

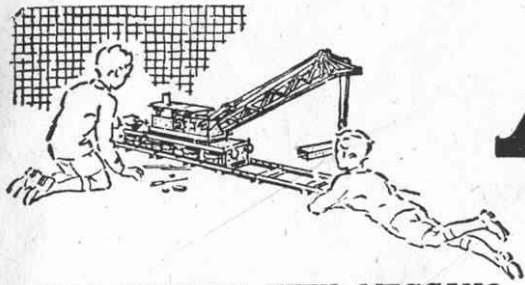
MECCANO

INSTRUCTIONS FOR
No. 5 OUTFIT

No.
41.5

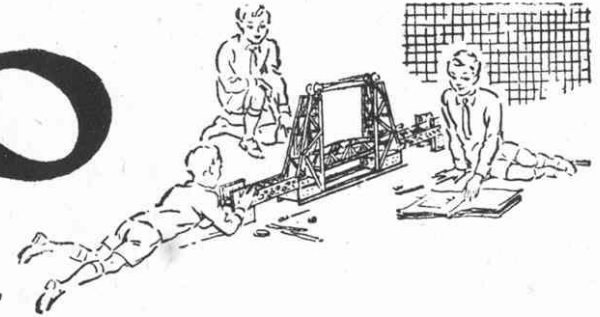


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MECCANO

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, Ship Coalers, 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 eleven different Outfits, ranging from No. 0 to No. 10. Each Outfit from No. 1 upwards can be converted into the next one 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 commence, you can build it up by degrees until you possess 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.

As shown in the illustrations, the realism of many models can be increased by the inclusion of the figures, motor vehicles and other items from the Dinky Toys Series; pilots and drivers from the Aeroplane and Motor Car Constructor Outfits; trees and hedges from the Hornby Railway Series; Meccano sacks, cable drums, etc. These items are not included in any of the Outfits. A Clockwork Motor is included in Outfits 7a, 8, 9 and 10 only, and an Electric Motor in Outfits 9a and 10 only.

ELECTRIC LIGHTING OF MECCANO MODELS

It is great fun to illuminate your Meccano models by electric light, and a special Meccano Lighting Set can be obtained from your dealer for this purpose. This consists of two spot lights with plain and coloured imitation glass discs, one stand lamp, two special brackets, and two pea lamps, operated from a 4-volt flash-lamp battery (not included in the Set). The stand lamp is used for decorative purposes, and the spot lights can be used as headlamps, floodlights on cranes, and in countless other ways.

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, Shipping and Road and Track News. Other pages deal with Stamp Collecting, and Books of interest to boys; and a feature of outstanding interest is the section devoted to short articles from readers.

The "Meccano Magazine" is the finest of all papers for boys who are interested in the wonderful things going on in the world around them. It is published on the first of each month. 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 news-agent.

THE MECCANO GUILD

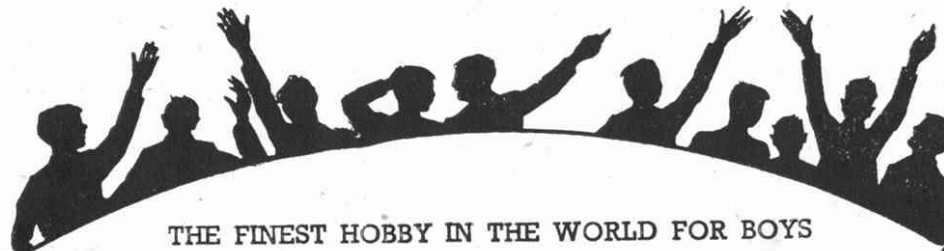
Every owner of a Meccano Outfit should join the Meccano Guild. This is a world-wide organisation, started at the request of Meccano boys. Its primary object is to bring boys together and to make them feel that they are all members of a great brotherhood, each trying to help others to get the very best 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. There are nearly 200 active clubs in Great Britain, and nearly 100 in countries overseas, each with 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.

Recruiting Medallions are awarded to members who are successful in securing recruits for the Guild, and good work on behalf of Meccano clubs, or of the Guild generally, is recognised by the presentation of special Merit Medallions. Full particulars of both these awards will be sent post free on request.

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 every day hundreds of letters from boys in all parts of the world, and each of these is answered personally by one of our staff of experts. Whatever your problem may be, write to us about it.



THE FINEST HOBBY IN THE WORLD FOR BOYS

HOW TO COMMENCE THE FUN

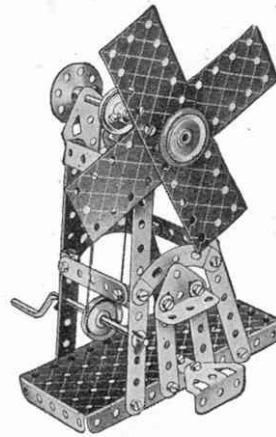
THE MOST FASCINATING OF ALL HOBBIES

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

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... nual of Instructions is given a list
... is a good plan to lay out on the
... d, and put the remainder of the
... parts for your model a complete
... d all the principal parts are illus-
... t cases their measurements are
... o find out which is which, as the
... o holes are spaced $\frac{1}{2}$ " apart, so
... t can be found at once. For
... u look in your Outfit for a Strip
... e Plate, so you look for a Flexible
... he time a few models have been



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 long Rod 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, meanwhile, being held with a spanner. This method of using a second Nut is known as lock-nutting, and it is employed in a large number of Meccano models.

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.

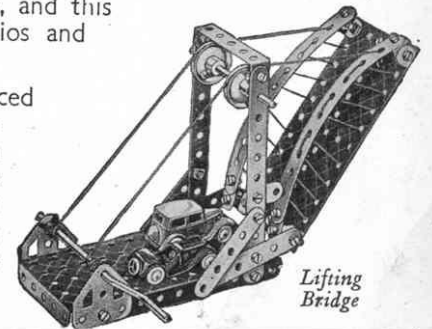
MOTORS AND GEARING

Models can be operated by means of either Meccano Clockwork or Electric Motors.

The 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.

The Electric Motors have the advantage of giving long continuous runs. Their speed is much higher than that of the 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 a 1:19 reduction; while a Worm meshed with a 57-teeth Gear will give a 1:57 reduction.



Lifting Bridge

IMPORTANT

Wartime conditions and restrictions have made necessary certain alterations in the introductory page of this Manual. The most important are the following:—

The Meccano Lighting Set has been withdrawn, but the models shown with lighting arrangements can readily be built with only slight changes.

The Aeroplane and Motor Car Constructor Outfits also are withdrawn, and the miniature pilots and drivers shown in certain models are no longer available.

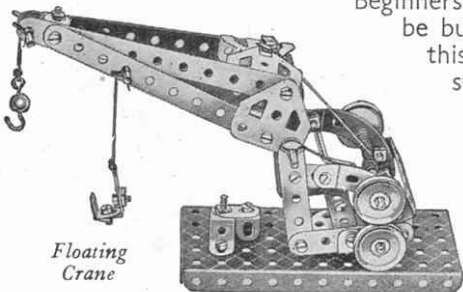
The Meccano Plates (Flanged, Flat, Curved, etc.) are shown in the Manuals with diagonal lines. On the new Meccano Plates these lines are omitted.

The only Meccano Motor at present available is the "MAGIC" Clockwork Motor. It is not included in Outfits.

MECCANO LIMITED

built the names of the parts will have become familiar.

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.



Floating Crane

HOW TO COMMENCE THE FUN

THE MOST FASCINATING OF ALL HOBBIES

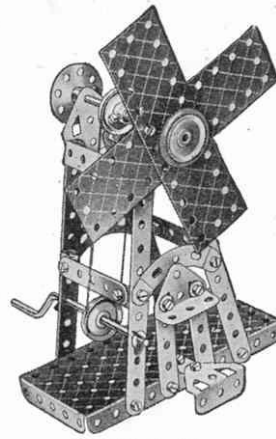
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It is so simple to build Meccano models that operations can be started as soon as the first Outfit is opened. Different boys build in different ways, but in the end they all reach the same splendid results. The following hints are given with the object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

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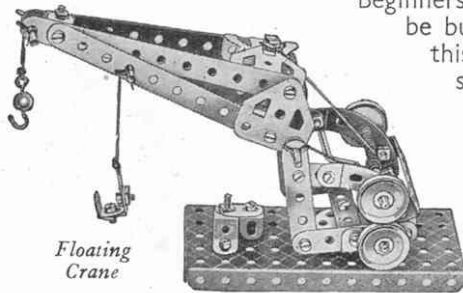
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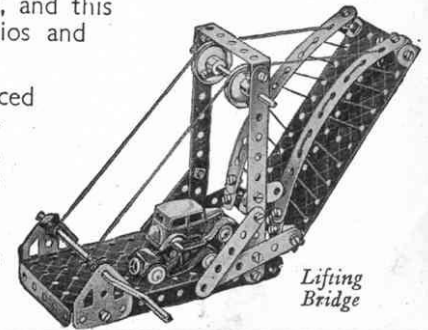
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The Electric Motors have the advantage of giving long continuous runs. Their speed is much higher than that of the Clockwork Motors, and this makes it possible to employ higher reduction ratios and thus obtain greater power.

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 a 1:19 reduction; while a Worm meshed with a 57-teeth Gear will give a 1:57 reduction.

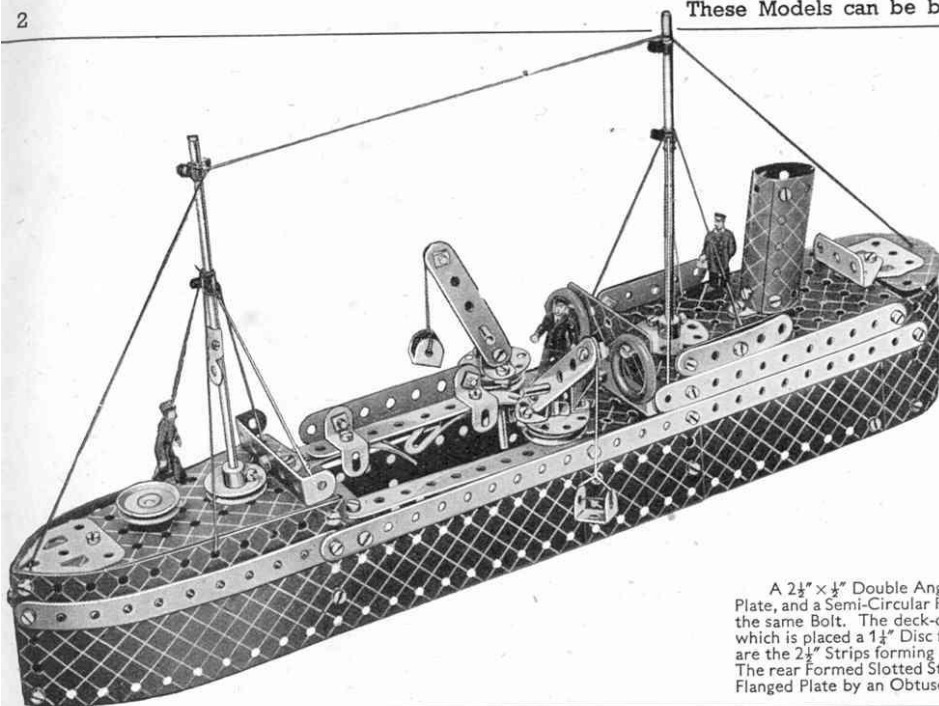


Floating Crane



Lifting Bridge

These Models can be built with MECCANO No. 4 Outfit (or No. 3 and No. 3a Outfits)



4.1 DREDGER

Parts required

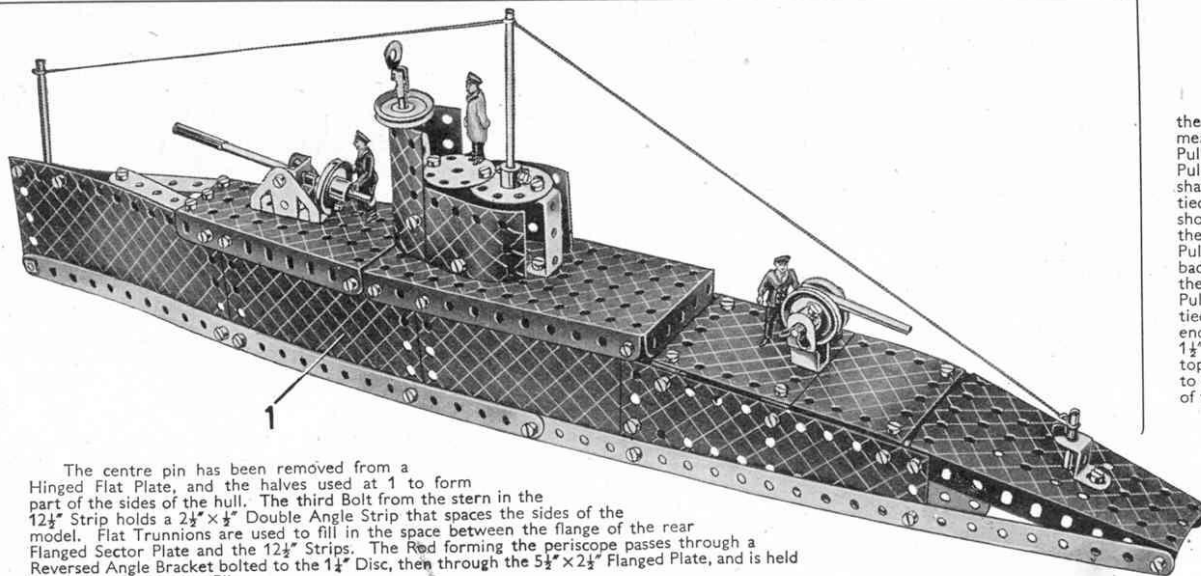
2 of No. 1	1 of No. 51
6 " " 2	1 " " 52
2 " " 3	1 " " 54a
9 " " 5	5 " " 111c
4 " " 10	2 " " 125
2 " " 11	1 " " 126
8 " " 12	2 " " 126a
2 " " 12c	2 " " 155a
4 " " 16	2 " " 188
2 " " 17	2 " " 189
2 " " 18a	2 " " 190
4 " " 22	2 " " 191
1 " " 24	2 " " 192
8 " " 35	2 " " 199
70 " " 37	2 " " 200
6 " " 37a	1 " " 212
4 " " 38	1 " " 213
1 " " 40	2 " " 214
3 " " 48a	2 " " 215
	2 " " 217a

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 $1\frac{1}{2}"$ 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	4 of No. 48a
3 " " 5	1 " " 52
1 " " 11	2 " " 54a
2 " " 12	2 " " 125
1 " " 15b	2 " " 126
3 " " 16	2 " " 126a
1 " " 17	2 " " 188
1 " " 18a	2 " " 189
1 " " 18b	2 " " 190
4 " " 22	2 " " 191
1 " " 24	2 " " 192
5 " " 35	1 " " 198
64 " " 37	1 " " 199
1 " " 40	1 " " 212
1 " " 44	1 " " 213
1 " " 48	1 " " 217a

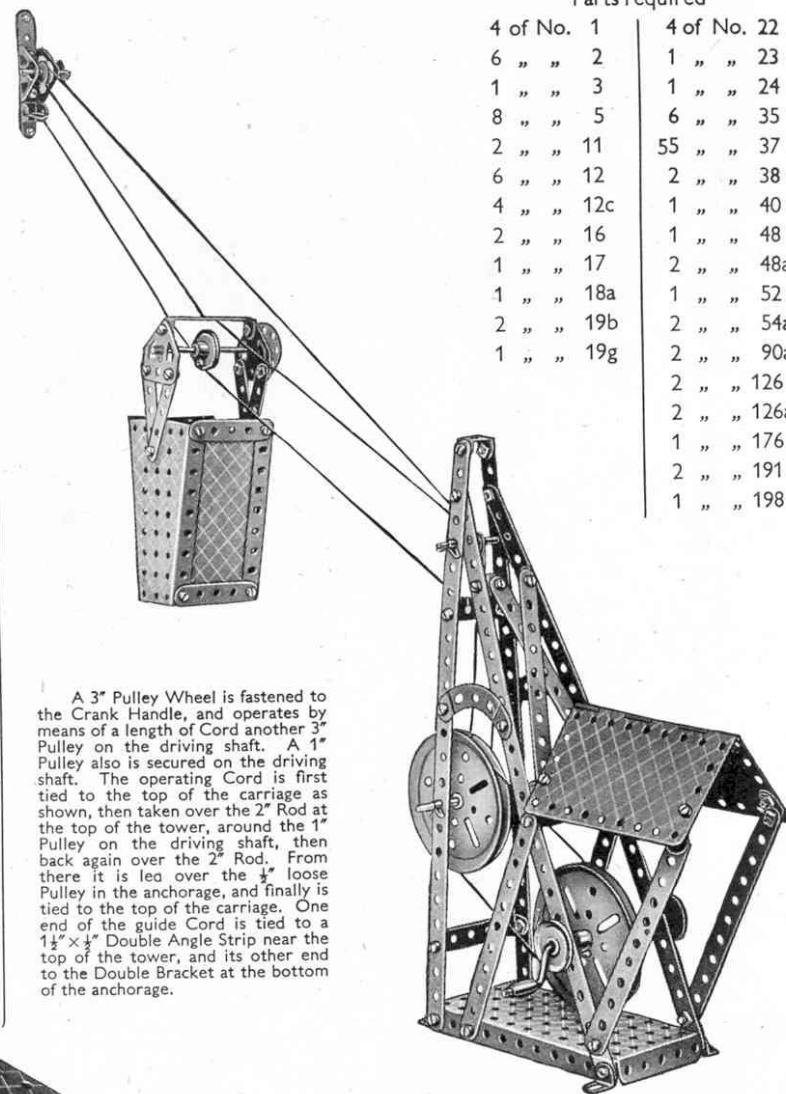


The centre pin has been removed from a Hinged Flat Plate, and the halves used at 1 to form part of the sides of the hull. The third Bolt from the stern in the $12\frac{1}{2}"$ Strip holds a $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strip that spaces the sides of the model. Flat Trunnions are used 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 $1\frac{1}{2}"$ 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

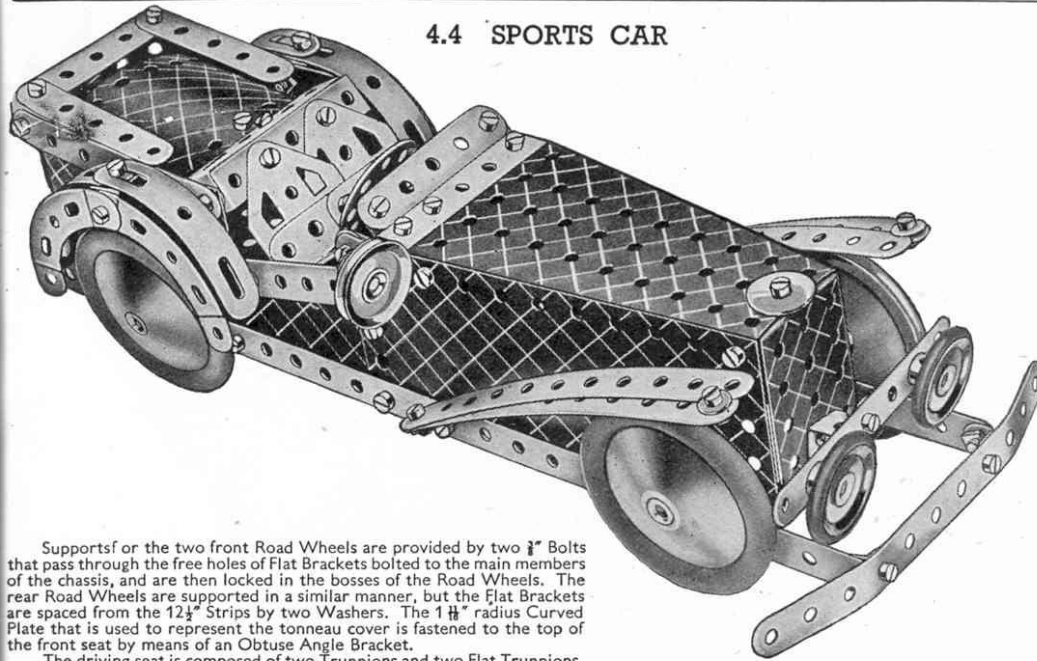
Parts required

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 " " 54a
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 Flat Brackets 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 Flat Brackets are spaced from the $12\frac{1}{2}$ " Strips by two Washers. The $1\frac{1}{4}$ " 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 $2\frac{1}{2}$ " \times $\frac{1}{2}$ " 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.

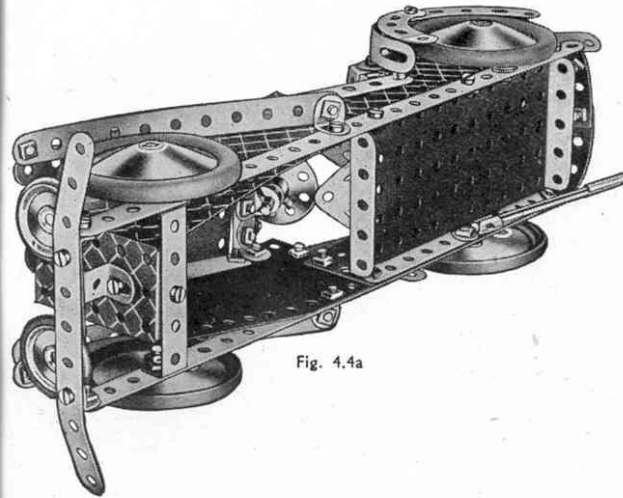


Fig. 4.4a

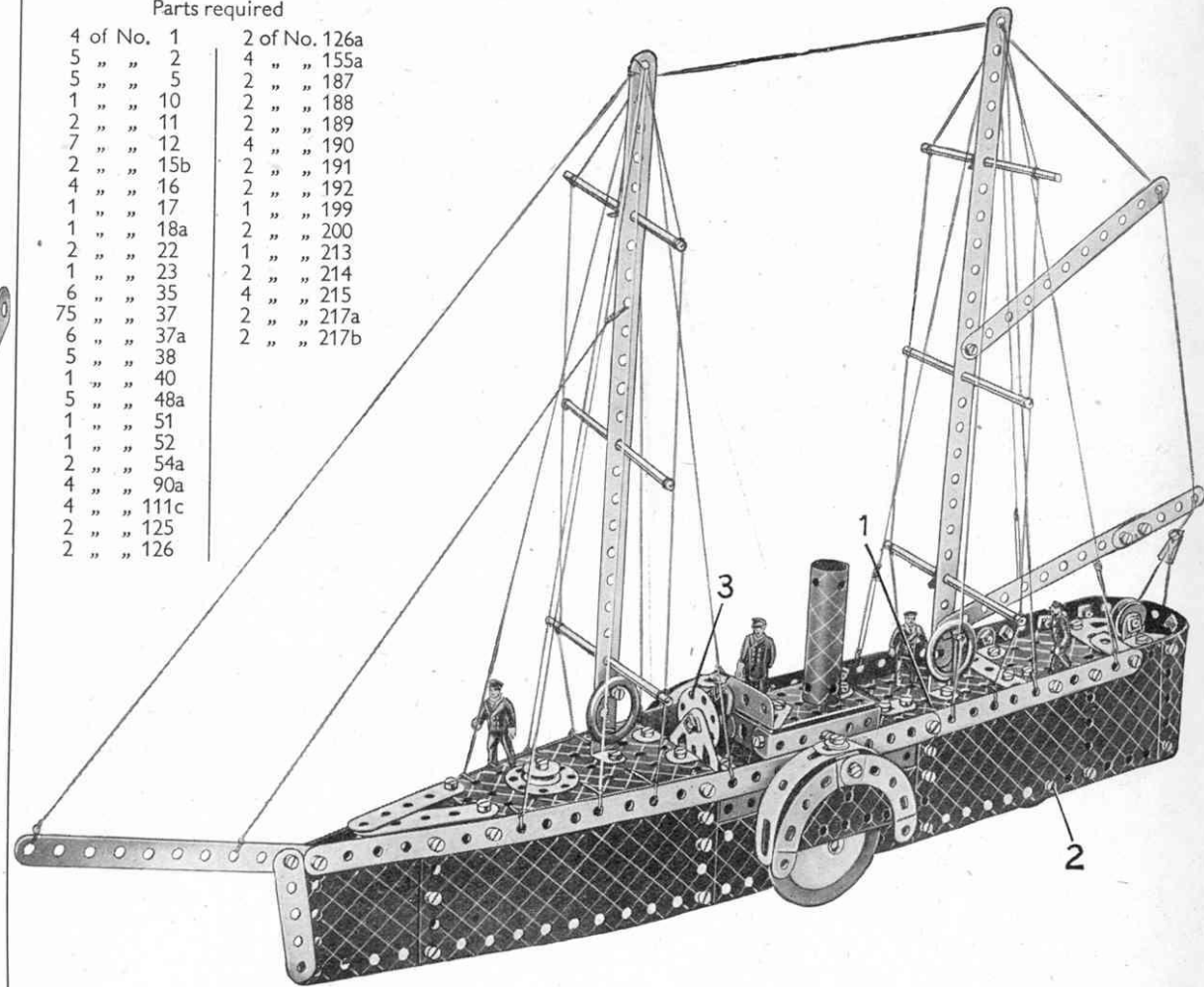
Parts required

2 of No. 1	1 of No. 52
5 " " 2	1 " " 54a
1 " " 3	4 " " 90a
9 " " 5	6 " " 111c
4 " " 10	2 " " 125
2 " " 11	2 " " 126
6 " " 12	2 " " 126a
3 " " 12c	2 " " 155a
1 " " 16	4 " " 187
1 " " 18b	2 " " 188
3 " " 22	2 " " 190
1 " " 24	2 " " 192
2 " " 35	2 " " 199
66 " " 37	1 " " 200
7 " " 38	1 " " 212
1 " " 44	1 " " 213
6 " " 48a	4 " " 215
1 " " 51	2 " " 217a

4.5 EARLY TYPE OF STEAMSHIP

Parts required

4 of No. 1	2 of No. 126a
5 " " 2	4 " " 155a
5 " " 5	2 " " 187
1 " " 10	2 " " 188
2 " " 11	2 " " 189
7 " " 12	4 " " 190
2 " " 15b	2 " " 191
4 " " 16	2 " " 192
1 " " 17	1 " " 199
1 " " 18a	2 " " 200
2 " " 22	1 " " 213
1 " " 23	2 " " 214
6 " " 35	4 " " 215
75 " " 37	2 " " 217a
6 " " 37a	2 " " 217b
5 " " 38	
1 " " 40	
5 " " 48a	
1 " " 51	
1 " " 52	
2 " " 54a	
4 " " 90a	
4 " " 111c	
2 " " 125	
2 " " 126	



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 $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " 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 Flat Bracket. A $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip is bolted across the Flanged Sector Plate and to the sides of the vessel. Two $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " 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 $1\frac{1}{2}$ " and a 2" Rod joined by a Rod Connector, which is journalled 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 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 $1\frac{1}{4}$ " Disc 3 is lock-nutted to a Trunnion to form the wheel.

4.6 DRILLING MACHINE

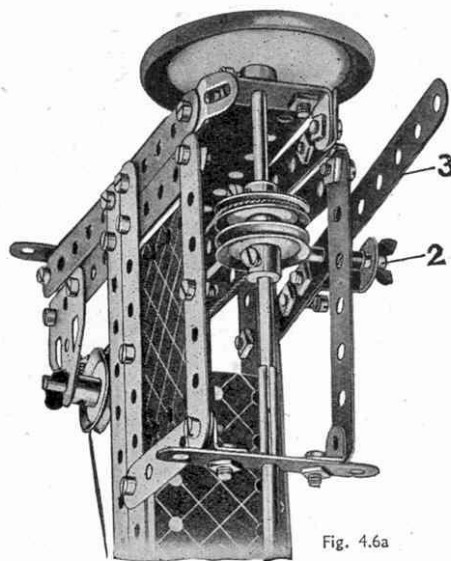
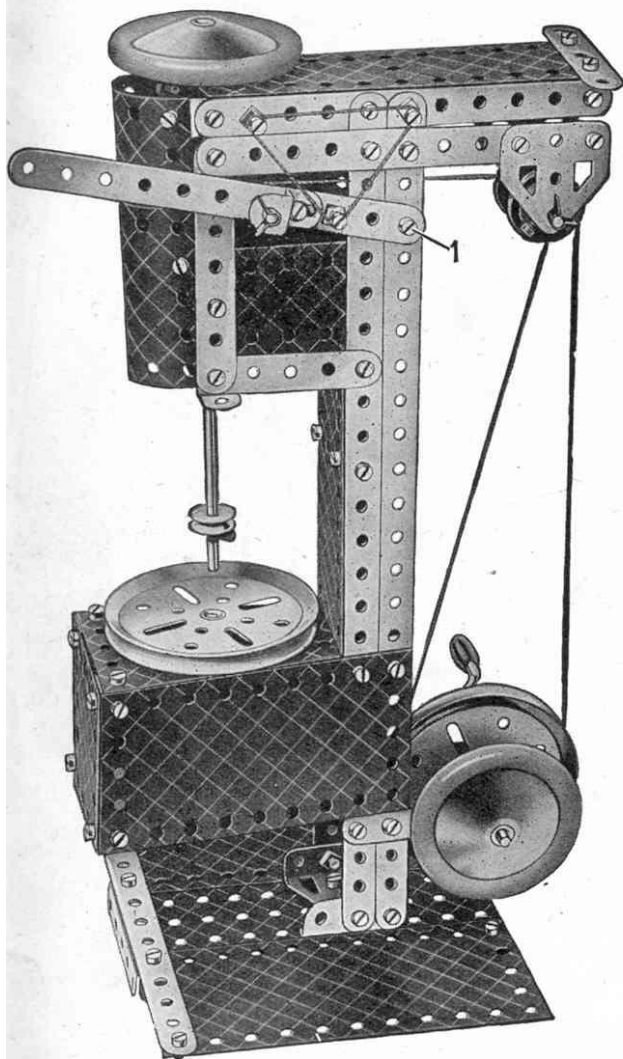


Fig. 4.6a

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	6 " " 35	2 " " 187
7 " " 5	71 " " 37	1 " " 188
8 " " 12	7 " " 37a	2 " " 189
2 " " 12c	1 " " 48	2 " " 190
1 " " 15b	1 " " 48a	2 " " 191
1 " " 16	1 " " 52	2 " " 192
2 " " 17	1 " " 54a	2 " " 199
2 " " 19b	4 " " 111c	1 " " 213
1 " " 19g	1 " " 125	

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 $2\frac{1}{2}$ " x $\frac{1}{2}$ " 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 Wheel 5 and then wound round Rod 6. By turning the handle 7 on the Bush Wheel 7 the bucket is raised or lowered.

