

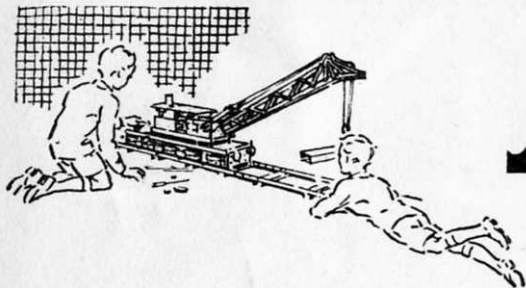
MECCANO



INSTRUCTIONS for OUTFIT No. 5

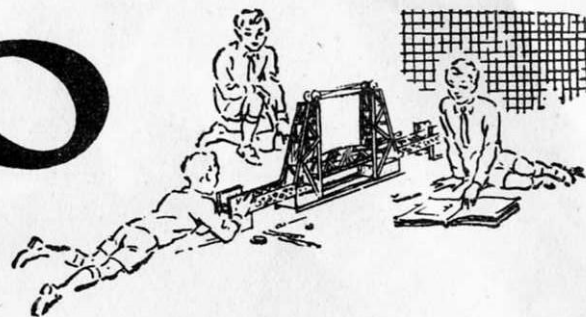
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BINNS ROAD, LIVERPOOL 13, ENGLAND

51.5



MECCANO

Real Engineering in Miniature



MODEL-BUILDING WITH MECCANO

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

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

HOW TO BUILD UP YOUR OUTFIT

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

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

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, Bridges, Cranes and Aeroplanes, and special sections dealing with the latest Engineering, Aviation, Motoring

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

If you are not already a reader write to the Editor for particulars. He will send you a specimen copy and tell you how to obtain the Magazine regularly.

THE MECCANO GUILD

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

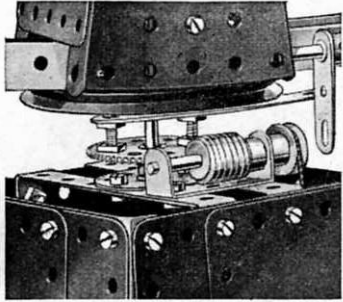
Clubs founded and established under the guidance of the Guild Secretary provide Meccano boys with opportunities of enjoying to the utmost the fun of model-building. Each has its Leader, Secretary, Treasurer and other officials. With the exception of the Leader, all the officials are boys, and as far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

MECCANO SERVICE

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

Whatever your problem may be, write to us about it. We shall be delighted to help you in any way possible. Address your letters to **Information Service**.

HOW TO BEGIN THE FUN



A Worm and a 57-teeth Gear give a useful drive ratio for many models

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.

A FEW USEFUL HINTS

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.

Flexible Plates are sometimes used for forming curved surfaces in models, but they are not intended to be bent at right angles. With careful handling a Plate can be bent to the required curve and after use straightened again.

All Outfits from No. 2 upward include a Cord Anchoring Spring, Part No. 176. This part provides a neat and positive method of fastening a length of Cord to a Rod. When pushing the Spring on to a Rod or Crank Handle, turn left so that its coils tend to unwind; turn it in the same direction when pulling it off the Rod.

THE IMPORTANCE OF "LOCK-NUTTING"

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

A Rod is usually mounted in a support or bearing, such as a hole in a strip, so that it is free to revolve. The Rod is then said to be **journalled** in the Strip.

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.

DRIVING YOUR MODELS

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

Small and light models may be driven direct from the driving pulley of the motor or through a belt running over two pulleys of the same size, giving what is known as a 1 : 1 (one-to-one) ratio. For large models it is necessary to take the drive from a small pulley on the motor shaft to a larger pulley on the driving shaft of the model. In most cases a 1" Pulley on the motor shaft and a 3" Pulley on the model shaft will be found satisfactory. This provides a reduction ratio of approximately 3 : 1.

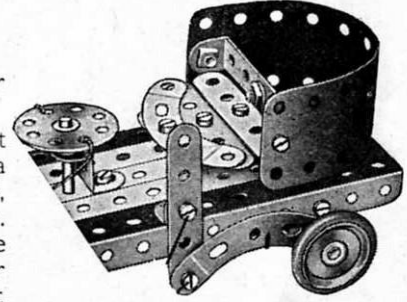
Rubber bands are very convenient for driving belts. Sometimes, however, a rubber band of the right length is not available, and then Meccano Cord or thin string is used. To tie the Cord to form an endless belt, use the familiar reef knot.

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

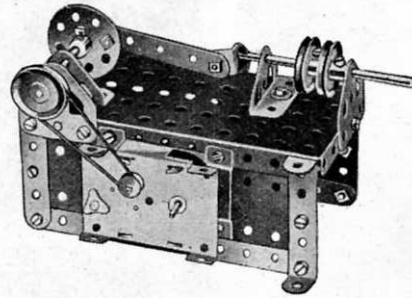
All the models in this Book were built up and tested in our model-building department. Some of them are shown fitted with a motor, and provided that they are properly constructed the motor will drive them satisfactorily.

If the motor is to operate successfully however, there must be no excessive friction in the mechanism of the model. This can be caused by shafts and their bearings being slightly out of line, or by a belt or Cord drive being too tight. Before condemning the motor therefore, first make sure that every revolving shaft moves quite freely in its bearings, and that the bearings are in line with one another. The bearings can be brought into line by pushing through them a Drift (Part No. 36c) or a Rod, before the bolts holding the various parts are tightened up. To make the running perfectly smooth, apply a little light machine oil to every bearing or pivot on which moving parts are mounted.

The models included in this Book give a good idea of the various types of Meccano construction, and provide a guide to the building of a large number of other models with this outfit. If any difficulty should arise in planning a new model, write to Meccano Limited, Binns Road, Liverpool 13, and every possible assistance will be given.



A Flexible Plate used to form a curved surface.

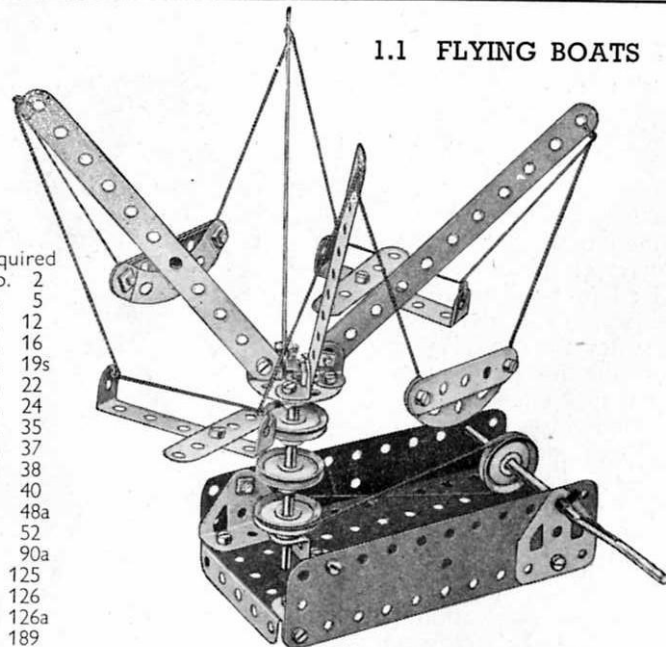


A Magic Motor fitted to drive a Steam Engine.

1.1 FLYING BOATS

Parts required

4 of No. 2
4 " " 5
4 " " 12
1 " " 16
1 " " 19s
4 " " 22
1 " " 24
3 " " 35
24 " " 37
1 " " 38
1 " " 40
2 " " 48a
1 " " 52
2 " " 90a
1 " " 125
2 " " 126
2 " " 126a
2 " " 189

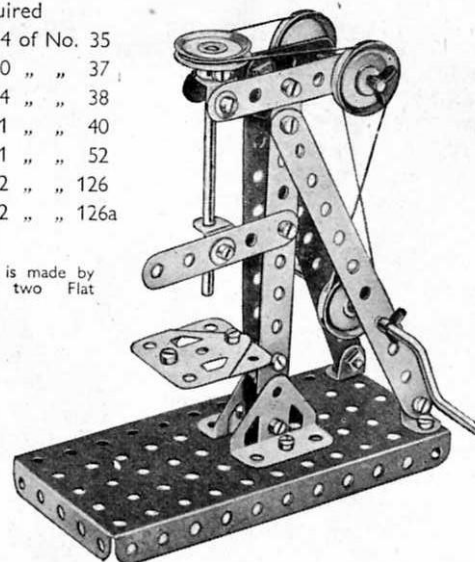


1.2 DRILL

Parts required

4 of No. 2	4 of No. 35
3 " " 5	20 " " 37
8 " " 12	4 " " 38
1 " " 16	1 " " 40
1 " " 17	1 " " 52
1 " " 19s	2 " " 126
4 " " 22	2 " " 126a

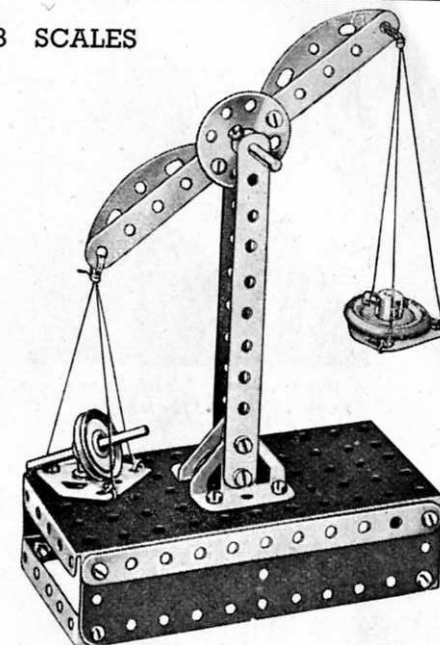
The drill table is made by bolting together two Flat Trunnions.



