rod that forms the front axle. The method of attaching the chimney to the two Plates 1 is shown in Fig. 4.18c. The Bolts 4 pass through a Fishplate behind Plate 3, thus securing the Strip 2 to the Plate. The 1" Pulley with Rubber Ring represents the top of the boiler.

Fig. 4.18b shows the construction of the rear wheel bogie. The bogie is attached to the wagon by a Rod 5, which passes through the holes in the $12\frac{1}{2}$ Strips 6 and through the upper holes in the Fiat Trunnions bolted to the bogie. The Rod is held in position by Spring Clips.

Parts required

4 of No. 1
8 " " 2
2 " " 3
6 " " 5
4 " " 10
2 " " 11
8 " " 12
2 " " 12c
2 " " 15b
4 " " 16
2 " " 19b
5 " " 22
1 " " 23
1 " " 24
8 " " 35
75 " " 37
2 " " 37a

8 of No. 38
1 " " 48
6 " " 48a
1 " " 51
1 " " 52
1 " " 54
4 " " 90a
2 " " 111c
2 " " 125
1 " " 126
2 " " 126a

1 of No. 155
4 " " 187
2 " " 188
2 " " 189
4 " " 190
2 " " 191
2 " " 192
2 " " 199
2 " " 200
1 " " 214
4 " " 215

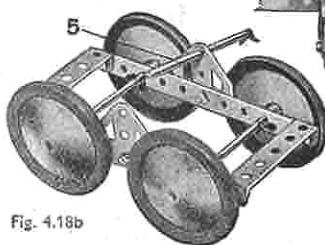


Fig. 4.18b

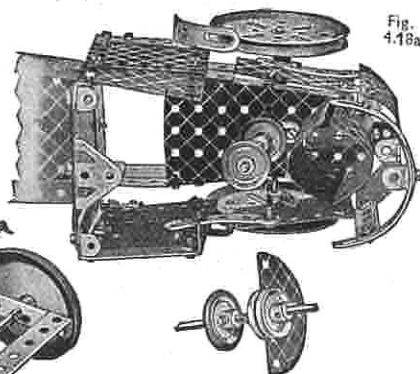
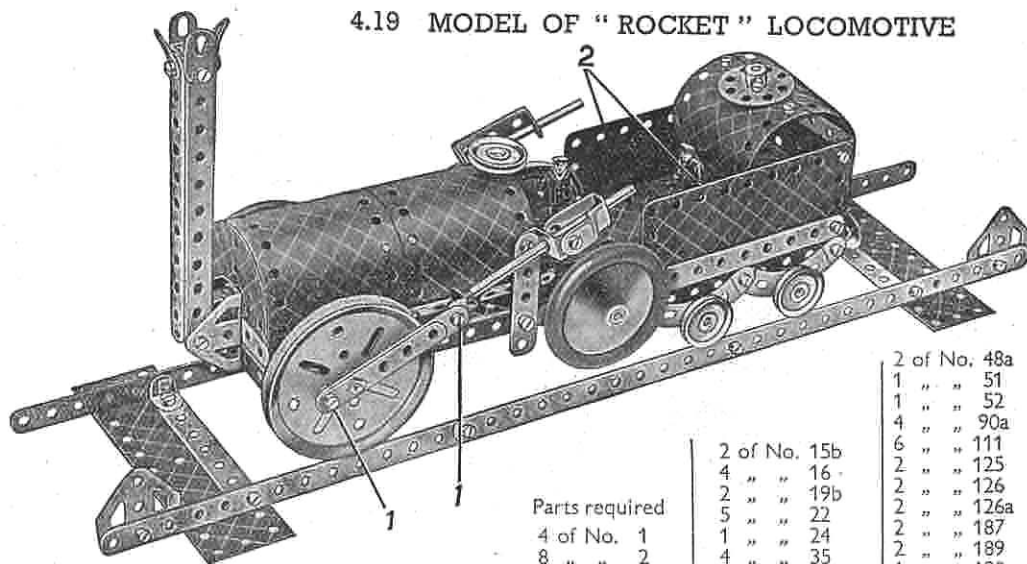


Fig. 4.18c

Fig. 4.18a

4.19 MODEL OF "ROCKET" LOCOMOTIVE



Parts required

4 of No. 1
8 " " 2
2 " " 3
9 " " 5
4 " " 10
1 " " 11
8 " " 12
4 " " 12c

2 of No. 15b
4 " " 16
2 " " 19b
2 " " 126
2 " " 126a
1 " " 187
2 " " 189
1 " " 190
1 " " 191
2 " " 192
1 " " 198
2 " " 200
1 " " 44
1 " " 48

2 of No. 48a
1 " " 51
1 " " 52
4 " " 90a
6 " " 111
2 " " 125
2 " " 126
2 " " 126a
2 " " 187
2 " " 189
1 " " 190
1 " " 191
2 " " 192
1 " " 198
2 " " 200
2 " " 214

The pin has been removed from a Hinged Flat Plate and the halves used as flat plates 2, to form the sides of the tender. The chassis of the engine consists of a $5\frac{1}{2} \times 2\frac{1}{2}$ and a $2\frac{1}{2} \times 1\frac{1}{2}$ Flanged Plate, fastened together by two $2\frac{1}{2}$ Strips. Two $5\frac{1}{2} \times 2\frac{1}{2}$ Flexible Plates bolted to $5\frac{1}{2}$ Strips form the boiler, and are fastened to the $5\frac{1}{2} \times 2\frac{1}{2}$ Flanged Plate by Obtuse Angle Brackets, two of which can be seen in Fig. 4.19a. Semi-Circular Plates form the ends of the boiler.

The four $5\frac{1}{2}$ Strips that represent the chimney are joined together at the top by a Double Bracket and an Angle Bracket. The Chimney is bolted to two Trunnions, secured to the chassis and to the boiler front. Bearings for the piston rods are formed on one side by a $1\frac{1}{2} \times \frac{1}{2}$ Double Angle Strip and a Reversed Angle Bracket, and on the other side by a Stepped Bent Strip and a Reversed Angle Bracket. The Bolts 1 on the connecting rods are lock-nutted, and the piston rods are retained in position by Spring Clips placed on each side of the Angle Brackets. The $\frac{3}{4}$ " Washers representing buffers are fastened against the heads of the $\frac{3}{4}$ " Bolts, which are lock-nutted to the Flexible Plate forming the back of the tender.

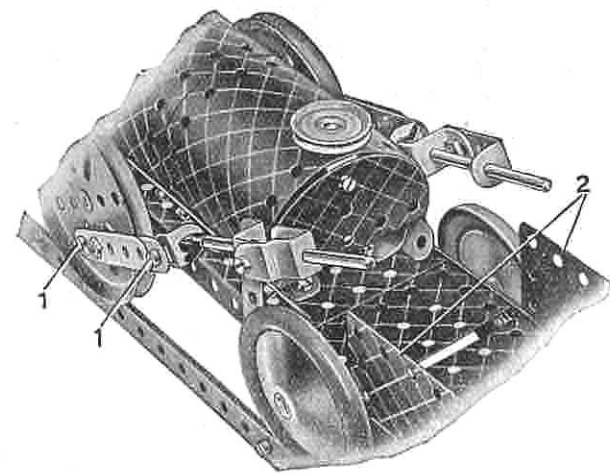
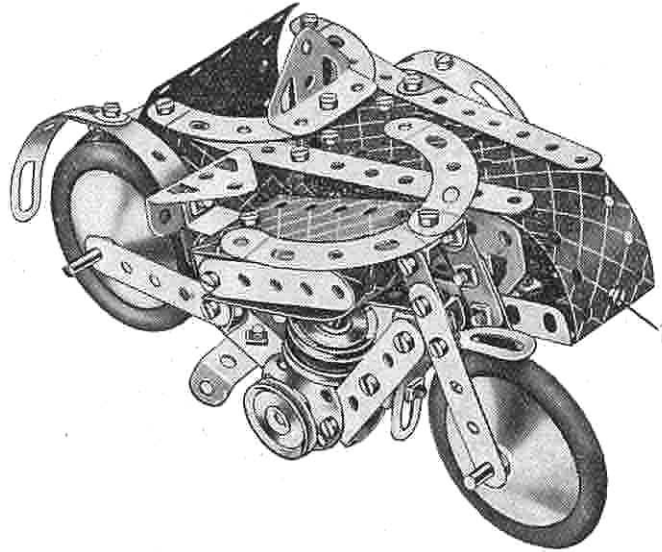


Fig. 4.19a

4.20 MOTOR CYCLE AND SIDECAR



Parts required

5 of No. 2	3 of No. 48a
1 " " 3	1 " " 54
8 " " 5	4 " " 90a*
5 " " 10	1 " " 111c
2 " " 11	1 " " 125
8 " " 12	2 " " 126
1 " " 12c	2 " " 126a
1 " " 16	3 " " 187
2 " " 17	2 " " 188
1 " " 18a	2 " " 189
3 " " 22	1 " " 190
2 " " 24a	2 " " 199
1 " " 35	1 " " 200
51 " " 37	2 " " 214
2 " " 38	4 " " 215
1 " " 48	

The $5\frac{1}{2}'' \times 1\frac{1}{4}''$ Flexible Plate that forms the front of the sidecar is bolted at 1 to a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip, which is fastened by Bolt 2 to the $4\frac{1}{2}''$ Flanged Sector Plate forming the bottom of the sidecar. The Bolts 3 pass through the Flexible Plates and also through a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip.

The engine cylinder consists of two 1" Pulleys mounted on a 2" Rod, one end of which is journalled in the Strip 4 that forms the top of the frame. The other end of the Rod is held between the two Bolts that fasten the Wheel Discs to the frame.

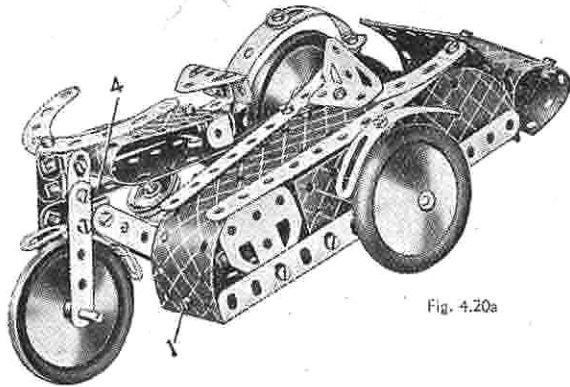


Fig. 4.20a

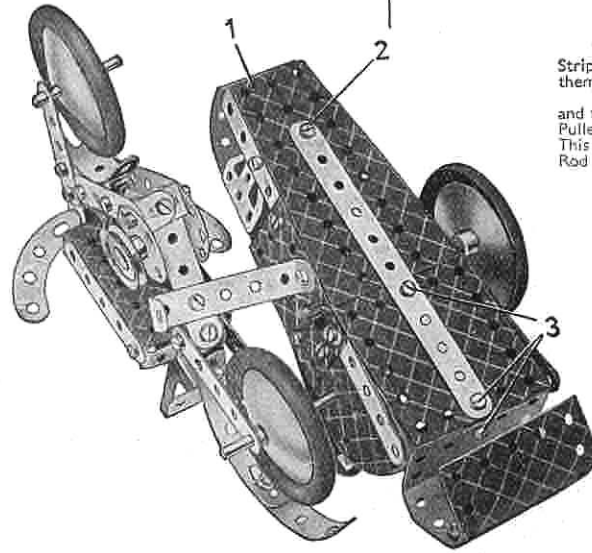
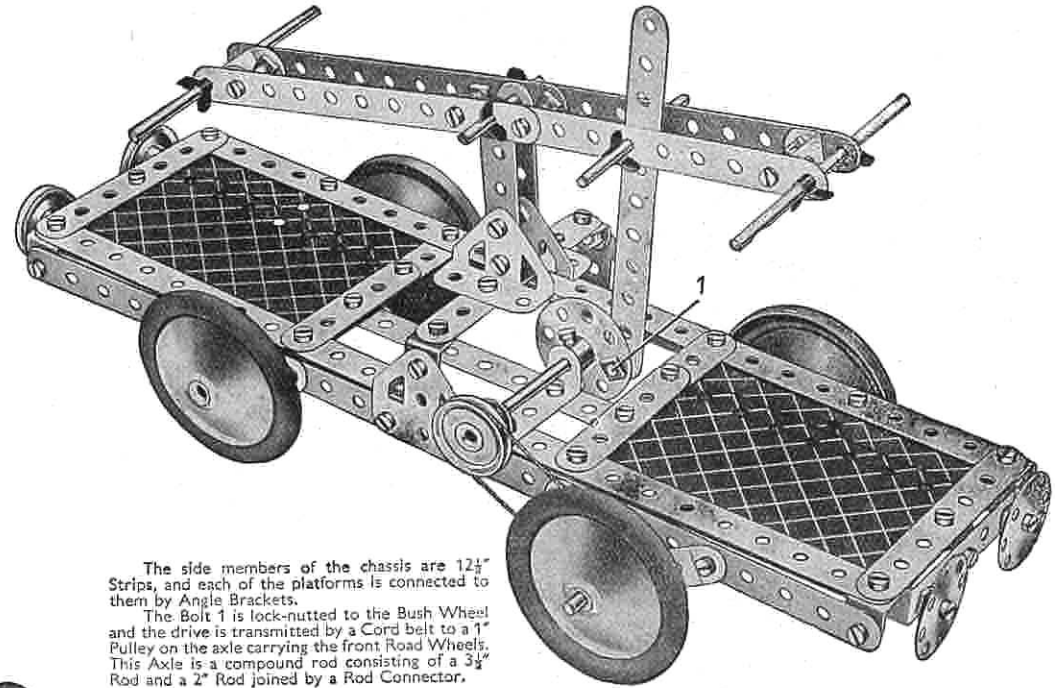


Fig. 4.20b

4.21 HAND TROLLEY CAR



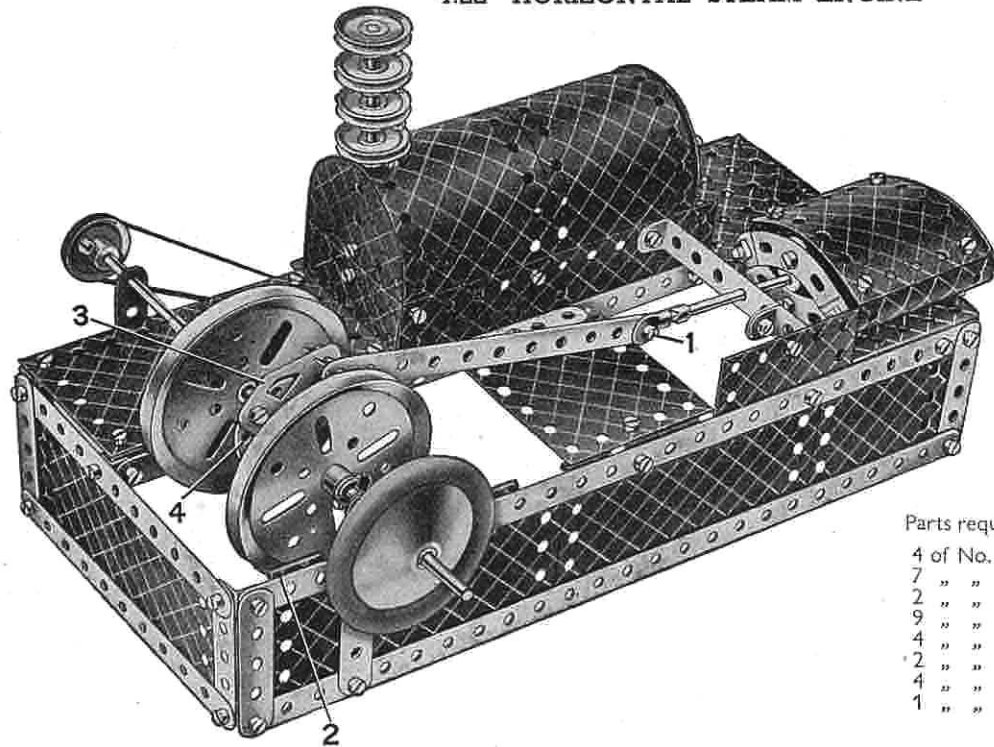
The side members of the chassis are $12\frac{1}{2}''$ Strips, and each of the platforms is connected to them by Angle Brackets.

The Bolt 1 is lock-nutted to the Bush Wheel and the drive is transmitted by a Cord belt to a 1" Pulley on the axle carrying the front Road Wheels. This Axle is a compound rod consisting of a $3\frac{1}{2}''$ Rod and a 2" Rod joined by a Rod Connector.