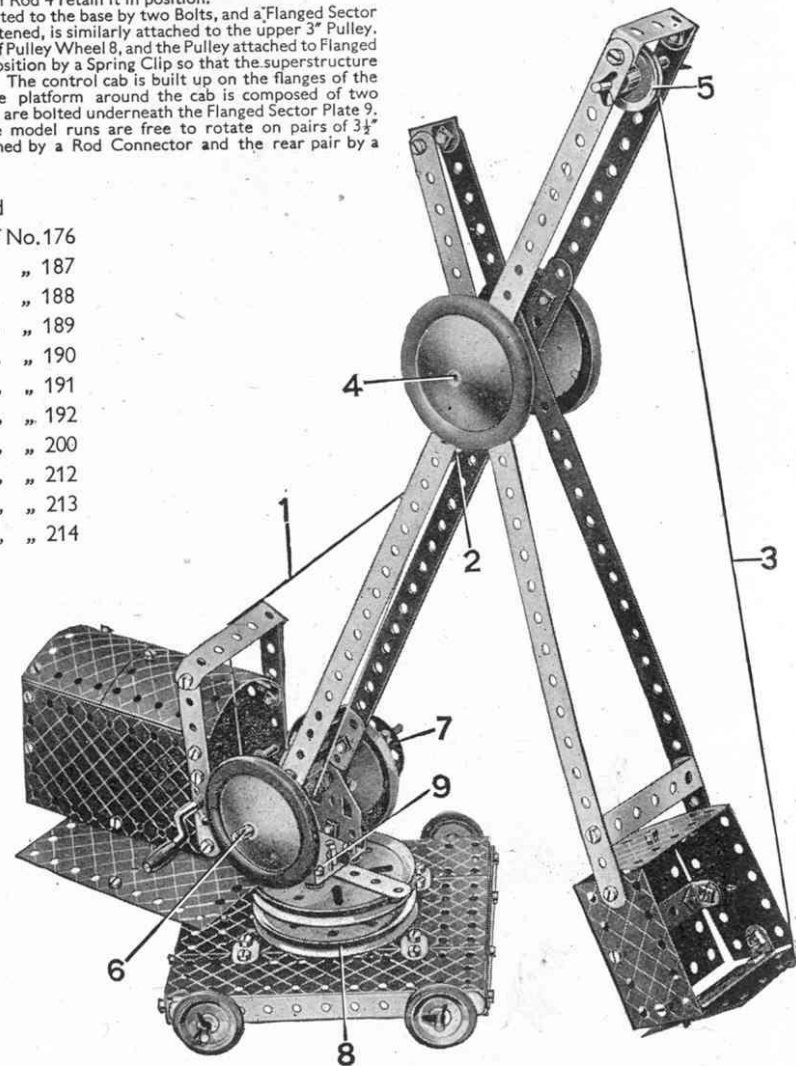
The bucket arm is pivoted on Rod 4, which passes through holes in the $12\frac{1}{2}$ " Strips forming the jib and the bucket arm. Road Wheels fastened at each end of Rod 4 retain it in position.

A 3" Pulley Wheel 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 Wheel 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 $5\frac{1}{2}$ " x $2\frac{1}{2}$ " 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.

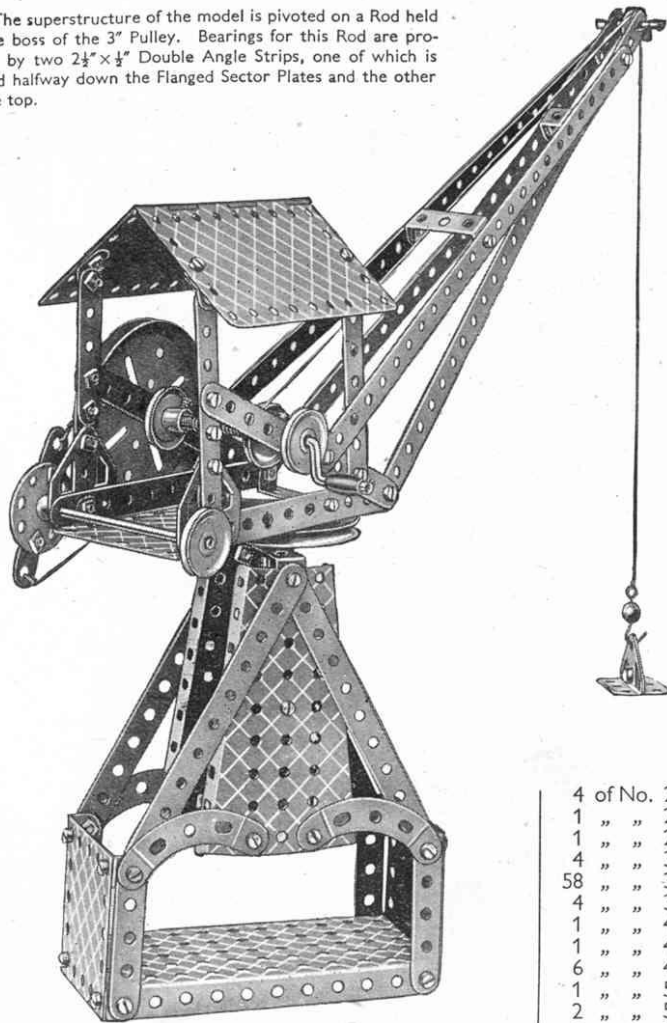
Parts required

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 " " 54a	
5 " " 111c	
2 " " 126	
2 " " 126a	
4 " " 155a	



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 $2\frac{1}{2}" \times \frac{1}{2}"$ 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	2 of No. 12
8 " " 2	3 " " 12c
1 " " 3	2 " " 16
9 " " 5	1 " " 18a
1 " " 11	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 " " 54a
1 " " 57c
4 " " 90a
2 " " 126
2 " " 126a
1 " " 176
3 " " 190
1 " " 198

Parts required

4 of No. 1	8 of No. 38
6 " " 2	1 " " 40
9 " " 5	1 " " 44
1 " " 10	1 " " 48
1 " " 11	4 " " 48a
6 " " 12	1 " " 51
4 " " 12c	1 " " 52
1 " " 15b	2 " " 54a
3 " " 16	1 " " 57c
1 " " 18a	4 " " 90a
1 " " 18b	4 " " 111c
2 " " 19b	2 " " 126a
1 " " 19g	3 " " 187
5 " " 22	1 " " 188
1 " " 23	2 " " 189
1 " " 24	4 " " 190
8 " " 35	2 " " 200
64 " " 37	1 " " 212
6 " " 37a	2 " " 217a

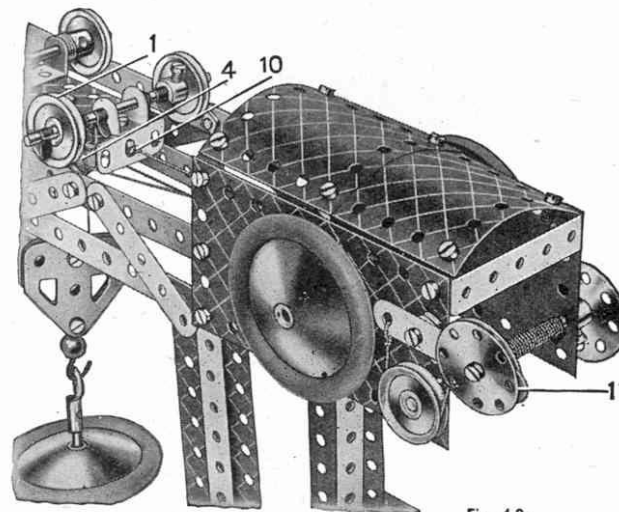
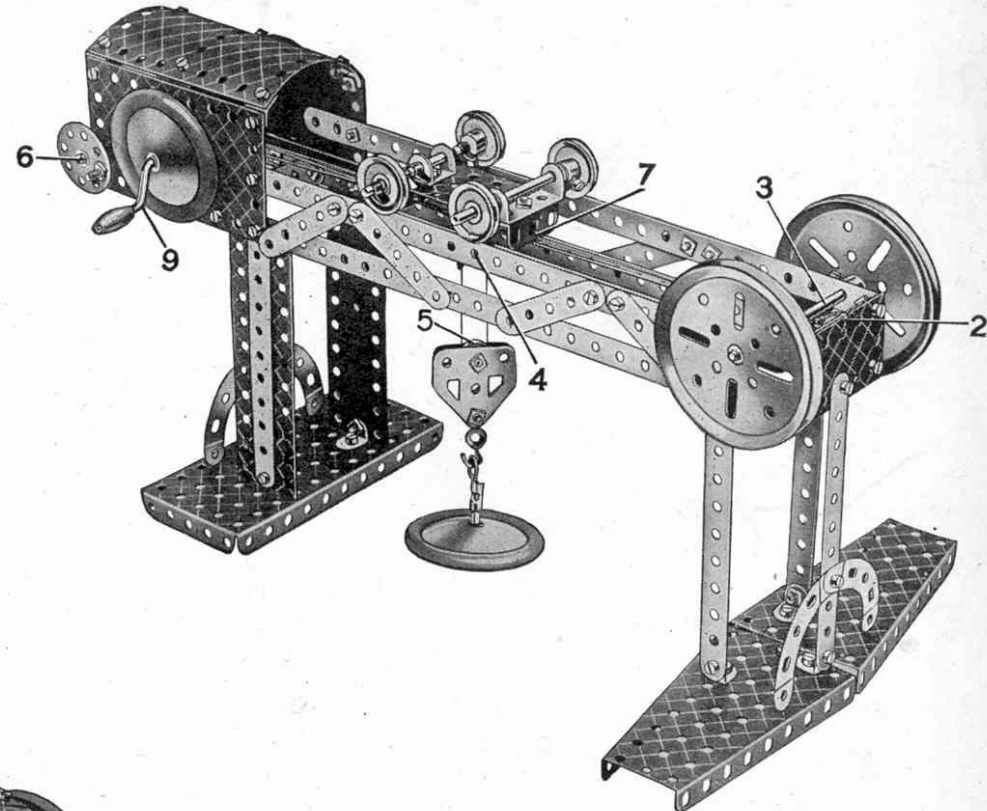


Fig. 4.9a

4.9 GANTRY CRANE



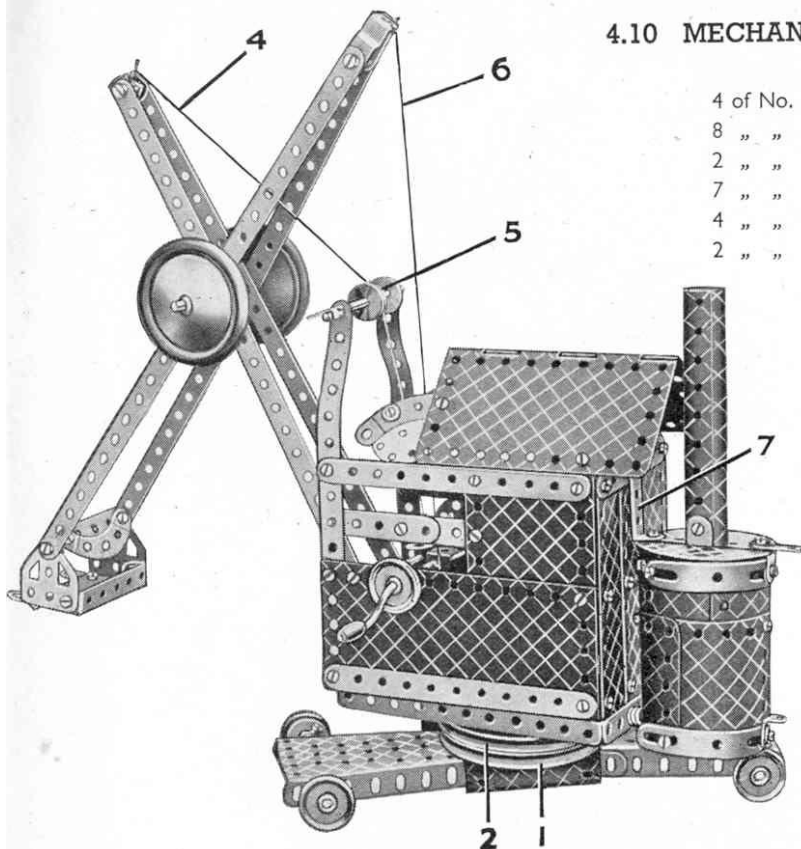
The sides of the cabin each consist of two $2\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates overlapped one hole. The top of the cabin, which consists of two $1\frac{1}{8}"$ radius Curved Plates, is attached to the sides by means of Obtuse Angle Brackets at each corner as shown.

The hoisting carriage is a $2\frac{1}{2}" \times 1\frac{1}{2}"$ Flanged Plate 7. Bearings for one of the $3\frac{1}{2}"$ Rods carrying the 1" Pulley Wheels are provided by the holes in the turned up ends of a $1\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strip, and for the other Rod by the holes in a Double Bracket. The Bolt 1 (Fig. 4.9a) secures a Cranked Bent Strip 4 vertically to the underside of the Flanged Plate 7. A 1" Rod passes through the lower holes of the Cranked 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 $\frac{1}{2}"$ Bolt, which carries a $\frac{1}{2}"$ 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 Cranked 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. 51	1 of No. 212
8 " " 2	4 " " 12c	1 " " 52	1 " " 213
2 " " 3	2 " " 15b	2 " " 54a	2 " " 214
7 " " 5	3 " " 16	3 " " 90a	4 " " 215
4 " " 10	2 " " 17	5 " " 111c	2 " " 217a
2 " " 11	2 " " 19b	2 " " 125	2 " " 217b
	1 " " 19g	2 " " 126	
	5 " " 22	2 " " 126a	
	1 " " 23	1 " " 176	
	1 " " 24	3 " " 187	
	8 " " 35	2 " " 188	
81 " " 37a	2 " " 189	2 " " 190	
75 " " 37b	4 " " 190	2 " " 191	
7 " " 38	2 " " 191	2 " " 192	
1 " " 40	2 " " 192	1 " " 198	
1 " " 44	1 " " 198	2 " " 199	
1 " " 48	2 " " 199	2 " " 200	
5 " " 48a	2 " " 200		

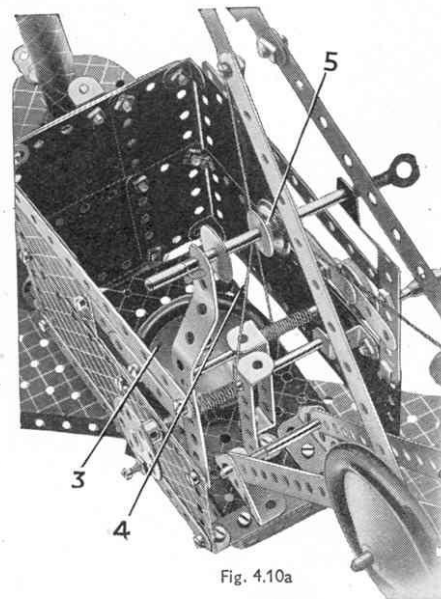


Fig. 4.10a

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

A 2" Rod is locked in the boss of Pulley 1, and on it is placed Pulley 2, boss downward. 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 $1\frac{1}{2}$ " 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 $\frac{1}{2}$ " Bolt at the bottom, where it is spaced from the cab by three Washers.

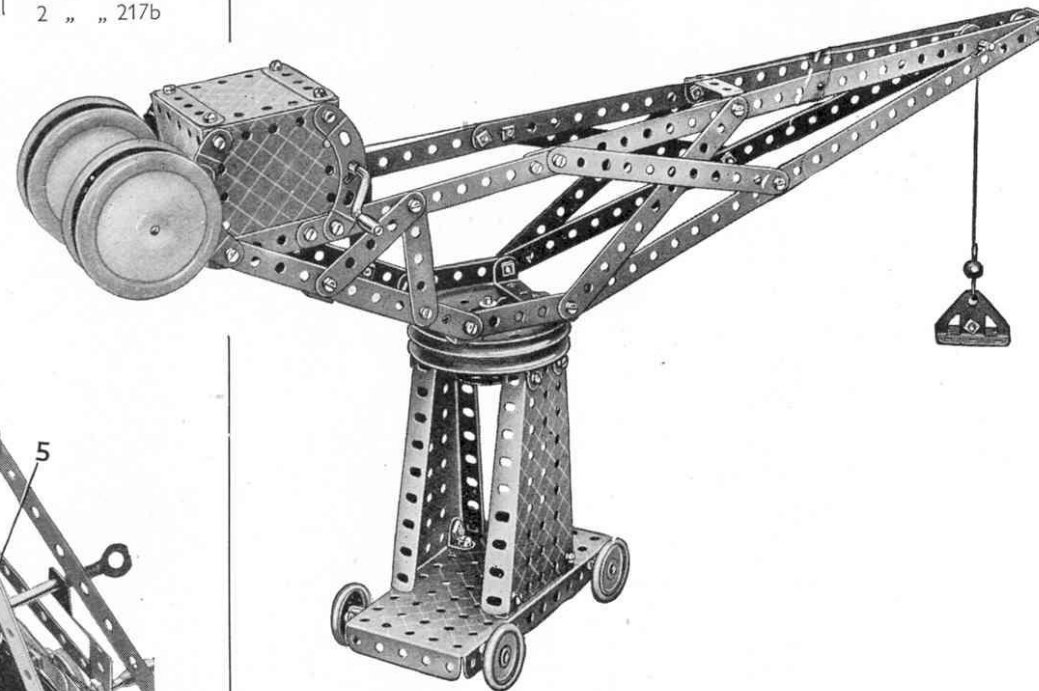
The Cord 4 is taken over the $\frac{1}{2}$ " Pulley 5 and tied to the Double Bracket at the top of the jib. This $\frac{1}{2}$ " Pulley 5 is clamped loosely between the two $\frac{3}{4}$ " Discs by two Spring Clips to form a deep-grooved pulley.

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

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.

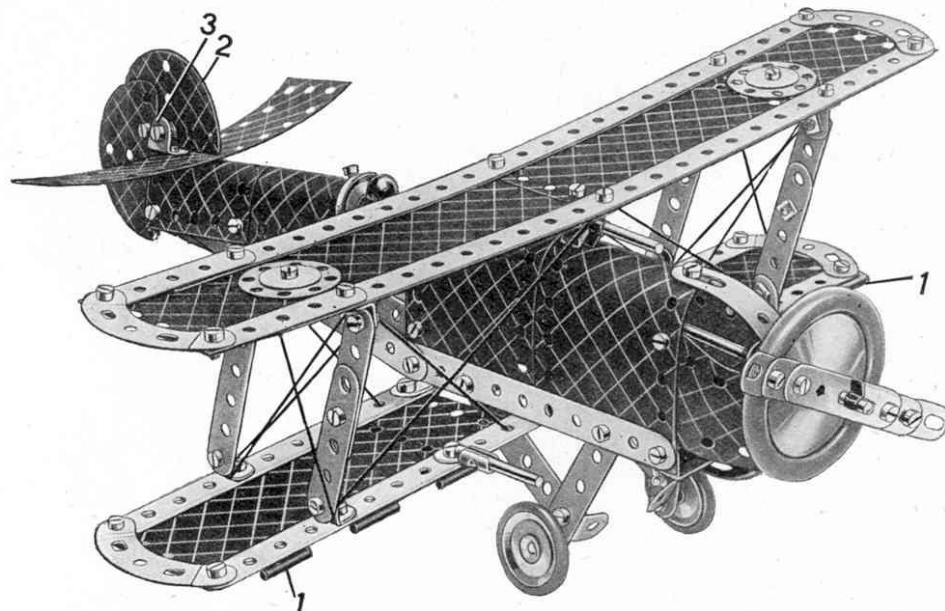
The four Road Wheels are fastened to a 4" Rod that passes through the holes of two Flat Trunnions bolted to the $2\frac{1}{2}$ " small radius Curved Strips.



Parts required

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

4.12 FIGHTING BIPLANE



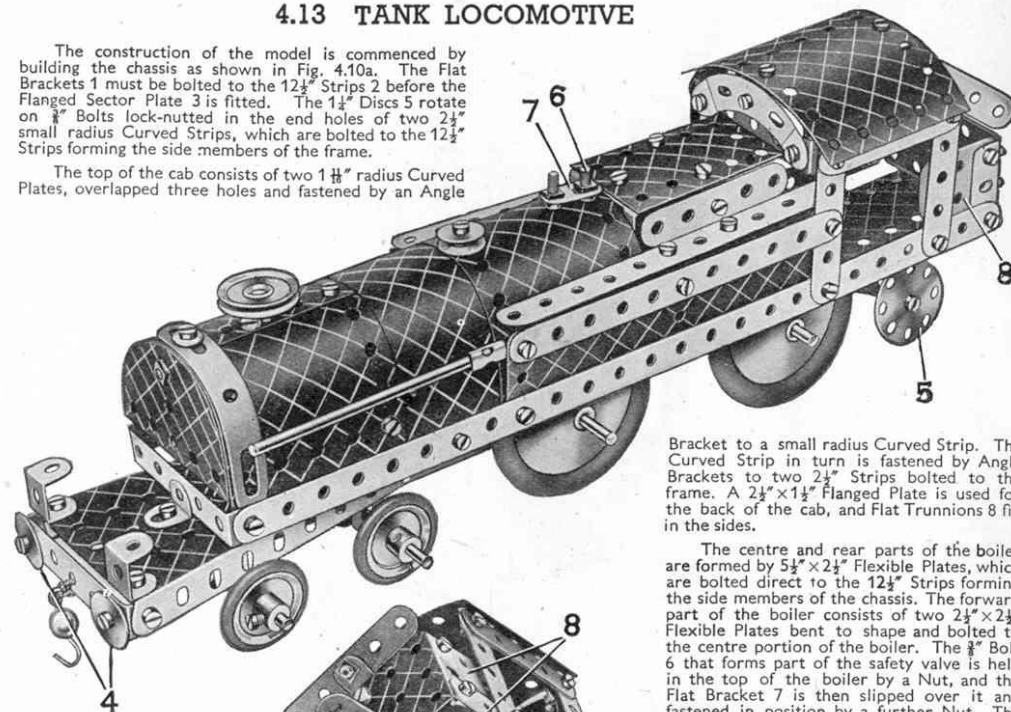
Parts required				
4 of No. 1	1 of No. 16	1 of No. 40	1 of No. 187	1 of No. 212
6 " " 2	2 " " 17	1 " " 48	2 " " 188	2 " " 214
2 " " 3	1 " " 18a	4 " " 48a	1 " " 189	2 " " 215
9 " " 5	4 " " 22	4 " " 90a	4 " " 190	2 " " 217a
4 " " 10	6 " " 35	5 " " 111c	2 " " 191	2 " " 217b
2 " " 11	74 " " 37	2 " " 125	2 " " 192	
8 " " 12	1 " " 37a	2 " " 126a	1 " " 198	
3 " " 12c	5 " " 38	2 " " 155a	2 " " 199	

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 $3\frac{1}{2}$ " 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 Flat Brackets 1 must be bolted to the $12\frac{1}{2}$ " Strips 2 before the Flanged Sector Plate 3 is fitted. The $1\frac{1}{2}$ " Discs 5 rotate on $\frac{1}{2}$ " Bolts lock-nutted in the end holes of two $2\frac{1}{2}$ " small radius Curved Strips, which are bolted to the $12\frac{1}{2}$ " Strips forming the side members of the frame.

The top of the cab consists of two $1\frac{1}{2}$ " 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 $2\frac{1}{2}$ " Strips bolted to the frame. A $2\frac{1}{2}$ " x $1\frac{1}{2}$ " 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 $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flexible Plates, which are bolted direct to the $12\frac{1}{2}$ " Strips forming the side members of the chassis. The forward part of the boiler consists of two $2\frac{1}{2}$ " x $2\frac{1}{2}$ " Flexible Plates bent to shape and bolted to the centre portion of the boiler. The $\frac{3}{4}$ " Bolt 6 that forms part of the safety valve is held in the top of the boiler by a Nut, and the Flat Bracket 7 is then slipped over it and fastened in position by a further Nut. The buffers 4 are lock-nutted to a $2\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strip bolted to the flanges of the Flanged Sector Plate 3.

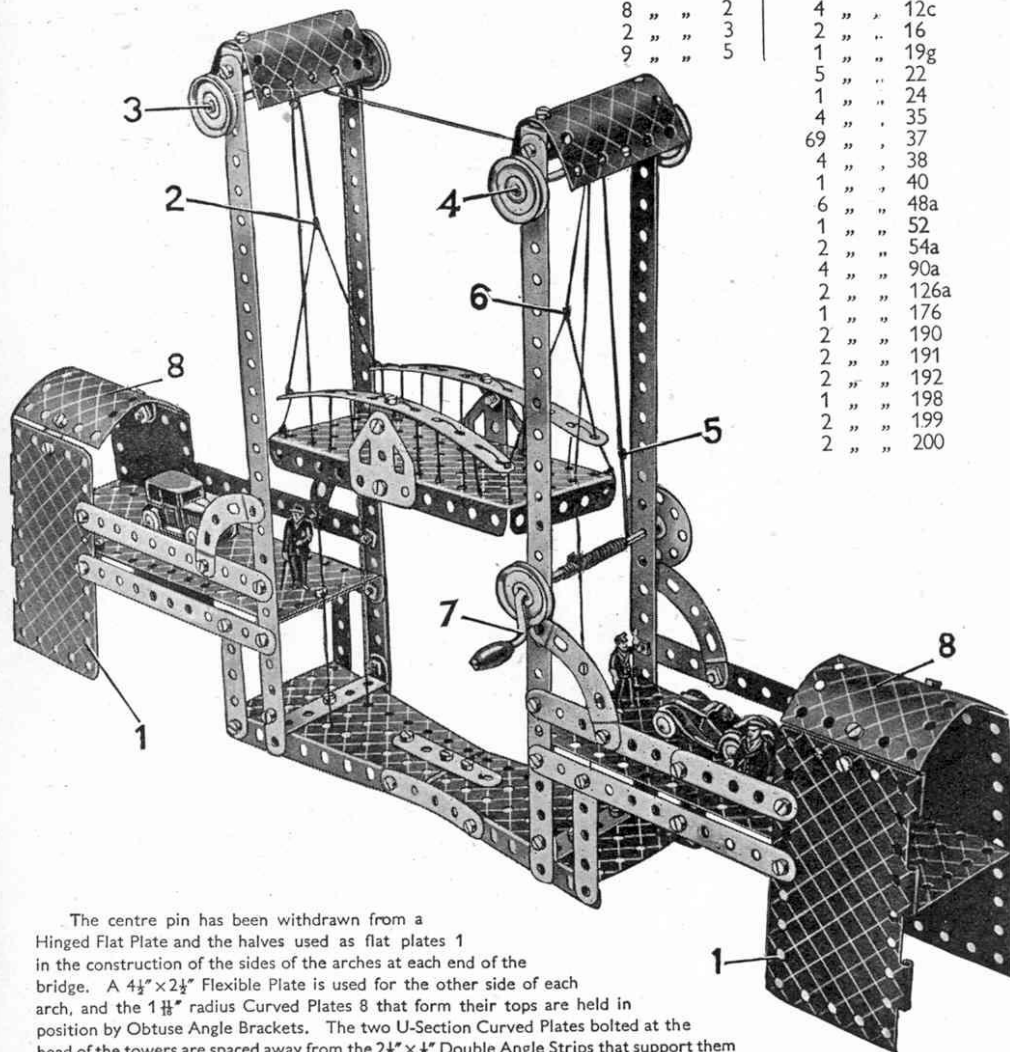
Parts required				
4 of No. 1	1 of No. 44	4 of No. 187	1 of No. 214	
5 " " 2	1 " " 48	2 " " 188	2 " " 215	
9 " " 5	4 " " 48a	2 " " 189	2 " " 217a	
5 " " 10	1 " " 51	2 " " 190	2 " " 217b	
2 " " 11	1 " " 54a	2 " " 192		
6 " " 12	1 " " 57c	2 " " 200		
4 " " 12c	3 " " 90a	1 " " 212		
1 " " 15b	5 " " 111c			
4 " " 16	2 " " 125			
5 " " 22	2 " " 126			
1 " " 23	2 " " 126a			
4 " " 35	2 " " 126a			
70 " " 37	4 " " 155a			
9 " " 37a				
7 " " 38				

Fig. 4.10a

4.14 LIFTING BRIDGE

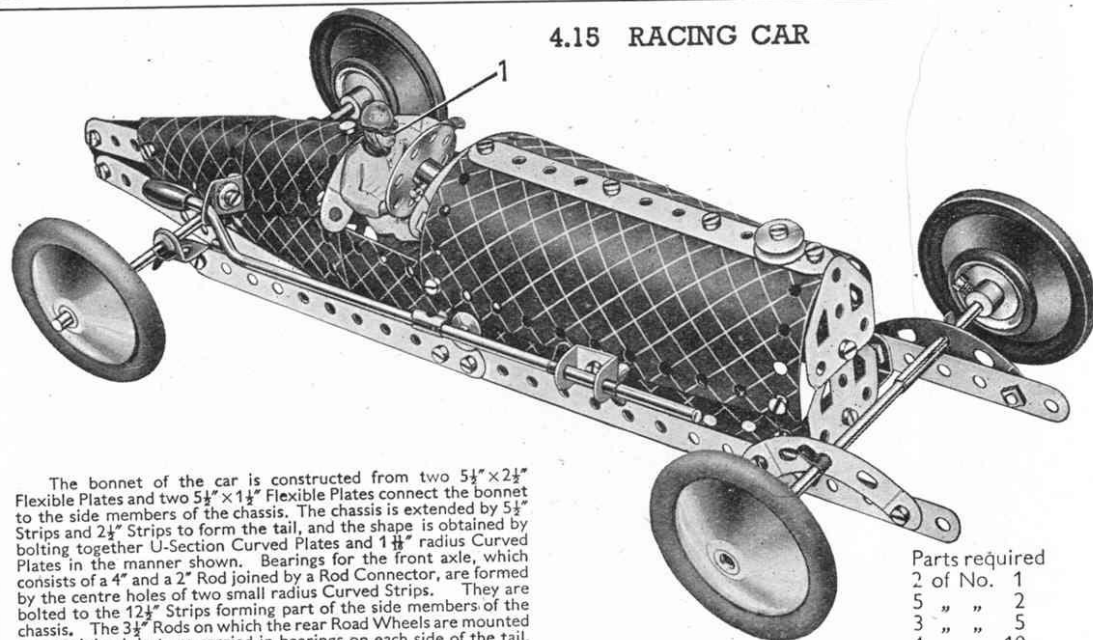
Parts required

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 " " 54a
	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 Flat Bracket fastened to the side of the car. The Rods are held in position by Spring Clips. The Driver 1 (Motor Car Constructor Part No. A1100) is not included in the Outfit, but can be purchased separately if required.