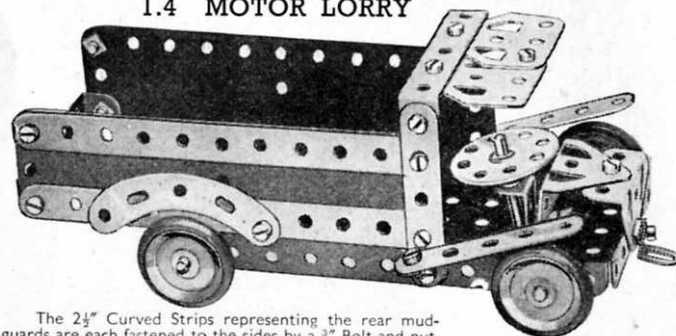
1.3 SCALES

Parts required

4 of No. 2
2 " " 5
2 " " 17
2 " " 22
1 " " 24
19 " " 37
1 " " 38
1 " " 40
2 " " 48a
1 " " 52
2 " " 90a
1 " " 111c
2 " " 126
2 " " 126a
1 " " 155
2 " " 189



1.4 MOTOR LORRY

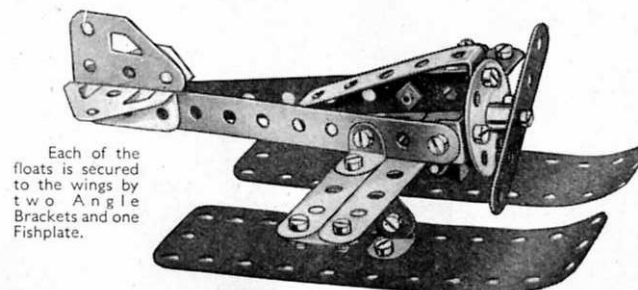


The 2½" Curved Strips representing the rear mudguards are each fastened to the sides by a ½" Bolt and nut, with a Spring Clip between the mudguards and the 5½" Strip to form a distance piece.

Parts required

4 of No. 2	1 of No. 17	19 of No. 37	2 of No. 90a	2 of No. 126a
4 " " 5	4 " " 22	4 " " 37a	3 " " 111c	4 " " 155
3 " " 12	1 " " 24	2 " " 48a	1 " " 125	2 " " 189
2 " " 16	2 " " 35	1 " " 52	2 " " 126	

1.5 RACING SEAPLANE



Each of the floats is secured to the wings by two Angle Brackets and one Fishplate.

Parts required

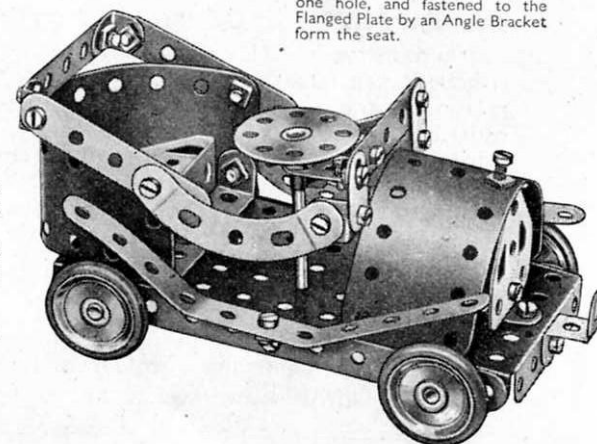
3 of No. 2	1 of No. 24	2 of No. 111c
3 " " 3	19 " " 37	2 " " 126
4 " " 10	1 " " 37a	1 " " 126a
8 " " 12	1 " " 48a	2 " " 189

1.6 KIDDIE CAR

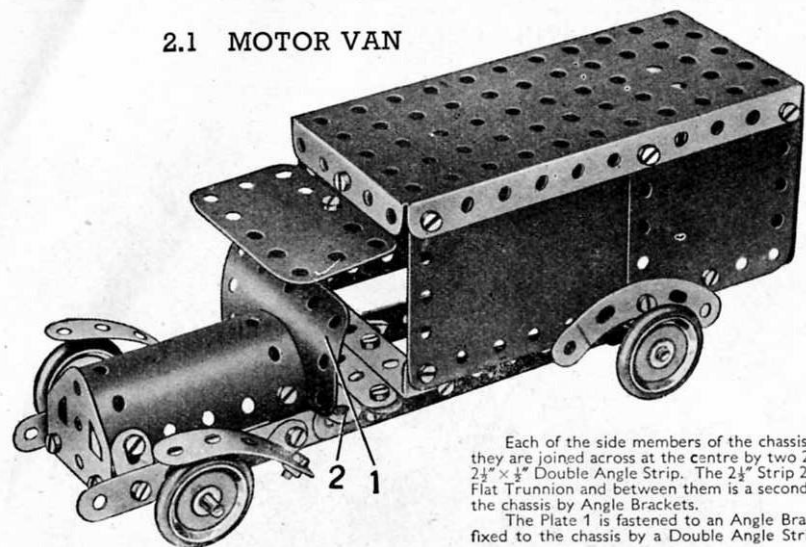
Parts required

4 of No. 2
4 " " 5
3 " " 10
7 " " 12
2 " " 16
1 " " 17
4 " " 22
1 " " 24
1 " " 35
24 " " 37
3 " " 37a
2 " " 48a
1 " " 52
2 " " 90a
2 " " 111c
1 " " 125
2 " " 126
1 " " 126a
4 " " 155
2 " " 169

Two Trunnions overlapped one hole, and fastened to the Flanged Plate by an Angle Bracket form the seat.



2.1 MOTOR VAN



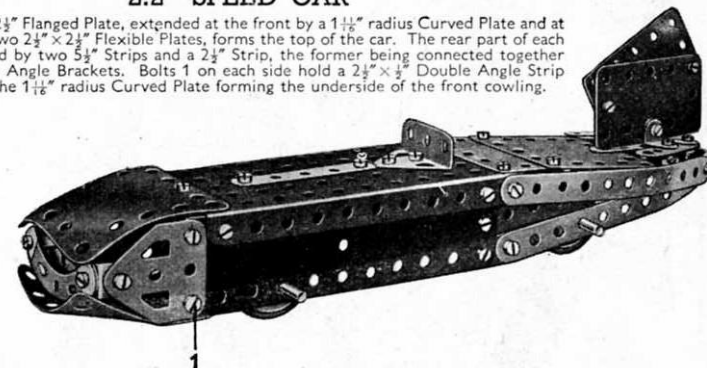
Parts required			
4 of No.	2	1 of No.	52
4 " "	5	2 " "	90a
4 " "	10	1 " "	126
8 " "	12	2 " "	126a
2 " "	16	4 " "	155
4 " "	22	2 " "	188
4 " "	35	2 " "	189
40 " "	37	2 " "	190
4 " "	38	1 " "	191
2 " "	48a	1 " "	199

Each of the side members of the chassis consists of two 5 1/2" Strips overlapped, and they are joined across at the centre by two 2 1/2" Strips, one of which is shown at 2, and a 2 1/2" x 1/2" Double Angle Strip. The 2 1/2" Strip 2 and the Double Angle Strip are bolted to a Flat Trunnion and between them is a second 2 1/2" Strip, which is fastened at each end to the chassis by Angle Brackets.

The Plate 1 is fastened to an Angle Bracket that is bolted to Strip 2. The body is fixed to the chassis by a Double Angle Strip and an Angle Bracket.

2.2 SPEED CAR

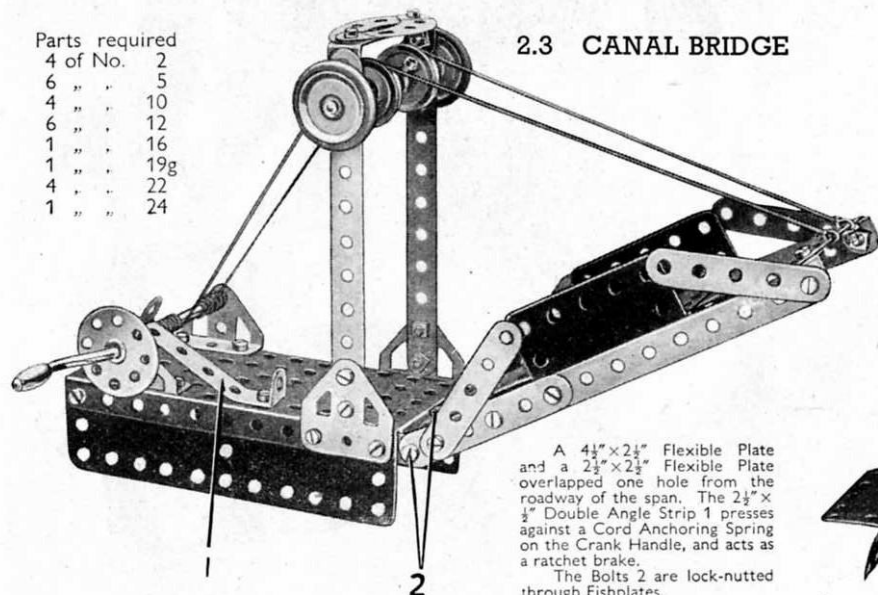
A 5 1/2" x 2 1/2" Flanged Plate, extended at the front by a 1 1/2" radius Curved Plate and at the rear by two 2 1/2" x 2 1/2" Flexible Plates, forms the top of the car. The rear part of each side is formed by two 5 1/2" Strips and a 2 1/2" Strip, the former being connected together at the tail by Angle Brackets. Bolts 1 on each side hold a 2 1/2" x 1/2" Double Angle Strip that carries the 1 1/2" radius Curved Plate forming the underside of the front cowl.