Parts required

4 of No. 1	2 of No. 18a	2 of No. 48a
6 " " 2	4 " " 22	4 " " 90a
2 " " 3	1 " " 24	4 " " 111c
8 " " 5	2 " " 24a	2 " " 126*
2 " " 11	8 " " 35	2 " " 126a
8 " " 12	54 " " 37	4 " " 187
1 " " 15b	7 " " 37a	4 " " 190
3 " " 16	2 " " 38	2 " " 191
2 " " 17	1 " " 48	1 " " 213

4.22 HORIZONTAL STEAM ENGINE



Parts required

4 of No.	1
7 " "	2
2 " "	3
9 " "	5
4 " "	10
2 " "	11
4 " "	12
1 " "	15b

3 of No.	16
1 " "	17
1 " "	18b
2 " "	19b
5 " "	22
1 " "	24
1 " "	24a
6 " "	35
75 " "	37
6 " "	37a
3 " "	38
6 " "	48a
1 " "	51
1 " "	52
4 " "	90a
6 " "	111c
2 " "	125
2 " "	126
2 " "	126a
1 " "	176
1 " "	187
2 " "	188
2 " "	189
4 " "	190
2 " "	191
2 " "	192
1 " "	198
2 " "	199
2 " "	200
1 " "	212
1 " "	213
2 " "	214
1 <i>Magic</i> Motor (not included in Outfit)	

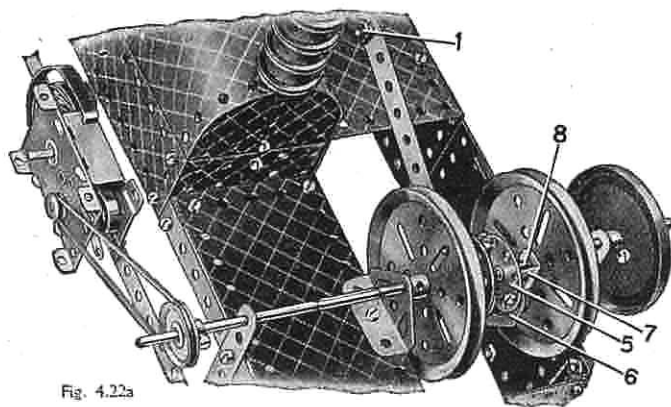
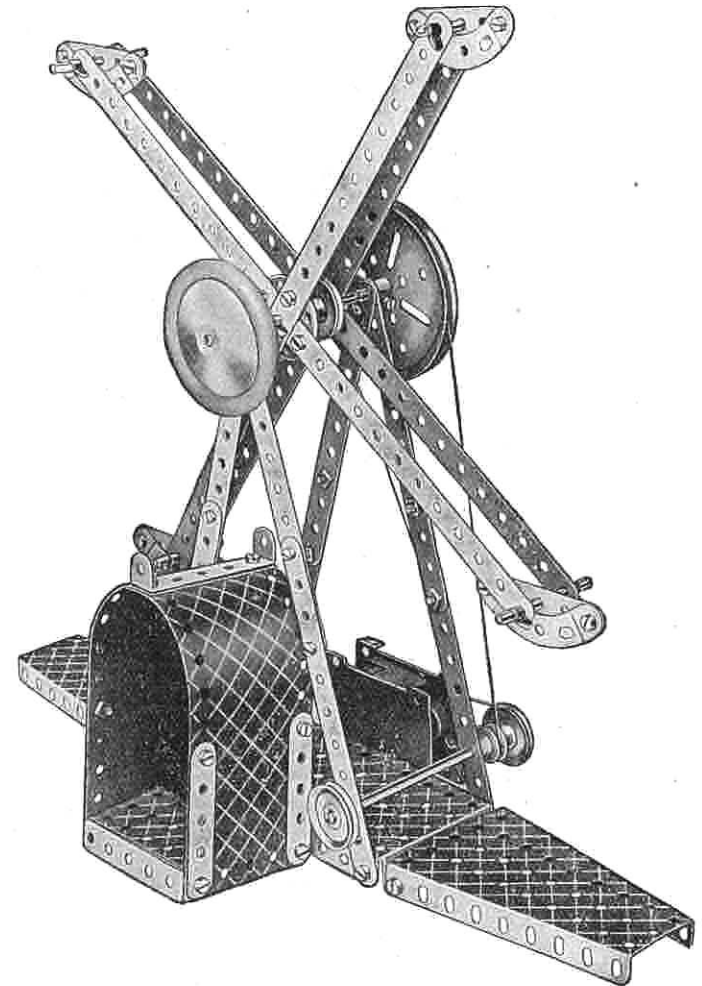


Fig. 4.22a

The Bolt 1 is lock-nutted. The centre pin is withdrawn from a Hinged Flat Plate and the two halves used as flat plates at 2. The Flat Trunnion 3 is bolted to Bush Wheel 4 and forms one web of the crank. The Bush Wheel is fastened to a 2" Rod, which carries also a 3" Pulley, and a Rod Connector joins this Rod to a 3½" Rod that transmits the drive from the *Magic* Motor. The other web of the crank is made by bolting a Wheel Disc 5 to a Flat Trunnion 6, one of the bolts holding also a Reversed Angle Bracket 7. A Spring Clip 8 is fixed in position so that when the crankshaft is rotated the Rod on which the 3" Pulley and the Road Wheel are fastened is rotated by the Reversed Angle Bracket 7. The cylinder is composed of two 1½" radius Curved Plates and two U-Section Curved Plates bolted together as shown, and the complete unit is fastened in position to the 5½" x 2½" Flanged Plate that forms the base.

The boiler consists of two 5½" x 2½" Flexible Plates bolted to 5½" x 1½" Flexible Plates, and its ends are closed by Semi-circular Plates and 2½" x 1½" Flexible Plates. The fire-box door is represented by a Trunnion. The chimney is a 4" Rod fitted with 1" Pulleys, and is held in place by a Cord Anchoring Spring. Fig. 4.22a shows the arrangement for driving the model with a *Magic* Motor.

4.23 FLYBOATS

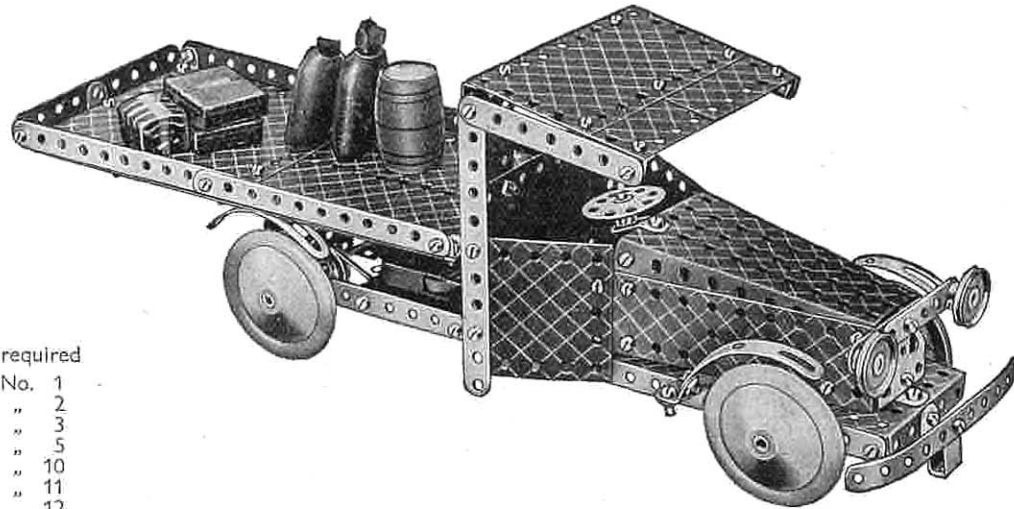


Parts required

4 of No.	1
8 " "	2
8 " "	5
2 " "	15b
2 " "	17
2 " "	18a
1 " "	19b
3 " "	22
1 " "	24
8 " "	35
44 " "	37
1 " "	40
6 " "	48a
1 " "	51
1 " "	52
2 " "	54
4 " "	90a
1 " "	176
1 " "	187
2 " "	192
1 <i>Magic</i> Motor (not included in Outfit)	

The *Magic* Motor is bolted to the flange of the 5½" x 2½" Flanged Plate, and the drive is taken from the pulley of the Motor to a 1" Pulley fastened on a Rod journalled in the 12½" Strips that support the main shaft. A ¼" fast Pulley also is secured on this Rod, and drives through a belt of Cord a 3" Pulley on the main shaft. The arms that support the boats are bolted to a Bush Wheel fastened on the main shaft. Each of the boats consists of a 2½" Strip and a 2½" small radius Curved Strip bolted together.

4.24 MOTOR LORRY



Parts required

- 2 of No. 1
- 7 " " 2
- 2 " " 3
- 8 " " 5
- 2 " " 10
- 2 " " 11
- 8 " " 12
- 3 " " 12c
- 2 " " 15b
- 1 " " 16
- 1 " " 22
- 1 " " 24
- 5 " " 35
- 75 " " 37
- 2 " " 37a
- 5 " " 38
- 1 " " 44
- 1 " " 48
- 4 " " 48a
- 1 " " 52
- 2 " " 54
- 4 " " 111c
- 2 " " 125
- 2 " " 126
- 1 " " 126a
- 4 " " 187
- 2 " " 188
- 2 " " 189
- 4 " " 190
- 2 " " 191
- 2 " " 192
- 1 " " 198
- 4 " " 215

The chassis of the model consists of two 12½" Strips bolted to a 5½" x 2½" Flanged Plate and secured at their free ends by a 2½" x ½" Double Angle Strip. Both the front and rear axles are journalled directly in the chassis. The *Magic Motor* is attached by its flanges to one of the 12½" Strips, and the drive is taken through a Driving Band from the pulley of the Motor to a 1" fast Pulley fastened on the back axle of the lorry.

The platform is fixed to the end of the chassis by two 2½" x ½" Double Angle Strips, the ends of which can be seen in Fig. 4.24a, and also to the back of the cab by a 1½" x ½" Double Angle Strip. The front bumper consists of a 5½" Strip curved to shape and fastened by a Stepped Bent Strip to the 5½" x 2½" Flanged Plate forming the front of the chassis. The head-lamps, which are 1" Pulleys, are fixed in place by ½" Bolts pushed through the 2½" Strips into the bosses of the Pulleys and held by the setscrews.

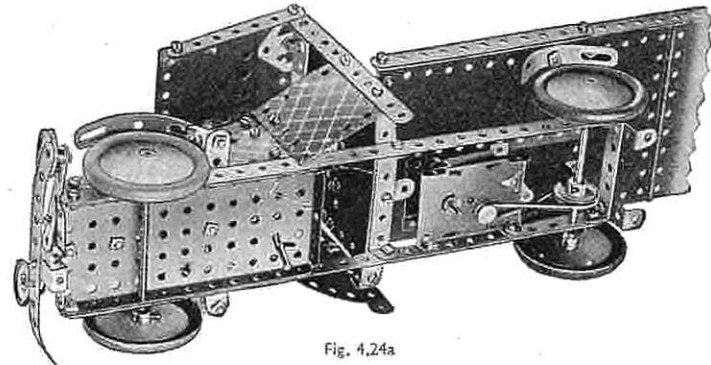
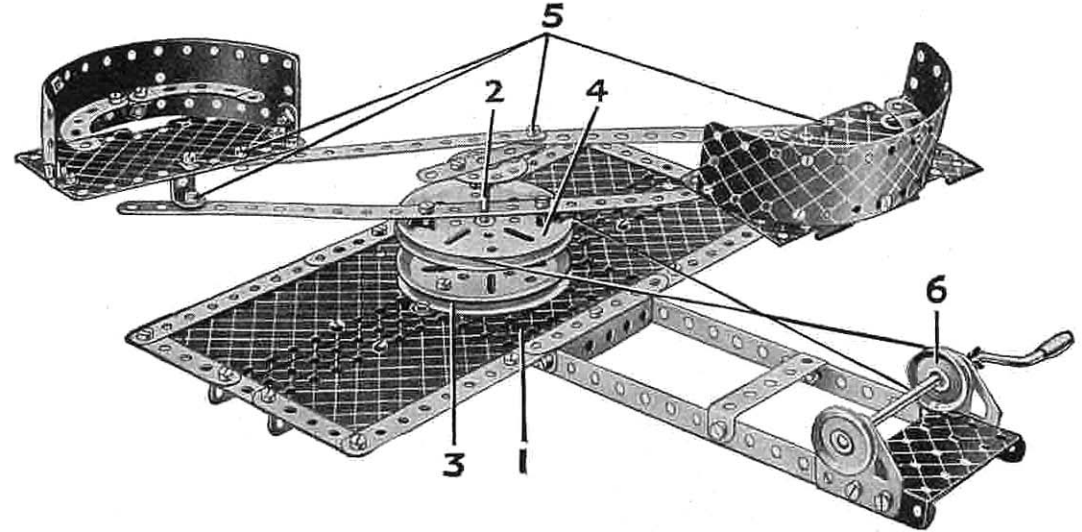


Fig. 4.24a

1 *Magic Motor* (not included in Outfit)

4.25 " WHIP " ROUNDABOUT



Parts required

- | | |
|------------|---------------|
| 3 of No. 1 | 52 of No. 37b |
| 7 " " 2 | 8 " " 38 |
| 2 " " 3 | 1 " " 40 |
| 4 " " 5 | 1 " " 48a |
| 4 " " 10 | 1 " " 51 |
| 2 " " 11 | 1 " " 52 |
| 6 " " 12 | 2 " " 54 |
| 1 " " 17 | 4 " " 90a |
| 2 " " 19b | 6 " " 111c |
| 1 " " 19g | 2 " " 126a |
| 2 " " 22 | 2 " " 188 |
| 1 " " 24 | 2 " " 189 |
| 4 " " 35 | 2 " " 191 |
| 65 " " 37a | 2 " " 192 |

1 of No. 198

The base of the model is formed by a 5½" x 2½" Flanged Plate 1 extended on each side by a Flanged Sector Plate, a 5½" x 2½" and a 4½" x 2½" Flexible Plate. The edges of the base are strengthened with Strips. Two 12½" Strips are bolted to the flanges of Plate 1 and their ends are connected by a 2½" x 1½" Flanged Plate. Two Flat Trunnions provide bearings for a small Crank Handle.

A 3" Pulley 3 is bolted to Flanged Plate 1 and in its boss is fixed a 2" Rod 2. A second 3" Pulley 4 is spaced from Pulley 3 by a Spring Clip and is free to turn on Rod 2. Across its face is bolted a 12½" Strip, the Strip being spaced from the Pulley by a Spring Clip and two Washers placed on the shank of each securing Bolt.

A Bush Wheel fitted with a 2½" Strip is secured on Rod 2 in the position shown, the end of the Strip being connected to the cars by 5½" Strips. All the Bolts 5 are lock-nutted.

The 1" Pulley 6 mounted on the Crank Handle, drives Pulley 4 through a belt of Cord.

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

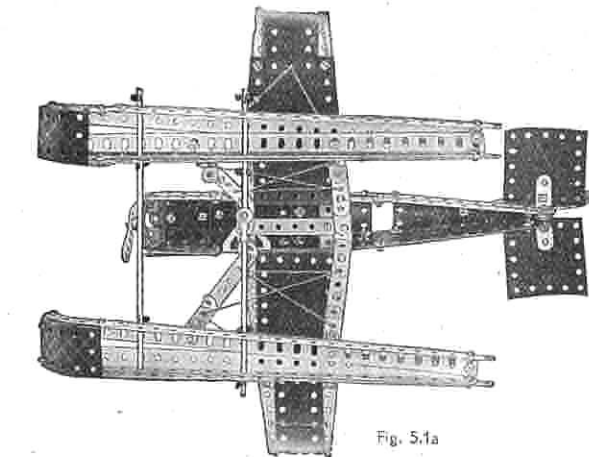
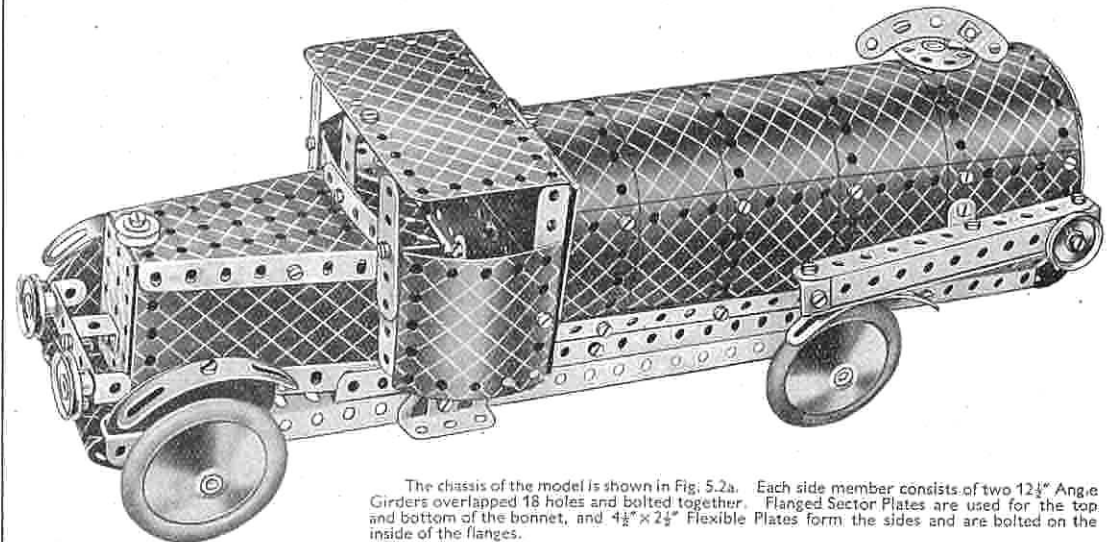


Fig. 5.1a

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

The leading edge of the wing is fastened to the fuselage by a Trunion, 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 $2\frac{1}{2}'' \times 1\frac{1}{4}''$ Flexible Plates overlapped one hole. The cab is fastened to the chassis by Angle Brackets, and to the bonnet by the $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip that forms the central division of the windscreen.