Parts required

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

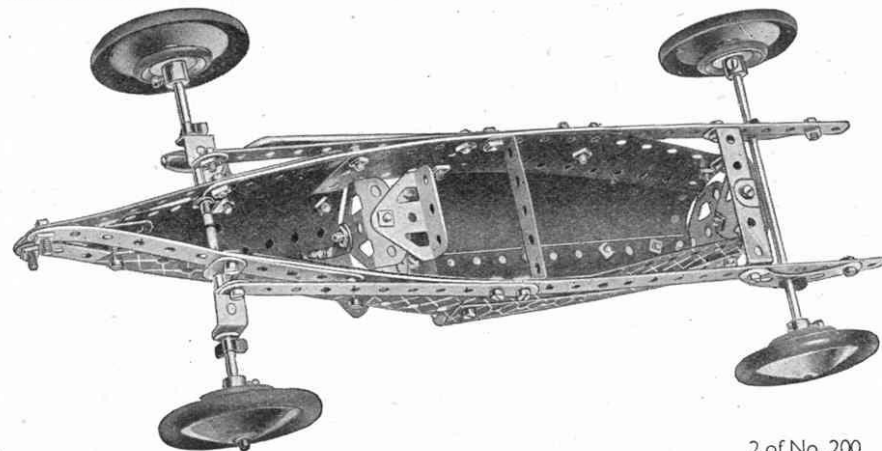
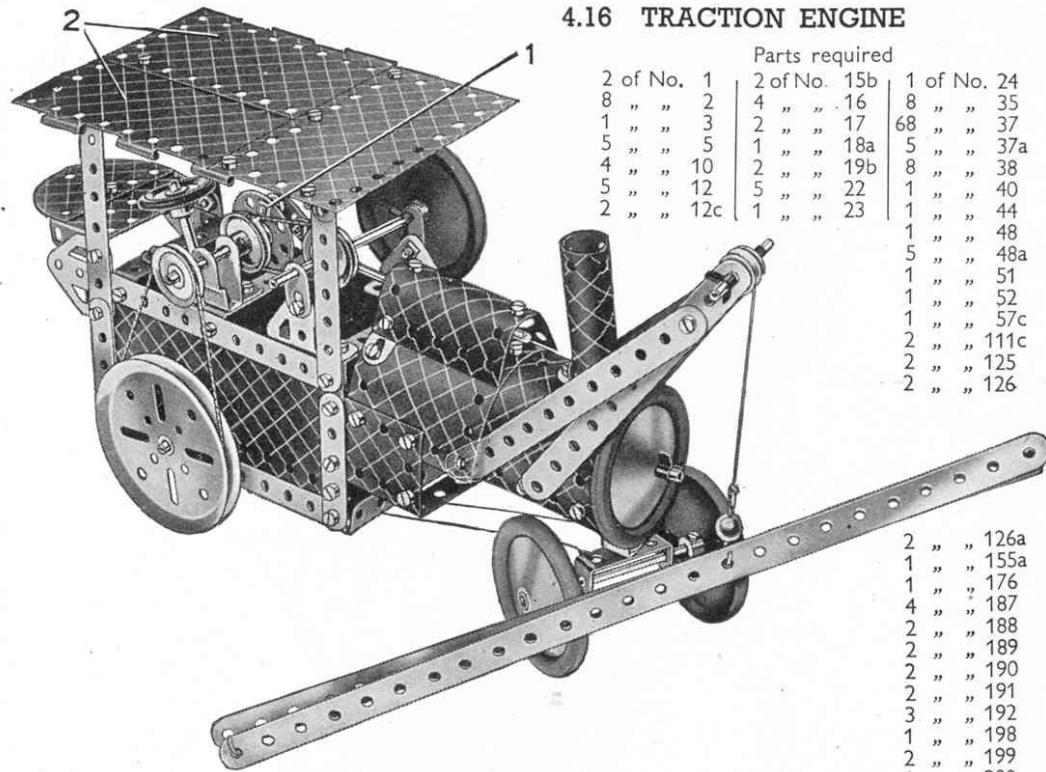


Fig. 4.15a

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

4.16 TRACTION ENGINE



Parts required		
2 of No. 1	2 of No. 15b	1 of No. 24
8 " " 2	4 " " 16	8 " " 35
1 " " 3	2 " " 17	68 " " 37
5 " " 5	1 " " 18a	5 " " 37a
4 " " 10	2 " " 19b	8 " " 38
5 " " 12	5 " " 22	1 " " 40
2 " " 12c	1 " " 23	1 " " 44
		1 " " 48
		5 " " 48a
		1 " " 51
		1 " " 52
		1 " " 57c
		2 " " 111c
		2 " " 125
		2 " " 126
		2 " " 126a
		1 " " 155a
		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
		1 " " 217b

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 Flat Brackets, 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 $1\frac{1}{2} \times \frac{1}{2}$ 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.

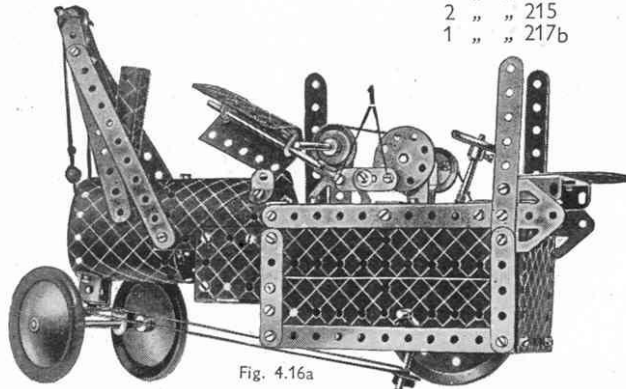
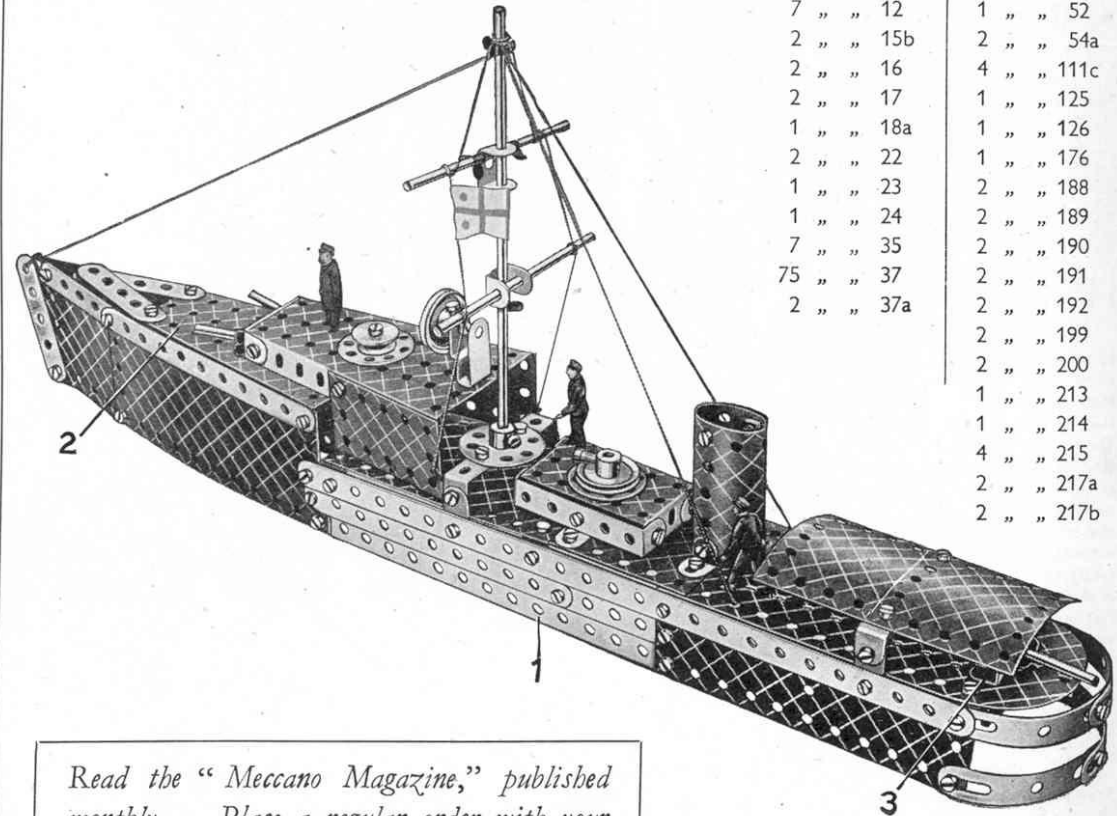


Fig. 4.16a

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 a 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.

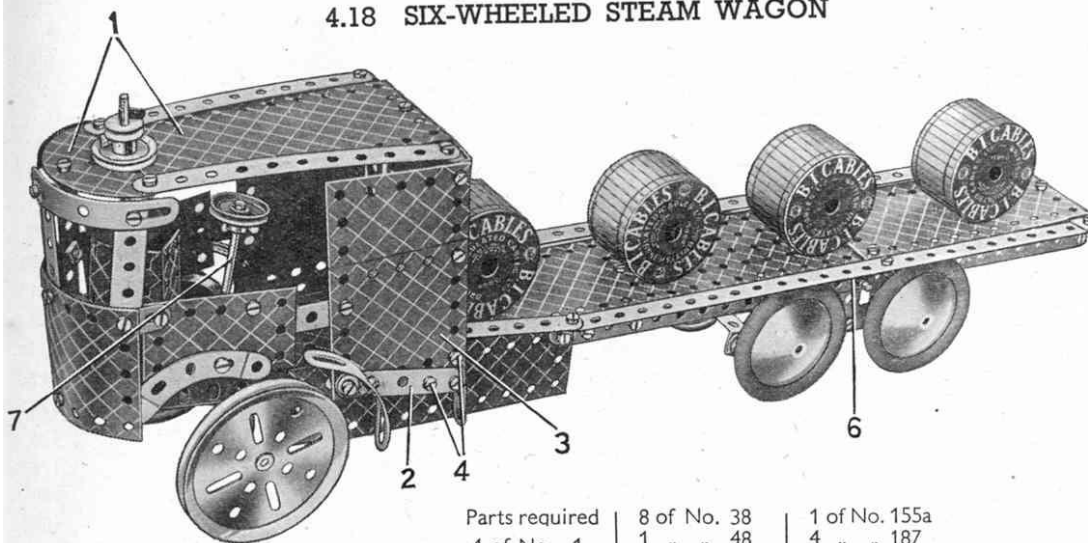


Parts required

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 " " 54a
2 " " 16	4 " " 111c
2 " " 17	1 " " 125
1 " " 18a	1 " " 126
2 " " 22	1 " " 176
1 " " 23	2 " " 188
1 " " 24	2 " " 189
7 " " 35	2 " " 190
75 " " 37	2 " " 191
2 " " 37a	2 " " 192
	2 " " 199
	2 " " 200
	1 " " 213
	1 " " 214
	4 " " 215
	2 " " 217a
	2 " " 217b

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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 Flat Bracket 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 Flat Trunnions bolted to the bogie. The Rod is held in position by Spring Clips.

Parts required		8 of No. 38	1 of No. 155a
4 of No. 1	1	1 " " 48	4 " " 187
8 " " 2	2	6 " " 48a	2 " " 188
2 " " 3	3	1 " " 51	2 " " 189
6 " " 5	5	1 " " 52	4 " " 190
4 " " 10	10	1 " " 54a	2 " " 191
2 " " 11	11	4 " " 90a	2 " " 192
8 " " 12	12	2 " " 111c	2 " " 199
2 " " 12c	12c	2 " " 125	2 " " 200
2 " " 15b	15b	1 " " 126	1 " " 214
4 " " 16	16	2 " " 126a	4 " " 215
2 " " 19b	19b		
5 " " 22	22		
1 " " 23	23		
1 " " 24	24		
8 " " 35	35		
75 " " 37	37		
2 " " 37a	37a		

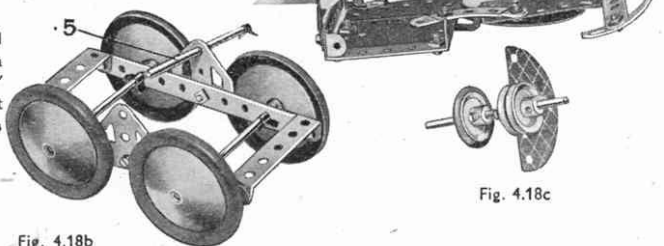


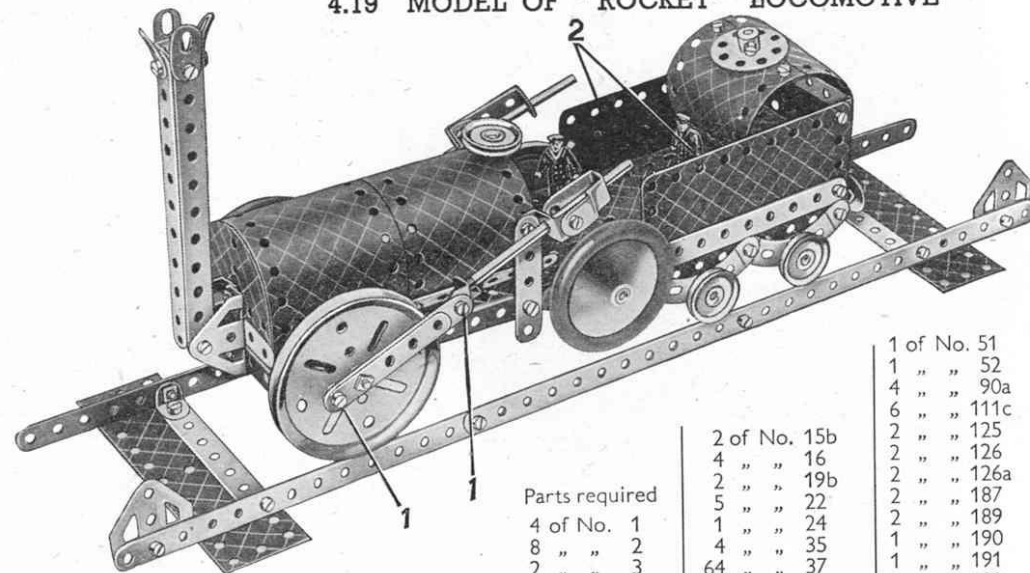
Fig. 4.18b

Fig. 4.18a



Fig. 4.18c

4.19 MODEL OF "ROCKET" LOCOMOTIVE



Parts required

4 of No. 1	3	22
8 " " 2	1	24
2 " " 3	4	35
9 " " 5	64	37
4 " " 10	12	37a
1 " " 11	8	38
8 " " 12	1	44
4 " " 12c	1	48
	2	48a

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 Cranked 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 $\frac{3}{4}''$ Discs 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.

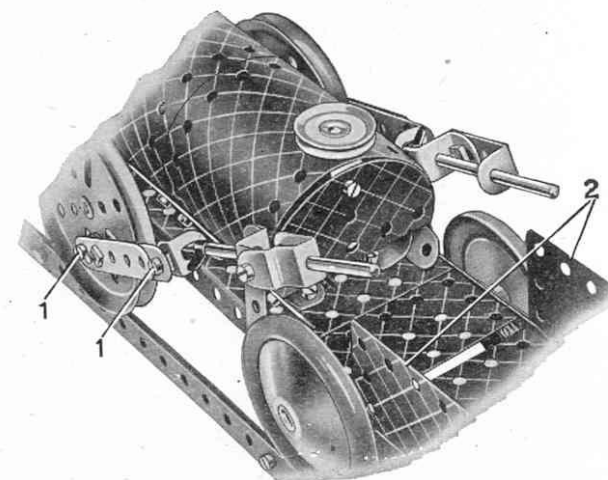
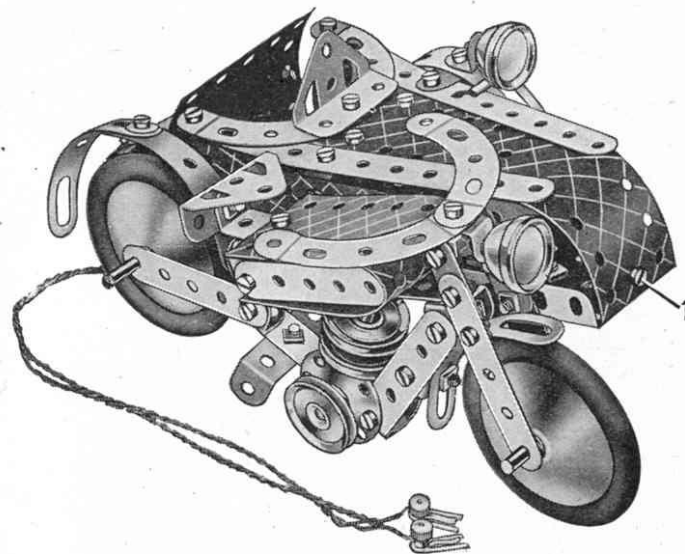


Fig. 4.19a

4.20 MOTOR CYCLE AND SIDECAR



The $5\frac{1}{2}'' \times 1\frac{1}{2}''$ 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 $\frac{1}{2}''$ 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 journaled 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 $1\frac{1}{2}''$ Discs to the frame.

The model is fitted with two Spotlights taken from a Meccano Lighting Set. These are fastened by the Angle Brackets supplied with the Lighting Set, to the handlebars and sidecar mudguard. The battery for supplying current for the Spotlights can be concealed in the sidecar.

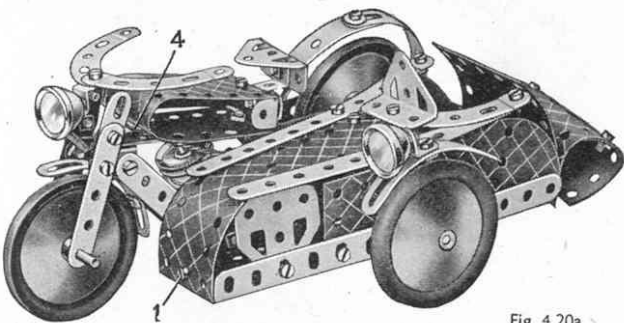


Fig. 4.20a

Parts required

5 of No. 2	1 of No. 54a
1 " " 3	4 " " 90a
8 " " 5	1 " " 111c
5 " " 10	1 " " 125
2 " " 11	2 " " 126
8 " " 12	2 " " 126a
1 " " 12c	3 " " 187
1 " " 16	2 " " 188
2 " " 17	2 " " 189
1 " " 18a	1 " " 190
3 " " 22	2 " " 199
1 " " 35	1 " " 200
51 " " 37	2 " " 214
2 " " 38	4 " " 215
1 " " 48	2 " " 217a
3 " " 48a	Lighting Set (Not included in Outfit)

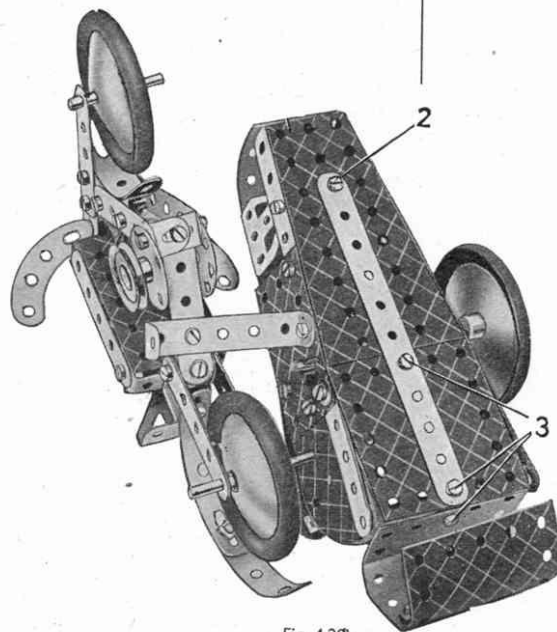
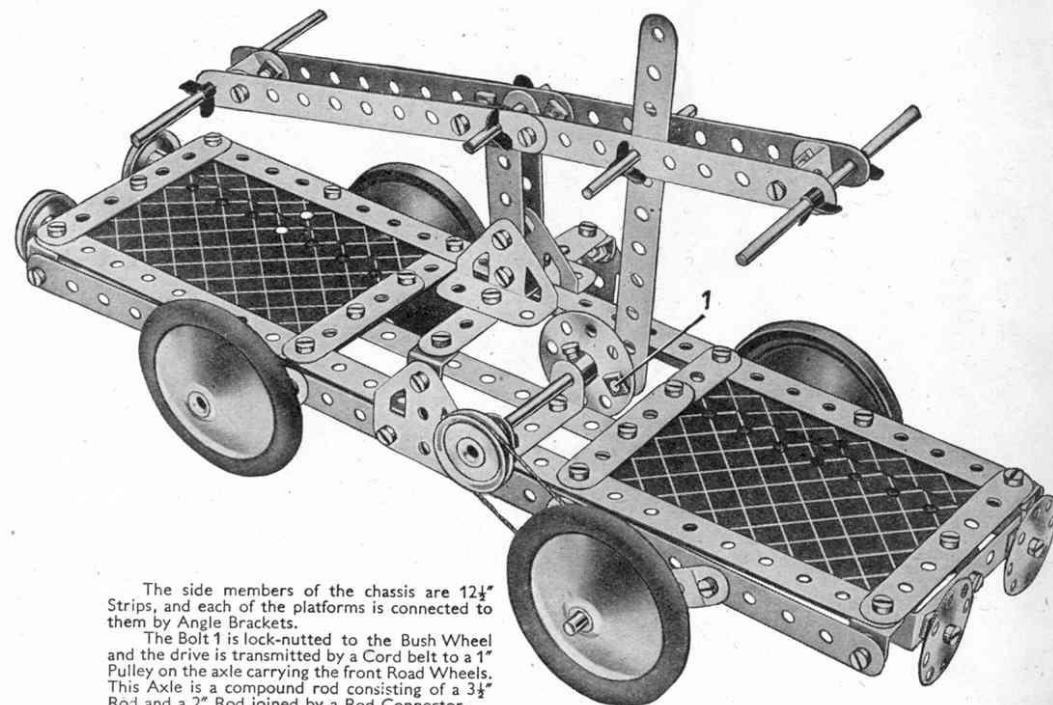


Fig. 4.20b.

4.21 HAND TROLLEY CAR



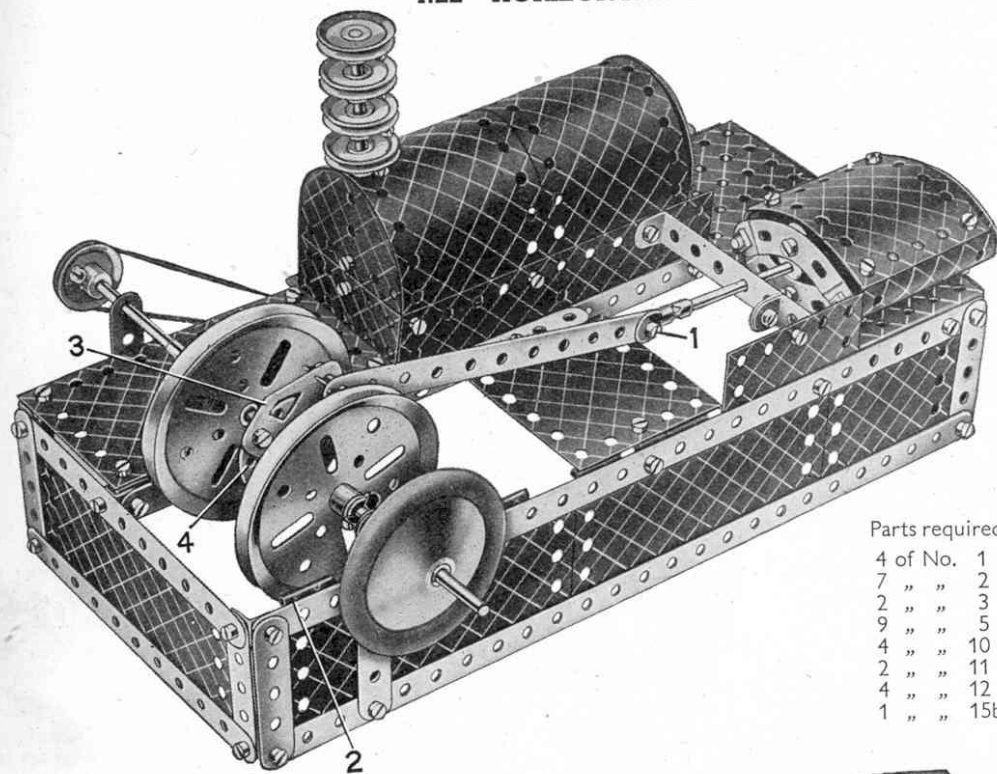
The side members of the chassis are $12\frac{1}{2}''$ Strips, and each of the platforms is connected to them by Angle Brackets.

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	4 of No. 90a
6 " " 2	4 " " 22	4 " " 111c
2 " " 3	1 " " 24	2 " " 126
8 " " 5	8 " " 35	2 " " 126a
2 " " 11	54 " " 37	4 " " 187
8 " " 12	7 " " 37a	4 " " 190
1 " " 15b	2 " " 38	2 " " 191
3 " " 16	1 " " 48	1 " " 213
2 " " 17	2 " " 48a	2 " " 217a

4.22 HORIZONTAL STEAM ENGINE



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 1½" 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 $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates bolted to $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates, and its ends are closed by Semi-circular Plates and $2\frac{1}{2}'' \times 1\frac{1}{2}''$ 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 *Magie* Motor.