Parts required			
4 of No.	2	4 of No.	22
6 " "	5	38 " "	37
2 " "	10	1 " "	37a
4 " "	12	4 " "	38
2 " "	16	2 " "	48a
		1 of No.	52
		2 " "	90a
		1 " "	126
		2 " "	126a
		4 " "	155
		2 of No.	188
		2 " "	189
		2 " "	190
		2 " "	200

Parts required	
4 of No.	2
6 " "	5
4 " "	10
6 " "	12
1 " "	16
1 " "	19g
4 " "	22
1 " "	24

2.3 CANAL BRIDGE



A 4 1/2" x 2 1/2" Flexible Plate and a 2 1/2" x 2 1/2" Flexible Plate overlapped one hole from the roadway of the span. The 2 1/2" x 1/2" Double Angle Strip 1 presses against a Cord Anchoring Spring on the Crank Handle, and acts as a ratchet brake.

The Bolts 2 are lock-nutted through Fishplates.

Parts required (continued)	
39 of No.	37
2 " "	37a
2 " "	38
2 " "	48a
1 " "	52
2 " "	90a
2 " "	126
2 " "	126a
2 " "	155
1 " "	176
2 " "	188
2 " "	189
2 " "	190
1 " "	191
1 " "	199
1 " "	200

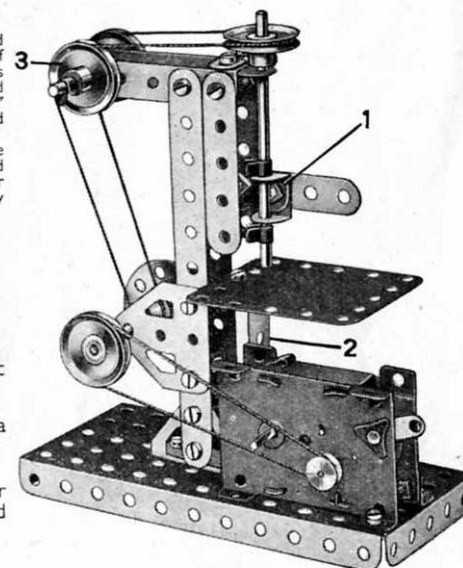


2.4 DRILLING MACHINE

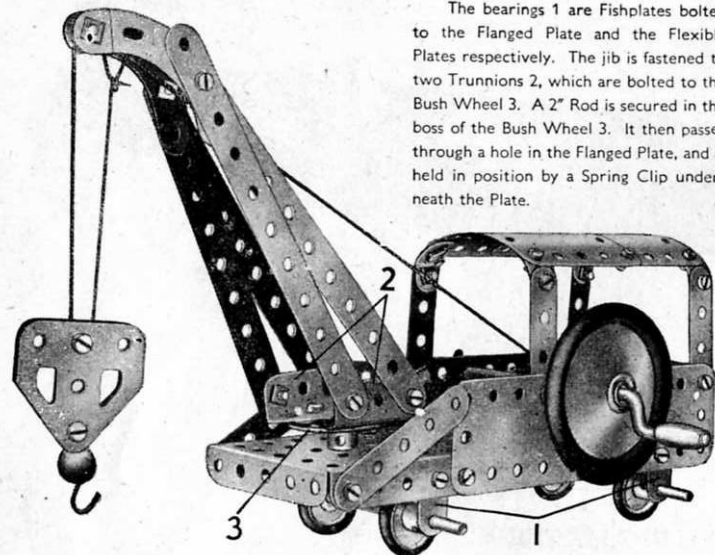
The horizontal 2 1/2" Strips at the top of the drill are joined together, and also to the vertical 2 1/2" Strips, by means of Angle Brackets. The lower bearings 1 are two Angle Brackets bolted to a 2 1/2" Strip, and the Rod forming the drill is journaled in these, and in a Fishplate at its upper end. A 2 1/2" x 2 1/2" Flexible Plate is supported by a Double Angle Strip 2, and represents the table.

The drive is taken from the Motor to the 1" Pulley on the lower shaft. A second Driving Band passes round the 1/2" fixed Pulley supplied with the Motor, which is also fixed on the lower shaft, round the two Pulleys at 3, and finally round the 1" Pulley fastened on the vertical drill shaft.

Parts required			
2 of No.	2	1 of No.	24
5 " "	5	4 " "	35
1 " "	10	22 " "	37
5 " "	12	2 " "	37a
1 " "	16	1 " "	40
2 " "	17	1 " "	48a
4 " "	22	1 " "	52
		1 of No. 111c	
		2 " "	126
		2 " "	126a
		1 " "	190
		1 Magic Motor	
		(Not included in Outfit)	



2.5 RAILWAY BREAKDOWN CRANE



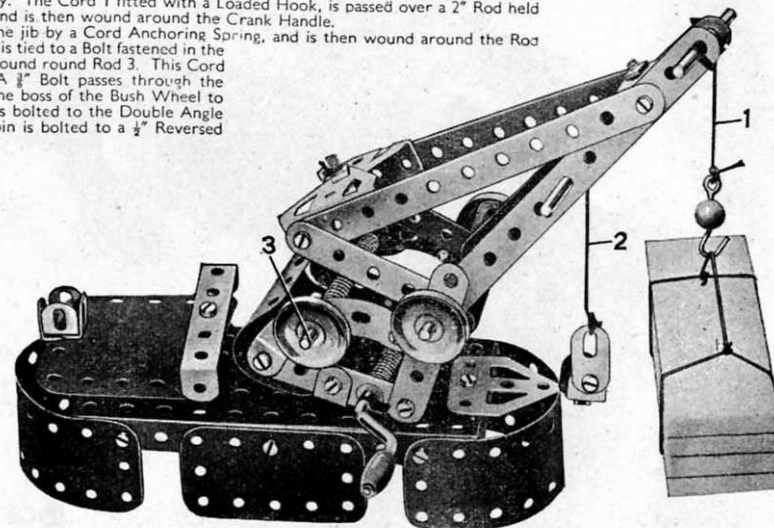
The bearings 1 are Fishplates bolted to the Flanged Plate and the Flexible Plates respectively. The jib is fastened to two Trunnions 2, which are bolted to the Bush Wheel 3. A 2" Rod is secured in the boss of the Bush Wheel 3. It then passes through a hole in the Flanged Plate, and is held in position by a Spring Clip underneath the Plate.

Parts required	
4 of No.	2
6 " "	5
4 " "	10
3 " "	12
2 " "	16
1 " "	17
1 " "	19g
4 " "	22
1 " "	24
2 " "	35
39 " "	37
3 " "	37a
3 " "	38
1 " "	40
2 " "	48a
1 " "	52
1 " "	57c
2 " "	90a
3 " "	111c
2 " "	126
2 " "	126a
1 " "	155
1 " "	176
1 " "	187
1 " "	188
2 " "	189
1 " "	190
2 " "	200

2.6 FLOATING CRANE

The jib consists of 5½" Strips and 2½" Strips. At its upper end these are joined by Angle Brackets, and at its lower end by Trunnions. Each side of the lower part of the crane consists of 2½" Strips and a small radius Curved Strip, the two sides being connected by a 2½" x ½" Double Angle Strip. The jib is pivoted to this structure by means of a 3½" Rod, which carries at each end a 1" Pulley. The Cord 1 fitted with a Loaded Hook, is passed over a 2" Rod held in place in the jib by means of Spring Clips and is then wound around the Crank Handle.

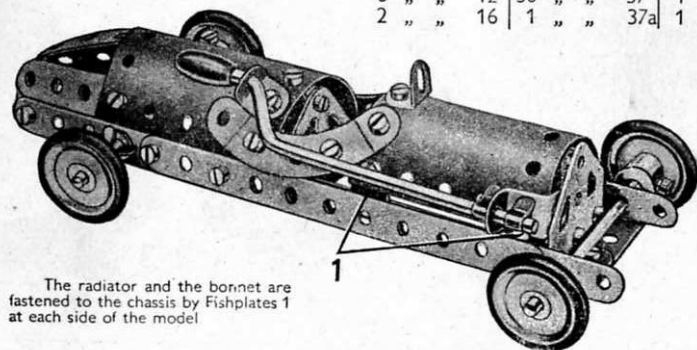
The Cord 2 passes over a Rod held in the jib by a Cord Anchoring Spring, and is then wound around the Rod that forms the pivot for the jib. A third Cord is tied to a Bolt fastened in the two Trunnions at the base of the jib, and is wound round Rod 3. This Cord controls the luffing motion of the crane. A ½" Bolt passes through the Flanged Plate and is held by a set screw in the boss of the Bush Wheel to which the jib is fastened. The Bush Wheel is bolted to the Double Angle Strip below the Rod 3. The roof of the cabin is bolted to a ½" Reversed Angle Bracket fixed to the Flanged Plate.