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

Parts required

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

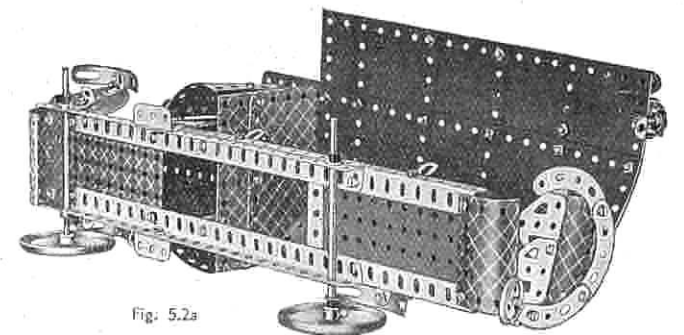
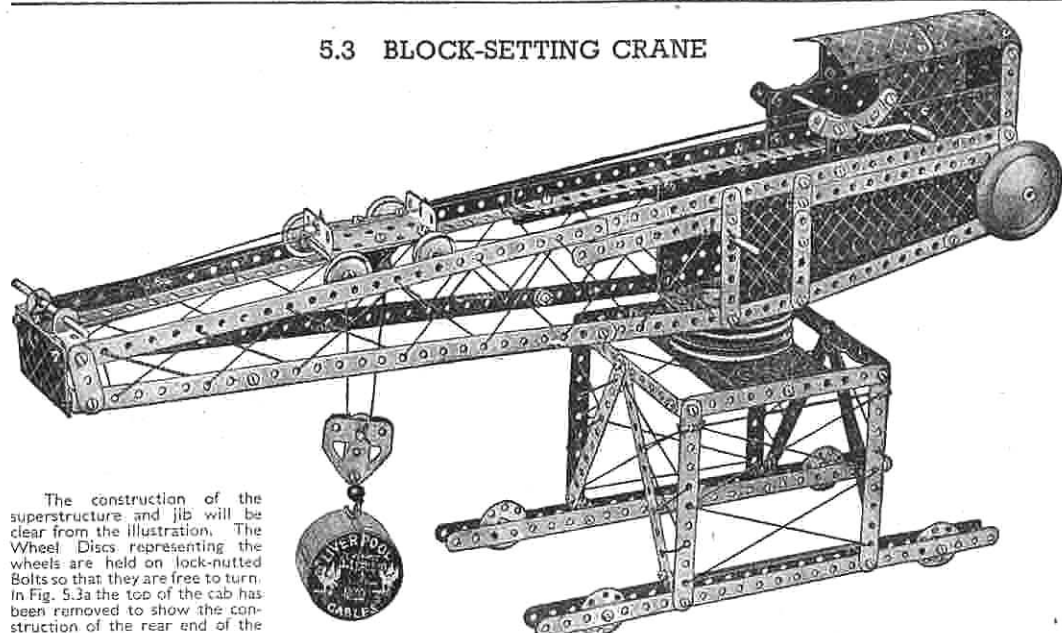


Fig. 5.2a

5.3 BLOCK-SETTING CRANE



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

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

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

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

Fig. 5.3a

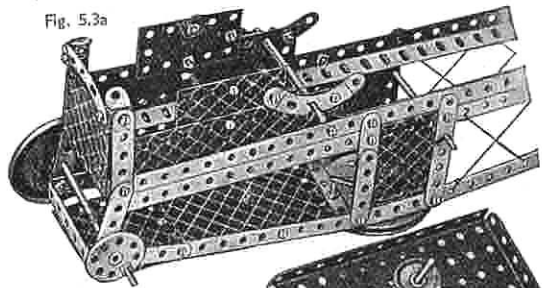


Fig. 5.3c

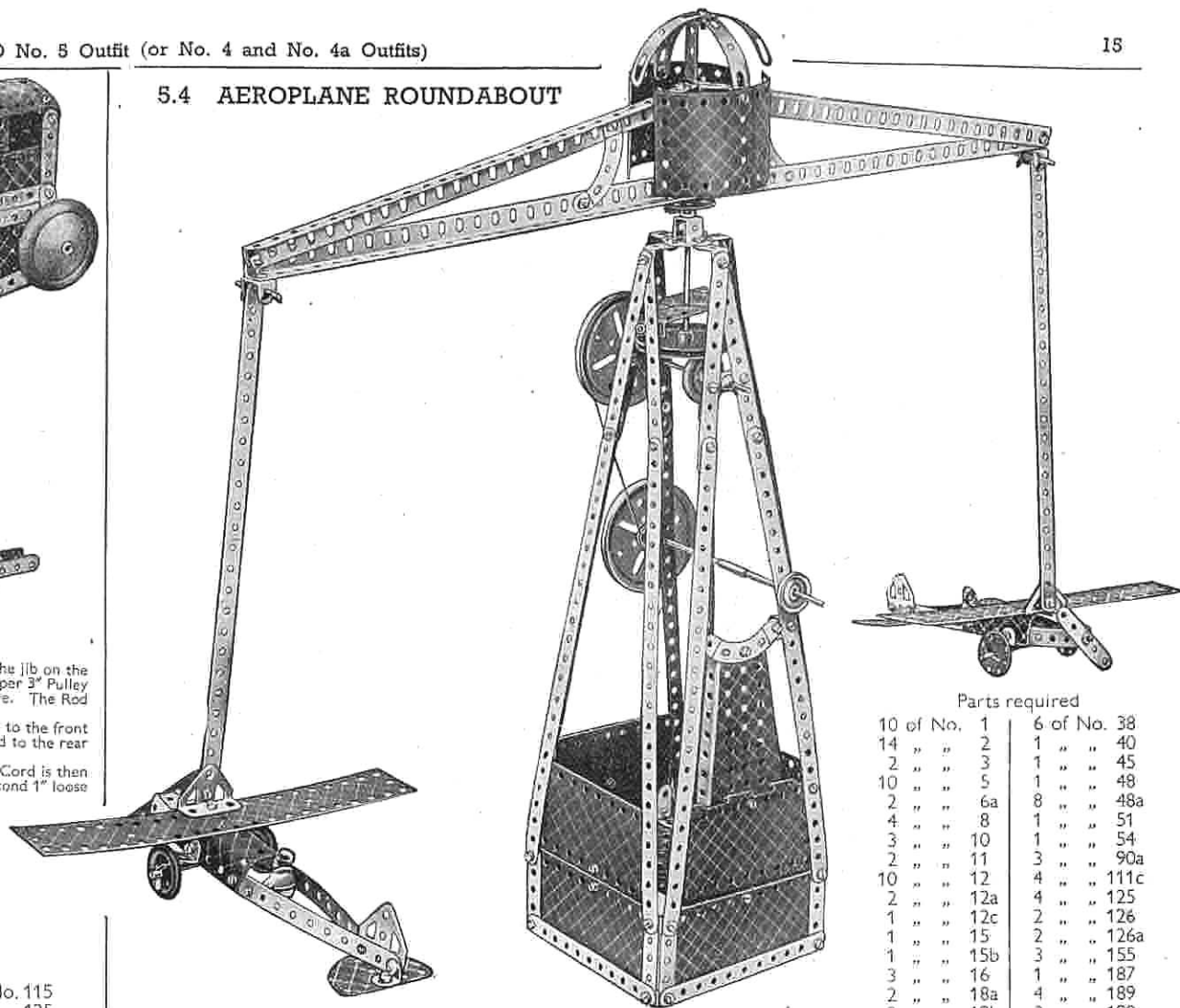


Fig. 5.3b

Parts required

10 of No. 1	2 of No. 22a	1 of No. 115
14 " " 2	1 " " 23	2 " " 125
2 " " 3	1 " " 24	2 " " 126
12 " " 5	4 " " 24a	2 " " 126a
2 " " 6a	10 " " 35	1 " " 176
4 " " 8	85 " " 37	1 " " 187
4 " " 11	6 " " 37a	3 " " 188
12 " " 12	11 " " 38	4 " " 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	3 " " 57c	
2 " " 19b	3 " " 90a	
1 " " 19g	1 " " 111a	
5 " " 22	6 " " 111c	

5.4 AEROPLANE ROUNDABOUT



Parts required

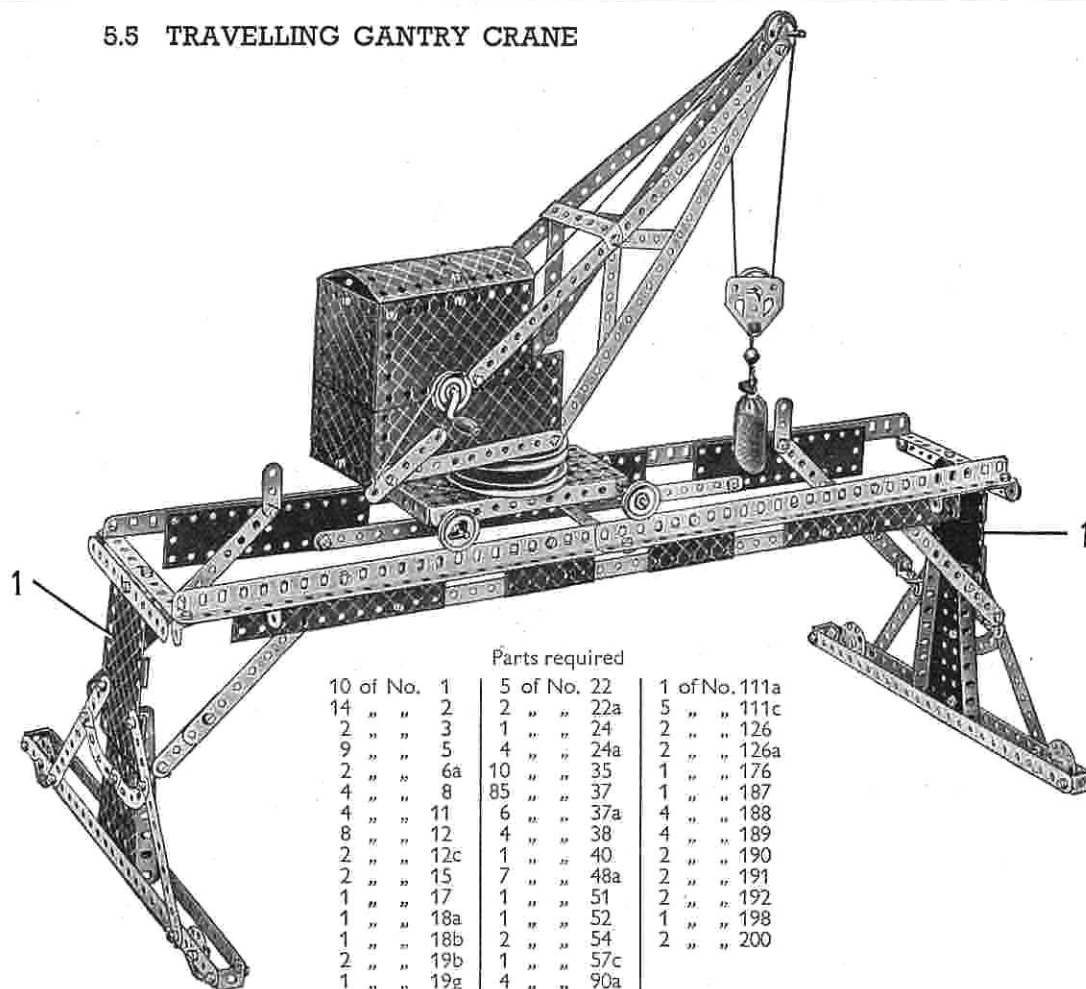
10 of No. 1	6 of No. 38
14 " " 2	1 " " 40
2 " " 3	1 " " 45
10 " " 5	1 " " 48
2 " " 6a	8 " " 48a
4 " " 8	1 " " 51
3 " " 10	1 " " 54
2 " " 11	3 " " 90a
10 " " 12	4 " " 111c
2 " " 12a	4 " " 125
1 " " 12c	2 " " 126
1 " " 15	2 " " 126a
1 " " 15b	3 " " 155
3 " " 16	1 " " 187
2 " " 18a	4 " " 189
2 " " 19b	2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

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

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

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

5.5 TRAVELLING GANTRY CRANE



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

The pin has been withdrawn from a Hinged Flat Plate and the halves are used as flat plates 1 in the construction of the supports for the gantry. Four Wheel Discs are fastened to the 12½" Strips by lock-nutted Bolts, so that the gantry can travel along the ground.

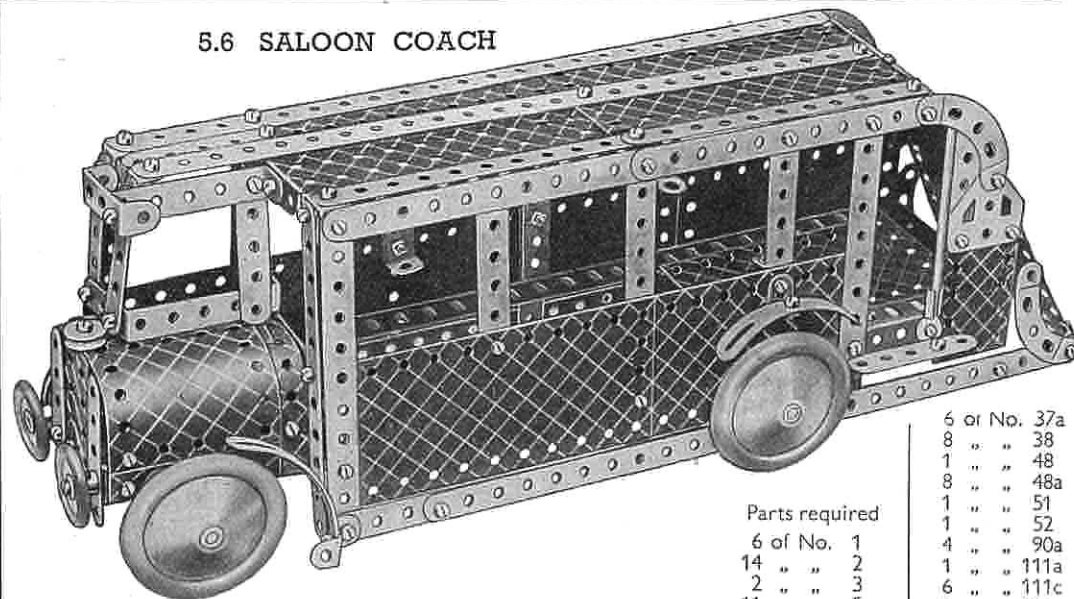
Each of the rails along which the crane runs consists of two 12½" Angle Girders, overlapped three holes and joined across by 5½" Strips. Trunnions connect the rails to the supports.