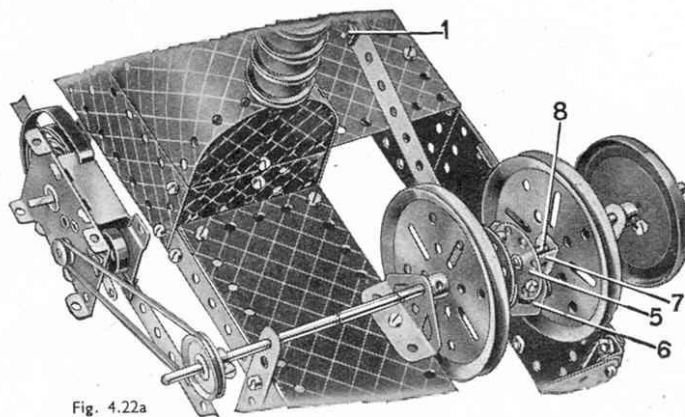
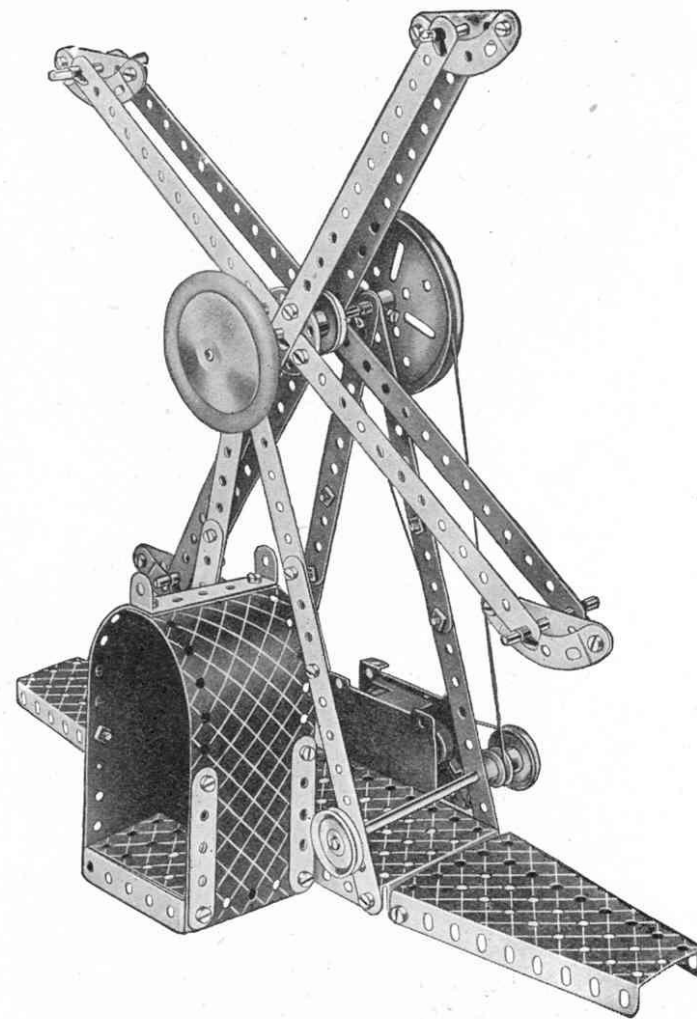


Fig. 4.22a

3	of No.	16
1	" "	17
1	" "	18b
2	" "	19b
5	" "	22
1	" "	24
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	" "	217a
1	<i>Magic</i>	Motor

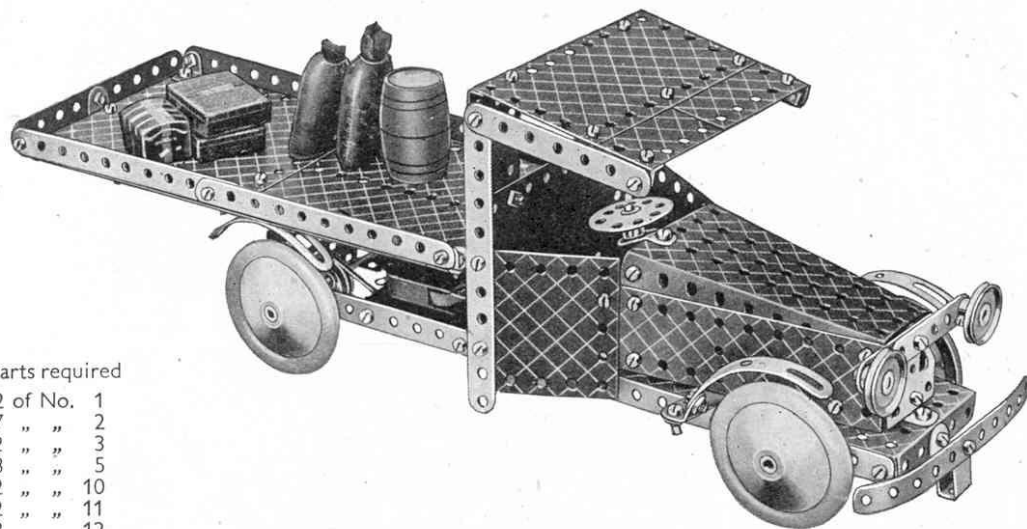
4.23 FLYBOATS



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 " "	54a
4 " "	90a
1 " "	176
1 " "	187
2 " "	192
1	<i>Magic Motor</i>

The *Magic Motor* is bolted to the flange of the $5\frac{1}{2}'' \times 2\frac{1}{4}''$ Flanged Plate, and the drive is taken from the pulley of the Motor to a 1" Pulley fastened on a Rod journaled in the $12\frac{1}{2}''$ Strips that support the main shaft. A $\frac{1}{2}''$ 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 $2\frac{1}{2}''$ Strip and a $2\frac{1}{2}''$ 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
3 " "	22
1 " "	24
5 " "	35
75 " "	37
2 " "	37a
5 " "	38
1 " "	44
1 " "	48
4 " "	48a
1 " "	52
2 " "	54a
4 " "	111c
2 " "	125
2 " "	126
1 " "	126a
4 " "	187
2 " "	188
2 " "	189
4 " "	190
2 " "	191
2 " "	192
1 " "	198
4 " "	215
1 Magic Motor	

The chassis of the model consists of two $12\frac{1}{2}$ " Strips bolted to a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate and secured at their free ends by a $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip. Both the front and rear axles are journaled directly in the chassis. The *Magic Motor* is attached by its flanges to one of the $12\frac{1}{2}$ " 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 $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strips, the ends of which can be seen in Fig. 4.24a and also to the back of the cab by a $1\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip. The front bumper consists of a $5\frac{1}{2}$ " Strip curved to shape and fastened by a Cranked Bent Strip to the $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate forming the front of the chassis. The headlamps, which are 1" Pulleys, are fixed in place by $\frac{3}{8}$ " Bolts pushed through the $2\frac{1}{2}$ " Strips into the bosses of the Pulleys and held by the setscrews.

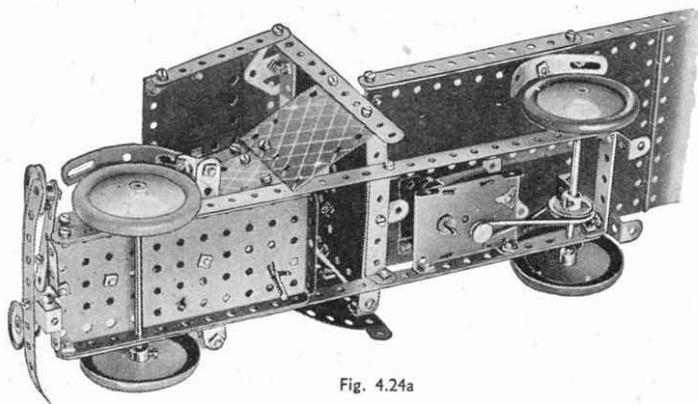
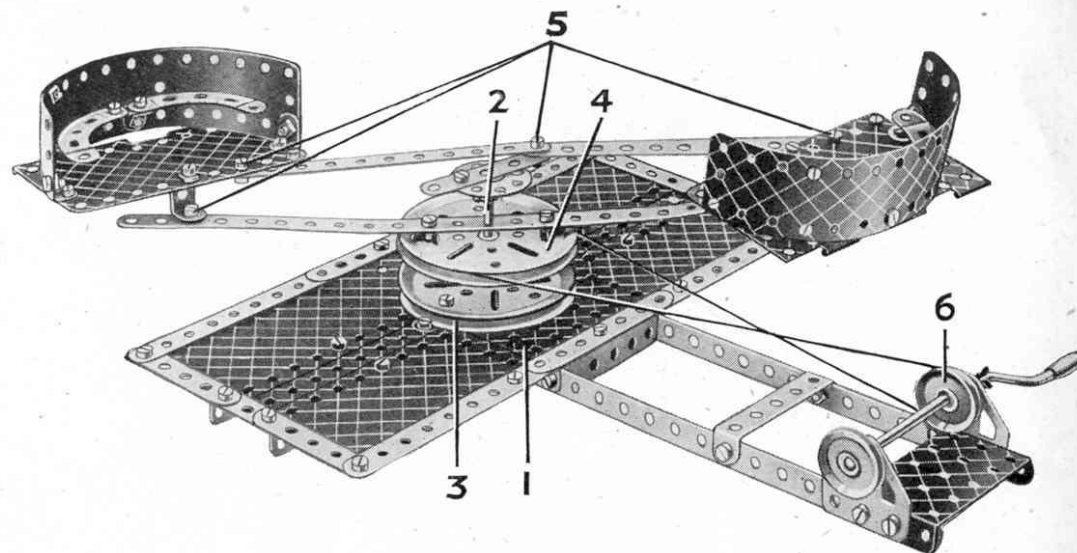


Fig. 4.24a

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 " "	54a
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 $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate 1 extended on each side by a Flanged Sector Plate, a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " and a $4\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate. The edges of the base are strengthened with Strips. Two $12\frac{1}{2}$ " Strips are bolted to the flanges of Plate 1 and their ends are connected by a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flanged Plate. Two Flat Trunnions provide bearings for a Small Crank Handle.

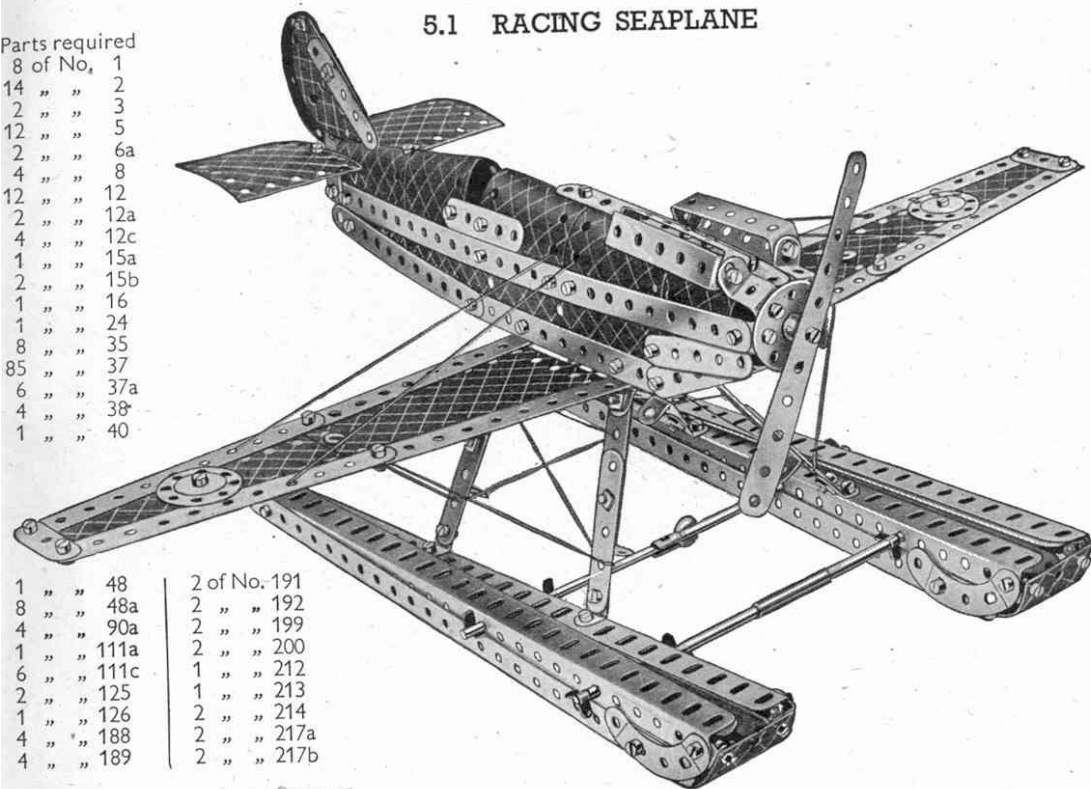
A 3" Pulley 3 is bolted to Flanged Plate 1 and in its boss is fixed a 2" Rod 2. A second 3" Pulley 4 is spaced from Pulley 3 by a Spring Clip and is free to turn on Rod 2. Across its face is bolted a $12\frac{1}{2}$ " Strip, the Strip being spaced from the Pulley by a Spring Clip and two Washers placed on the shank of each securing Bolt.

A Bush Wheel fitted with a $2\frac{1}{2}$ " Strip is secured on Rod 2 in the position shown, the end of the Strip being connected to the cars by $5\frac{1}{2}$ " 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
8 "	35
85 "	37
6 "	37a
4 "	38
1 "	40



1 "	48	2 of No.	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
4 "	188	2 "	217a
4 "	189	2 "	217b

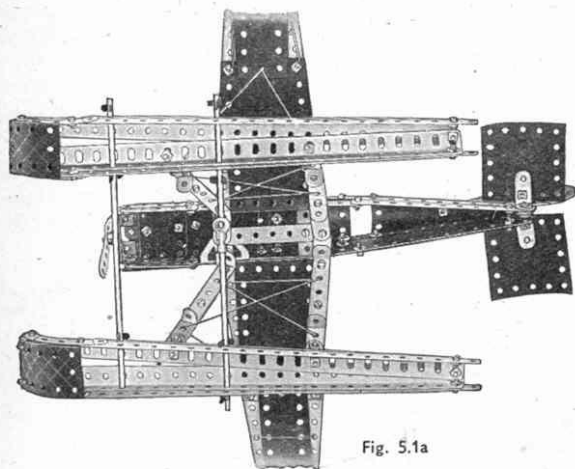
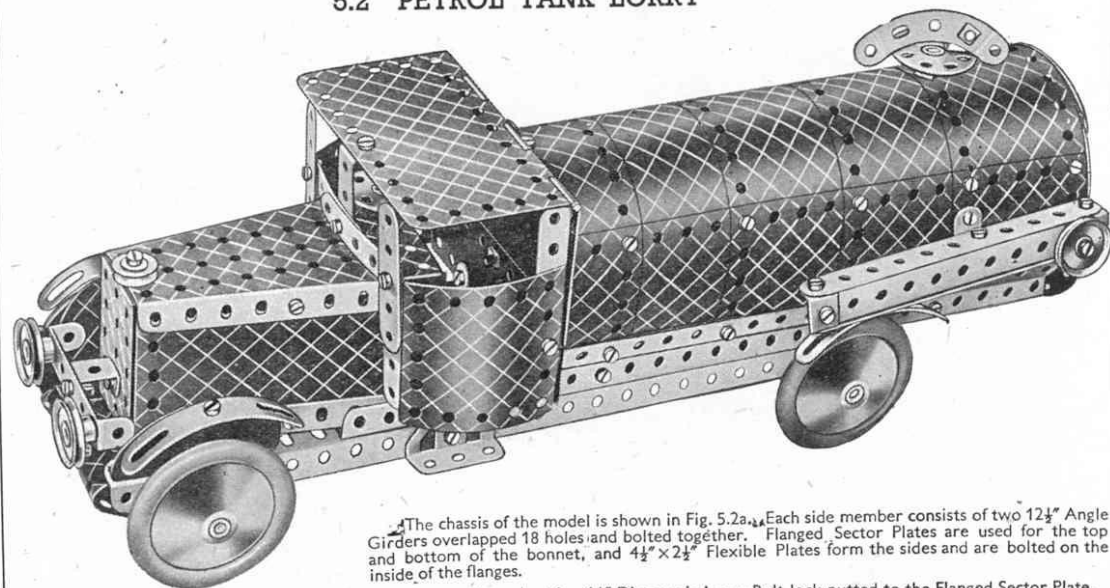


Fig. 5.1a

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

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

5.2 PETROL TANK LORRY



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

The steering wheel is a $1\frac{1}{2}$ " Disc carried on a Bolt lock-nutted to the Flanged Sector Plate.

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

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

Parts required

7 of No.	2	1 of No.	52
1 "	3	2 "	54a
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
4 "	35	4 "	192
80 "	37	1 "	198
5 "	37a	2 "	199
9 "	38	2 "	200
1 "	48	2 "	214
1 "	48a	4 "	215
1 "	51	1 "	217a

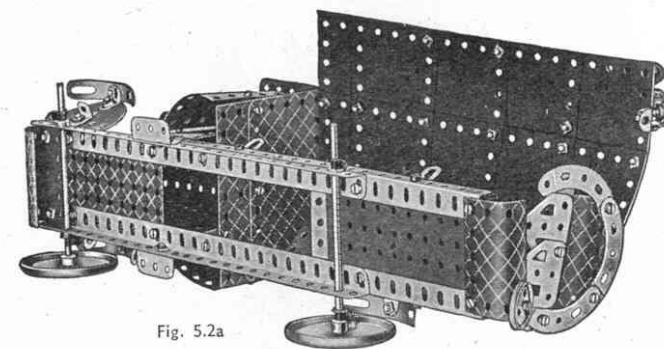
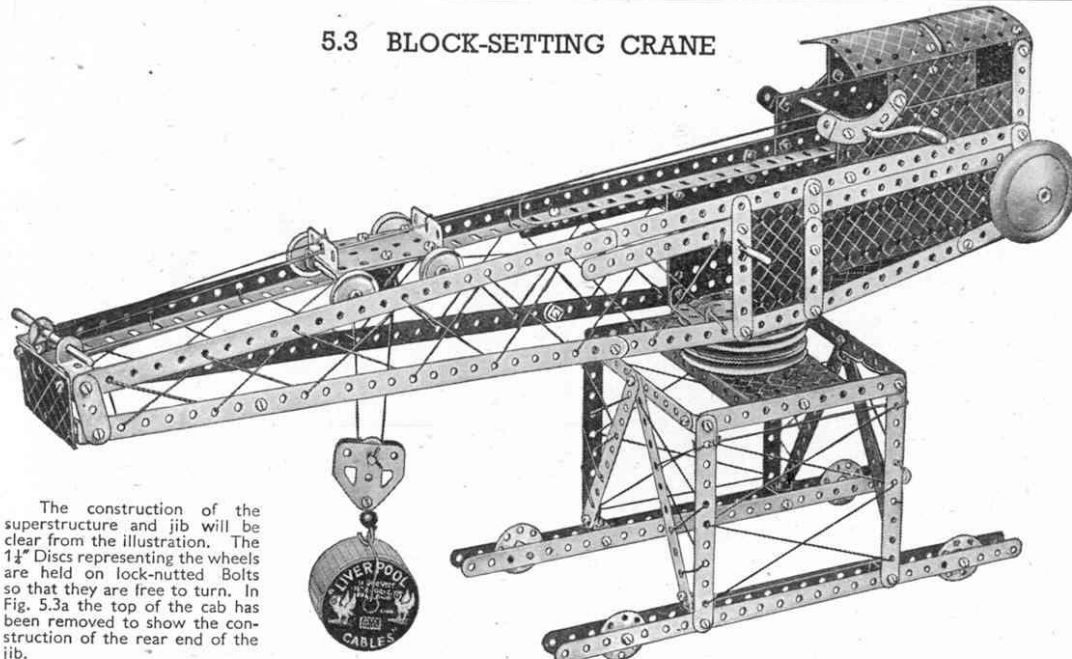


Fig. 5.2a

5.3 BLOCK-SETTING CRANE



The construction of the superstructure and jib will be clear from the illustration. The $1\frac{1}{2}$ " Discs representing the wheels are held on lock-nutted Bolts so that they are free to turn. In Fig. 5.3a the top of the cab has been removed to show the construction of the rear end of the jib.

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

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

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

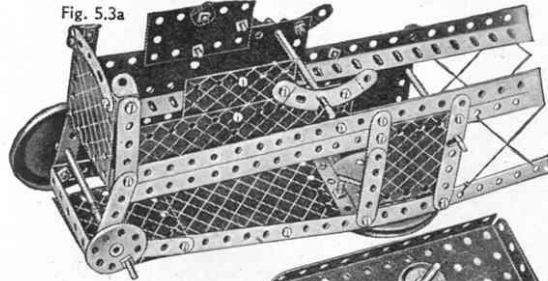


Fig. 5.3c

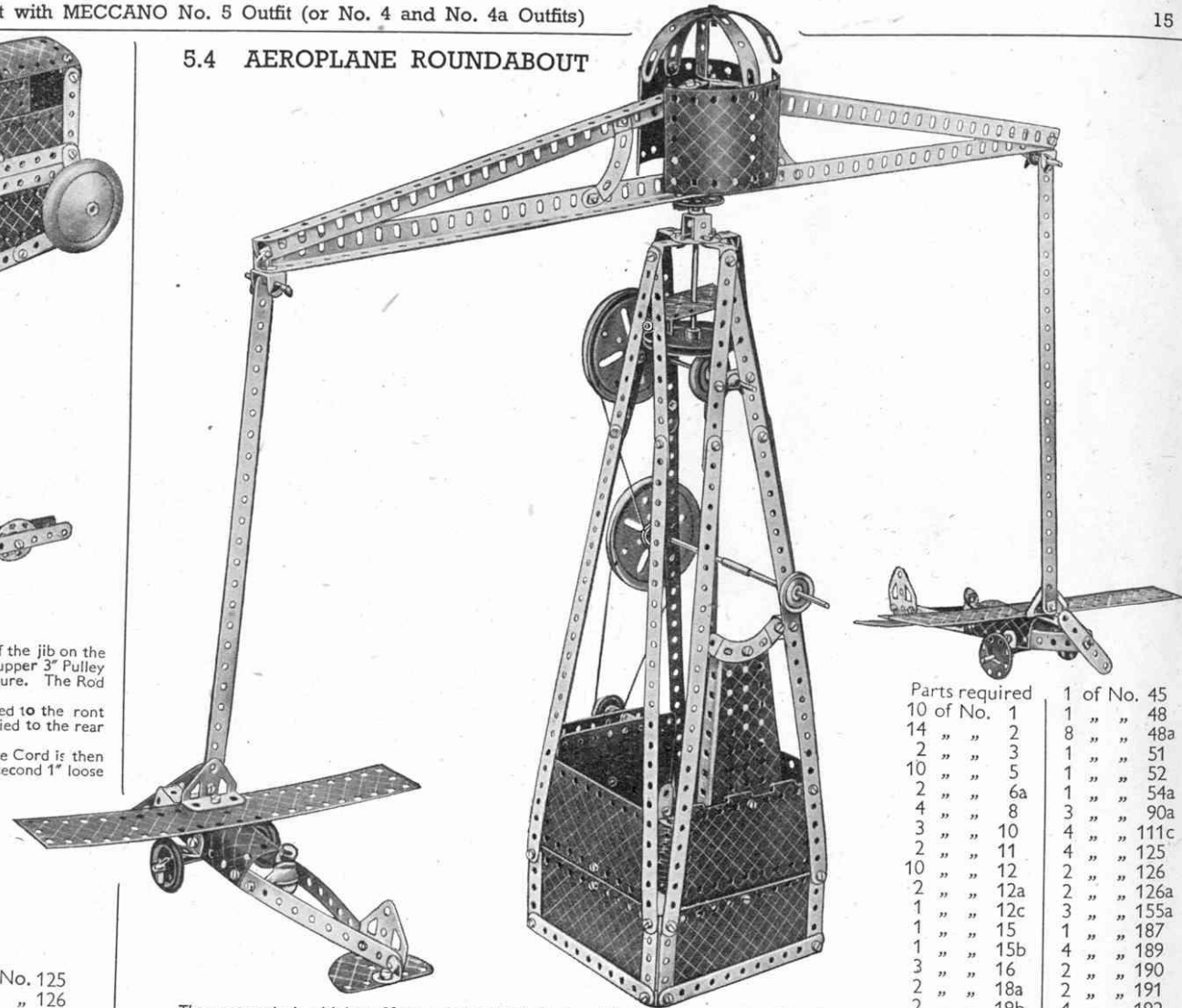


Fig. 5.3b

Parts required

10 of No. 1	2 of No. 22a	
14 " " 2	1 " " 23	
2 " " 3	1 " " 24	
12 " " 5	10 " " 35	
2 " " 6a	85 " " 37	
4 " " 8	6 " " 37a	
4 " " 11	11 " " 38	
12 " " 12	1 " " 40	2 of No. 125
2 " " 12a	1 " " 45	2 " " 126
4 " " 12c	1 " " 48	2 " " 176
1 " " 15b	7 " " 48a	1 " " 187
3 " " 16	1 " " 51	3 " " 188
2 " " 17	1 " " 52	4 " " 189
1 " " 18a	1 " " 57c	4 " " 190
1 " " 18b	3 " " 90a	1 " " 191
2 " " 19b	1 " " 111a	2 " " 200
1 " " 19g	6 " " 111c	4 " " 217a
5 " " 22	1 " " 115	

5.4 AEROPLANE ROUNDABOUT



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

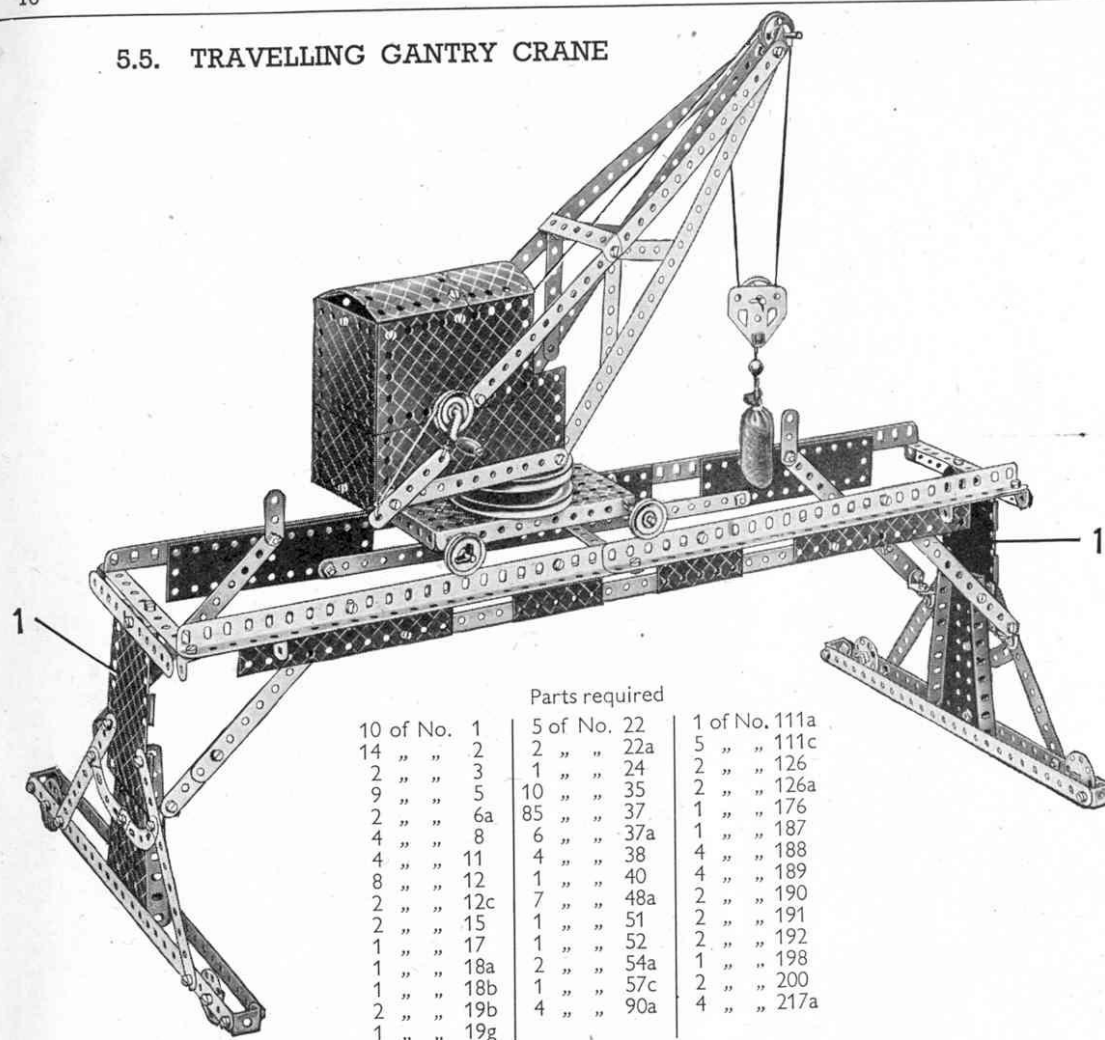
The Clockwork Motor is fastened by two 1" x 1" Angle Brackets to a $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flanged Plate bolted inside the base. The drive is taken from a 1" fast Pulley on the driving shaft of the Motor, to a 3" Pulley fixed on a Crank Handle journaled in two of the 12 $\frac{1}{2}$ " Strips of the tower.