Parts required

Parts required		Parts required	
4 of No.	2	2 of No.	48a
6 " "	5	1 " "	52
3 " "	10	1 " "	57c
8 " "	12	2 " "	90a
2 " "	16	4 " "	111c
2 " "	17	1 " "	125
1 " "	19g	2 " "	126
4 " "	22	1 " "	126a
1 " "	24	1 " "	176
4 " "	35	2 " "	188
29 " "	37	2 " "	189
4 " "	37a	1 " "	199
4 " "	38	1 " "	200
1 " "	40		

2.7 RACING CAR



The radiator and the bonnet are fastened to the chassis by Fishplates 1 at each side of the model

Parts required		Parts required		Parts required	
4 of No.	2	1 of No.	19g	2 of No.	38
5 " "	5	4 " "	22	1 " "	48a
4 " "	10	4 " "	35	2 " "	90a
8 " "	12	30 " "	37	1 " "	125
2 " "	16	1 " "	37a	1 " "	126

2.8 BACON SLICER

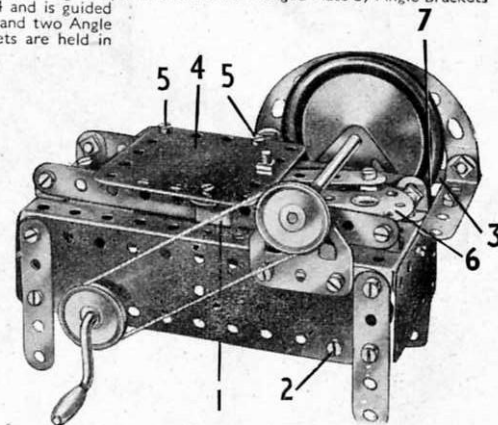
The base of the model consists of a Flanged Plate fitted with four 2½" Strips for legs. Two 5½" x 1½" and two 2½" x 1½" Flexible Plates are bolted to the flanges of the Plate.

The guides for the sliding carriage 4 are formed by two 5½" Strips attached to the Flanged Plate by Angle Brackets. The carriage consists of a 2½" x 2½" Flexible Plate 4 and is guided along the Strips by the Reversed Angle Bracket 1 and two Angle Brackets on the opposite side. The Angle Brackets are held in place by Bolts 5.

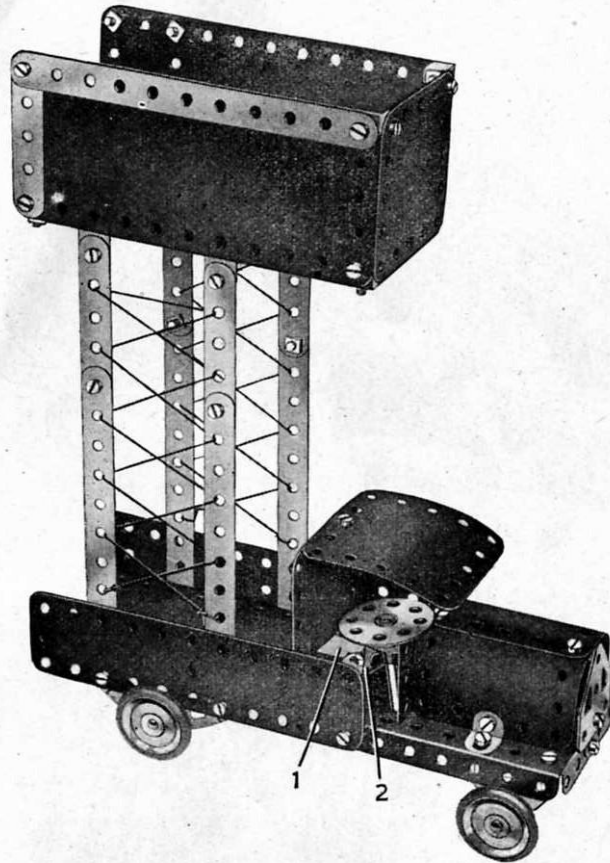
The cutting blade is represented by a Road Wheel fixed on a 3½" Rod journaled in two Flat Trunnions. A Pulley on this Rod is connected by a belt of Cord to a second Pulley on the Crank Handle.

The carriage is moved backwards and forwards by a crank consisting of a Bush Wheel 6 fixed on a 2" Rod. This Rod is journaled in the Flanged Plate and in the centre hole of a Double Angle Strip fixed across the interior of the base by the Bolt 2 and another in a similar position on the opposite side. A 1" Pulley on the 2" Rod is connected by a crossed belt of Cord to a further 1" Pulley secured to the Crank Handle between the 5½" Flexible Plates.

A guard for the rotating blade is provided by two Curved Strips attached to a 5½" Strip 3. This Strip is fastened at one end to the Flanged Plate by a 2½" Strip and a Fishplate 7, and at its other end it is attached to a 2½" x 2½" Flexible Plate bolted horizontally to the Flanged Plate.

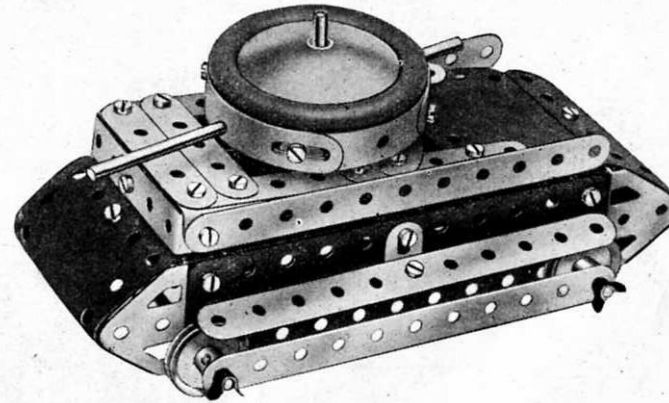


3.1 TOWER WAGON



A Stepped Bent Strip 1 is bolted in a horizontal position in the centre of the Flanged Plate, and a $2\frac{1}{2}$ " Curved Strip is bolted on top of it by the centre hole, to form a seat. A Reversed Angle Bracket 2 is then bolted in one of the elongated holes of the Curved Strip to form a bearing for the Rod carrying the Bush Wheel.

3.2 TANK



Construction of the gun turret is commenced by bolting a $2\frac{1}{2}$ " Strip across a Bush Wheel. Four 3" Formed Slotted Strips are bolted together to form a circle and fastened to the $2\frac{1}{2}$ " Strip by means of Angle Brackets. Next two Angle Brackets are bolted to the Bush Wheel in the positions shown in Fig. 3.2a. Two Rods are pushed through holes in the Formed Slotted Strips and through the free holes of the Angle Brackets, and are fastened in position by means of Spring Clips. The turret is held in place by a $3\frac{1}{2}$ " Rod that is locked in the boss of the Bush Wheel and then passed through the $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flanged Plate and through a hole in a Reversed Angle Bracket. A Cord Anchoring Spring is then screwed on to it to hold it in position. To complete the turret a Road Wheel is fastened on the upper end of the $3\frac{1}{2}$ " Rod. The Reversed Angle Bracket is bolted to the $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flanged Plate.

The *Magic Motor* is bolted to the Flanged Plate, and the drive is taken to the back axle by means of a Driving Band.

Note: The Motor used in this model is not included in the Outfit.

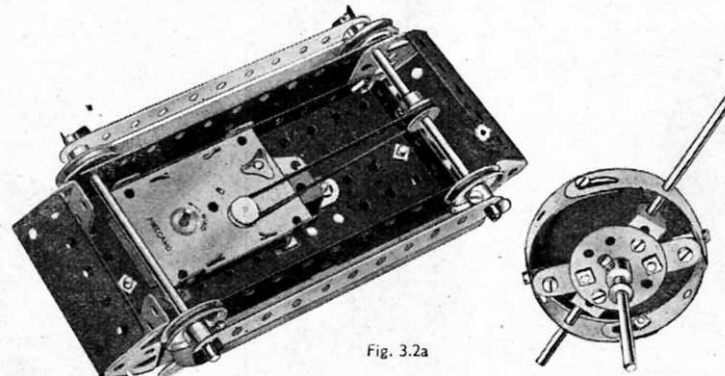


Fig. 3.2a

3.3 PORTABLE GARAGE CRANE

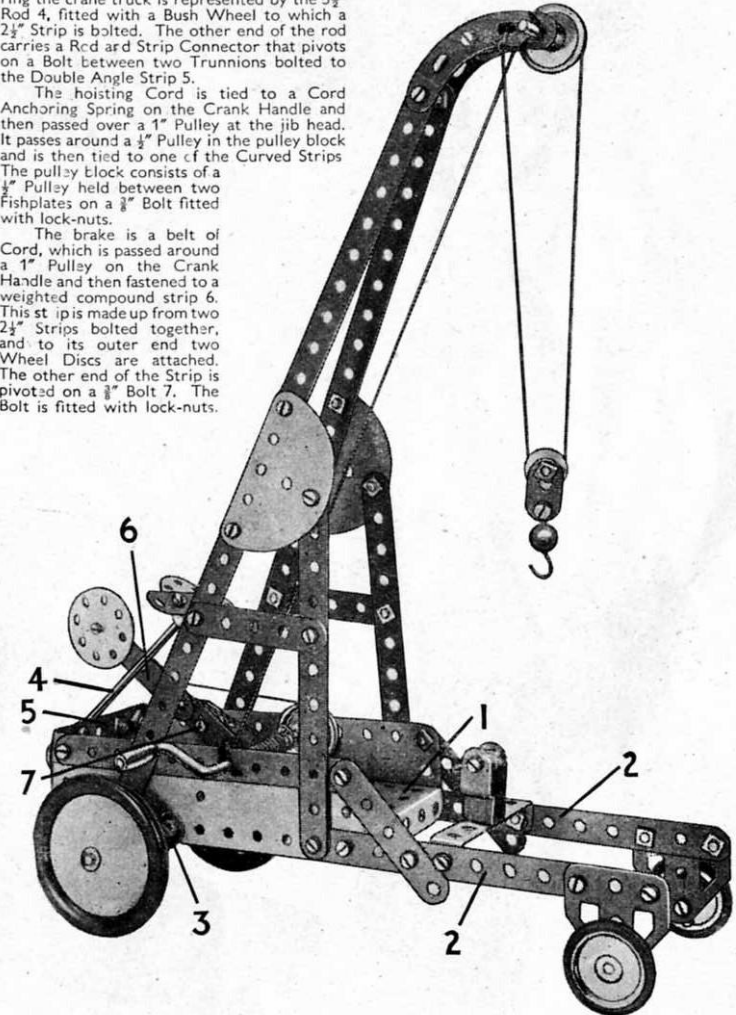
A Flanged Plate 1 is extended on each side by $5\frac{1}{2}$ " Strips 2. The Road Wheels are locked on a $3\frac{1}{2}$ " Rod supported in $2\frac{1}{2}$ " Curved Strips 3 on each side of the model. The 1" Pulleys rotate on $\frac{3}{8}$ " Bolts passed through Flat Trunnions.