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

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

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

5.6 SALOON COACH



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

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

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

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

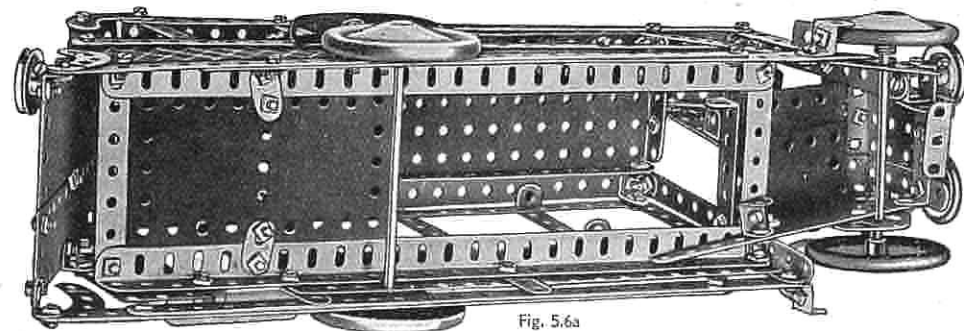


Fig. 5.6a

5.7 MERRY-GO-ROUND

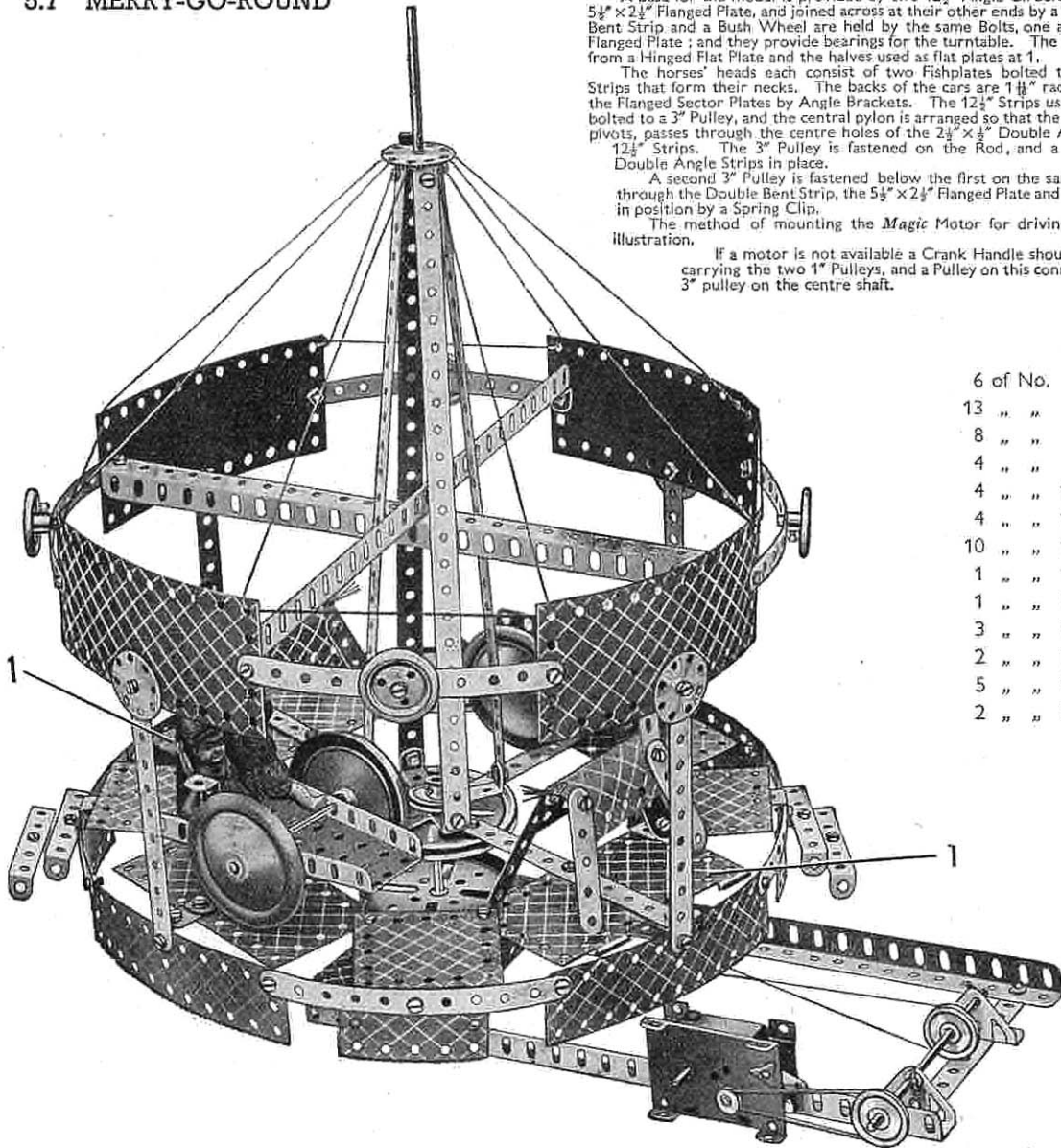
A base for the model is provided by two 12½" Angle Girders bolted to the end flanges of a 5½" x 2½" Flanged Plate, and joined across at their other ends by a 5½" Strip as shown. A Double Bent Strip and a Bush Wheel are held by the same Bolts, one above and the other below the Flanged Plate; and they 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 2½" small radius Curved Strips that form their necks. The backs of the cars are 1½" radius Curved Plates, attached to the Flanged Sector Plates by Angle Brackets. The 12½" 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 2½" x ½" Double Angle Strips at the ends of the 12½" Strips. The 3" Pulley is fastened on the Rod, and a 1" Pulley clamps the 2½" x ½" 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 5½" x 2½" 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.

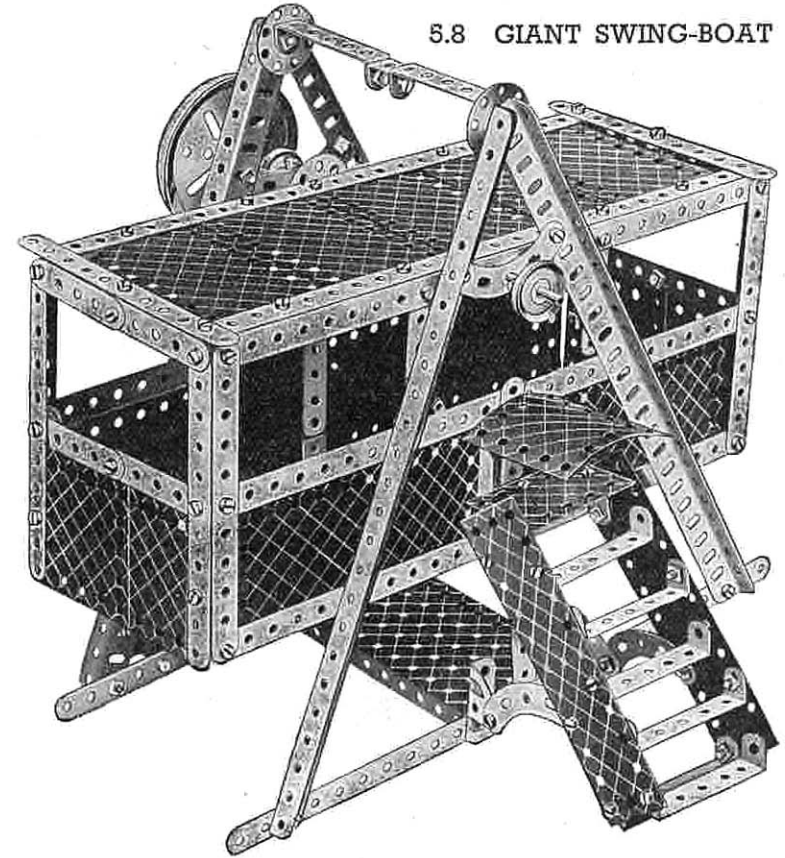


Parts required

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
2 " " 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 $5\frac{1}{2}$ " x $2\frac{1}{2}$ " 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 $2\frac{1}{2}$ " x $1\frac{1}{2}$ " Flexible Plate held in position by two $1"$ x $1"$ 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 journalled in holes in two Flanged Sector Plates as shown in Fig. 5.8a below. The Sector Plates are bolted at their lower ends to a $2\frac{1}{2}"$ x $1\frac{1}{2}"$ 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 journalled 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 $\frac{1}{2}"$ bolt lock-nutted to but spaced by Washers from another $3"$ Pulley fixed on the pivot rod of the swing-boat.

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

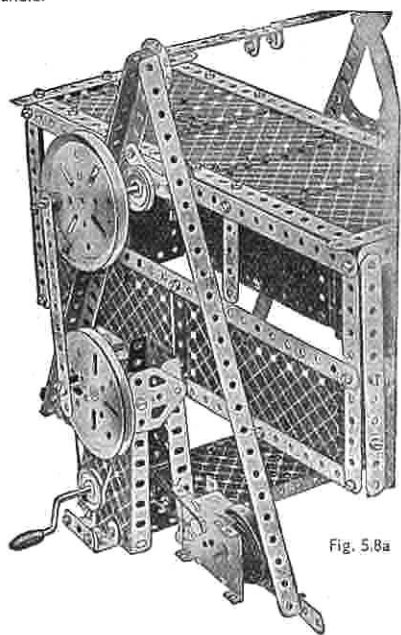
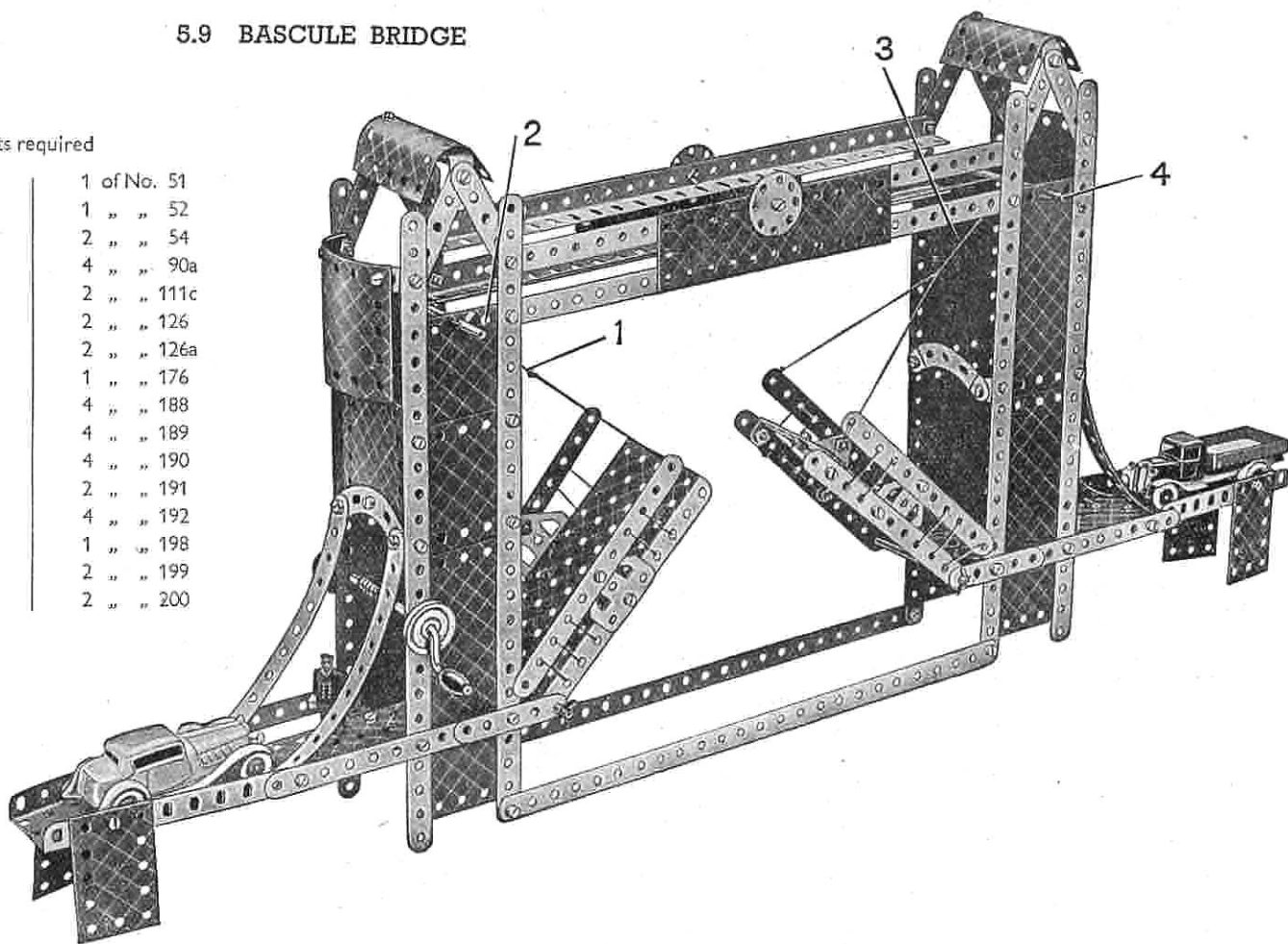


Fig. 5.8a

5.9 BASCULE BRIDGE

Parts required

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

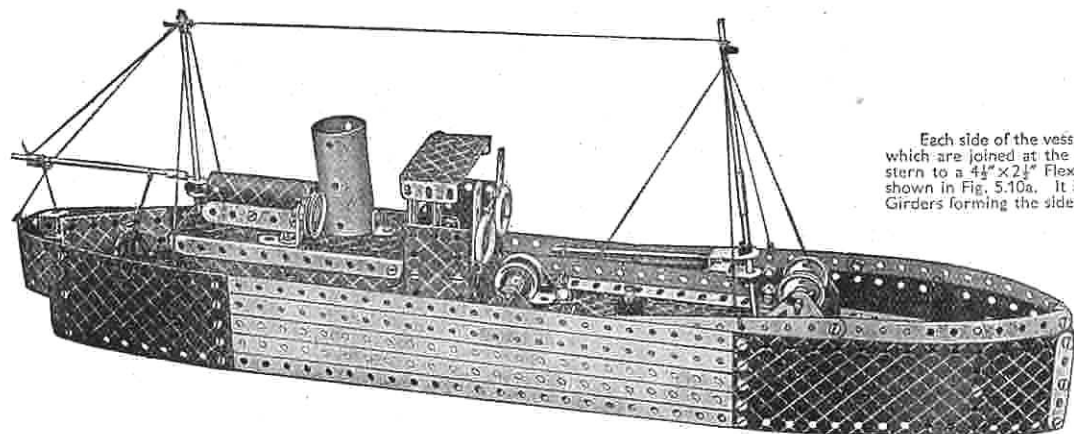


The centre pin has been withdrawn from a Hinged Flat Plate, and one of the halves is used in the construction of the side of one of the towers. Each of the main towers consists of four $12\frac{1}{2}"$ Strips to which are bolted Flexible Plates as shown. The $12\frac{1}{2}"$ Strips are braced across by the $2\frac{1}{2}"$ x $\frac{1}{2}"$ 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 $2\frac{1}{2}"$ x $\frac{1}{2}"$ 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 $5\frac{1}{2}"$ x $2\frac{1}{2}"$ 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 $2\frac{1}{2}"$ x $\frac{1}{2}"$ Double Angle Strip and Angle Brackets.

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

5.10 TRAWLER

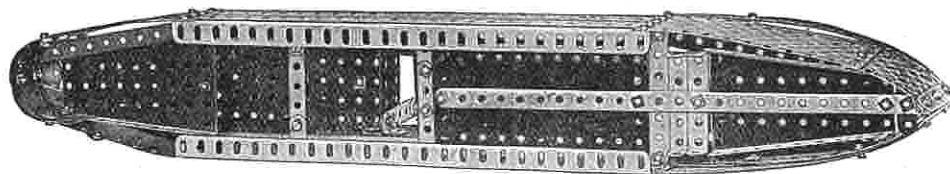


Each side of the vessel consists of three $1\frac{1}{2}$ " Strips and two Angle Girders, which are joined at the forward end to a $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flexible Plate, and at the stern to a $4\frac{1}{2}$ " x $2\frac{1}{2}$ " Flexible Plate. The deck of the model is constructed as shown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