The Crank Handle is lengthened by joining to it a $3\frac{1}{2}$ " Rod with a Rod Connector. It carries also a 1" fast Pulley, which is connected by Cord to a second 3" Pulley mounted on a 5" Rod, bearings for which are provided by the centre holes of two 14" Strips near the top of the tower. A 1" Pulley fitted with a Rubber Ring is fastened to this Rod, inside the tower. The Rubber Ring bears against the rim of a Road Wheel fastened on the lower end of the vertical 4" Rod to which the beam carrying the aeroplanes also is fastened.

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

Parts required	1 of No. 45
10 of No. 1	1 " " 48
14 " " 2	8 " " 48a
2 " " 3	1 " " 51
10 " " 5	1 " " 52
2 " " 6a	1 " " 54a
4 " " 8	3 " " 90a
3 " " 10	4 " " 111c
2 " " 11	4 " " 125
10 " " 12	2 " " 126
2 " " 12a	2 " " 126a
1 " " 12c	3 " " 155a
1 " " 15	1 " " 187
1 " " 15b	4 " " 189
3 " " 16	2 " " 190
2 " " 18a	2 " " 191
2 " " 19b	4 " " 192
1 " " 19g	1 " " 198
4 " " 22	2 " " 199
2 " " 22a	2 " " 200
1 " " 24	1 " " 213
10 " " 35	2 " " 214
83 " " 37	4 " " 215
4 " " 37a	3 " " 217a
6 " " 38	
1 " " 40	1 No. 1 Clockwork Motor

5.5. TRAVELLING GANTRY CRANE



Parts required	
10 of No. 1	5 of No. 22
14 " " 2	2 " " 22a
2 " " 3	1 " " 24
9 " " 5	10 " " 35
2 " " 6a	85 " " 37
4 " " 8	6 " " 37a
4 " " 11	4 " " 38
8 " " 12	1 " " 40
2 " " 12c	7 " " 48a
2 " " 15	1 " " 51
1 " " 17	1 " " 52
1 " " 18a	2 " " 54a
1 " " 18b	1 " " 57c
2 " " 19b	4 " " 90a
1 " " 19g	
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
	4 " " 217a

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 $1\frac{1}{2}$ " Discs are fastened to the $12\frac{1}{2}$ " Strips by lock-nutted Bolts, so that the gantry can travel along the ground.

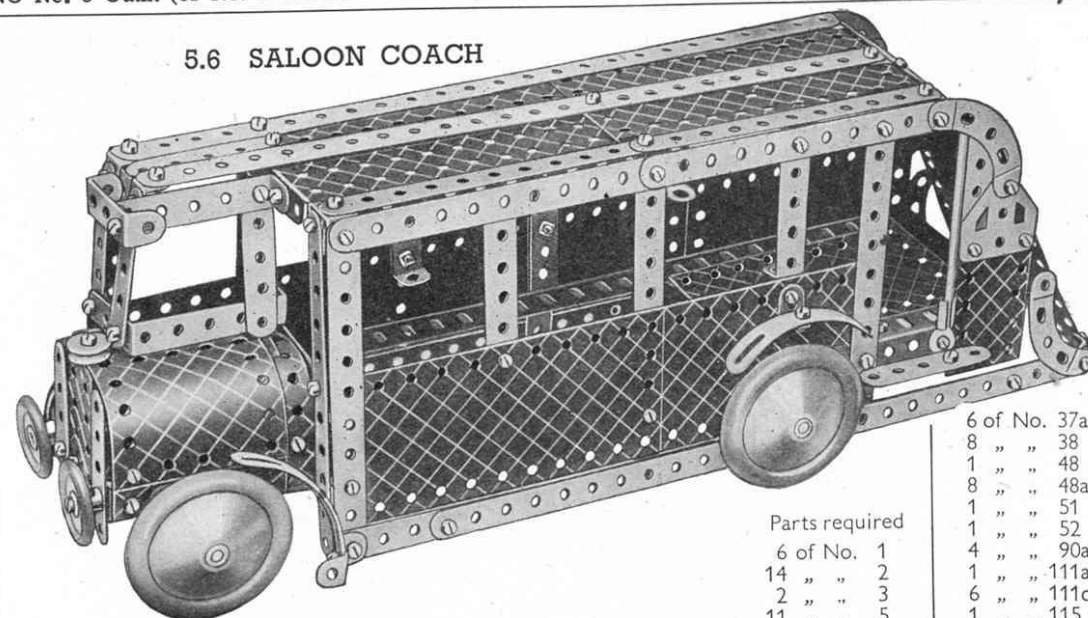
Each of the rails along which the crane runs consists of two $12\frac{1}{2}$ " Angle Girders, overlapped three holes and joined across by $5\frac{1}{2}$ " Strips. Trunnions connect the rails to the supports.

A $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flanged Plate fitted with a 3" Pulley forms the base of the crane, and the 1" Pulleys are fastened on 5" Rods journaled in the end holes of the Flanged Plate.

The cab of the crane consists of Flexible Plates fastened together by $2\frac{1}{2}$ " x $\frac{1}{2}$ " 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 $12\frac{1}{2}$ " Strips of the jib carry also a $2\frac{1}{2}$ " x $1\frac{1}{2}$ " 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 a 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

14 " " 2

2 " " 3

11 " " 5

2 " " 6a

3 " " 8

2 " " 10

3 " " 11

12 " " 12

12 " " 12c

1 " " 15

1 " " 15a

1 " " 16

3 " " 22

1 " " 23

1 " " 35

85 " " 37

6 of No. 37a

8 " " 38

1 " " 48

8 " " 48a

1 " " 51

1 " " 52

4 " " 90a

1 " " 111a

6 " " 111c

1 " " 115

2 " " 125

2 " " 126a

2 " " 155a

4 " " 187

4 " " 188

3 " " 189

2 " " 190

2 " " 191

4 " " 192

2 " " 199

2 " " 200

1 " " 212

4 " " 215

Two $12\frac{1}{2}$ " Angle Girders joined by $3\frac{1}{2}$ " 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 $5\frac{1}{2}$ " Strips to which a $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flanged Plate and two $5\frac{1}{2}$ " x $1\frac{1}{2}$ " Flexible Plates are fastened by Angle Brackets. The curved back of the coach is formed by two $1\frac{1}{2}$ " radius Curved Plates, a $5\frac{1}{2}$ " x $1\frac{1}{2}$ " Flexible Plate, and a $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flexible Plate. The Flexible Plates are curved and bolted to the $1\frac{1}{2}$ " 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 $2\frac{1}{2}$ " x $1\frac{1}{2}$ " Flexible Plate. The radiator is a $2\frac{1}{2}$ " x $1\frac{1}{2}$ " Flanged Plate.

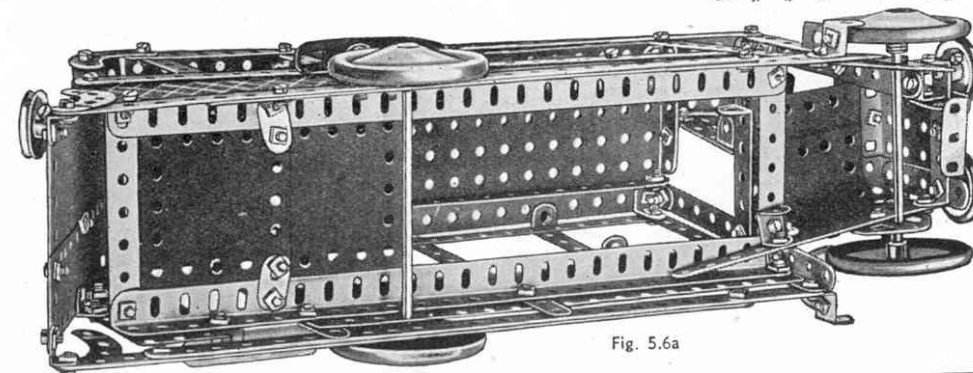


Fig. 5.6a

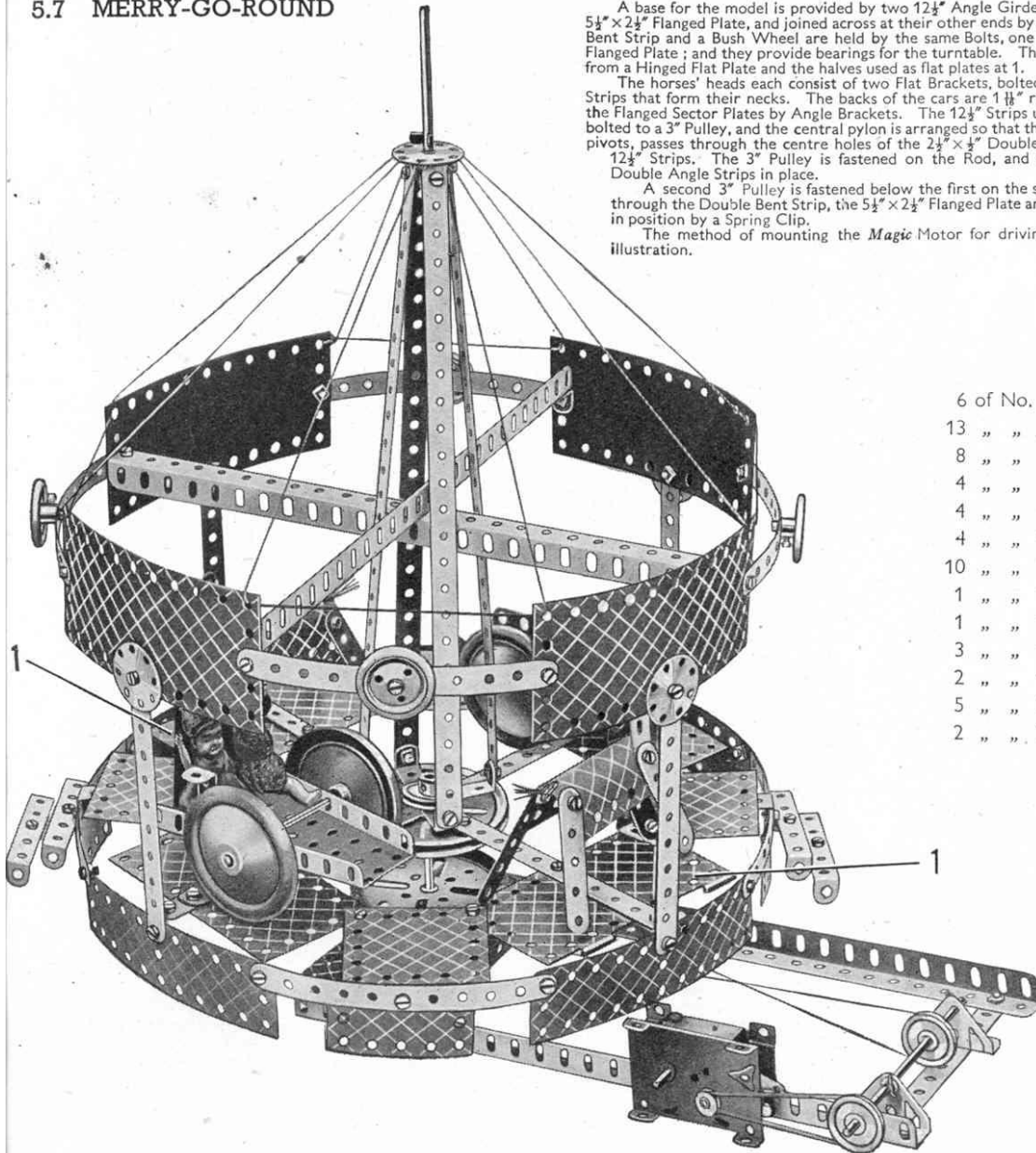
5.7 MERRY-GO-ROUND

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 Flat Brackets, 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.

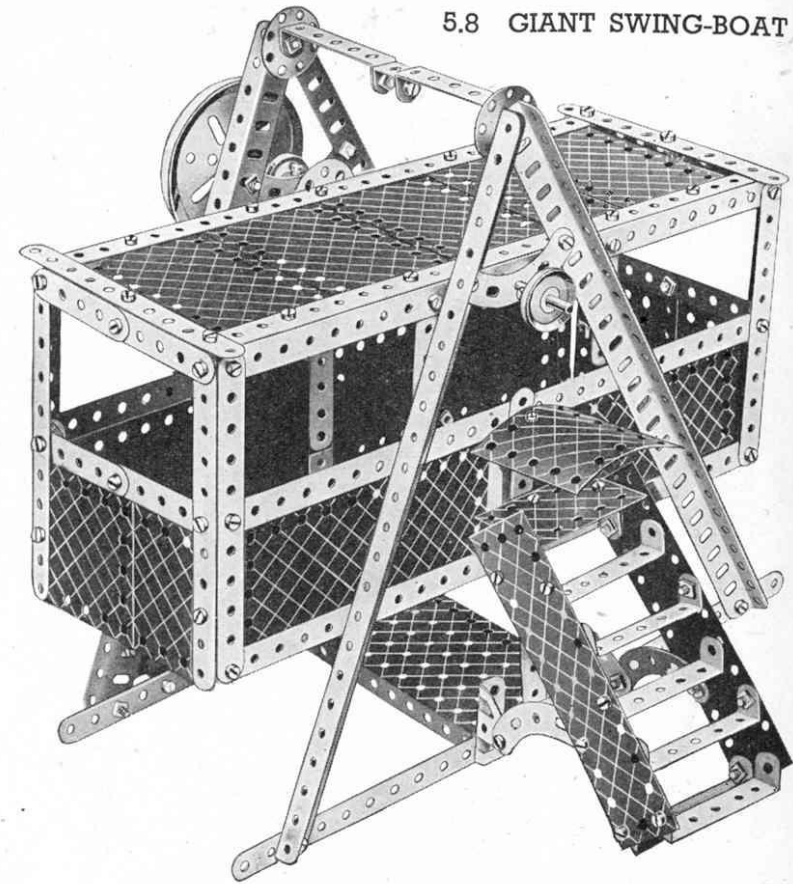
The method of mounting the *Magic Motor* for driving the model is clear from the illustration.



Parts required

6 of No. 1	1 of No. 24
13 " " 2	5 " " 35
8 " " 5	85 " " 37
4 " " 8	2 " " 37a
4 " " 10	2 " " 38
4 " " 11	1 " " 40
10 " " 12	1 " " 45
1 " " 15	8 " " 48a
1 " " 15b	1 " " 52
3 " " 16	2 " " 54a
2 " " 19b	4 " " 90a
5 " " 22	2 " " 111c
2 " " 22a	4 " " 125
	2 " " 126
	4 " " 155a
	4 " " 187
	4 " " 188
	4 " " 189
	4 " " 190
	2 " " 191
	4 " " 192
	1 " " 198
	2 " " 199
	2 " " 200
	4 " " 217a
	1 <i>Magic Motor</i>

5.8 GIANT SWING-BOAT



Parts required

10 of No. 1	4 of No. 22	6 of No. 111c
12 " " 2	1 " " 24	2 " " 126
2 " " 3	3 " " 35	2 " " 126a
12 " " 5	85 " " 37	1 " " 147b
4 " " 8	6 " " 37a	3 " " 188
4 " " 11	6 " " 38	2 " " 189
6 " " 12	1 " " 45	4 " " 190
2 " " 12a	8 " " 48a	2 " " 191
1 " " 15	1 " " 51	4 " " 192
1 " " 16	1 " " 52	1 " " 198
1 " " 17	2 " " 54a	1 " " 200
2 " " 19b	4 " " 90a	1 " " 213
1 " " 19g	1 " " 111a	2 " " 217a

1 *Magic Motor*

5.8 GIANT SWING-BOAT—continued

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

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

The swing-boat is pivoted on a compound rod consisting of a 5" Rod and a 4" 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 *Magic Motor* is bolted direct to the base. The drive is taken by a Driving Band from the small pulley of the Motor to a 1" Pulley on the shaft of a 3½" Crank Handle journaled in holes in two Flanged Sector Plates. A second 1" Pulley on the Crank Handle is connected by a Driving Band to a 3" Pulley on a 2" Rod journaled in the Flanged Sector Plates. A 5½" Strip is attached to a Pivot Bolt, and its other end is pivoted on a Bolt lock-nutted to the top 3" Pulley. The two Flanged Sector Plates are bolted at the bottom to a 2½"×1½" Flanged Plate and to two Double Brackets.

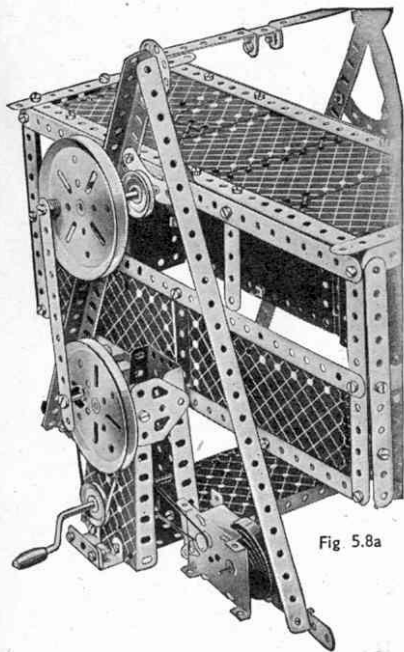
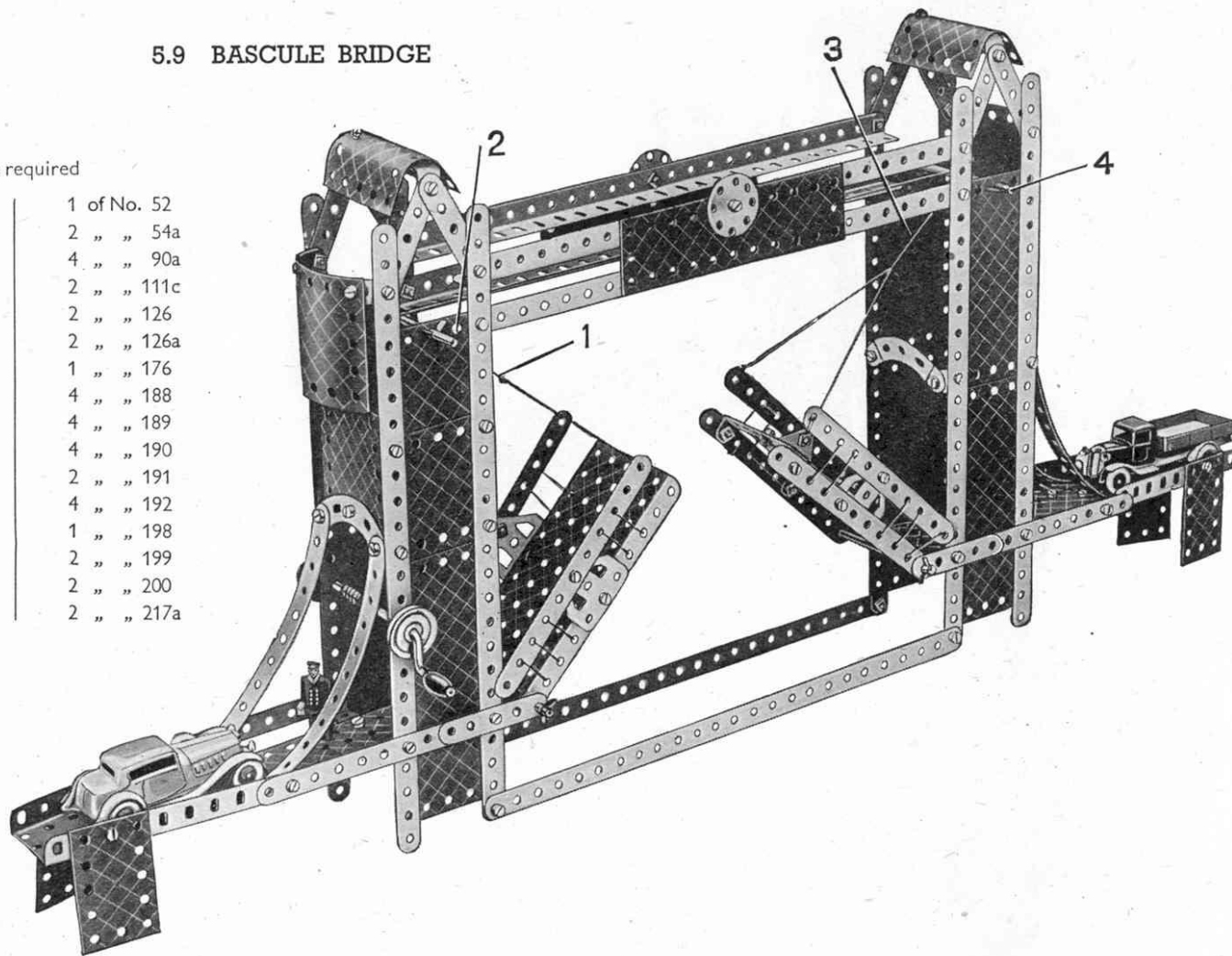


Fig 5.8a

5.9 BASCULE BRIDGE

Parts required

10 of No. 1	1 of No. 52
14 " " 2	2 " " 54a
12 " " 5	4 " " 90a
4 " " 8	2 " " 111c
10 " " 12	2 " " 126
4 " " 12c	2 " " 126a
4 " " 16	1 " " 176
1 " " 19g	4 " " 188
2 " " 22	4 " " 189
8 " " 35	4 " " 190
84 " " 37	2 " " 191
2 " " 37a	4 " " 192
8 " " 38	1 " " 198
1 " " 40	2 " " 199
8 " " 48a	2 " " 200
1 " " 51	2 " " 217a

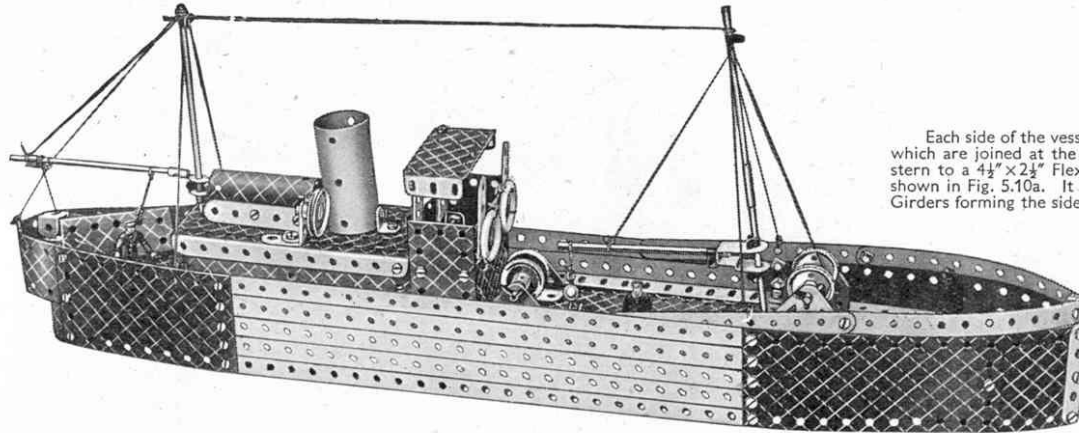


The centre pin has been withdrawn from a Hinged Flat Plate, and one of the halves is used in the construction of the side of one of the towers. Each of the main towers consists of four 12½" Strips to which are bolted Flexible Plates as shown. The 12½" Strips are braced across by the 2½"×1½" Double Angle Strips that support the approach roadway, the 2½" small radius Curved Strips, and a further Double Angle Strip at the top of the tower. The U-Section Curved Plates are spaced from the 2½"×1½" Double Angle Strips by three Washers. The two towers are joined across at the top by four Angle Girders, and at the bottom by two 12½" Strips.

Four 2½" Strips form bearings for the 3½" Rods on which the halves of the span are pivoted. The left-hand half is a 5½"×2½" Flanged Plate fitted with Flat Trunnions and 5½" Strips as shown. The other half of the span is a part of the Hinged Flat Plate, and is connected to two 5½" Strips by a 2½"×1½" Double Angle Strip and Angle Brackets.

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

5.10 TRAWLER

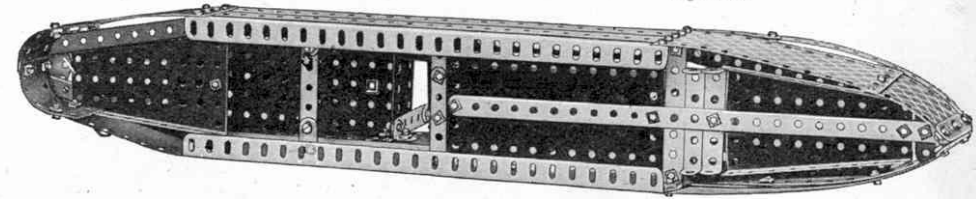


Each side of the vessel consists of three $12\frac{1}{2}$ " Strips and two Angle Girders, which are joined at the forward end to a $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flexible Plate, and at the stern to a $4\frac{1}{2}$ " x $2\frac{1}{2}$ " Flexible Plate. The deck of the model is constructed as shown 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 Flat Brackets 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.