The jib is built up from two $12\frac{1}{2}$ " Strips bolted to the sides of the Flanged Plate and extended at their upper ends by Curved Strips. It is held rigid by $5\frac{1}{2}$ " Strips fixed to the Flanged Plate and also to Semi-Circular Plates fastened to the $12\frac{1}{2}$ " Strips.

The handle used for hauling and manoeuvring the crane truck is represented by the $3\frac{1}{2}$ " Rod 4, fitted with a Bush Wheel to which a $2\frac{1}{2}$ " Strip is bolted. The other end of the rod carries a Red and Strip Connector that pivots on a Bolt between two Trunnions bolted to the Double Angle Strip 5.

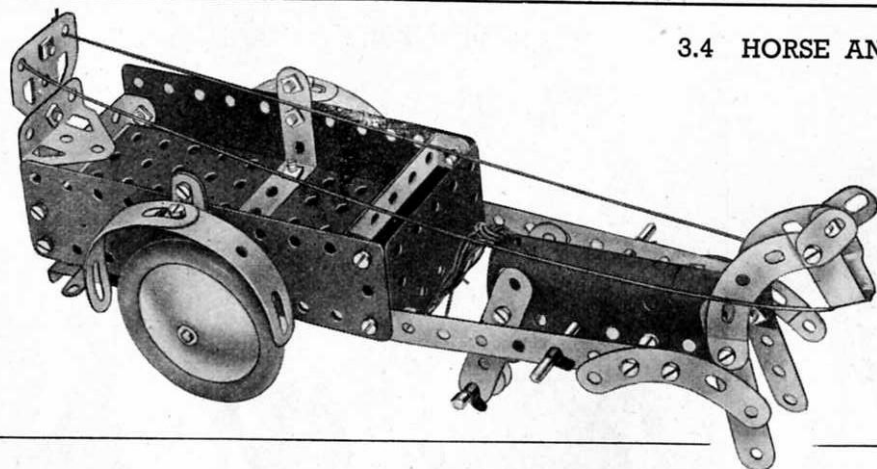
The hoisting Cord is tied to a Cord Anchoring Spring on the Crank Handle and then passed over a 1" Pulley at the jib head. It passes around a $\frac{1}{2}$ " Pulley in the pulley block and is then tied to one of the Curved Strips. The pulley block consists of a $\frac{1}{2}$ " Pulley held between two Fishplates on a $\frac{3}{8}$ " Bolt fitted with lock-nuts.

The brake is a belt of Cord, which is passed around a 1" Pulley on the Crank Handle and then fastened to a weighted compound strip 6. This strip is made up from two $2\frac{1}{2}$ " Strips bolted together, and to its outer end two Wheel Discs are attached. The other end of the Strip is pivoted on a $\frac{3}{8}$ " Bolt 7. The Bolt is fitted with lock-nuts.



These Models can be built with MECCANO No. 3 Outfit (or No. 2 and No. 2a Outfits)

3.4 HORSE AND CART



The model is driven by a *Magic* Motor fastened underneath the $5\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate that forms the bottom of the cart. The drive is taken by a Driving Band from the pulley of the Motor to a $\frac{1}{2}$ " fast Pulley on the back axle. A $\frac{1}{2}$ " loose Pulley is fitted on a 2" Rod journaled in the bottom holes of the Strips forming the hind-legs of the horse, so that the model will travel smoothly along the ground.

Note: The Motor used in this model is not included in the Outfit.

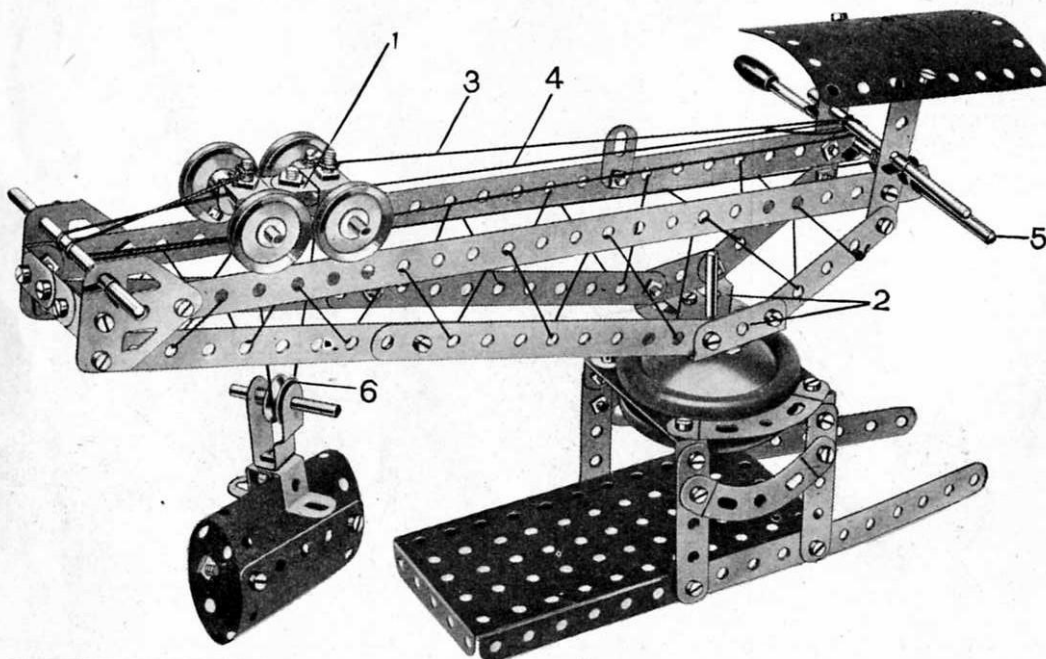
3.5 BLOCK-SETTING CRANE

The travelling bogie 1 consists of two Fishplates bolted together by their elongated holes, and at each end of it Double Brackets are fastened by $\frac{3}{8}$ " Bolts. Two 2" Rods are pushed through the Double Brackets and carry 1" fast Pulleys spaced so that their grooves fit on the two $12\frac{1}{2}$ " Strips that form the top of the jib. The Trunnions 2 at the base of the jib are secured to a Bush Wheel mounted on a Rod held in the bosses of two Road Wheels.

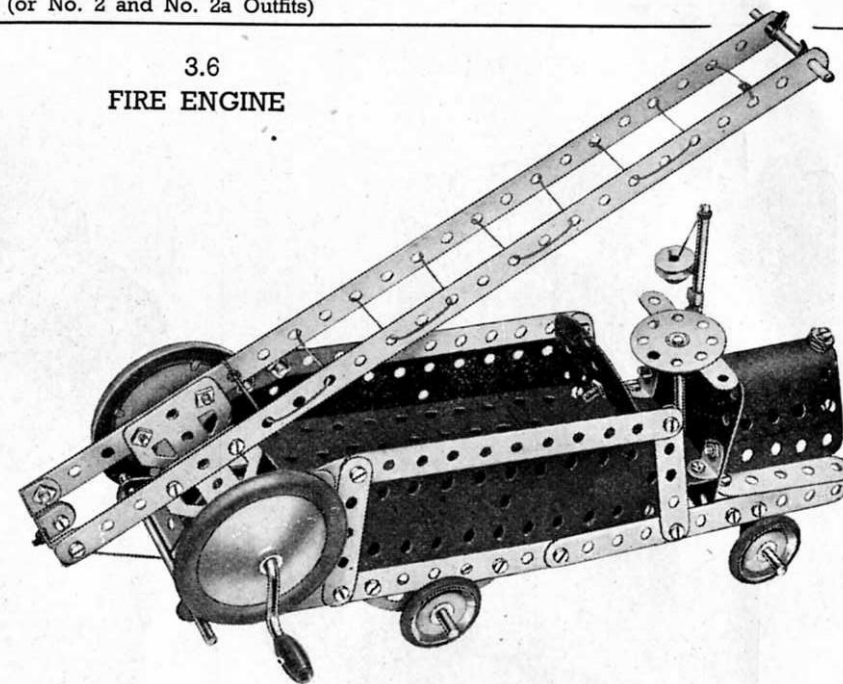
The Road Wheels are placed one above and one below the $2\frac{1}{2} \times 1\frac{1}{2}$ " Flexible Plates that form the top of the tower.