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

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

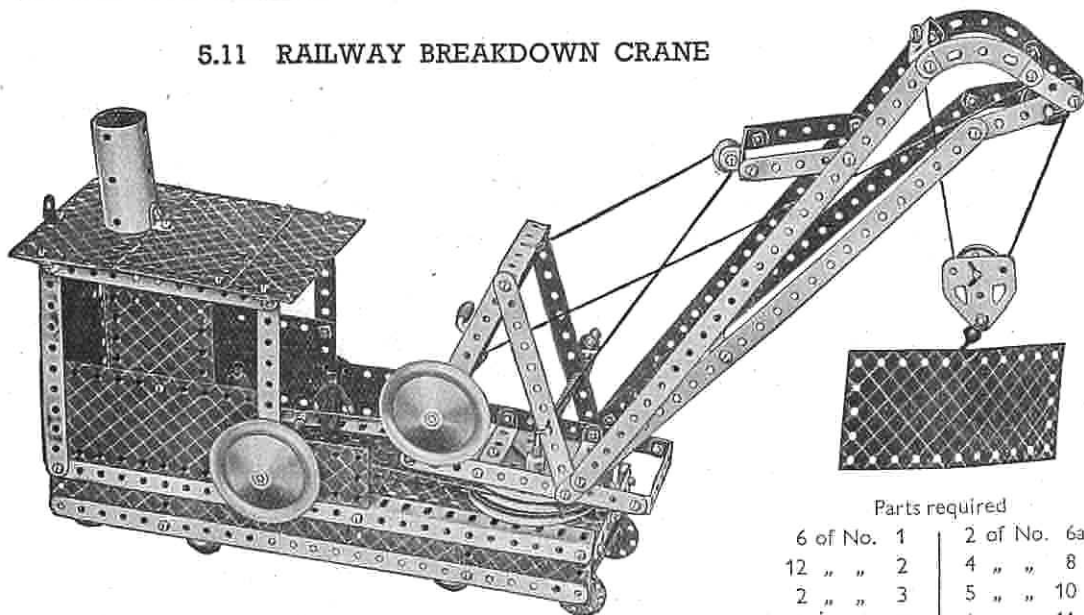
Fig. 5.10a



Parts required

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

5.11 RAILWAY BREAKDOWN CRANE



Parts required

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

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

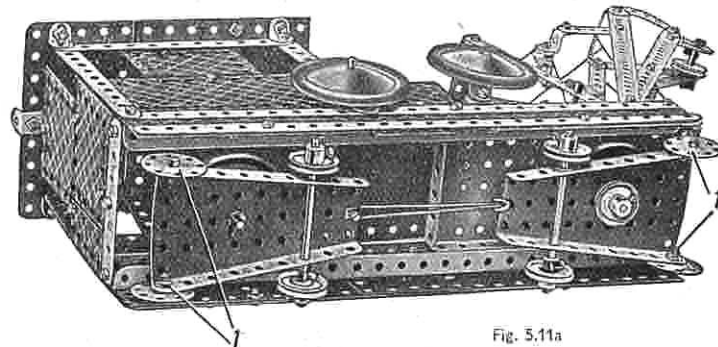


Fig. 5.11a

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

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

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

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

5.12 ELECTRIC LOCOMOTIVE

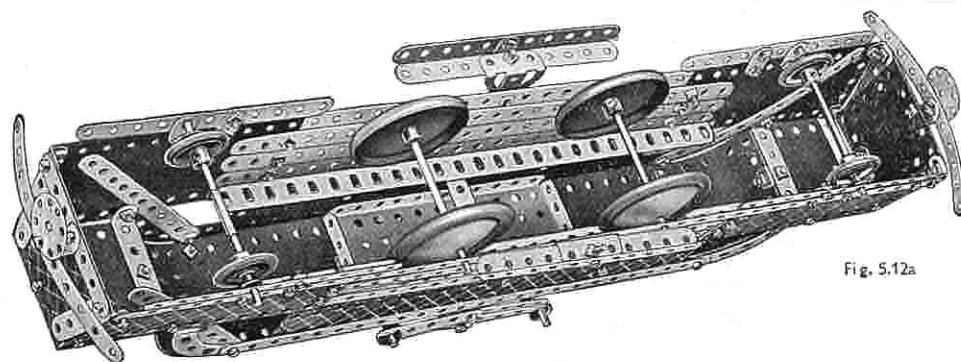
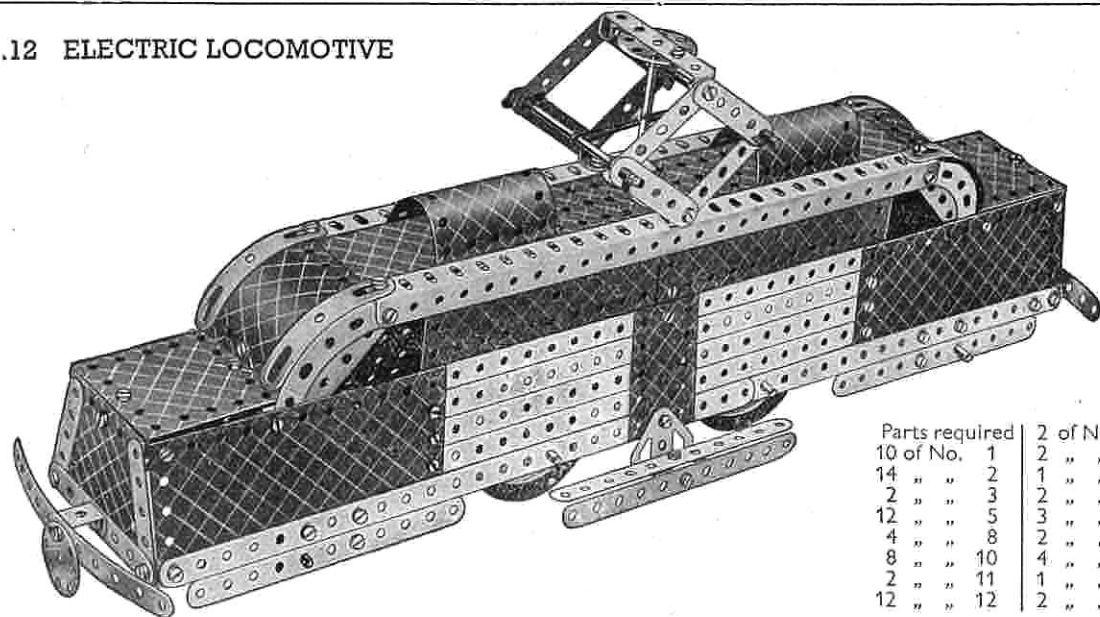


Fig. 5.12a

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

The method of constructing the sides and roof will be clear from the illustrations. The front wheel axle consists of two 2" Rods joined by a Rod Connector.

Each side of the current collector consists of 2½" Strips, pairs of which are lock-nutted to an Angle Bracket and a 2½" x ½" Double Angle Strip respectively. They are pivoted together on 3½" 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 5½" x 2½" Flanged Plate.

The two U-Section Curved Plates are attached to the roof by Obtuse Angle Brackets.

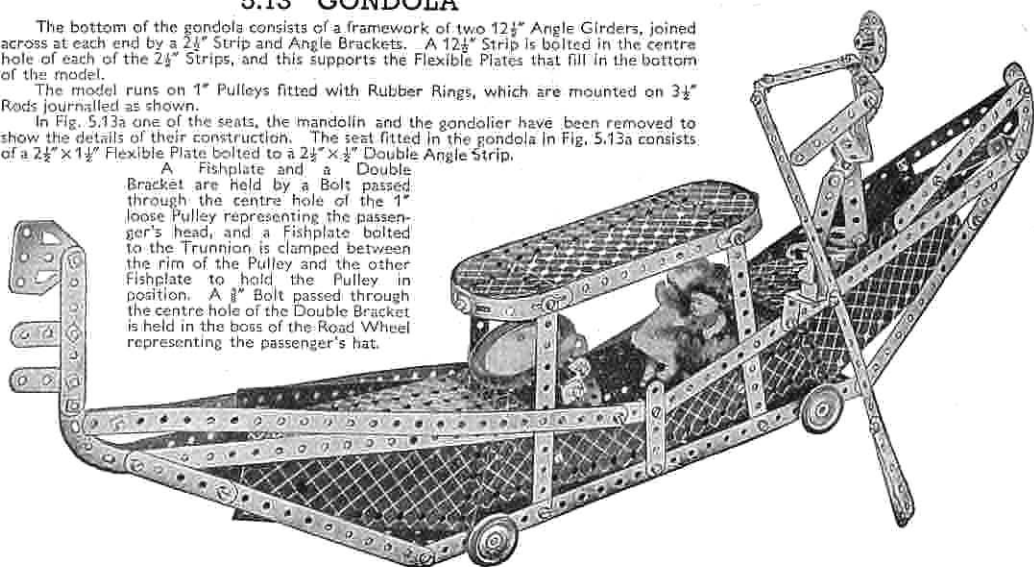
5.13 GONDOLA

The bottom of the gondola consists of a framework of two 12½" Angle Girders, joined across at each end by a 2½" Strip and Angle Brackets. A 12½" Strip is bolted in the centre hole of each of the 2½" 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 3½" 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 2½" x 1½" Flexible Plate bolted to a 2½" x ½" 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 ½" Bolt passed through the centre hole of the Double Bracket is held in the boss of the Road Wheel representing the passenger's hat.



Parts required	7 of No. 1	3 of No. 48a
14 " " 2	1 " " 51	1 " " 52
2 " " 3	1 " " 54	2 " " 54
12 " " 5	4 " " 90a	4 " " 90a
2 " " 6a	1 " " 111c	6 " " 111c
2 " " 8	1 " " 115	1 " " 115
7 " " 10	3 " " 125	3 " " 125
3 " " 11	2 " " 126	2 " " 126
5 " " 12	2 " " 126a	2 " " 126a
1 " " 12a	4 " " 155	4 " " 155
4 " " 12c	1 " " 187	1 " " 187
2 " " 16	4 " " 189	4 " " 189
1 " " 18a	5 " " 190	5 " " 190
4 " " 22	2 " " 191	2 " " 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		

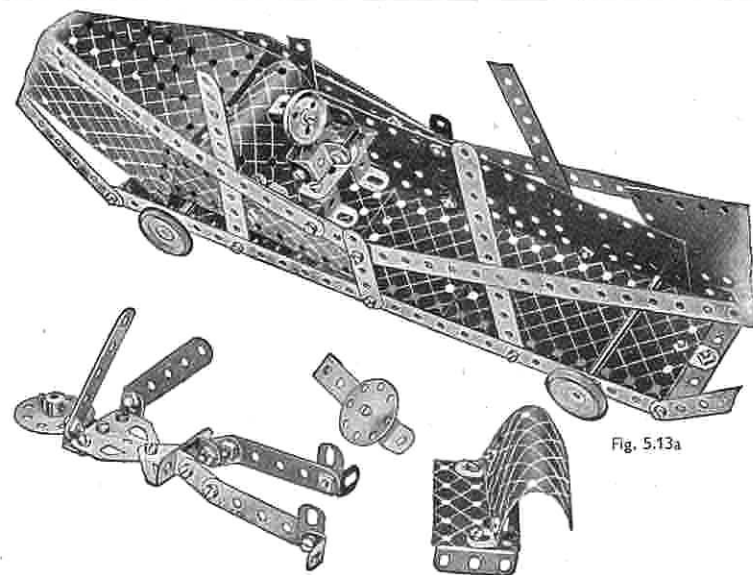


Fig. 5.13a

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 $1\frac{1}{2}$ " Rod. Two $3\frac{1}{2}$ " Rods joined by a Rod Connector form the slide valve, which is held in the Stepped Bent Strip 2, by a Cord Anchoring Spring and a 1" Pulley. The $5\frac{1}{2}$ " Strip forming the valve connecting rod is carried on a Bolt 1 lock-nutted to the Bush Wheel.

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

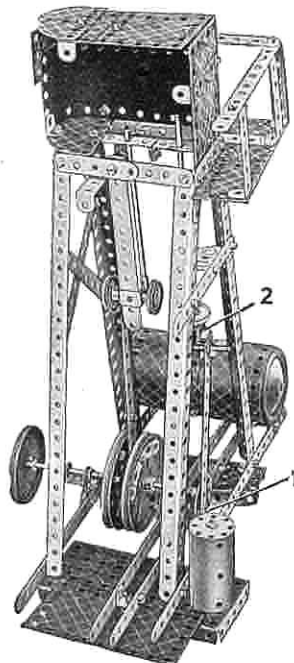
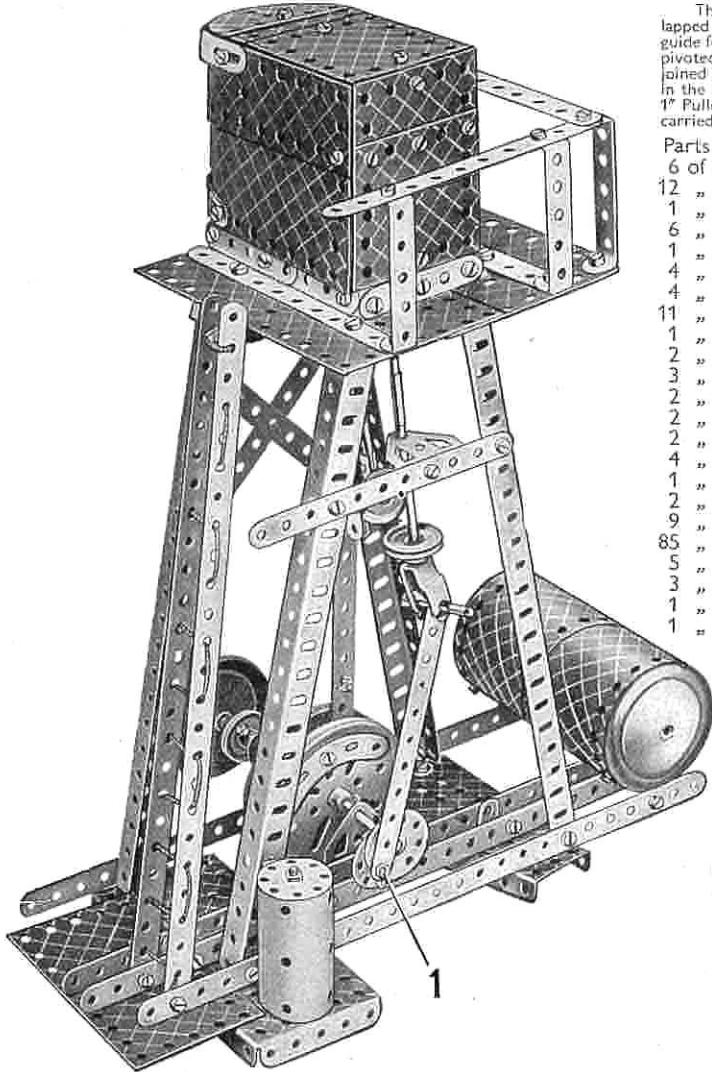
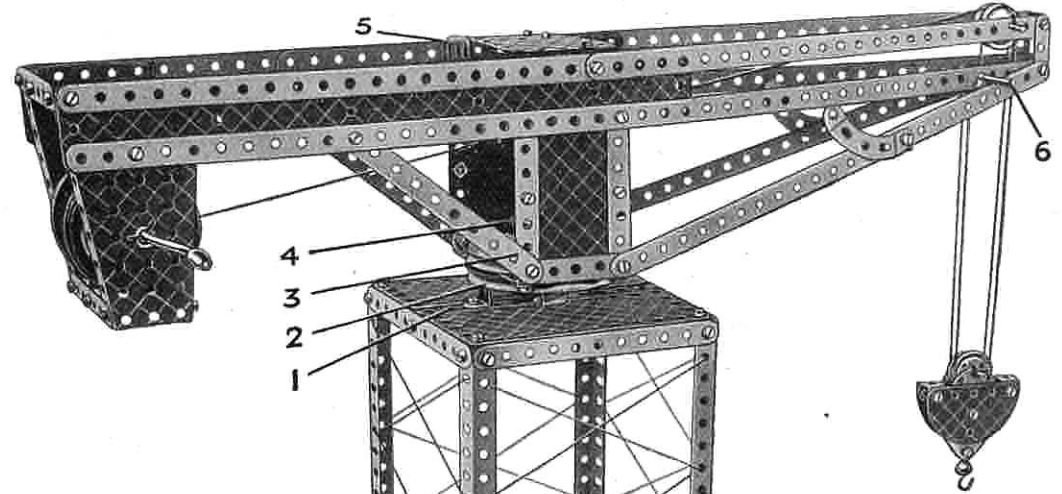


Fig. 5.14a

5.15 HAMMERHEAD CRANE



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

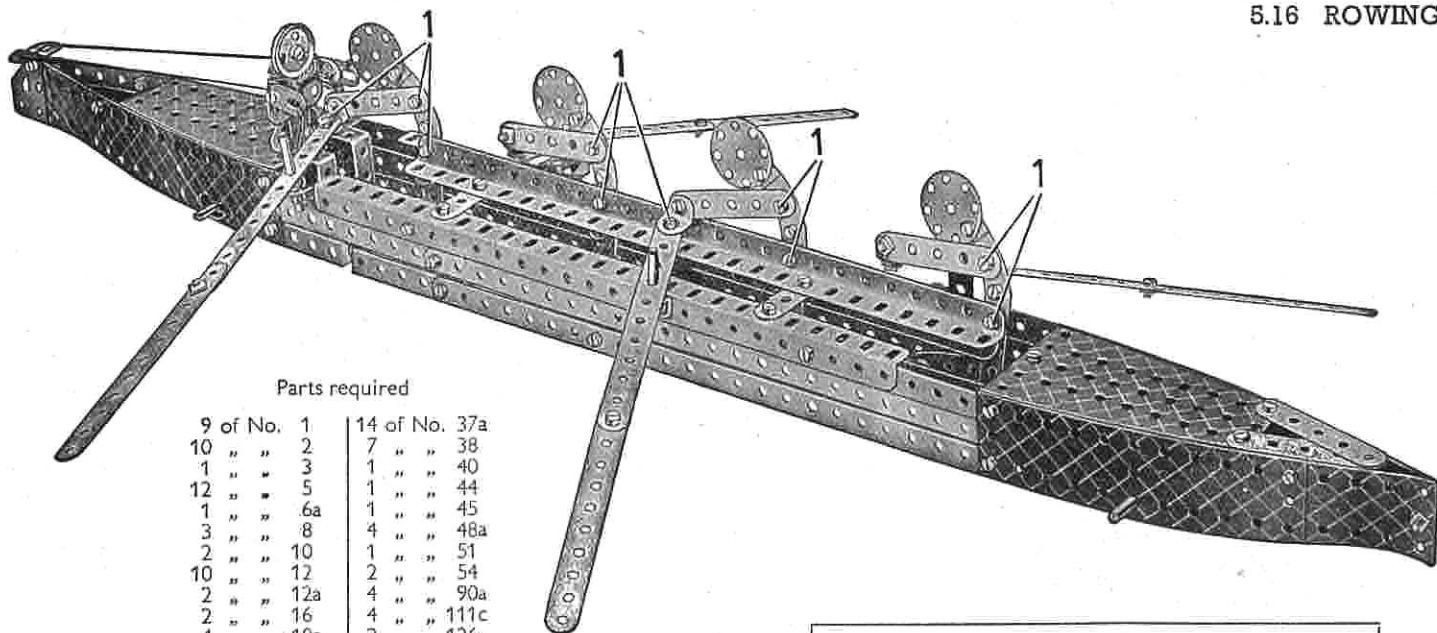
The $2\frac{1}{2}$ " x $1\frac{1}{2}$ " Flanged Plate 5 is connected to the other side of the jib by a $2\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strip, on top of which is bolted a $2\frac{1}{2}$ " x $2\frac{1}{2}$ " Flexible Plate.