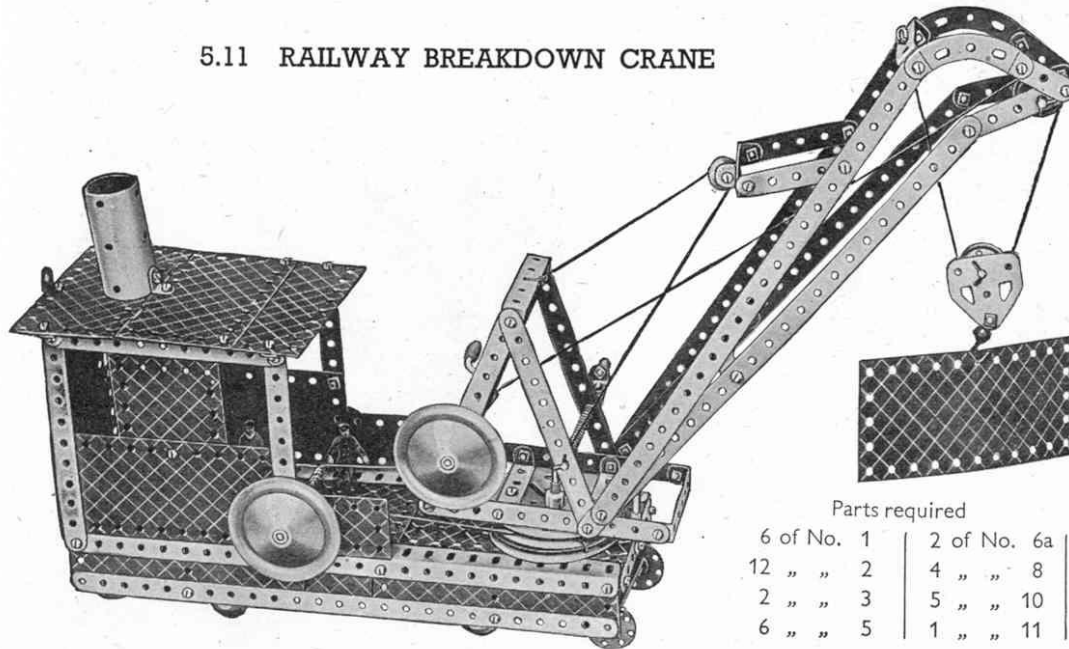
Fig. 5.10a



Parts required

7 of No. 1	1 of No. 15a	1 of No. 48	1 of No. 176
8 " " 2	2 " " 15b	5 " " 48a	4 " " 188
2 " " 3	1 " " 16	1 " " 51	3 " " 189
9 " " 5	2 " " 17	1 " " 52	4 " " 190
2 " " 6a	4 " " 22	2 " " 54a	2 " " 191
4 " " 8	2 " " 22a	1 " " 57c	3 " " 192
5 " " 10	1 " " 24	2 " " 111a	2 " " 199
1 " " 11	14 " " 35	6 " " 111c	1 " " 212
10 " " 12	85 " " 37	2 " " 125	1 " " 213
2 " " 12a	6 " " 37a	2 " " 126	1 " " 216
1 " " 12c	1 " " 40	2 " " 126a	1 " " 217a
1 " " 15	1 " " 44	2 " " 155a	

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. 57c
1 " " 15	2 " " 90a
4 " " 16	2 " " 111a
1 " " 17	6 " " 111c
2 " " 18a	1 " " 115
1 " " 18b	3 " " 125
2 " " 19b	2 " " 126a
1 " " 19g	1 " " 147b
5 " " 22	1 " " 176
2 " " 22a	1 " " 186a
1 " " 23	4 " " 187
1 " " 24	4 " " 188
14 " " 35	4 " " 189
79 " " 37	4 " " 190
12 " " 37a	2 " " 191
14 " " 38	4 " " 192
1 " " 40	1 " " 198
1 " " 48	1 " " 212
6 " " 48a	1 " " 216
1 " " 52	4 " " 217a
2 " " 54a	1 " " 217b

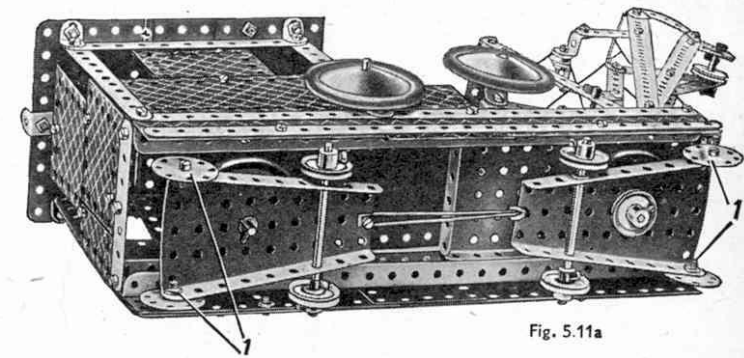


Fig. 5.11a

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 Flat Brackets. 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 $\frac{3}{8}$ " 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

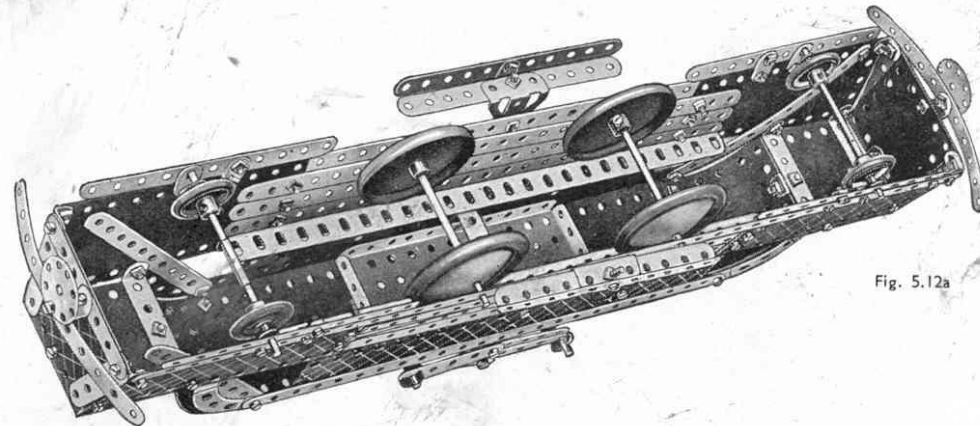
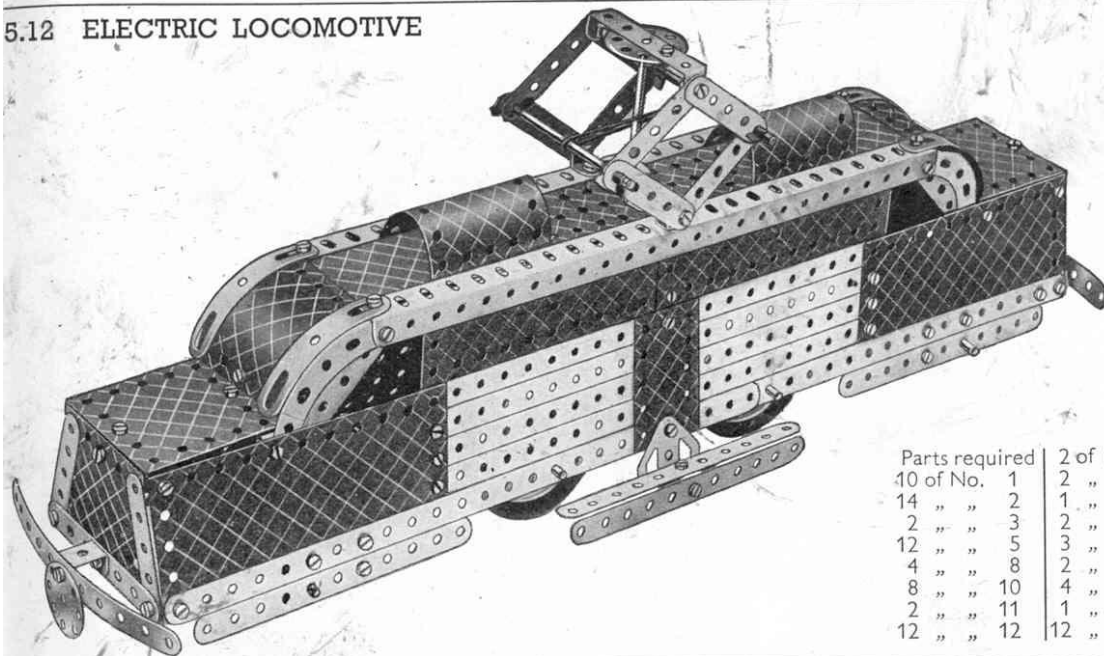


Fig. 5.12a

Parts required	2 of No.	12a	83 of No.	37	2 of No.	126	4 of No.	192
10 of No.	1	2	6	37a	4	155a	2	199
14	2	1	4	38	1	176	2	200
2	3	2	1	45	1	186	1	213
12	5	3	5	48a	4	187	4	215
4	8	2	1	52	2	188	2	217a
8	10	4	4	90a	4	189		
2	11	1	2	111a	4	190		
12	12	12	6	111c	2	191		

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 pantograph consists of four 2½" Strips, pairs of which are lock-nutted to an Angle Bracket and a 2½"×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"×2½" Flanged Plate.

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

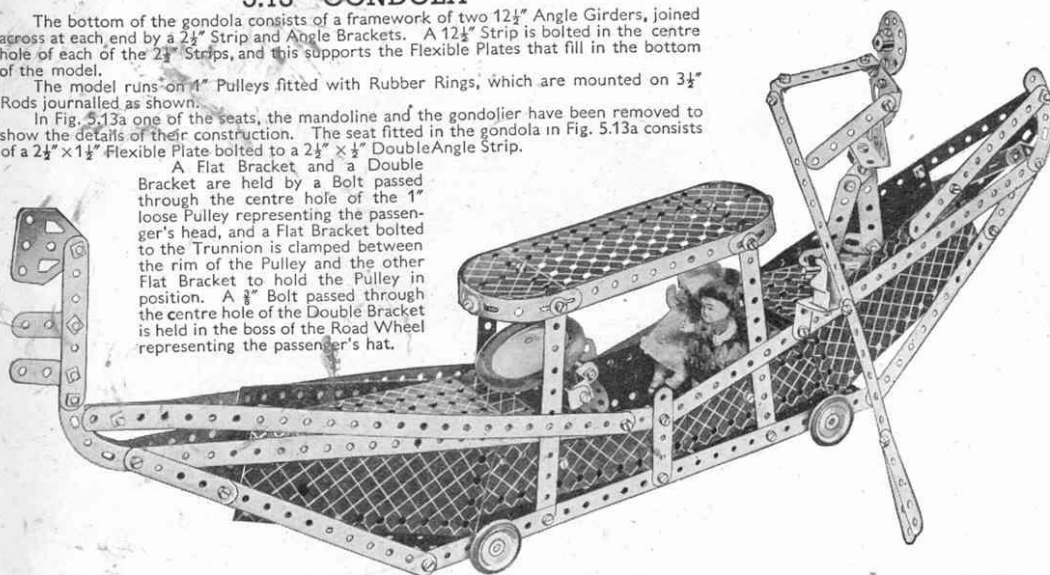
5.13 GONDOLA

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 4" Pulleys fitted with Rubber Rings, which are mounted on 3½" Rods journaled as shown.

In Fig. 5.13a one of the seats, the mandoline 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"×1½" Flexible Plate bolted to a 2½"×½" Double Angle Strip.

A Flat Bracket 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 Flat Bracket bolted to the Trunnion is clamped between the rim of the Pulley and the other Flat Bracket 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	1 of No.	51
14	2	1	52	
2	3	2	54a	
12	5	4	90a	
2	6a	6	111c	
2	8	1	115	
7	10	3	125	
3	11	2	126	
5	12	2	126a	
1	12a	4	155a	
4	12c	1	187	
2	16	1	188	
1	18a	4	189	
4	22	1	190	
1	22a	2	191	
1	24	4	192	
2	35	2	199	
85	37	2	214	
6	37a	4	215	
6	38	1	217a	
1	44			
1	48			
3	48a			

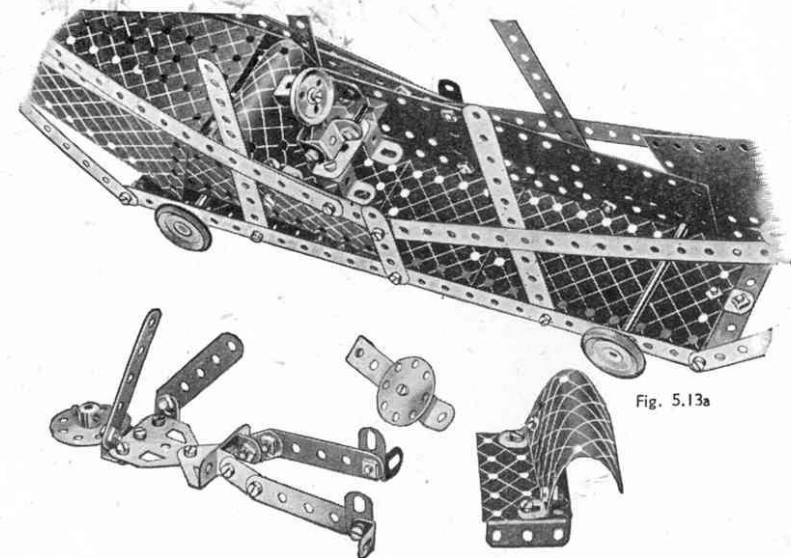


Fig. 5.13a

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 $1\frac{1}{2}$ " Disc. A $3\frac{1}{2}$ " Rod is held in the rear bearings by a $1\frac{1}{2}$ " 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 Cranked Bent Strip 2, by a Cord Anchoring Spring and a $1\frac{1}{2}$ " 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		1 of No. 52		4 of No. 189	
6 of No. 1	1	1	" " 54a	4	" " 190
12 " " 2	2	1	" " 80c	2	" " 191
1 " " 3	3	2	" " 111c	4	" " 192
6 " " 5	5	3	" " 125	1	" " 212
1 " " 6a	6a	2	" " 126	1	" " 213
4 " " 8	8	2	" " 126a	1	" " 214
4 " " 11	11	1	" " 176	4	" " 215
11 " " 12	12	3	" " 187	1	" " 216
1 " " 12a	12a	4	" " 188	2	" " 217a
2 " " 15	15				
3 " " 16	16				
2 " " 17	17				
2 " " 18a	18a				
2 " " 19b	19b				
4 " " 22	22				
1 " " 24	24				
9 " " 35	35				
85 " " 37	37				
5 " " 37a	37a				
3 " " 38	38				
1 " " 44	44				
1 " " 48	48				
7 " " 48a	48a				

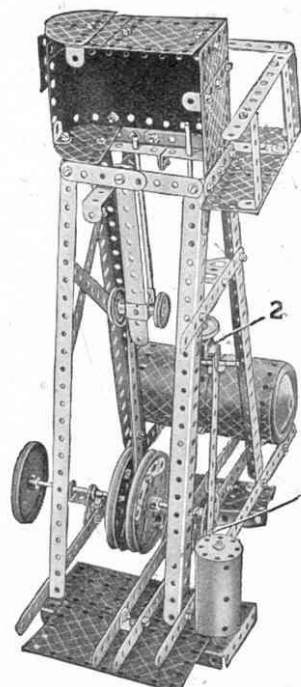
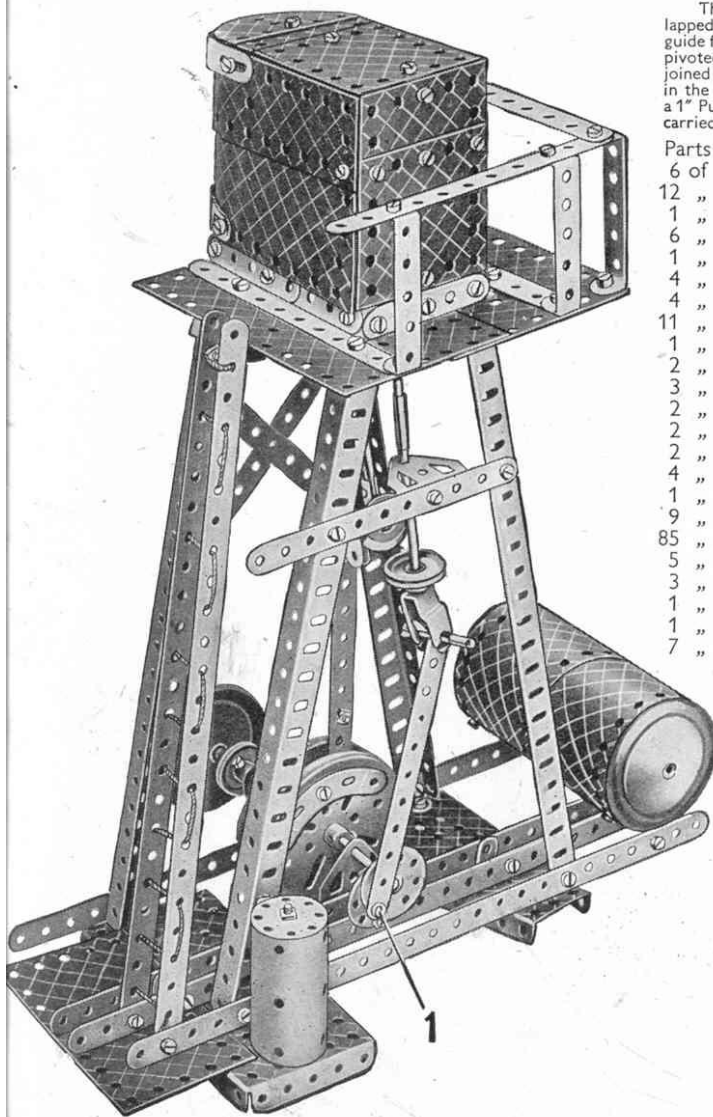
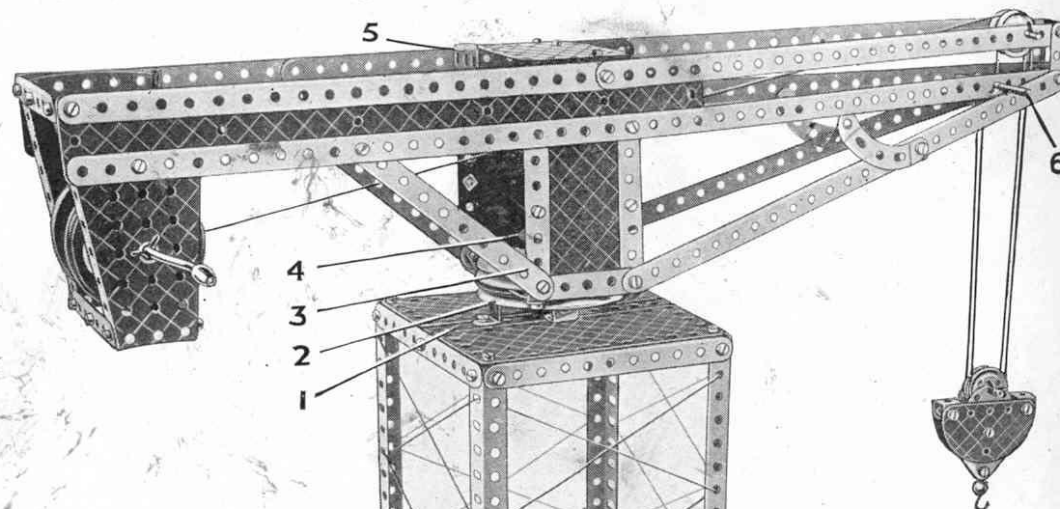


Fig. 5.14a

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.

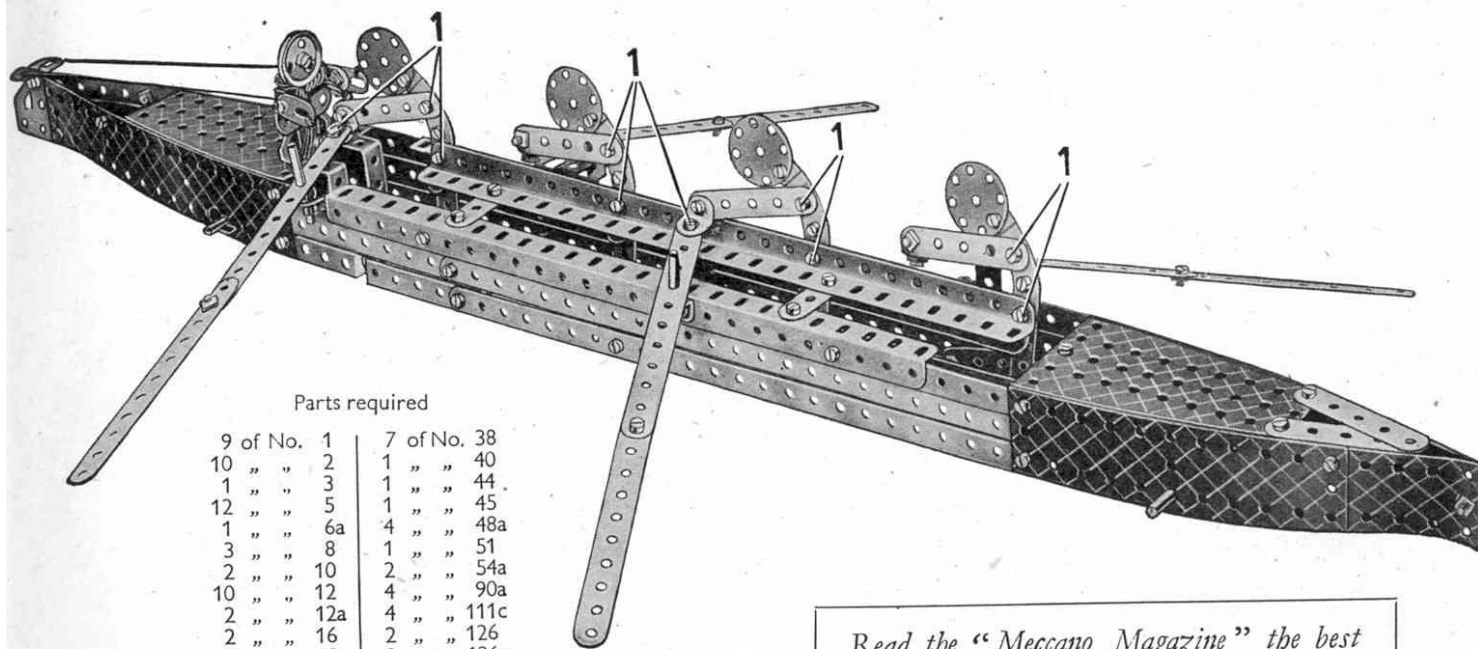
The $2\frac{1}{2}$ " x $1\frac{1}{2}$ " Flanged Plate 5 is connected to the other side of the jib by a $2\frac{1}{2}$ " x $1\frac{1}{2}$ " Double Angle Strip, on top of which is bolted a $2\frac{1}{2}$ " x $2\frac{1}{2}$ " Flexible Plate.

The hoisting Cord is tied to the Crank Handle journaled 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 Flat Bracket in the middle of Rod 6.

Parts required

10 of No. 1		1 of No. 51	
14 " " 2	2	1 " " 52	
2 " " 3	3	2 " " 54a	
12 " " 5	5	1 " " 57c	
2 " " 6a	6a	2 " " 90a	
4 " " 8	8	1 " " 111a	
1 " " 10	10	4 " " 111c	
4 " " 11	11	4 " " 125	
9 " " 12	12	2 " " 126a	
1 " " 16	16	1 " " 155a	
1 " " 17	17	1 " " 176	
3 " " 18a	18a	2 " " 187	
2 " " 19b	19b	4 " " 188	
1 " " 19g	19g	4 " " 189	
4 " " 22	22	3 " " 190	
2 " " 22a	22a	2 " " 191	
10 " " 35	35	4 " " 192	
90 " " 37a	37a	1 " " 198	
85 " " 37b	37b	1 " " 213	
9 " " 38	38	2 " " 214	
1 " " 40	40	3 " " 217a	
2 " " 48a	48a		

5.16 ROWING FOUR



Parts required

9 of No. 1	7 of No. 38
10 " " 2	1 " " 40
1 " " 3	1 " " 44
12 " " 5	1 " " 45
1 " " 6a	4 " " 48a
3 " " 8	1 " " 51
2 " " 10	2 " " 54a
10 " " 12	4 " " 90a
2 " " 12a	4 " " 111c
2 " " 16	2 " " 126
4 " " 18a	2 " " 126a
1 " " 18b	1 " " 147b
5 " " 22	4 " " 155a
2 " " 22a	1 " " 186
1 " " 24	4 " " 188
11 " " 35	4 " " 189
77 " " 37	4 " " 217a
14 " " 37a	

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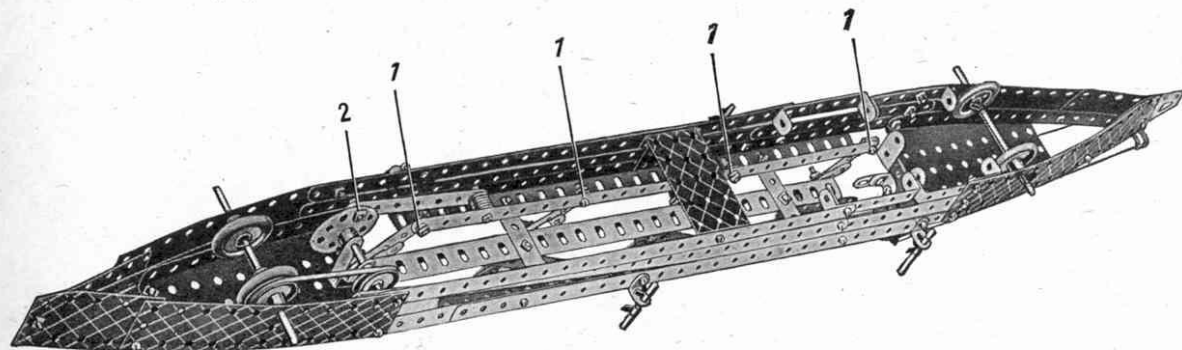


Fig. 5.16a

Each side of the boat consists of an Angle Girder extended by 12 1/2" Strips, the one at the stern overlapping nine holes, and that at the bows overlapping eight holes. Two 5 1/2" x 1 1/2" Flexible Plates are bolted to the 12 1/2" Strips at the bows and stern as shown. The sides are filled in by 12 1/2" Strips and 2 1/2" x 1/2" Double Angle Strips bolted to the 5 1/2" x 1 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 1/2" x 1 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 1/2" Strips fastened to the Angle Girders forming the sides. Each member of the crew consists of a 2 1/2" small radius Curved Strip overlapping a 2 1/2" Strip three holes. A further 2 1/2" Strip fitted with an Angle Bracket and bolted to the "body" forms the arms, and a 1 1/4" Disc represents the head. The four figures are pivotally attached to the Angle Girder in the positions shown. The lower end of the 2 1/2" Strip forming part of the body of each figure is also pivotally attached to a 12 1/2" Strip underneath the boat. The oars are pivotally attached to the Angle Brackets and they also are pivoted on 1 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 1/2" Strip by a 3 1/2" Strip. The Pivot Bolt carries six Washers on its shank. Bolt 2 should be lock-nutted.

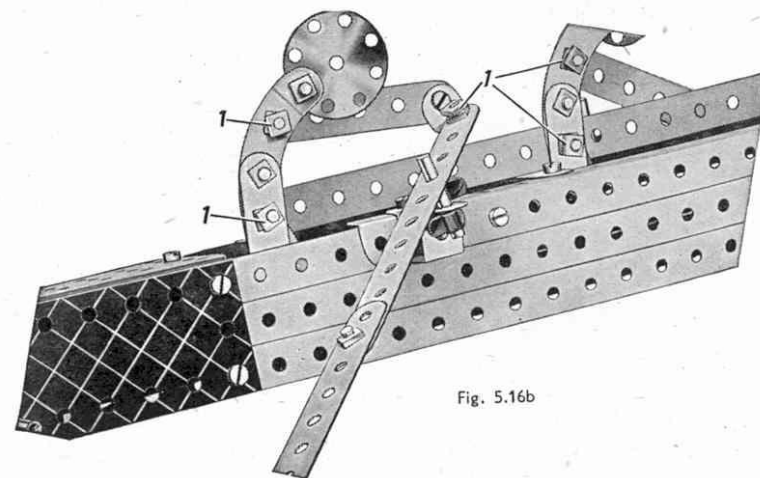
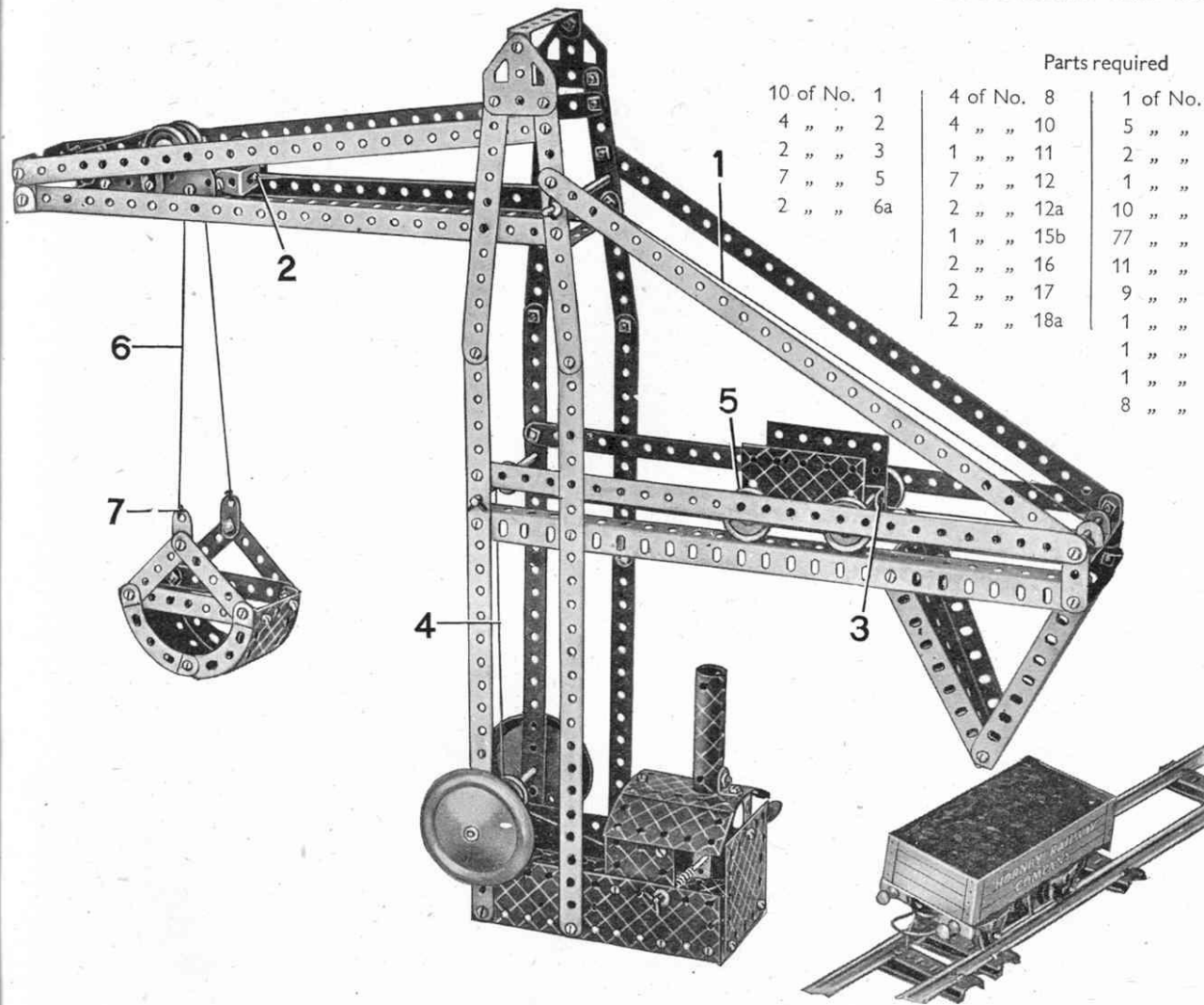


Fig. 5.16b

5.17 AUTOMATIC SHIP-COALER



Parts required

10 of No. 1	4 of No. 8	1 of No. 19g	1 of No. 51
4 " " 2	4 " " 10	5 " " 22	1 " " 52
2 " " 3	1 " " 11	2 " " 22a	2 " " 54a
7 " " 5	7 " " 12	1 " " 23	4 " " 90a
2 " " 6a	2 " " 12a	10 " " 35	5 " " 111c
	1 " " 15b	77 " " 37	4 " " 125
	2 " " 16	11 " " 37a	2 " " 126a
	2 " " 17	9 " " 38	2 " " 187
	2 " " 18a	1 " " 40	4 " " 188
		1 " " 45	3 " " 189
		1 " " 48	1 " " 190
		8 " " 48a	1 " " 199
			2 " " 200
			4 " " 217a
			2 " " 217b

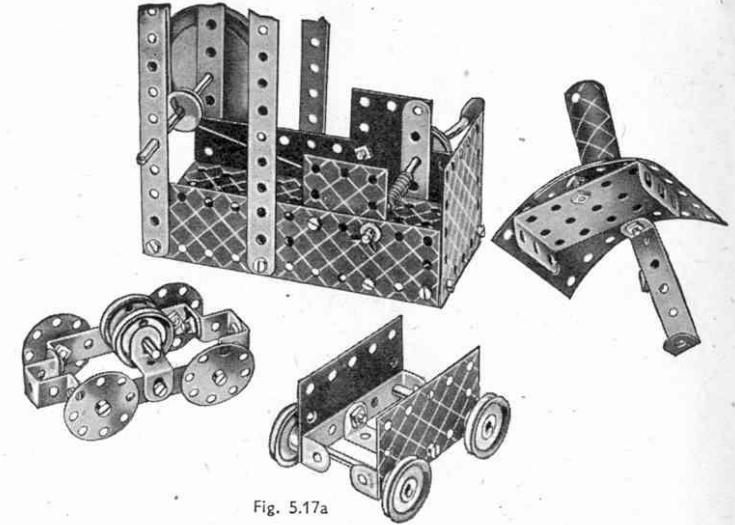


Fig. 5.17a

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 $\frac{3}{4}$ " Discs 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 $1\frac{1}{4}$ " 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 $3\frac{1}{2}$ " Strips, and the $5\frac{1}{2} \times 1\frac{1}{2}$ " Flexible Plate is attached to them by Angle Brackets.