Cord 3 is first fastened to the $\frac{3}{8}$ " Bolt at the rear end of the travelling bogie, and then wound three times around the Crank Handle. It is then led around the Rod journaled in the Flat Trunnions at the front end of the jib and brought back and tied to another $\frac{3}{8}$ " Bolt at the front of the bogie.

Cord 4 is first fastened to Rod 5, which is passed through the end holes of the $12\frac{1}{2}$ " Strips, and then over the rear axle of the bogie. It is then passed around the $\frac{1}{2}$ " Pulley 6, led over the front axle of the bogie, around the Rod at the front end of the jib, and finally tied to the bogie. The $\frac{1}{2}$ " Loose Pulley 6 and its Rod are held in the Stepped Bent Strip by a Cord Anchoring Spring.



3.6 FIRE ENGINE



Two Flat Trunnions are bolted to the bottom of the ladder, and the shaft of the Crank Handle shown in Fig. 3.6a passes through the holes at their narrow ends. The bonnet, which is formed from a U-Section Curved Plate and two $2\frac{1}{2} \times 1\frac{1}{2}$ " Flexible Plates, is fastened to the frame by Reversed Angle Brackets. These latter also support the $2\frac{1}{2}$ " Strips at the sides of the bonnet.

The $3\frac{1}{2}$ " Rod representing the steering column passes through the free hole of a Fishplate bolted to the dashboard, then through a hole in the Flexible Plate at the bottom of the cab. It is fastened in position by a Cord Anchoring Spring.

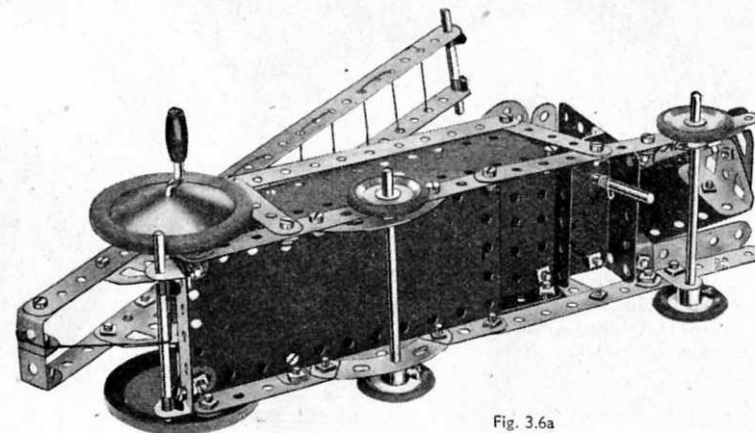


Fig. 3.6a

3.7 SIMPLE HAND LOOM

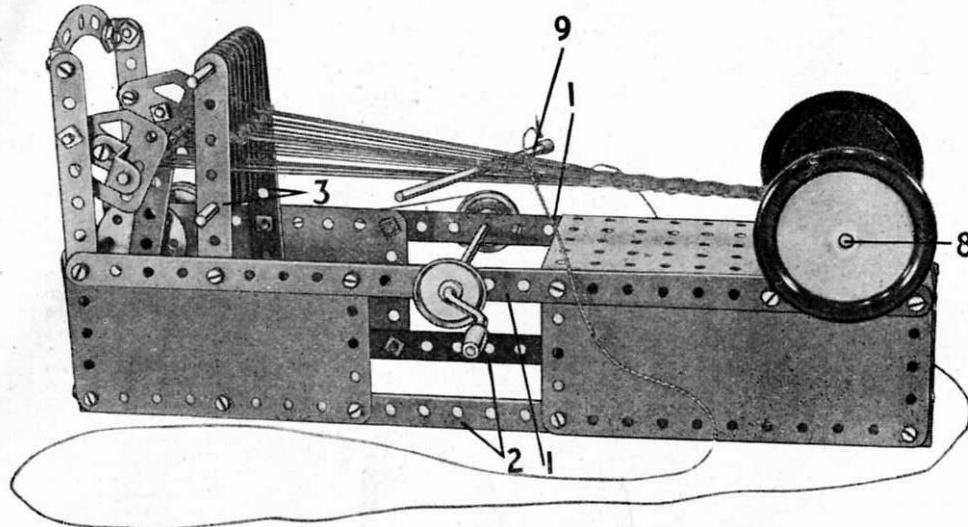


Fig. 3.7a

This interesting model is designed to demonstrate the principles of hand weaving. The base is formed by two 12 1/2 inch strips (1) bolted to a flanged plate at one end and joined by a 2 1/2 inch x 1/2 inch double angle strip at the other. Two 5 1/2 inch x 2 1/2 inch and two 4 1/2 inch x 2 1/2 inch flexible plates are bolted to the strips and joined at their lower edges by the 5 1/2 inch strips (2).

The 5 1/2 inch strips (3) form a support for the head frame, which consists of eight 2 1/2 inch strips held by two 3 1/2 inch rods. The strips are separated by spring clips and washers as shown, these parts being placed between the strips on the upper rod.

The warp separating movement is operated from a crank handle. A 1 inch pulley on this is connected by a belt of cord to a similar pulley (4), which is locked on a 2 inch rod that carries also the bush wheel (5). A 2 1/2 inch strip lock-nutted to the bush wheel links it with the rod (6). This rod is mounted in two flat trunnions, each fitted with a reversed angle bracket. The trunnions are free to turn on the shanks of 3/8 inch bolts fastened in the strips (7).

A 4 inch rod (8) fitted with two road wheels passes through two semi-circular plates bolted to the sides of the flanged plates.

A length of cord taken from each of the 2 1/2 inch strips forming the heads is tied to the rod (8). A second set of similar cords is taken from the rod (8). Each of these cords passes between the heads and is fastened to rod (6).

To operate the model the two sets of warp threads are separated by turning the crank handle slightly. A length of cord is then passed between the layers by means of the 3 1/2 inch rod (9). The crank handle is then again turned slightly, thus changing the positions of the warp layers, and the rod (9) is again passed through.

Cord is used in the illustrations to show the positions of the threads more clearly, but in actual operation it is better to use wool as this will give a closer and finer texture to the woven material.

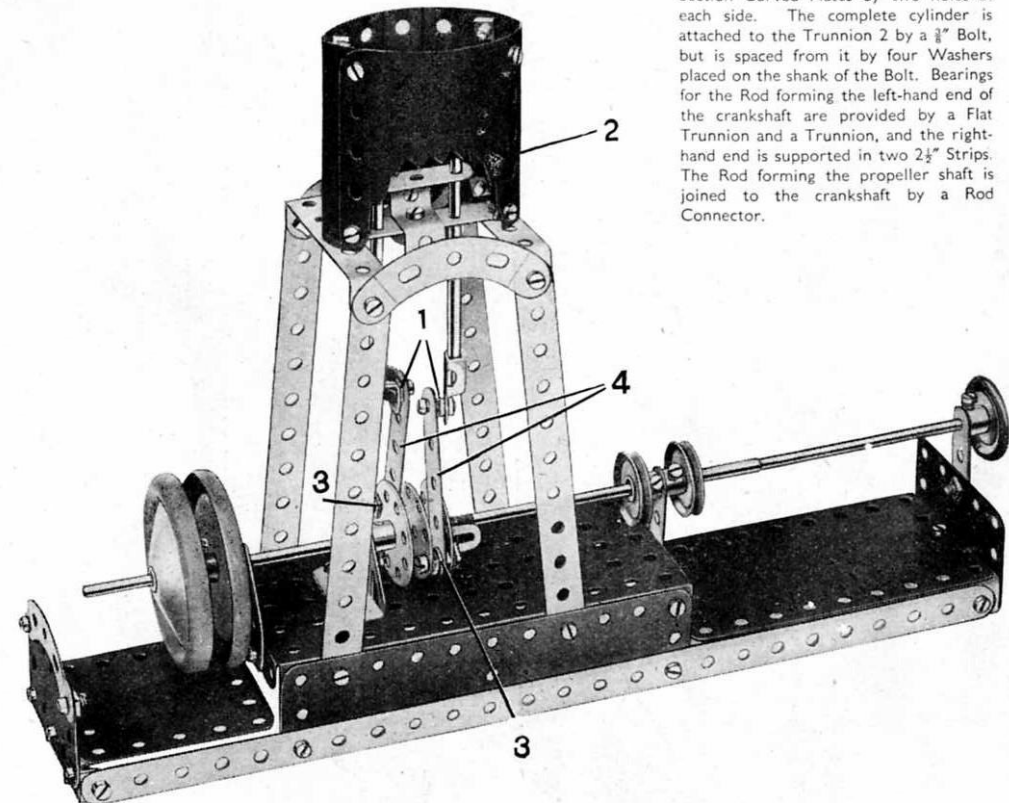
3.8 MARINE ENGINE

Bolts 1 are lock-nutted. The Bolts 3 are 3/8 inch long and are lock-nutted twice as shown. The 2 1/2 inch strips 4 must be quite free to move when the crankshaft is rotated.