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

Parts required

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

5.16 ROWING FOUR



Parts required

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

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

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

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

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

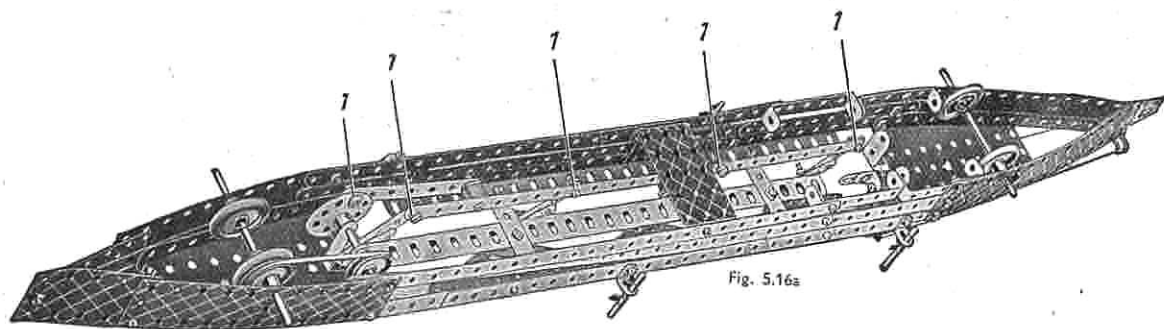


Fig. 5.16a

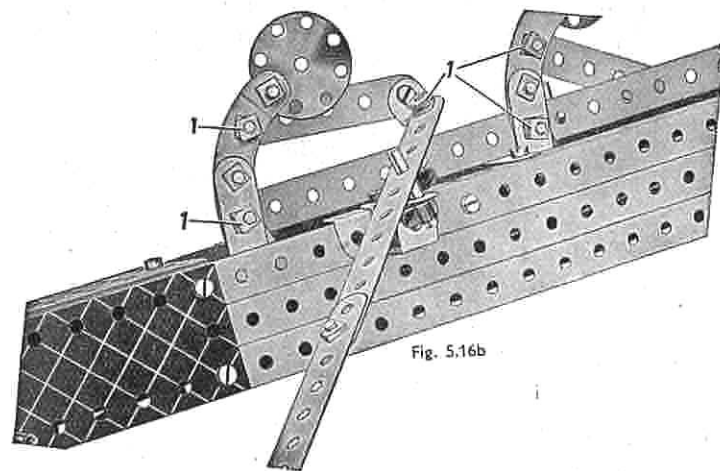
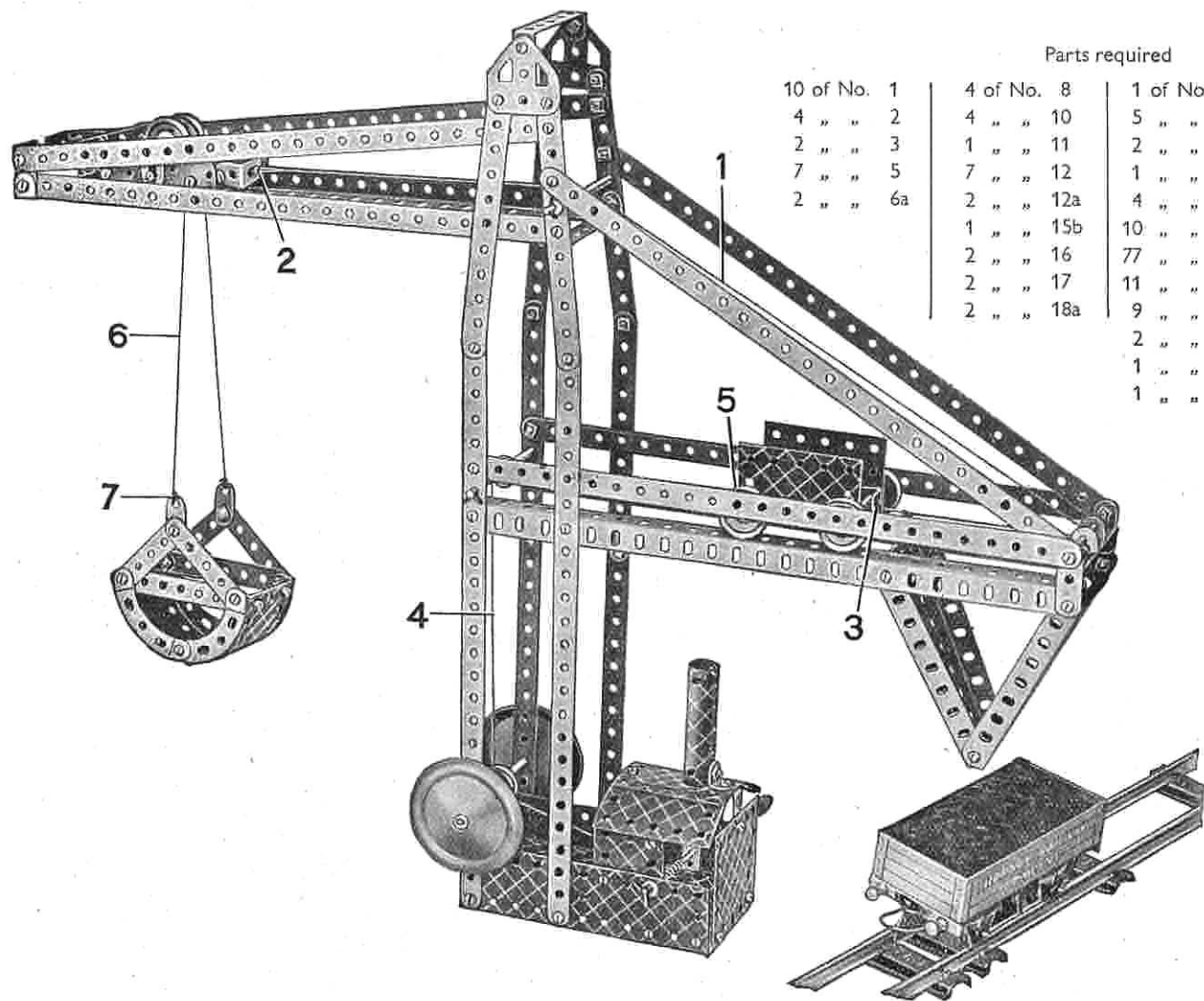


Fig. 5.16b

5.17 AUTOMATIC SHIP-COALER



Parts required

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

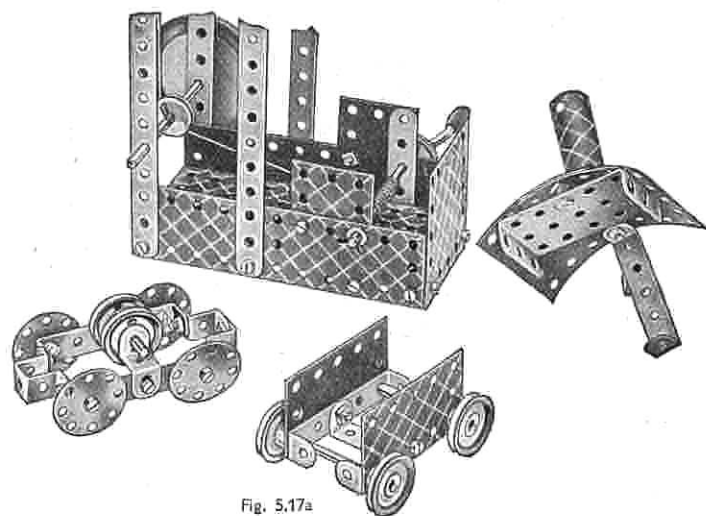


Fig. 5.17a

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

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

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

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

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

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

5.18 RACING YACHT

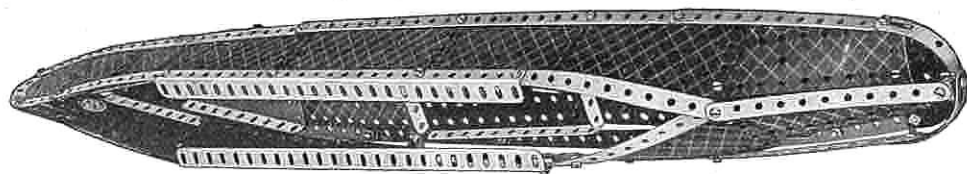


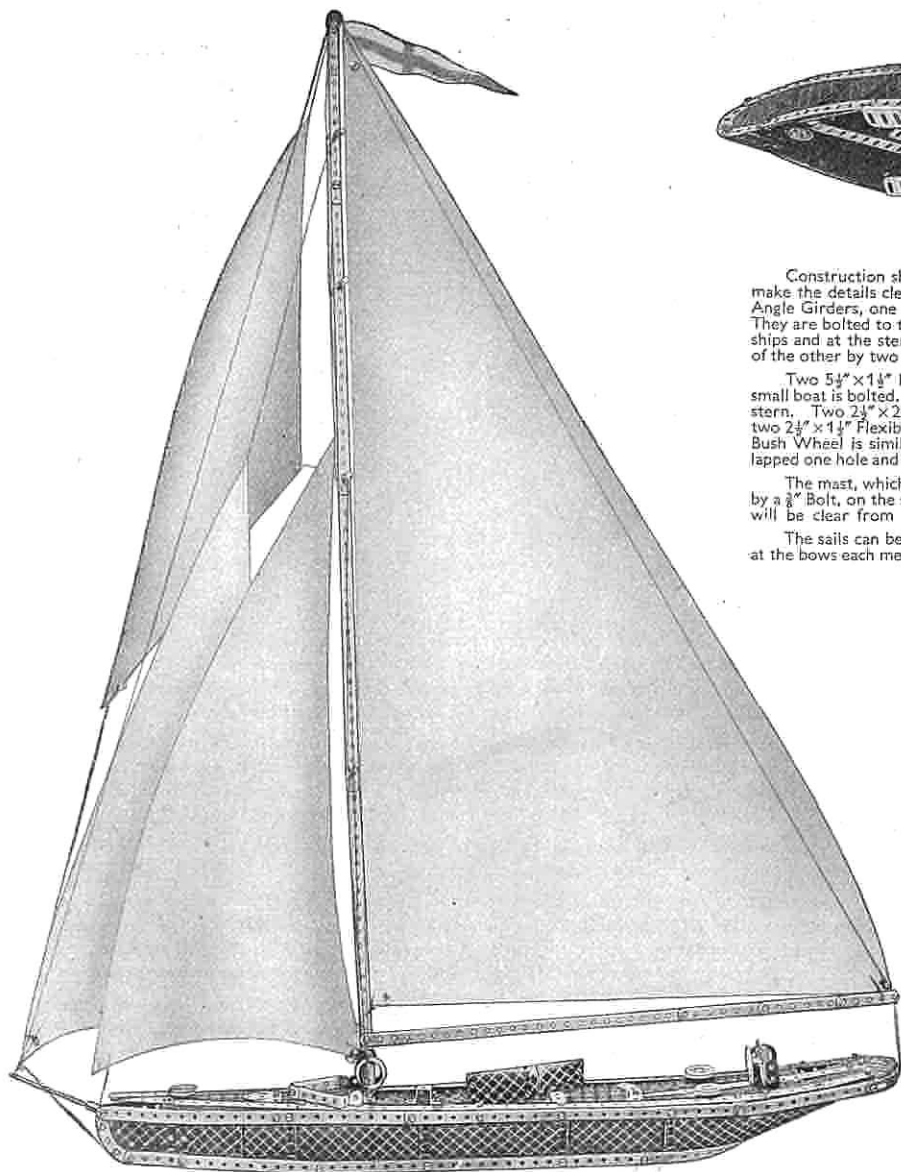
Fig. 5.18a

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

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

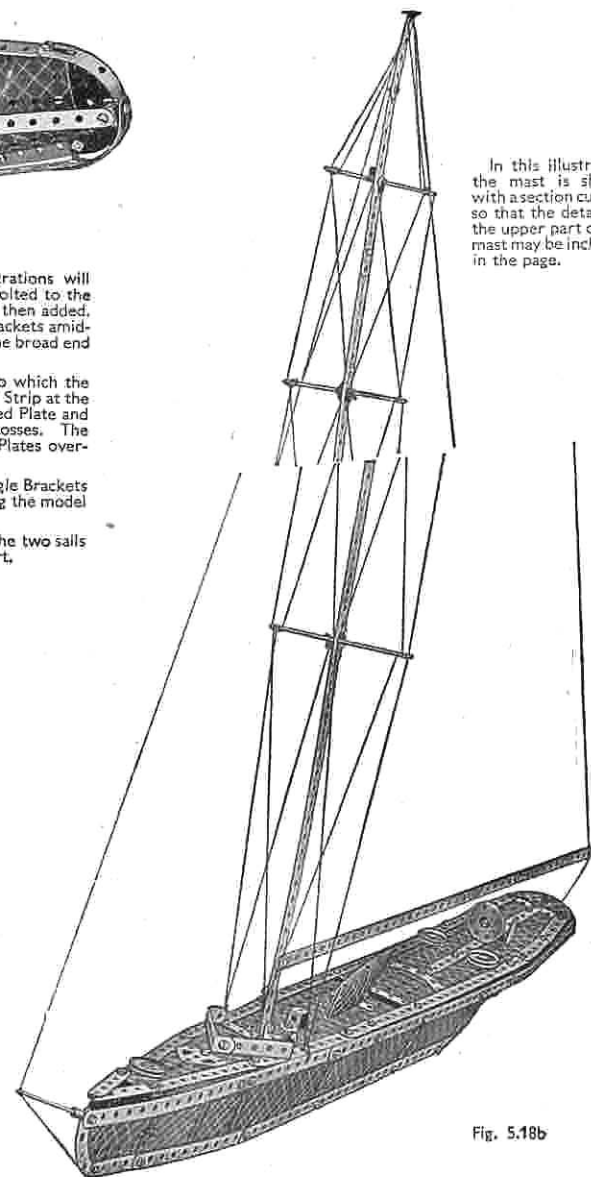
The mast, which consists of three $12\frac{1}{2}''$ Strips, a $5\frac{1}{2}''$ Strip and a $2\frac{1}{2}''$ Strip, is fastened between two Angle Brackets by a $\frac{3}{8}''$ Bolt, on the shank of which are four Washers between the Angle Brackets. The method of rigging the model will be clear from Fig.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

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



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 soace the upper and lower pairs of Angle Girders at the rear of the tank, and they form part of the creeper track covers.