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

Cord 6 is fastened to Flat Bracket 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 Flat Bracket on the grab.

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

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

5.18 RACING YACHT

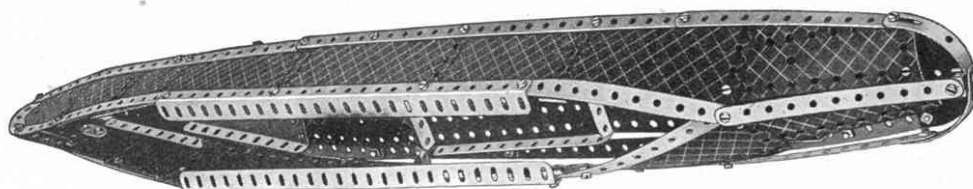


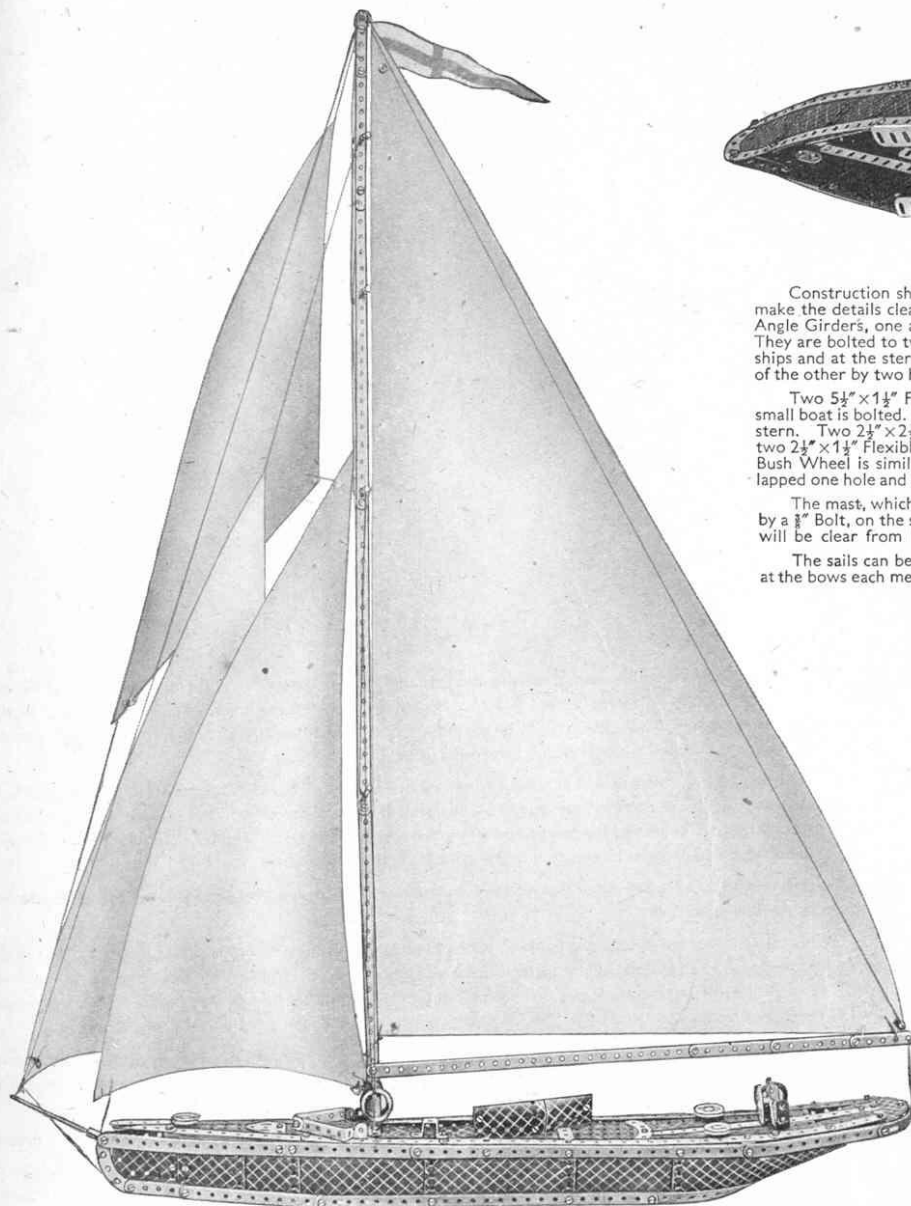
Fig. 5.18a

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

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

The mast, which consists of three $12\frac{1}{2}''$ Strips, a $5\frac{1}{2}''$ Strip and a $2\frac{1}{2}''$ Strip, is fastened between two Angle Brackets by a $\frac{3}{8}''$ 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 " " 155a
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 " " 54a	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 cutout so that the details of the upper part of the mast may be included in the page.

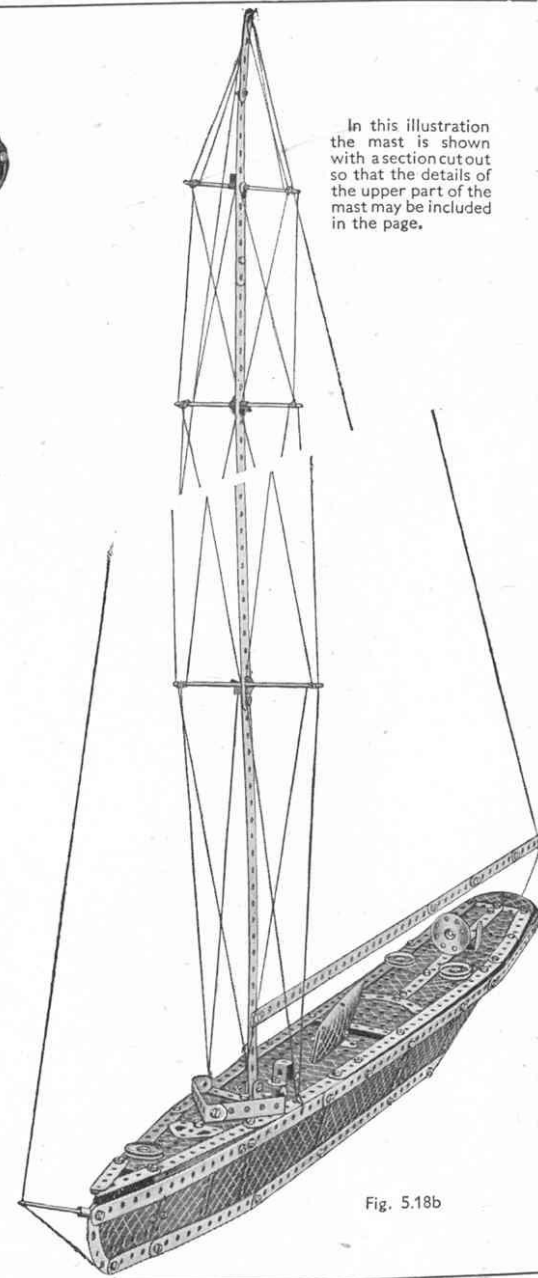


Fig. 5.18b

5.19 MILITARY TANK

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

The revolving gun turret is shown in Fig. 5.19a. The rear gun is a $3\frac{1}{2}$ " Rod, which is fitted with a Reversed Angle Bracket on the inside of the Flanged Plate, and is retained in position by Spring Clips. A 5" 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.

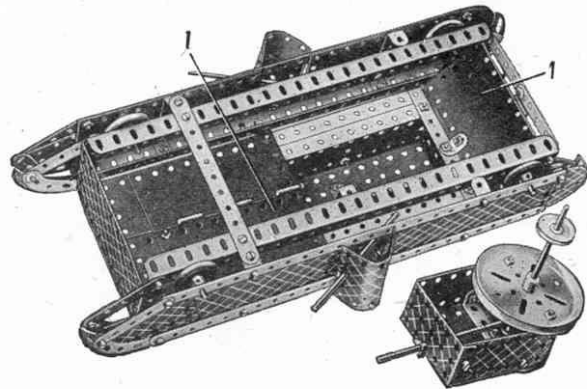


Fig. 5.19a

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 " " 54a	
4 " " 90a	
1 " " 125	
2 " " 126	
2 " " 126a	
4 " " 155a	

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 Cranked 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 Flat Bracket 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	1 of No. 57c	1 of No. 213
10 of No. 1	1 " " 24	2 " " 90a	2 " " 217a
10 " " 2	14 " " 35	4 " " 111c	
2 " " 3	69 " " 37	1 " " 115	
2 " " 5	6 " " 37a	2 " " 126	
3 " " 8	10 " " 38	2 " " 126a	
1 " " 10	1 " " 40	1 " " 147b	
1 " " 11	1 " " 44	1 " " 176	
6 " " 12	1 " " 48	1 " " 198	
2 " " 12a	1 " " 48a		
4 " " 12c	1 " " 51		
1 " " 15	1 " " 52		
3 " " 16	2 " " 54a		
2 " " 17			
2 " " 18a			
1 " " 18b			
2 " " 19b			
1 " " 19g			
5 " " 22			
2 " " 22a			

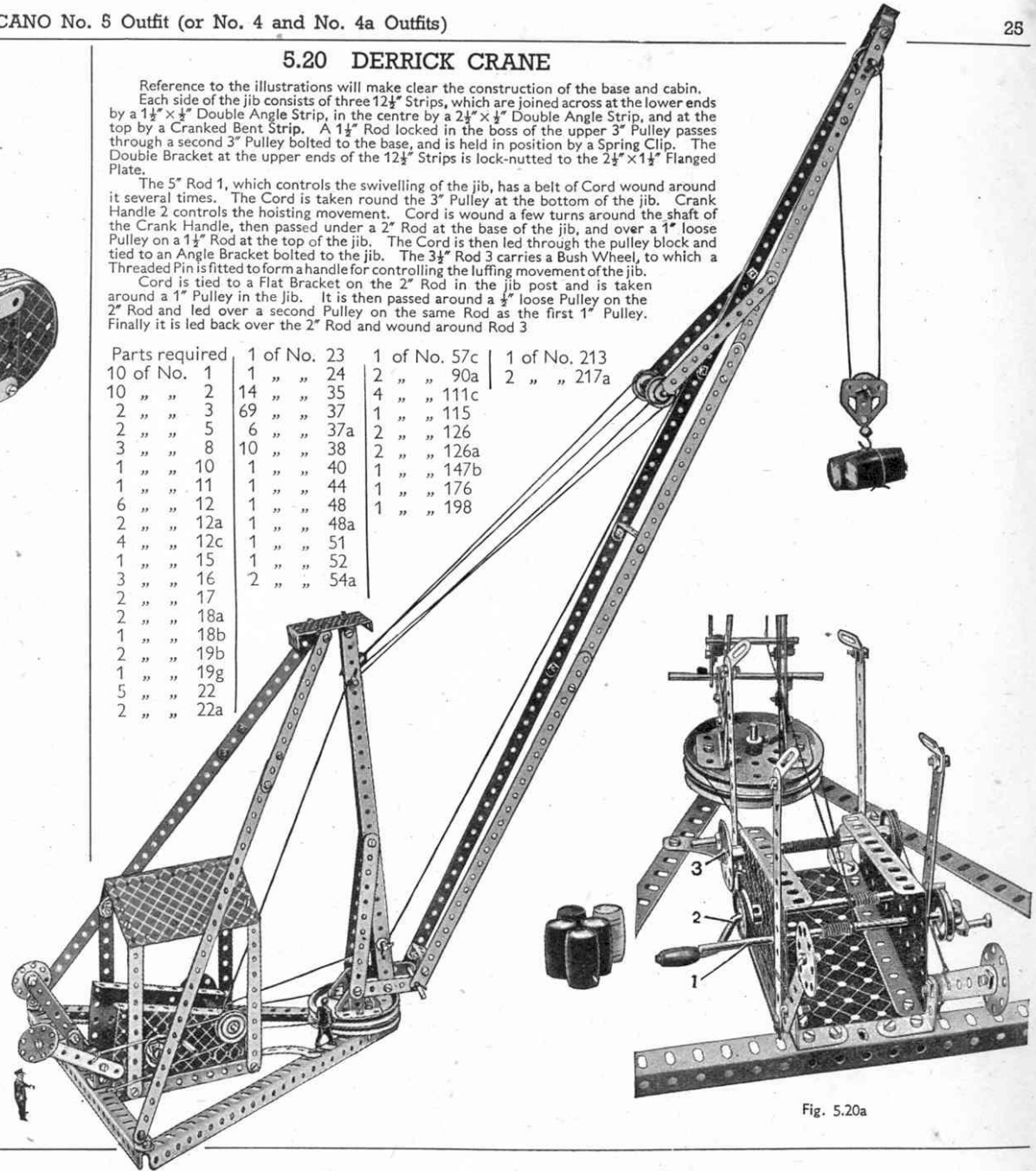
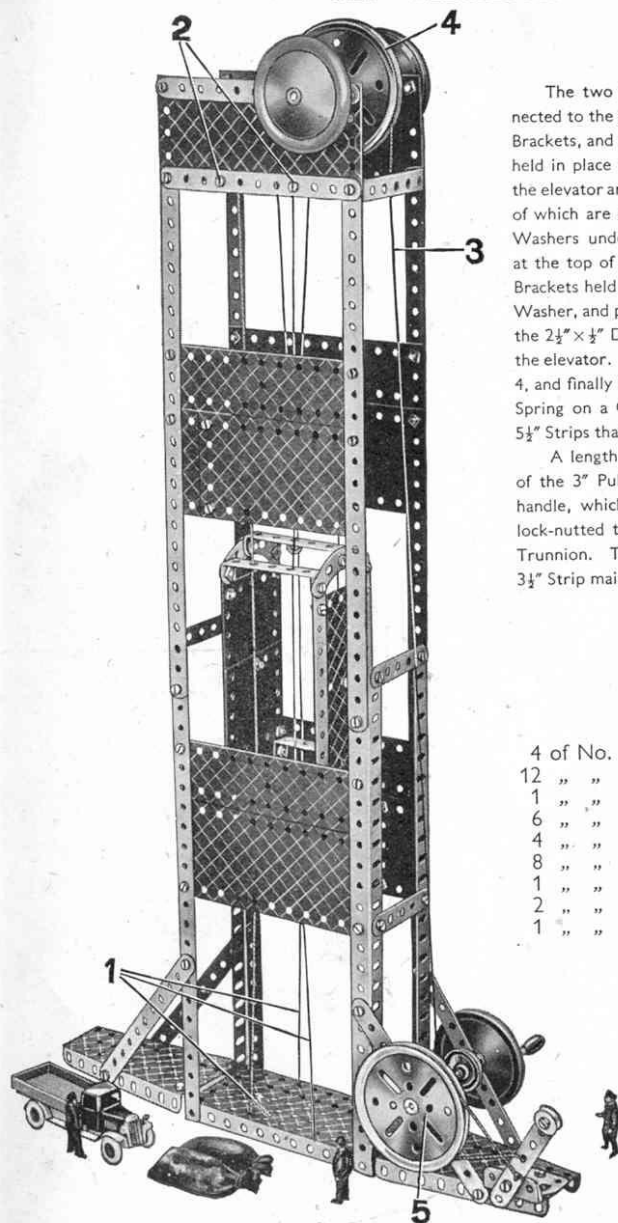


Fig. 5.20a

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. Cord 3 is tied to a Washer, and passes through the centre hole of the $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip at the top of the elevator. It then passes over the $3''$ Pulley 4, and finally is fastened to a Cord Anchoring Spring on a Crank Handle journaled in the $5\frac{1}{2}''$ Strips that brace the elevator shaft.

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

Parts required

4 of No. 1	2 of No. 22
12 " " 2	1 " " 23
1 " " 3	83 " " 37
6 " " 5	2 " " 37a
4 " " 8	7 " " 38
8 " " 12	1 " " 40
1 " " 15b	7 " " 48a
2 " " 19b	1 " " 52
1 " " 19g	2 " " 54a
	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

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, and are secured by $6\frac{1}{2}''$ compound strips to a Bush Wheel and the inner holes of a $3''$ Pulley on the supporting shaft. The shaft consists of a $5''$ and a $4''$ Rod fastened together by a Rod Connector, and is journaled in the centre holes of two $1\frac{1}{2}''$ Discs secured to the ends of two $12\frac{1}{2}''$ Angle Girders bolted to the base. The base 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 a Flanged Sector Plate. The construction of the cars can be seen from the illustration.

The drive is taken by Cord from a $1''$ Pulley on the shaft of a Crank Handle to a $3''$ Pulley on the shaft of the wheel. The Crank Handle is journaled in the holes of a Cranked 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 to the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate. The Flexible Plates forming the pay-box are joined together and secured to the framework of the model by $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips.

Fig. 5.22a shows the Big Wheel driven by an E120 Electric Motor. The drive is taken through a Worm meshed with a $1''$ Gear, and the $1''$ Pulley held on a Rod in the Cranked Bent Strip is driven by a Driving Band that runs on the same Rod as the $1''$ Gear, in order to give a slow drive.

Parts required

8 of No. 1	1 of No. 24	1 of No. 125
14 " " 2	9 " " 35	2 " " 126
2 " " 3	85 " " 37	2 " " 126a
11 " " 5	3 " " 37a	1 " " 147b
2 " " 6a	12 " " 38	2 " " 187
4 " " 8	1 " " 40	4 " " 188
5 " " 10	1 " " 44	2 " " 190
4 " " 11	1 " " 48	3 " " 192
12 " " 12	4 " " 48a	2 " " 199
2 " " 12a	1 " " 51	2 " " 200
1 " " 15	1 " " 52	1 " " 213
1 " " 15b	1 " " 54a	1 " " 214
4 " " 16	3 " " 111c	2 " " 215
2 " " 19b		4 " " 217a
1 " " 19g		
3 " " 22		
2 " " 22a		
1 " " 23		

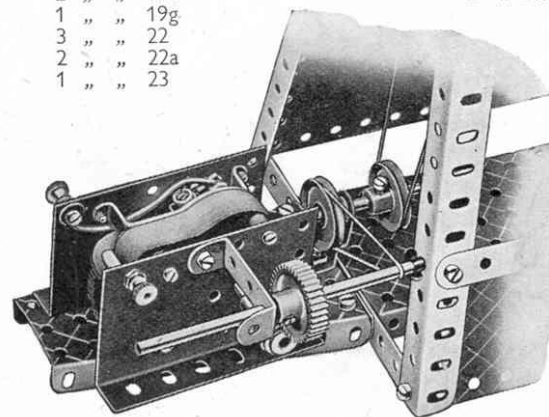
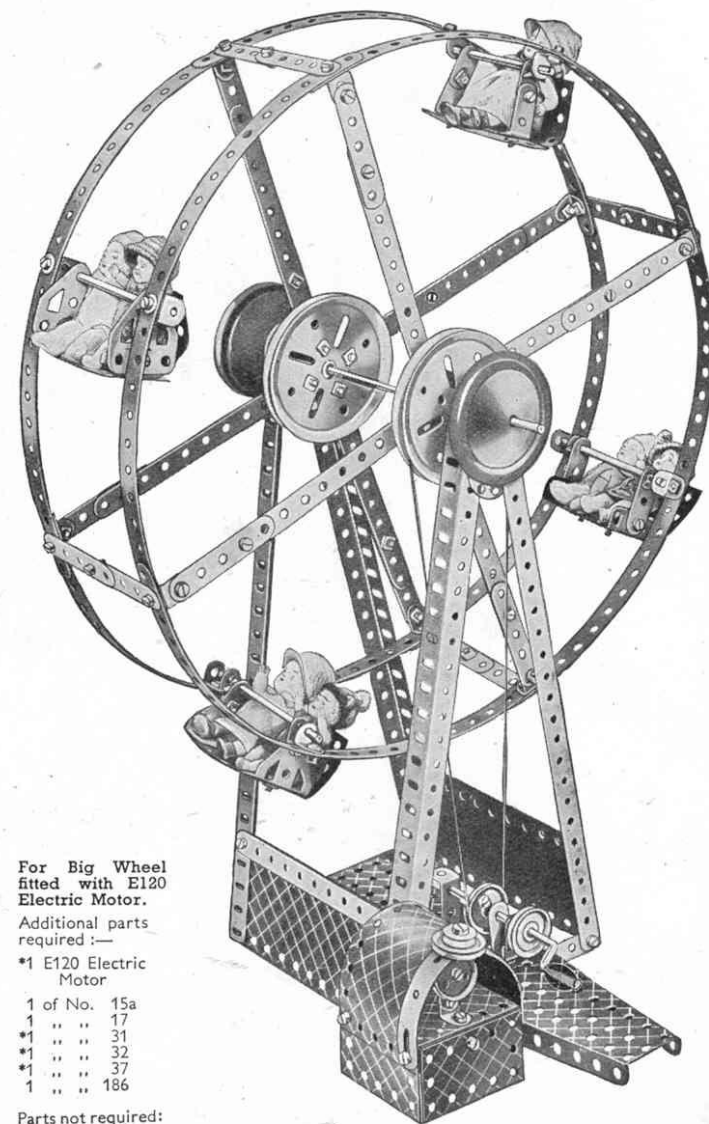


Fig. 5.22a Sectional view showing Motor fitted



For Big Wheel fitted with E120 Electric Motor.

Additional parts required :-

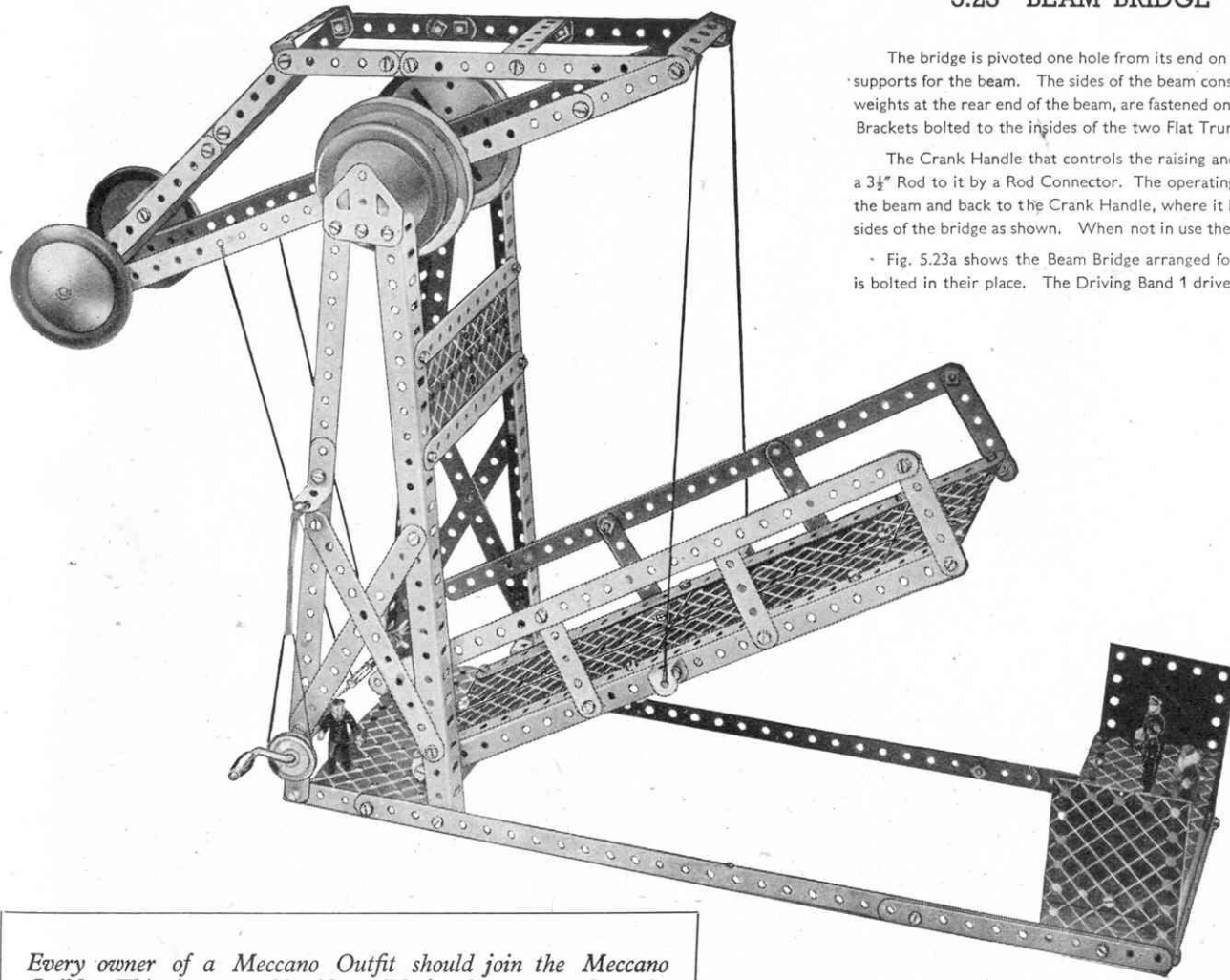
*1 E120 Electric Motor

1 of No. 15a
1 " " 17
*1 " " 31
*1 " " 32
*1 " " 37
1 " " 186

Parts not required:
1 of No. 19g

*Not included in Outfit.

5.23 BEAM BRIDGE



The bridge is pivoted one hole from its end on a 5" Rod, which is supported in two Reversed Angle Brackets bolted to two of the 12½" Angle Girders forming the supports for the beam. The sides of the beam consist of compound strips, and they are joined by 2½" × ½" Double Angle Strips. The Road Wheels, which act as counterweights at the rear end of the beam, are fastened on a 4" Rod. The beam is pivoted 1" out of centre to the front on a 5" Rod, which is supported in two Reversed Angle Brackets bolted to the insides of the two Flat Trunnions at the tops of the towers.

The Crank Handle that controls the raising and lowering of the bridge is journalled near the lower ends of the rear beam supports, and is lengthened by joining a 3½" Rod to it by a Rod Connector. The operating Cord is fastened to the Crank Handle by a Spring Clip, wound around its shaft several times and then taken through the beam and back to the Crank Handle, where it is again tied. Cords attached to the front end of the beam are tied to Double Brackets fastened halfway along the sides of the bridge as shown. When not in use the Crank Handle is kept stationary by a Cord band brake tensioned by a Driving Band.

Fig. 5.23a shows the Beam Bridge arranged for operation by an E20b Electric Motor. The two 5½" Strips bracing the beam supports are removed, and the Motor is bolted in their place. The Driving Band 1 drives the 1" Pulley direct from the Rod carrying the ½" Pinion.

Parts required

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

For Beam Bridge fitted with E20b Electric Motor.

Additional parts required :—

*1 E20b Electric Motor

*1 of No. 15
1 " " 22
*1 " " 23a
*1 " " 32
2 " " 37
2 " " 126
1 " " 186

Parts not required :—

2 of No. 2
1 " " 19g
1 " " 186a
1 " " 213

*Not included in Outfit.

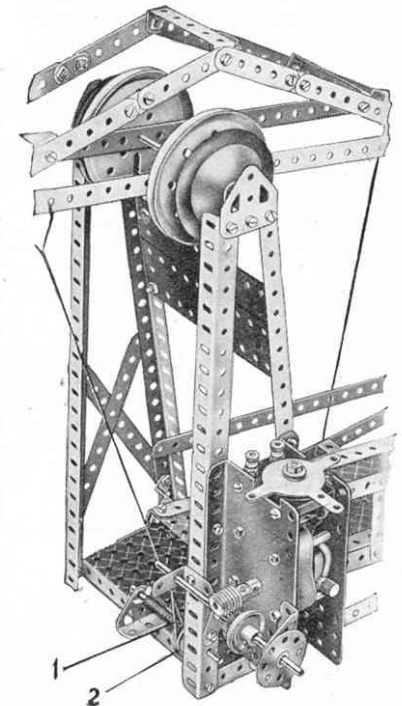


Fig. 5.23a Sectional view showing Motor fitted.