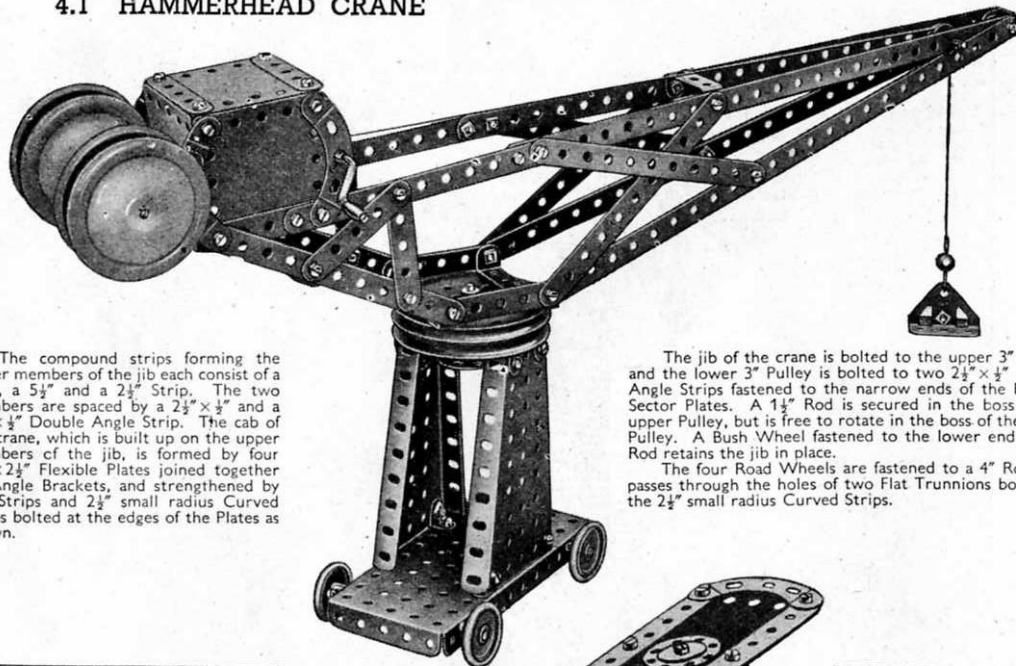
The piston rod is held by two spring clips, one at each side of the angle bracket pivotally fastened by one of the bolts 1. Inside the cylinder the rods slide through holes in a 2 1/2 inch strip and a trunnion 2. In order to show the construction clearly, part of the cylinder has been cut away in the illustration.

The rod carrying two 1 inch pulleys passes through the centre hole in the outer wheel disc. A 1/2 inch x 1/2 inch angle bracket is bolted to the disc in such a position that when the disc is turned the angle bracket engages with a spring clip on the rod. It is important that all nuts and bolts are made quite secure with the spanner and screwdriver.

The cylinder consists of two U-section curved plates, and two 1 1/2 inch radius curved plates, the latter overlapping the U-section curved plates by two holes at each side. The complete cylinder is attached to the trunnion 2 by a 3/8 inch bolt, but is spaced from it by four washers placed on the shank of the bolt. Bearings for the rod forming the left-hand end of the crankshaft are provided by a flat trunnion and a trunnion, and the right-hand end is supported in two 2 1/2 inch strips. The rod forming the propeller shaft is joined to the crankshaft by a rod connector.



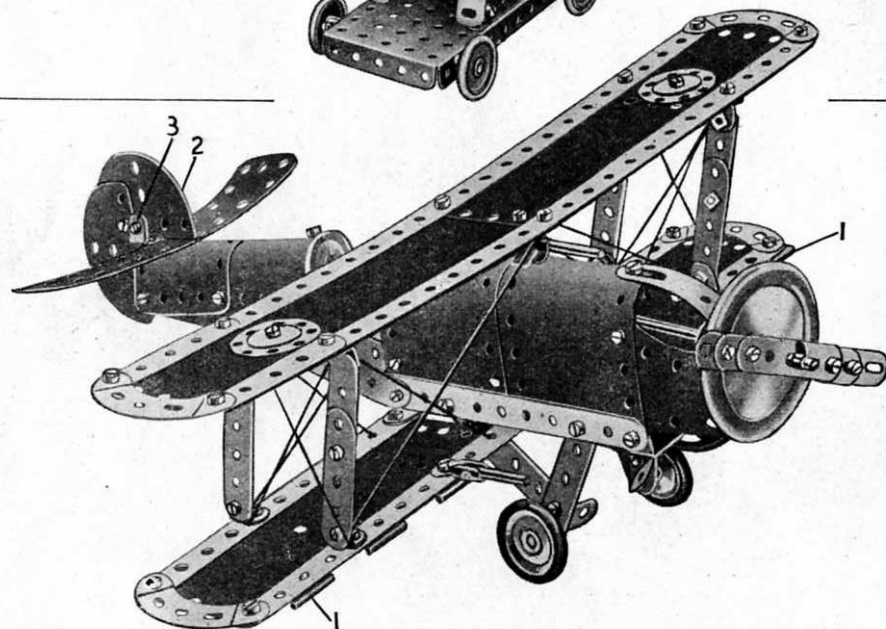
4.1 HAMMERHEAD CRANE



The compound strips forming the upper members of the jib each consist of a $12\frac{1}{2}"$, a $5\frac{1}{2}"$ and a $2\frac{1}{2}"$ Strip. The two members are spaced by a $2\frac{1}{2}" \times \frac{1}{2}"$ and a $1\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strip. The cab of the crane, which is built up on the upper members of the jib, is formed by four $2\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates joined together by Angle Brackets, and strengthened by $2\frac{1}{2}"$ Strips and $2\frac{1}{2}"$ small radius Curved Strips bolted at the edges of the Plates as shown.

The jib of the crane is bolted to the upper 3" Pulley, and the lower 3" Pulley is bolted to two $2\frac{1}{2}" \times \frac{1}{2}"$ 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.



4.2 FIGHTING BIPLANE

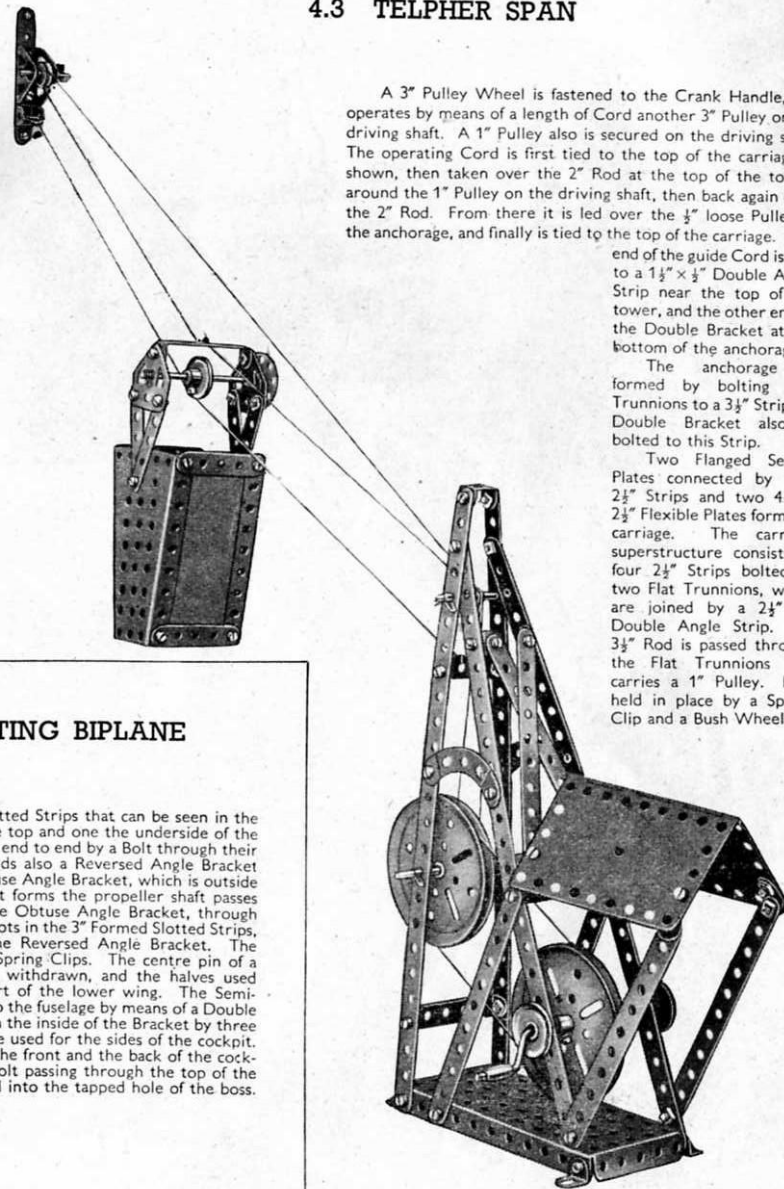
The two 3" Formed Slotted Strips that can be seen in the illustration, one forming the top and one the underside of the nose of the plane, are joined end to end by a Bolt through their slotted holes. The Bolt holds also a Reversed Angle Bracket inside the nose, and an Obtuse Angle Bracket, which is outside 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 halves 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.

4.3 TELPHER SPAN

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 the other end to the Double Bracket at the bottom of the anchorage.

The anchorage is formed by bolting two Trunnions to a $3\frac{1}{2}"$ Strip. A Double Bracket also is bolted to this Strip.

Two Flanged Sector Plates connected by four $2\frac{1}{2}"$ Strips and two $4\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates form the carriage. The carriage superstructure consists of four $2\frac{1}{2}"$ Strips bolted to two Flat Trunnions, which are joined by a $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strip. A $3\frac{1}{2}"$ Rod is passed through the Flat Trunnions and carries a 1" Pulley. It is held in place by a Spring Clip and a Bush Wheel.