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

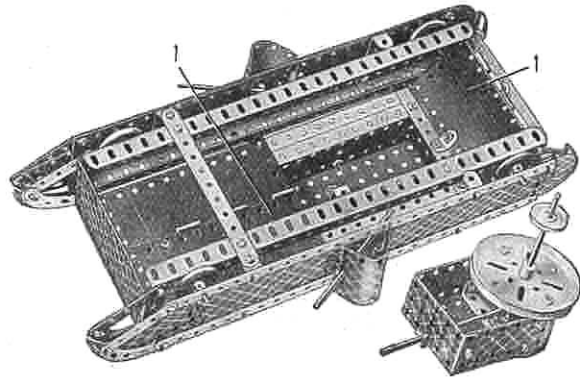
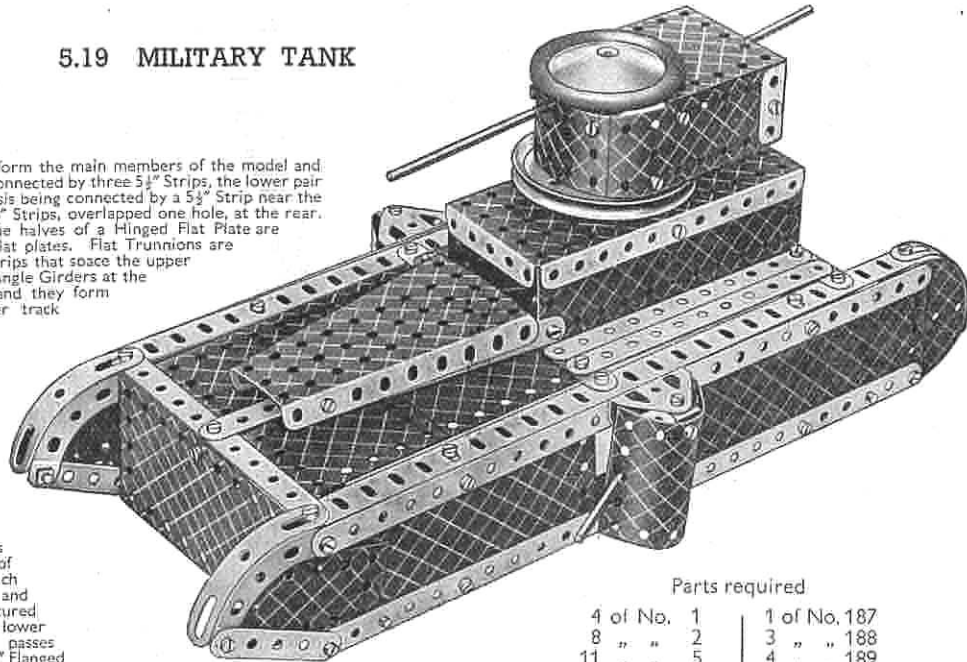


Fig. 5.19a

Parts required

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

5.20 DERRICK CRANE

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

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

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

Parts required

1 of No. 23	2 of No. 54	1 of No. 198
10 of No. 1	1 " " 24	1 " " 57c
10 " " 2	2 " " 24a	1 " " 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		

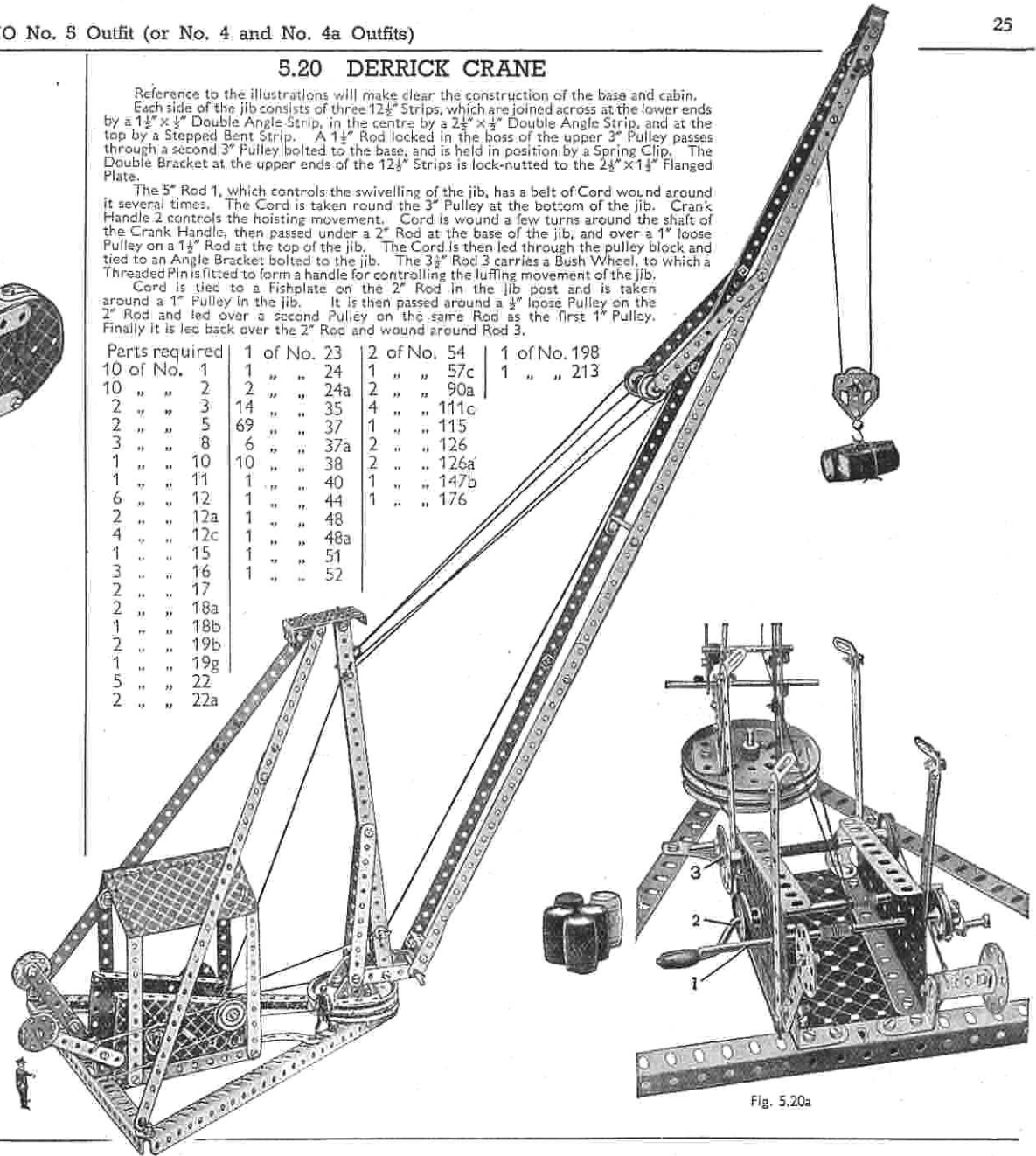
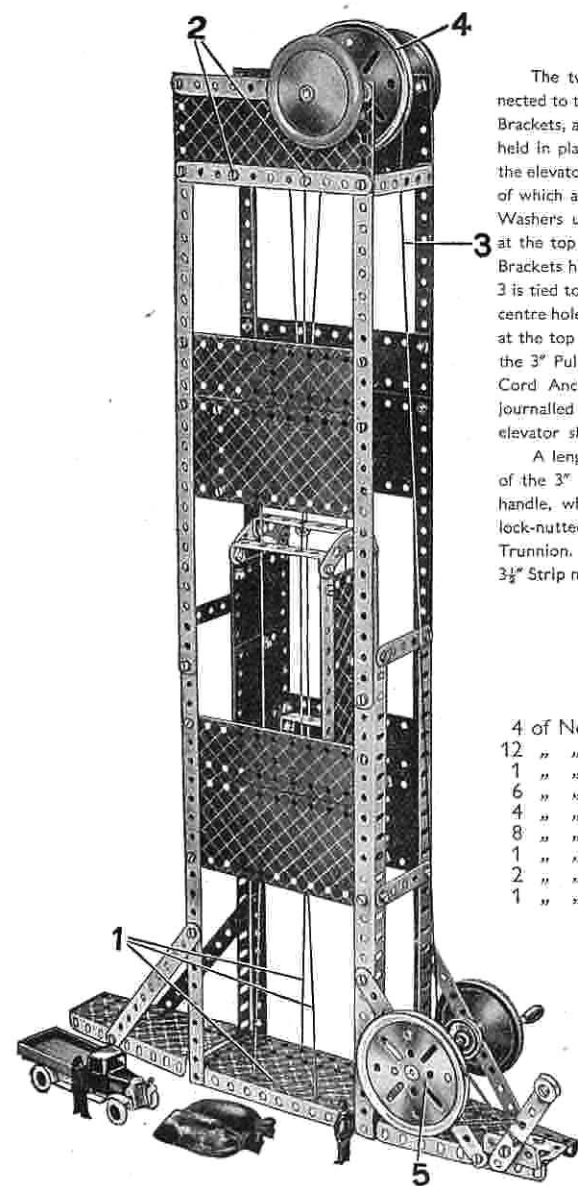


Fig. 5.20a

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 journalled in the $5\frac{1}{2}''$ Strips that brace the elevator shaft.

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

Parts required

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

5.22 BIG WHEEL

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

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

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

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

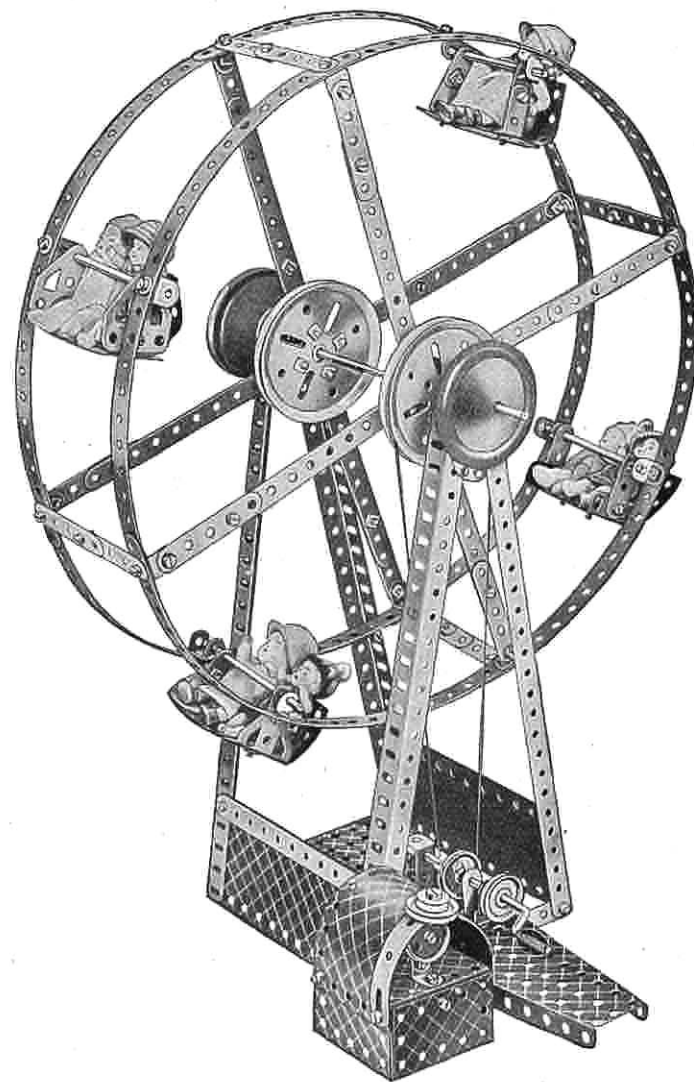
The construction of the cars can be seen from the illustration and it will be noticed that their details vary from each other. In one of the cars the sides are formed from Flat Trunnions, while in the second Trunnions are used for this purpose. In a third car the sides are $1\frac{1}{2}''$ Strips while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

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

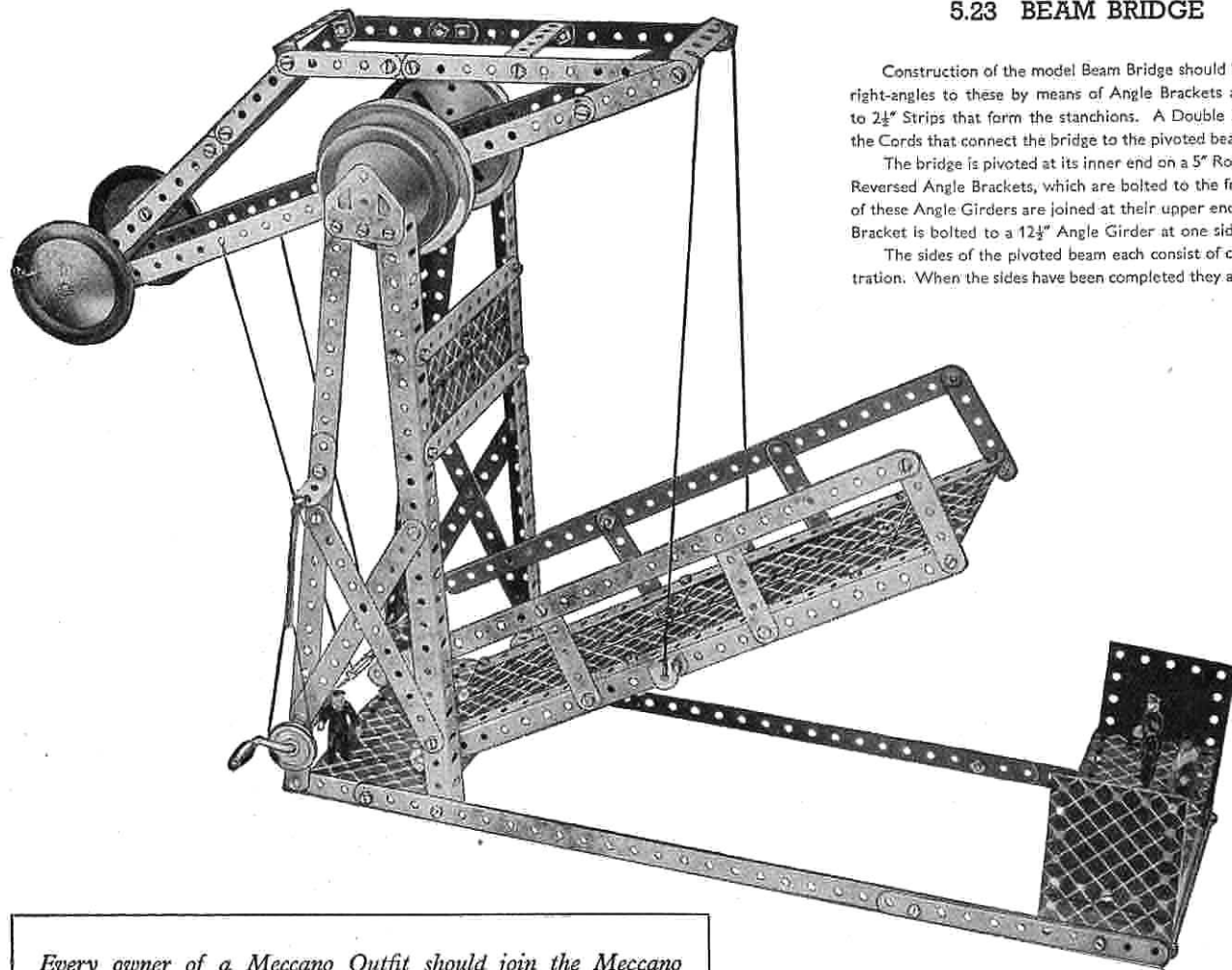
A decorative effect is provided by a 1" loose Pulley and a $\frac{1}{2}''$ loose Pulley fixed to the roof by means of a Pivot Bolt and nut.

Parts required

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



5.23 BEAM BRIDGE



Construction of the model Beam Bridge should be commenced with the lifting span. The sides of this consist of 12½" Strips. Further 12½" 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 12½" Strips bolted to 2½" 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 12½" Strips in the second holes from their inner ends and also through two Reversed Angle Brackets, which are bolted to the front pair of 12½" 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 5½" Strips arranged at each side as shown. A 1" x 1" Angle Bracket is bolted to a 12½" 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 2½" x ½" Double Angle Strips. Two Road Wheels, which act as counterweights are secured to a 4" Rod pushed through holes in the side members at the rear end of the beam. It should be noted that the beam is pivoted 1" (2 holes) out of centre towards the front of the model, on a 5" Rod which is supported in holes in two Reversed Angle Brackets bolted to the insides of the two Flat Trunnions at the tops of the side columns.

The bridge is raised or lowered by turning a Crank Handle, which is journalled near the lower ends of the rear beam supports. The Crank Handle is lengthened by joining to it a 3½" 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" x 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

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5.24 PITHEAD GEAR

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

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

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

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

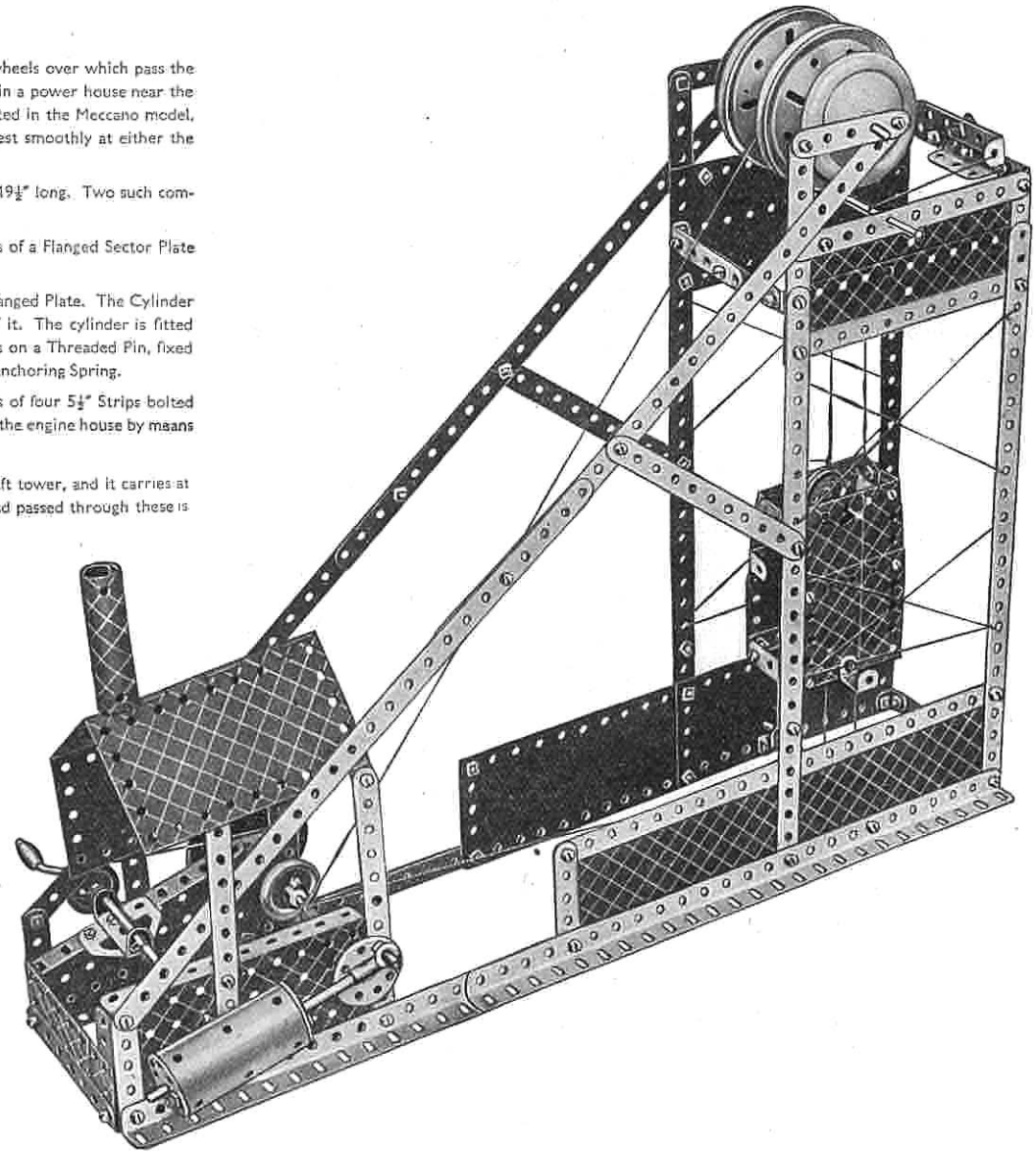
The roof of the engine house consists of a Hinged Flat Plate, which is attached by means of Obtuse Angle Brackets to the upper ends of four 5½" Strips bolted vertically to the 12½" Angle Girders of the base. The chimney is a Flexible Plate bent in the form of a cylinder and attached to the roof of the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