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5.24 PITHEAD GEAR

The rear side of the engine house consists of a Flanged Sector Plate and a $2\frac{1}{2}" \times 1\frac{1}{2}"$ Flanged Plate, which are bolted to an Angle Girder that forms part of the base of the model.

The $2\frac{1}{2}"$ Cylinder lock-nutted to the $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate, is fitted at each end with $1\frac{1}{2}"$ Discs by passing a 3" Screwed Rod through holes in their circumferences and screwing Nuts on each end of it. The piston is a $4\frac{1}{2}"$ Rod fitted with a Rod and Strip Connector, and is retained in position by a Cord Anchoring Spring on a Threaded Pin fastened to a Bush Wheel. A 5" Rod is journalled in the holes of the two $2\frac{1}{2}"$ Strips at the head of the shaft, and it carries at its centre a 1" fast Pulley. On each side of the Pulley are a 3" Pulley and a Road Wheel.

A 4" Rod is held in place in the holes of the $5\frac{1}{2}"$ Strips by Spring Clips, and directly below this Rod, at the bottom of the shaft, is a $3\frac{1}{2}"$ Rod, which is supported in the holes of two Reversed Angle Brackets. This Rod carries a $\frac{1}{2}"$ loose Pulley between two Spring Clips. The arrangement of the Cord forming the guides for the cage can be seen in the illustration. A length of Cord is tied through one of the holes in the 1" loose Pulley at the top of the cage, and is passed over the 1" fast Pulley between the two 3" Pulleys at the top of the shaft. It is then wound six times around the 5" Rod in the engine house, and then led around the $\frac{1}{2}"$ loose Pulley. Finally the Cord is tied to another hole in the 1" loose Pulley.

Fig. 5.24a shows the Pithead Gear adapted for Clockwork Motor drive. The Motor is bolted to the Angle Girder at the base, and the drive is taken from the 1" Pulley fastened on the Motor shaft to a 1" Pulley on the 5" Rod carrying the Bush Wheel.

		Parts required	
10 of No. 1	2 of No. 12a	5 of No. 22	1 of No. 48
14 " " 2	4 " " 12c	1 " " 22a	7 " " 48a
2 " " 3	2 " " 15	1 " " 23	1 " " 51
11 " " 5	1 " " 15a	1 " " 24	1 " " 52
1 " " 6a	1 " " 15b	9 " " 35	1 " " 54a
4 " " 8	1 " " 16	85 " " 37	1 " " 80c
2 " " 10	1 " " 17	4 " " 37a	1 " " 111a
2 " " 11	2 " " 19b	10 " " 38	3 " " 111c
5 " " 12	1 " " 19g	1 " " 40	1 " " 115

2 of No. 125
1 " " 126
1 " " 126a
2 " " 155a
1 " " 176
1 " " 186
3 " " 187
3 " " 188
4 " " 189
4 " " 190
1 " " 191
4 " " 192
1 " " 198
1 " " 199
1 " " 212
1 " " 216
2 " " 217a

For model Pithead Gear fitted with No. 1a or No. 2 Clockwork Motor.

Additional Parts required :-

*1 No. 1a or No. 2 Clockwork Motor

Parts not required
2 of No. 155a

* Not included in Outfit.

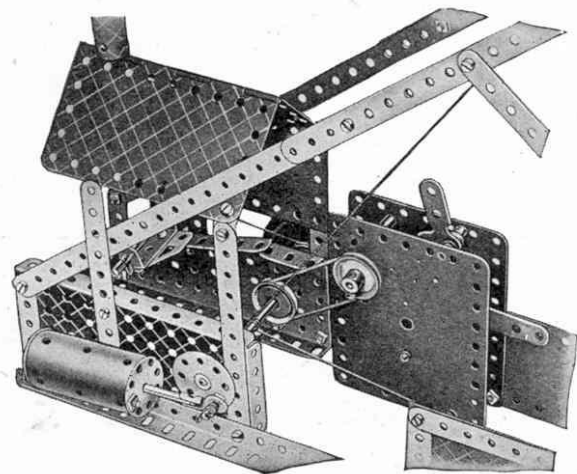
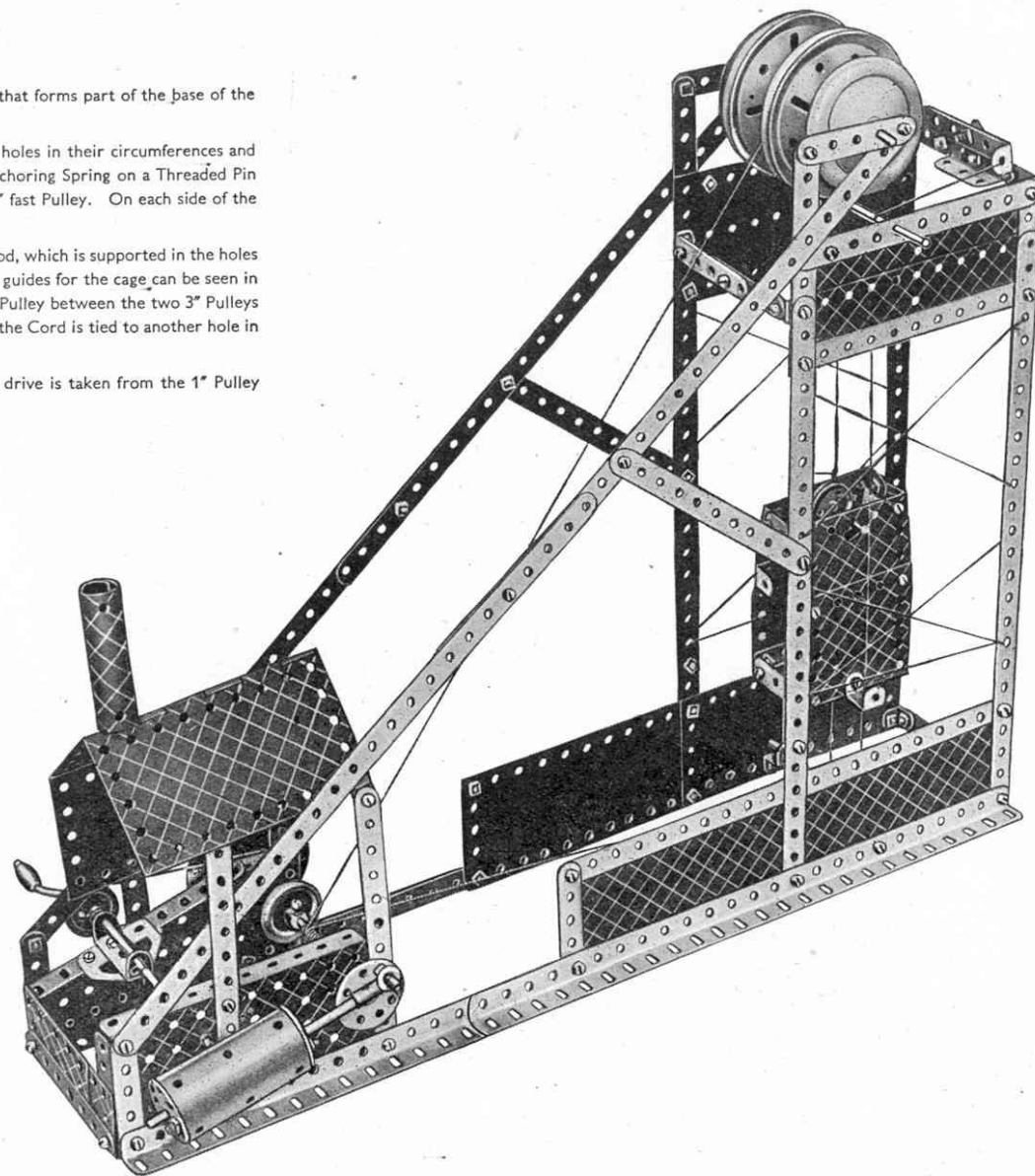
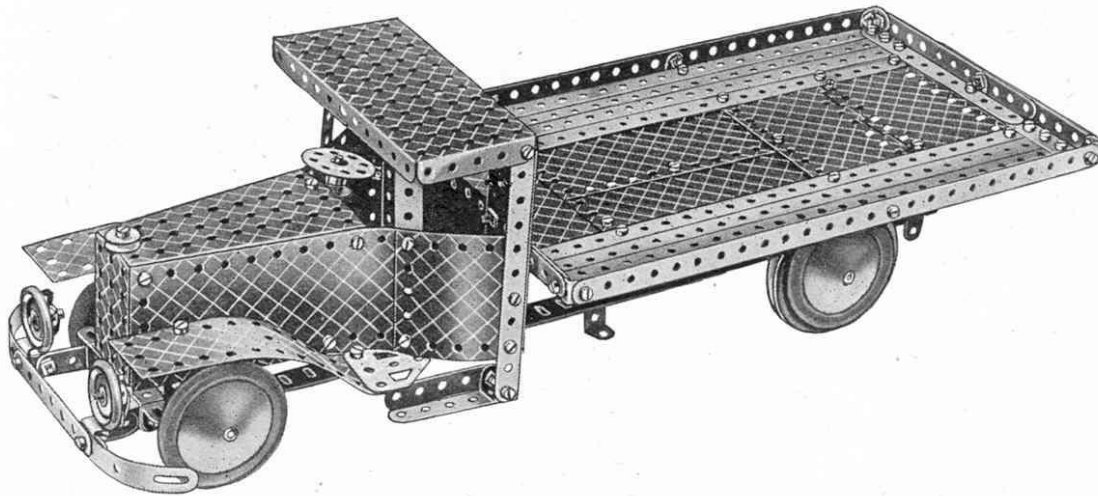


Fig. 5.24a Sectional view showing Motor fitted





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 $2\frac{1}{2}$ " \times $\frac{1}{2}$ " 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 $2\frac{1}{2}$ " \times $\frac{1}{2}$ " 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 $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates, and are bolted to the flanges of the Flanged Sector Plates. The radiator is a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " 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 " \times 1 " Angle Brackets and $1\frac{1}{2}$ " Strips.

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

Fig. 5.25b shows the Motor Lorry fitted with a No. 1 Clockwork Motor. The Motor is held to the chassis by four Bolts, and a $\frac{1}{2}$ " fast Pulley is fastened to the Motor shaft as shown. The drive is transmitted by a Driving Band to a 1" Pulley on the rear axle.

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 " " 155a	2 " " 200
4 " " 8	1 " " 15b	4 " " 35	2 " " 54a	4 " " 187	1 " " 213
2 " " 10	1 " " 16	85 " " 37	2 " " 111a	3 " " 188	2 " " 215

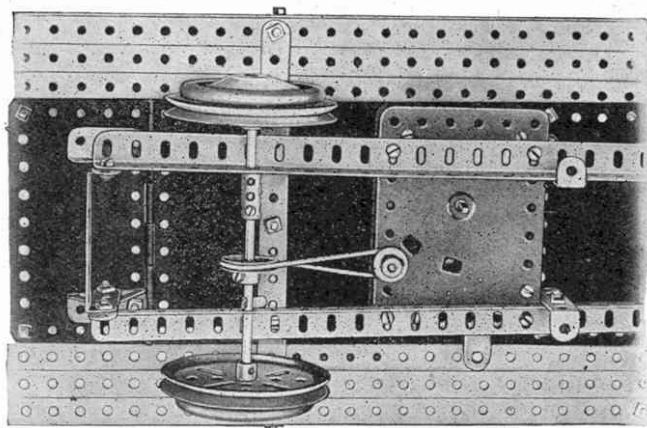


Fig. 5.25b. Sectional view showing Motor fitted.

For Motor Lorry fitted with No. 1 Clockwork Motor

Additional Parts required :-

* 1 No. 1 Clockwork Motor

1 of No. 22
* 1 " " 23a
* 4 " " 37
* 1 " " 63
1 " " 186a

Parts not required
1 of No. 213

* Not included in Outfit.

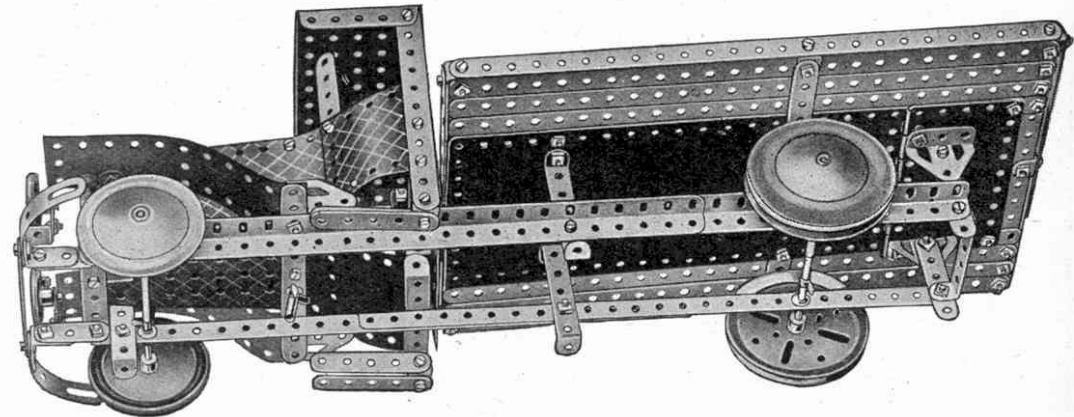
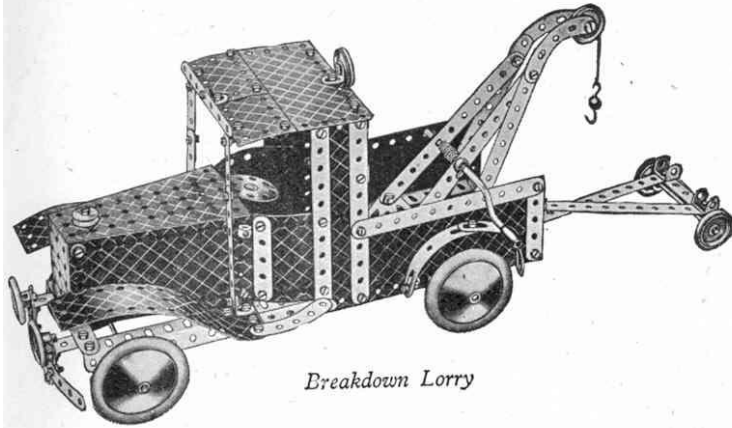


Fig. 5.25a

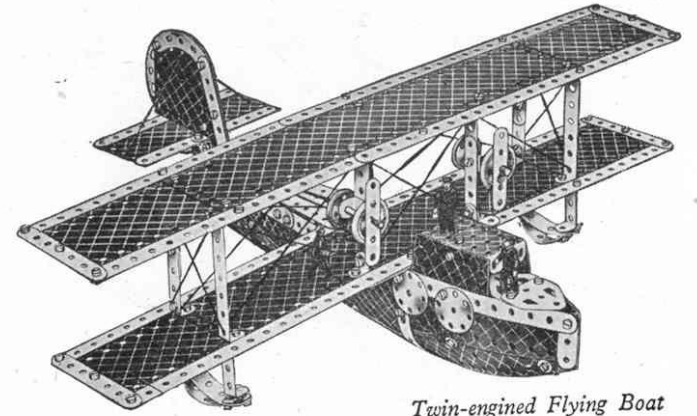
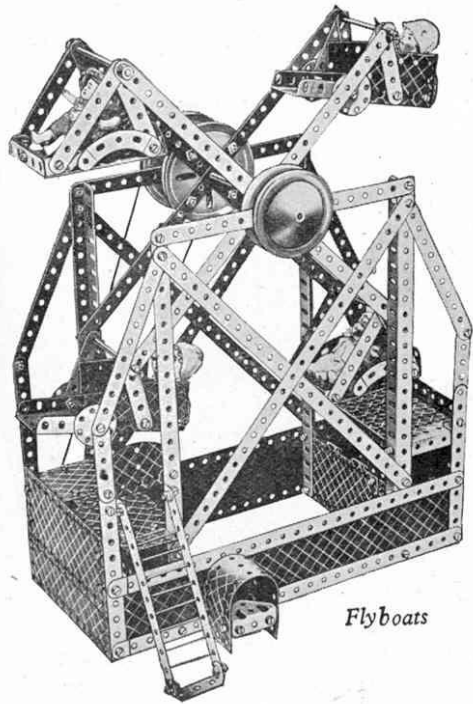
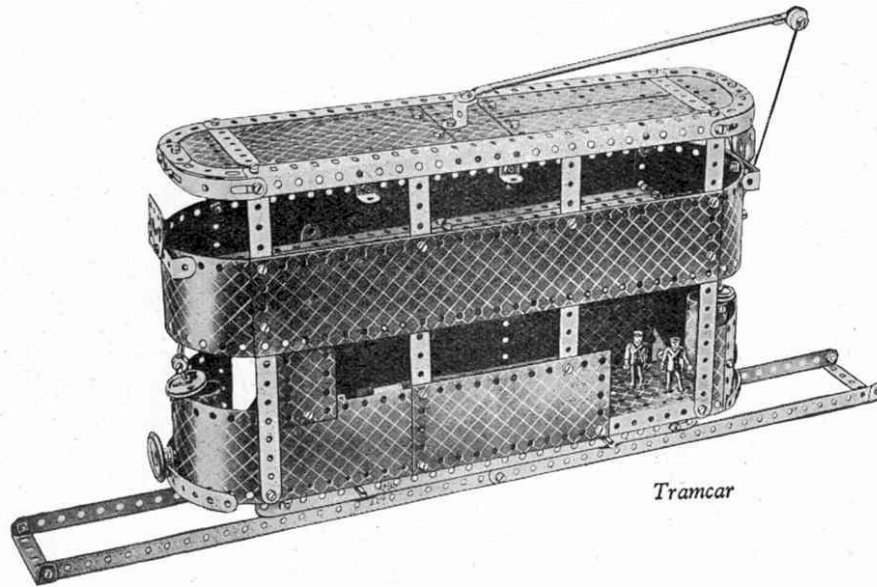
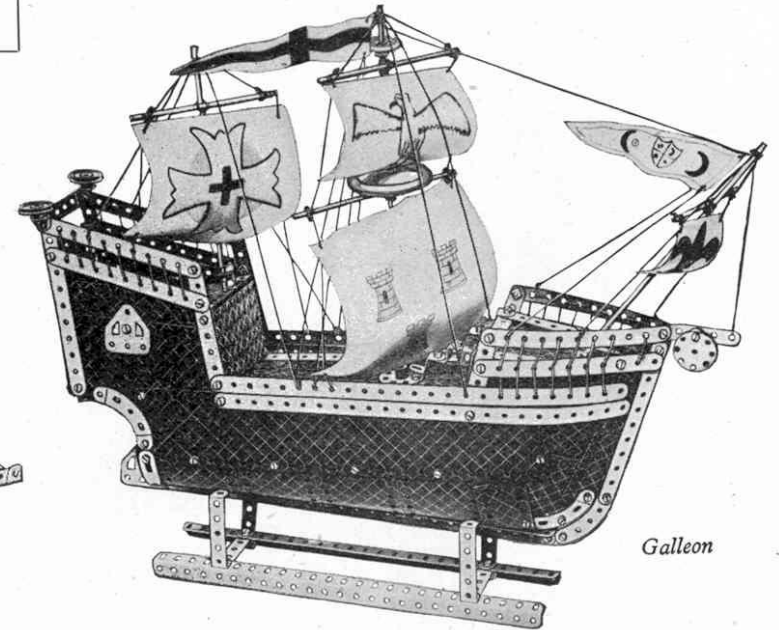
*Breakdown Lorry*

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 limitless, and the more Meccano parts you have, the bigger and better the models you will be able to build.

Ask your dealer to post you regularly the latest Meccano parts lists and other Meccano literature.

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

CONTENTS OF MECCANO OUTFITS

No.	Description	0	1	1a	2	2a	3	3a	4	4a	5	5a	6	6a	7	7a	8	8a	9	9a	10
1	Perforated Strips, 12"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1a	" " " 7"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1b	" " " 5"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2	" " " 4"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2a	" " " 3"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3	" " " 2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
6a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7	Angle Girders, 24"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
7a	" " " 18"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8	" " " 12"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8a	" " " 9"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8b	" " " 7"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9	" " " 5"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9a	" " " 4"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9b	" " " 3"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9c	" " " 2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9d	" " " 2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
9e	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
10	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
11	Flat Brackets	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12	Double Brackets	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12a	Angle Brackets, 1" x 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12b	" " " 1" x 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
12c	Obtuse Angle Brackets, 1" x 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13	Axle Rods, 11"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
13a	" " " 8"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
14	" " " 6"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15	" " " 5"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15a	" " " 4"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
15b	" " " 3"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16	" " " 2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16a	" " " 2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
16b	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
17	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
18b	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19b	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19h	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
19s	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
20b	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
21b	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
22a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
23a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
25a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
26b	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27b	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27c	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
30c	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
31a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
32	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
34b	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
35a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
36b	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
37b	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
40	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
41	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
43	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
44	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
45	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
46	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
47	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
47a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
48	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
48a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
48b	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
48c	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
48d	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
50a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
51	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
52	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
52a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
53	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
53a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
54a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
55a	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
57b	" " " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
57c	" " " 1"	...	...	...	...	...	...								

No.	Description	0	1	1a	2	2a	3	3a	4	4a	5	5a	6	6a	7	7a	8	8a	9	9a	10
95	Sprocket Wheels, 2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
95a	" " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
95b	" " 3"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
96	" " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
96a	" " 3"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
100	Braced Girders, 5 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
102	Single Bent Strips	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103	Flat Girders, 5 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103a	" " 12 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103b	" " 4 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103c	" " 3 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103d	" " 2 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103e	" " 2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103f	" " 1 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103g	" " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103h	" " 7 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103k	" " 7 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
108	Architraves, 2 1/4" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
109	Face Plates, 3 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
110	Rack Strips, 3 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
111	Bolts, 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
111a	" " 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
111c	" " 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
114	Hinges	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
115	Threaded Pins	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
116	Fork Pieces, Small	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
116a	" " 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
117	Steel Balls, 3/8" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
118	Hub Discs, 5/8" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
120b	Compression Springs	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
121	Reversed Angle Brackets, 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
125	" " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
126	Trunnions	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
126a	" " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
128	Flat Trunnions	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
129	Boss Bell Cranks	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
130	Rack Segments, 3" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
131	Triple Throw Eccentrics	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
132	Flywheels, 2 1/2" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
133	Corner Brackets, 1 1/2" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
133a	" " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
134	Crank Shafts, 1" stroke	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
136	Handrail Supports	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
136a	" " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
137	Wheel Flanges	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
140	Universal Couplings	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
142a	Motor Tyres, 3"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
142b	" " 3"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
143	Circular Girders, 5 1/2" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
144	Dog Clutches	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
145	Circular Strips, 7 1/2" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
146	" " 6" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
146a	" " 4" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
147a	Pawls	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
147b	Pivot Bolt with 2 Nuts	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
147c	Pawls without Boss	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
154a	Corner Angle Brackets, 1/2" R.H.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
154b	" " L.H.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
155a	Rubber Rings, for 1" pulley	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
157	Fans, 2" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
160	Channel Bearings, 1 1/2" x 1 1/2" x 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
161	Girder Brackets, 2" x 1" x 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
162	Boiler with Ends, complete	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
162a	Boiler Ends	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
162b	Boilers without Ends	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
163	Sleeve Pieces	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
164	Chimney Adaptors	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
165	Swivel Bearings	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
166	End Bearings	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
167b	Ring Frames for Rollers	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
168	Ball Bearings, 4" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
169	Digger Buckets	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
170	Eccentrics, 1/2" Throw	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
171	Socket Couplings	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
175	Flexible Couplings Units	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
176	Anchoring Springs for Cord	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
179	Rod Socket	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
185	Steering Bands, 2 1/2" Light	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
186	" " 10"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
186a	" " 10" Heavy	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
186b	" " 15"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
186c	" " 20"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
186d	" " 20"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
186e	" " 20"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
187	Road Wheels, 2 1/2" x 1 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
188	Flexible Plates, 5 1/2" x 1 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
189	" " 5 1/2" x 1 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
190	" " 3 1/2" x 2 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
190a	" " 4 1/2" x 2 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
191	" " 5 1/2" x 2 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
192	" " 9 1/2" x 2 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
196	Strip Plates, 12 1/2" x 2 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
197	Hinged Flat Plates, 4 1/2" x 2 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
198	Curved Plates, U Section, 2 1/2" x 2 1/2" radius	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
199	Curved Plates, U Section, 2 1/2" x 2 1/2" radius	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
200	Curved Plates, U Section, 2 1/2" x 2 1/2" radius	...	...	...</														

MECCANO PARTS

120. Buffers
120a. Spring Buffers
120b. Compression Springs



121. Train Couplings
122. Miniature Loaded Sacks



123. Cone Pulleys
124. Reversed Angle Brackets, 1"
125. " " " "



126. Trunnions
126a. Flat Trunnions



127. Simple Bell Cranks
128. Boss Bell Cranks



129. Rack Segments, 3" diam.



130. Eccentrics, Triple Throw



131. Dredger Buckets
132. Flywheels, 2 1/2" diam.



133. Corner Brackets, 1 1/2"
133a. " " " "



134. Crank Shafts, 1" stroke
135. Theodolite Protractors



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



- No. 138. Ships' Funnels
138a-z. " " Raked



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



140. Universal Couplings
141. Wire Lines (for clock weights)



142. Rubber Rings (to fit 3" diam. rims)
142a. Motor Tyres (to fit 2" diam. rims)
142b. " " " 3" " "
142c. " " " 1" " "
142d. " " " 1 1/2" " "



143. Circular Girders, 5 1/2" diam.



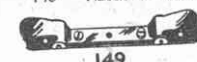
144. Dog Clutches



145. Circular Strips, 7 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



149. Collecting Shoes for Electric Locos
150. Crane Grabs



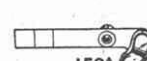
- No. 151. Pulley Blocks, Single Sheave
152. " " Two " "
153. " " Three " "



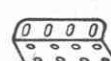
- 154a. Corner Angle Brackets, 1/2" (right-hand)
154b. Corner Angle Brackets, 1/2" (left-hand)
155. Rubber Rings (for 1" Pulleys) Black
155a. " " " White



156. Pointers (with boss) 2 1/2" overall



157. Fans, 2" diam.
158a. Signal Arms, Home
158b. " " Distant



160. Channel Bearings, 1 1/2" x 1" x 1/2"
161. Girder Brackets, 2" x 1" x 1/2"



162. Boilers, complete, with ends
162a. " " without ends
162b. " " without ends
163. Sleeve Pieces
164. Chimney Adaptors



165. Swivel Bearings
166. End



167. Geared Roller Bearings
167a. Roller Races, geared, 192 teeth
167b. Ring Frames for Rollers
167c. Pinions for Roller Bearings (16 teeth)



- No. 168. Ball Bearings, 4" diam.
168a. " Races, flanged discs
168b. " " toothed
168c. " Casings, complete with balls



169. Digger Buckets



170. Eccentrics, 1" throw
171. Socket Couplings



172. Pendulum Connections
173. Rail Adaptors



174. Grease Cups



175. Flexible Coupling Units



176. Anchoring Springs for Cord



177. Shafting Standards, Large
178. " " Small
179. Rod Sockets
180. Toothed Gear Rings, 3 1/2" diam.
181. Bobbins
182. Insulating Bushes
182a. Insulating Washers



183. Lamp Holders
184a. 2 1/2-volt Lamps
184b. 3 1/2 " " "
184c. 6-volt Lamps
184d. 10 " " "
184e. 20 " " "



- No. 185. Steering Wheels, 1 1/2" diam.
186. Driving Bands, 2 1/2" (Light)
186a. " " 6" "
186b. " " 10" "
186c. " " 10" (Heavy)
186d. " " 15" "
186e. " " 20" "
187. Road Wheels



192. Flexible Plates.
188. 2 1/2" x 1 1/2"
189. 5 1/2" x 1 1/2"
190. 2 1/2" x 2 1/2"
190a. 3 1/2" x 2 1/2"
191. 4 1/2" x 2 1/2"
192. 5 1/2" x 2 1/2"
196. 9 1/2" x 2 1/2"
197. 12 1/2" x 2 1/2"



198. Hinged Flat Plates, 4 1/2" x 2 1/2"
199. Curved Plates, U-Section 2 1/2" x 2 1/2" x 1/8"
200. " " 2 1/2" x 2 1/2", 1 1/8" radius



201. Lamps with Flex (3 1/2 volts)
202. Angle Brackets (for Headlamps)
203. Headlamps
203a. Headlamp Rims
203b. " Bodies
204. " Nuts
205. " Glasses
206. Lampshades
207. Lamp Bases
207a. Lamp with Standard and Flex
208. Battery Tags and Studs
208a. Washers for Battery Studs
210. Nuts for Battery Studs



- 211a. Helical Gear 1/2" { Can only be
211b. " " 1 1/2" used together



212. Rod and Strip Connectors
213. Rod Connectors



215. Semi-Circular Plates 2 1/2"
214. Formed Slotted Strips 3"



216. Cylinders, 2 1/2"



- 217A. Discs, 1 1/2"
217b. Discs 3/4"