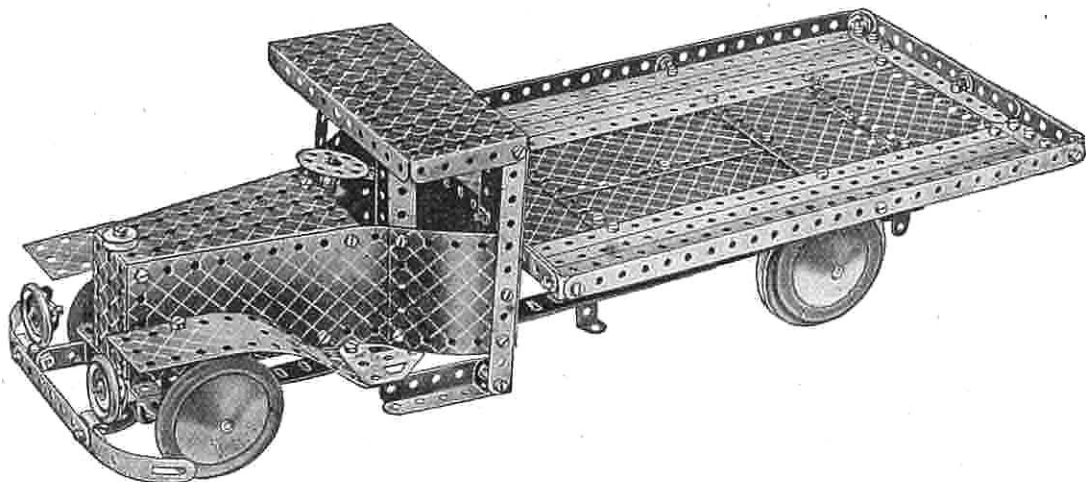
The pulley gear at the pit-head is arranged as follows. A 5" Rod is journaled in the holes of the two 2½" Strips at the top of the shaft tower, and it carries at its centre a 1" fast Pulley. On each side of this Pulley are a 3" Pulley and a Road Wheel. Just below the 2½" Strips are two 5½" Strips and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

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

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

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





5.25 MOTOR LORRY

The chassis of the lorry consists of two side members each built up from two $12\frac{1}{2}$ " Angle Girders overlapped 14 holes, and joined at each end by $2\frac{1}{2}$ " x $\frac{1}{4}$ " Double Angle Strips. The front Road Wheels are mounted on a 5" Rod passed through the side members of the chassis, and the back Road Wheels are secured on a compound rod consisting of a $3\frac{1}{2}$ " and a $1\frac{1}{2}$ " Rod joined by a Rod Connector and Journalled in a similar manner.

Flanged Sector Plates form the top and base for the bonnet and radiator. The narrow end of the bonnet is bolted to the centre hole of the $2\frac{1}{2}$ " x $\frac{1}{4}$ " Double Angle Strip joining the forward ends of the chassis, and the wider end is attached to the centre of a $5\frac{1}{2}$ " Strip bolted across the chassis. The sides of the bonnet are $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flexible Plates, and are bolted to the flanges of the Flanged Sector Plates. The radiator is a $2\frac{1}{2}$ " x $1\frac{1}{2}$ " Flanged Plate, which is fastened by its flanges to the forward ends of the two Flanged Sector Plates. The radiator cap is represented by a $\frac{1}{2}$ " loose Pulley. The bumper consists of a $3\frac{1}{2}$ " Strip, to the ends of which are bolted 3" Formed Slotted Strips, and it is fastened to the front end of the chassis by 1 " x 1 " Angle Brackets and $1\frac{1}{2}$ " Strips.

The headlamps are fitted to the bumper by means of Reversed Angle Brackets and consist of 1" fast Pulleys held to the Brackets by bolts. The mudguards are $5\frac{1}{2}$ " x $1\frac{1}{4}$ " Flexible Plates, which are curved to the shape shown, and to their rear ends Flat Trunnions are attached, the pointed portions of these extending under the $2\frac{1}{2}$ " x $2\frac{1}{2}$ " Curved Plates that are used to form the sides of the driver's compartment.

The cab is formed as follows. Two short Strips are bolted vertically to the cab sides to form the front supports for the cab roof, and the rear supports are $5\frac{1}{2}$ " Strips. The roof is a $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flanged Plate, which is bolted at each end to the $5\frac{1}{2}$ " Strips. At their lower ends the $5\frac{1}{2}$ " Strips carry a Double Bracket, to which are bolted at right angles two $2\frac{1}{2}$ " Strips that form the footsteps.

The platform of the lorry consists of $12\frac{1}{2}$ " Strips and Flexible Plates. The rear central portion of the platform is a Hinged Flat Plate, and the sides are $12\frac{1}{2}$ " Strips. Other Strips overlapped form the end. The end and sides are attached to the platform by means of Angle Brackets.

The platform is secured to the chassis at the front by $2\frac{1}{2}$ " x $\frac{1}{4}$ " Double Angle Strips and at the rear by Trunnions and $2\frac{1}{2}$ " Strips.

Parts required

10 of No. 1	12 of No. 11	1 of No. 17	6 of No. 37a	6 of No. 111c	2 of No. 189
12 " " 2	8 " " 12	2 " " 19b	12 " " 38	2 " " 125	2 " " 191
1 " " 3	2 " " 12a	2 " " 22	8 " " 48a	2 " " 126	4 " " 192
9 " " 5	1 " " 12c	1 " " 23	1 " " 51	2 " " 126a	1 " " 198
2 " " 6a	1 " " 15	1 " " 24	1 " " 52	2 " " 155	2 " " 200
4 " " 8	1 " " 15b	4 " " 35	2 " " 54	4 " " 187	1 " " 213
2 " " 10	1 " " 16	85 " " 37	2 " " 111a	3 " " 188	2 " " 215

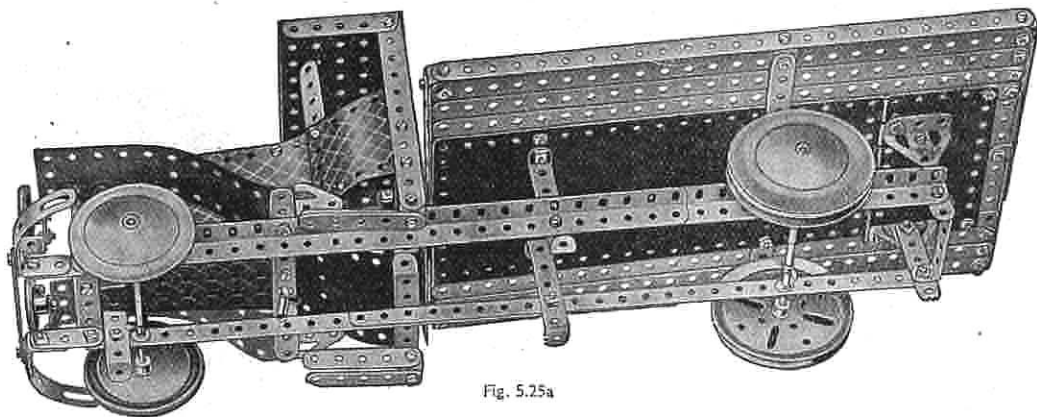
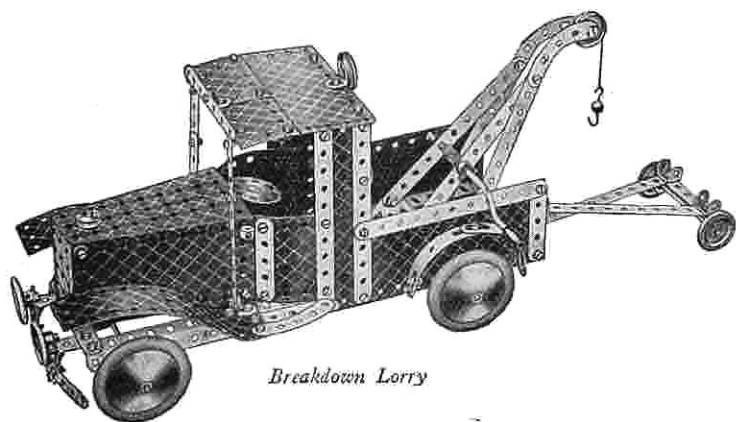


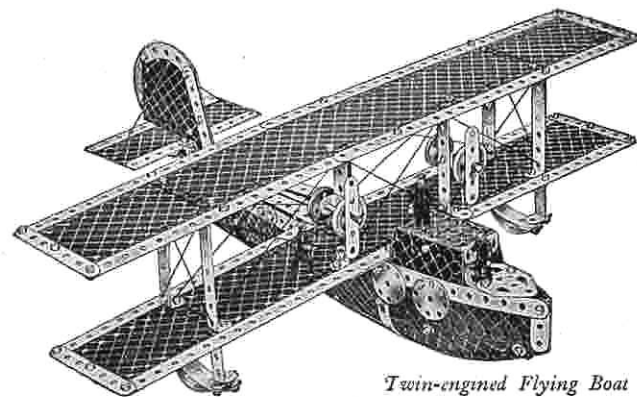
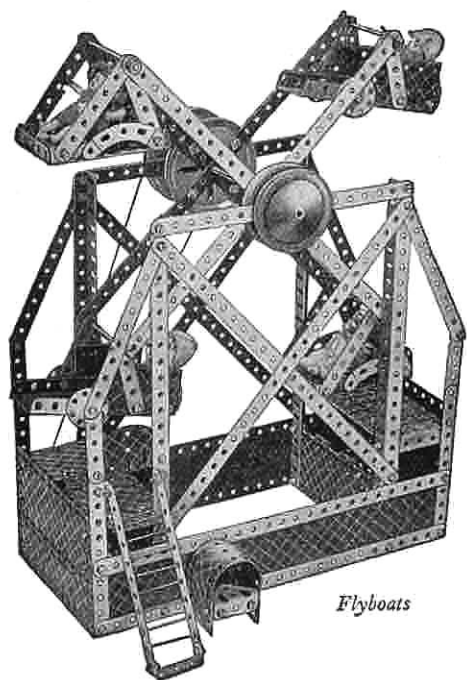
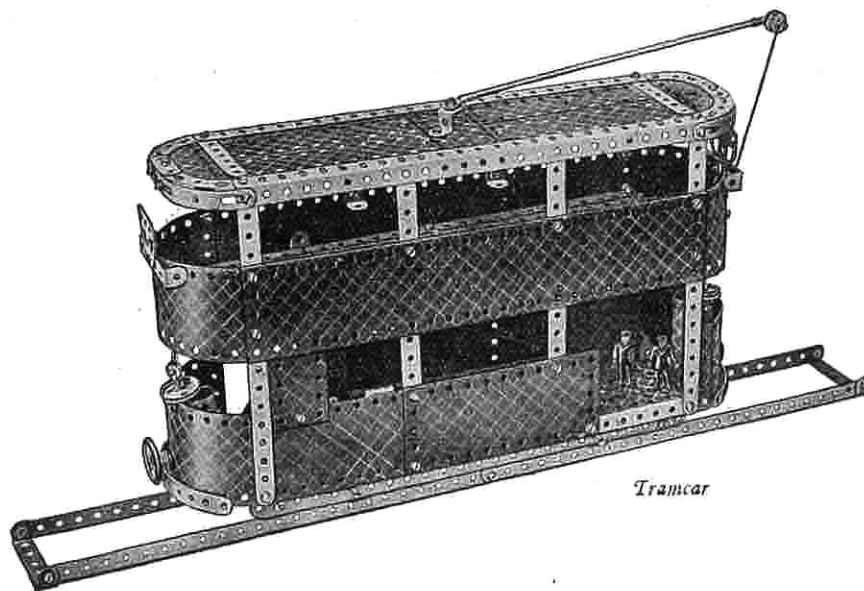
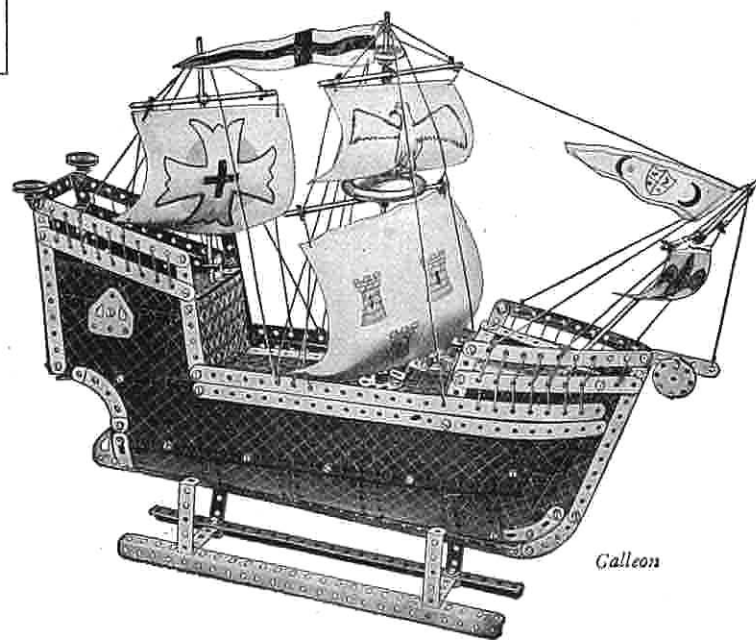
Fig. 5.25a

*Breakdown Lorry*

BUILD BIGGER AND BETTER MODELS

When you have built all the models shown in this Manual you will be keen to build bigger and more elaborate models. Your next step is to purchase a Meccano No. 5a Accessory Outfit containing all the parts required to convert your No. 5 into a No. 6 Outfit. You will thus be able to build the full range of No. 6 Outfit models, a selection of which is illustrated on this page.

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

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

MECCANO PARTS



No. 120b. Compression Springs, $\frac{3}{4}$ " long



122. Miniature Loaded Sacks



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



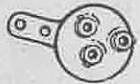
126. Trunnions 126a. Flat Trunnions



127. Bell Cranks
128. Bell Cranks, with Boss



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



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



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



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



No. 134. Crank Shafts, 1" stroke



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



138a. Ships' Funnels



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



140. Universal Couplings



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



No. 144. Dog Clutches



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



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



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



154a. Corner Angle Brackets, $\frac{1}{4}$ " (right-hand)
154b. Corner Angle Brackets, $\frac{1}{4}$ " (left-hand)
155. Rubber Rings (for 1" Pulleys)



157. Fans, 2" diam.



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



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



165. Swivel Bearings
166. End Flanged Ring, $9\frac{3}{8}$ " diam



168. Ball Bearings, 4" diam.
168a. " Races, flanged discs, $3\frac{1}{2}$ " diam.
168b. " " toothed " 4" diam.
168c. " Cages, $3\frac{1}{2}$ " diam., complete with balls.



171. Socket Couplings



175. Flexible Coupling Units



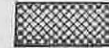
176. Anchoring Springs for Cord



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



No. 185. Steering Wheels, $1\frac{1}{2}$ " diam.
186. Driving Bands, $2\frac{1}{2}$ " (Light)
186a. " " 6" "
186b. " " 10" "
186c. " " 10" (Heavy)
186d. " " 15" "
186e. " " 20" "
187. Road Wheels, $2\frac{1}{2}$ " diam.
187a. Conical Disc, $1\frac{1}{2}$ " diam.



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



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



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



212. Rod and Strip Connectors -
213. Rod Connectors



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



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