4.4 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 (Fig. 4.4a) 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 supported in the Strip 4 (Fig. 4.4b) that forms the top of the frame. The other end of the Rod is held between the two Bolts that fasten the Wheel Discs to the frame.

The petrol tank is represented by a $5\frac{1}{2}" \times 1\frac{1}{2}"$ Flexible Plate bent to U-shape and attached to a $1\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strip by Angle Brackets. A $2\frac{1}{2}"$ Strip is attached to the Double Angle Strip and the unit is then bolted to the Strip 4 (Fig. 4.4b). The saddle, which is a Trunnion, is also attached to this Strip by a $\frac{1}{2}"$ Reversed Angle Bracket.

The Strip 4 carries a Double Bracket at its front end, and to this are bolted two $2\frac{1}{2}"$ Strips. To these Strips are attached two Wheel Discs, and these are joined by a double bracket built up from two Angle Brackets (see Fig. 4.4a).

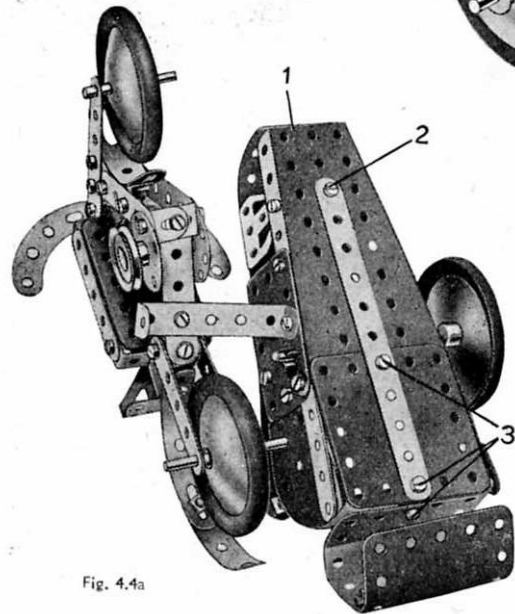


Fig. 4.4a

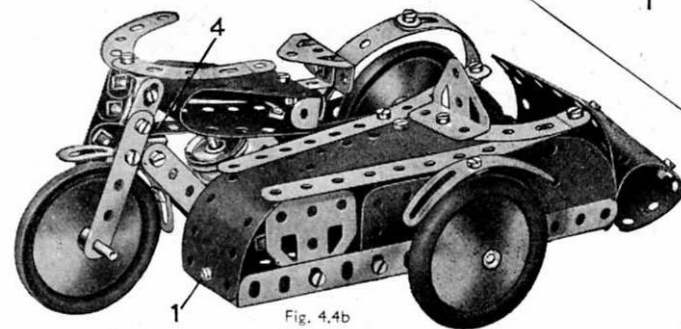
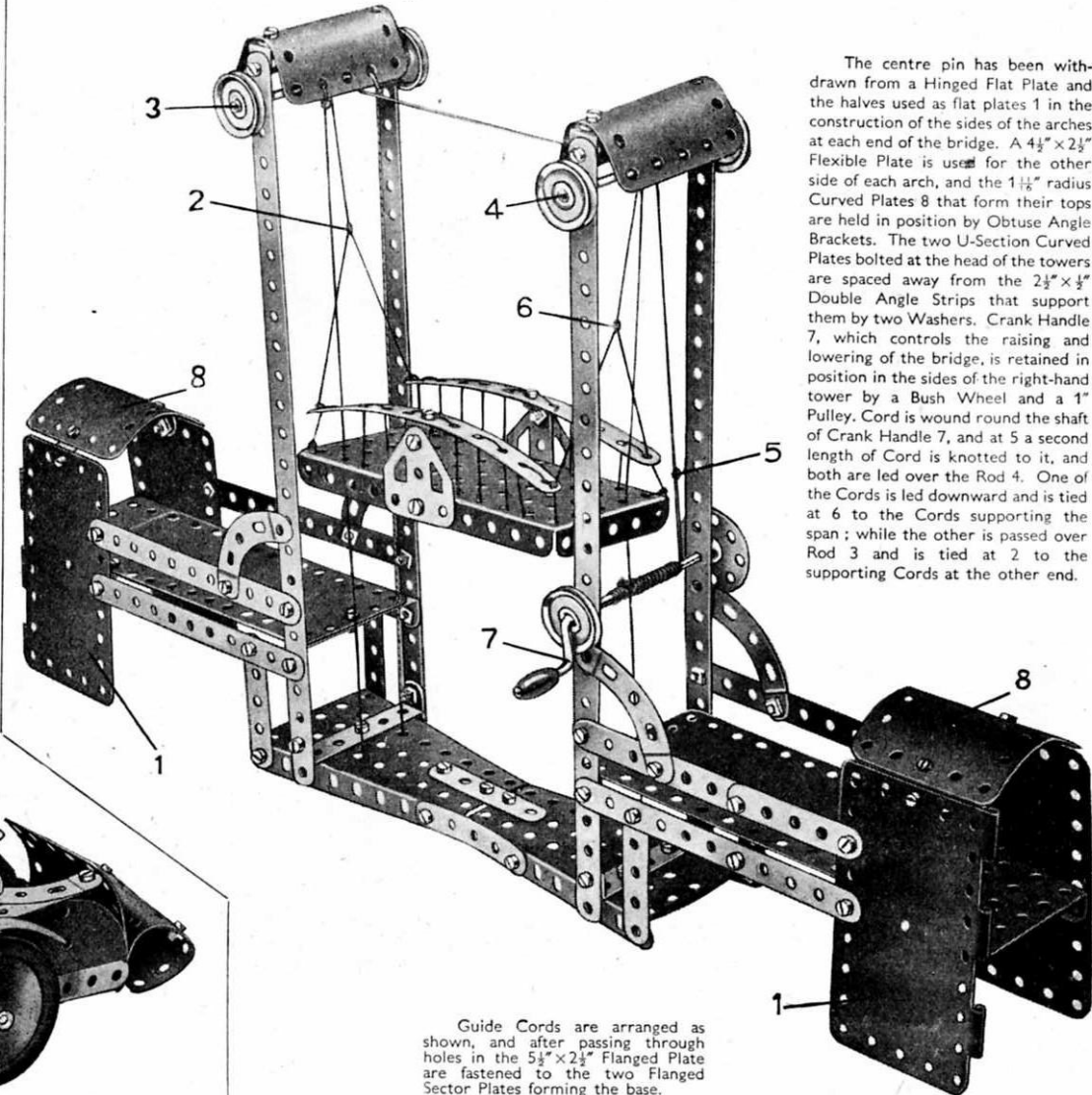


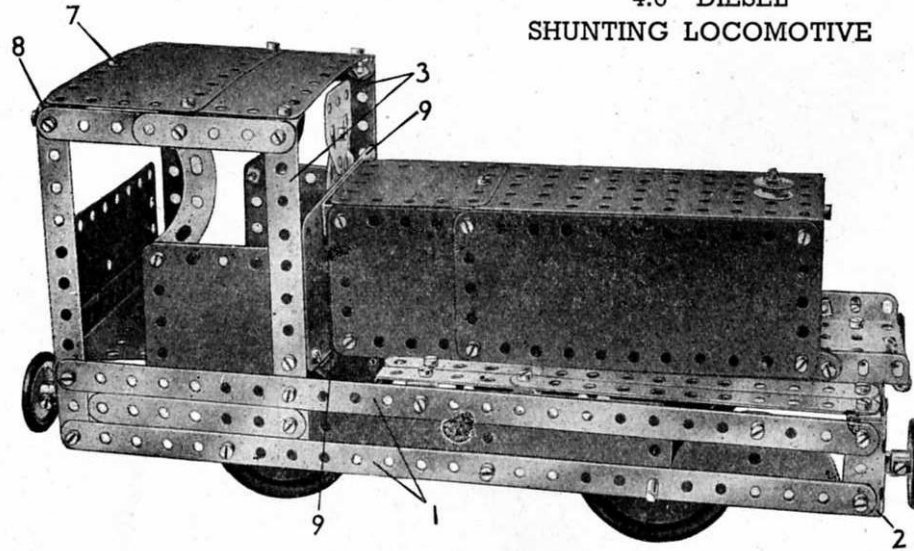
Fig. 4.4b

4.5 LIFTING BRIDGE



Guide Cords are arranged as shown, 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.

4.6 DIESEL SHUNTING LOCOMOTIVE



Note: The Motor used in this model is not included in the Outfit.

The main frames of the locomotive consist of 12½" Strips 1, bolted to a 5½" x 1½" Flexible Plate, a Semi-Circular Plate and the Trunnions 2. The back of the cab is formed by half a Hinged Flat Plate attached to the frames by Angle Brackets. The other half of the Hinged Flat Plate is used for the front of the cab, and is fixed to the 5½" Strips 3 by Angle Brackets.

The main frames are connected at the front by a 2½" x ½" Double Angle Strip 4 (Fig. 4.6a), a 1½" x ½" Double Angle Strip 5 and a 2½" x 1½" Flanged Plate 6. Two 2½" x 1½" Flexible Plates bolted together are attached to the Trunnions 2 by ½" Bolts. A 1" Pulley is locked on the shank of each of these Bolts to represent the buffers.

The sides of the cab are formed by 2½" x 2½" Flexible Plates attached to the Strips 3 and the main frames.

The roof is made by overlapping two 4½" x 2½" Flexible Plates two holes. It is bolted to Angle Brackets attached to the Strips 3. A second Angle Bracket held by the Bolt 7 is bolted to a compound strip 8, consisting of two 2½" Strips fastened to the sides by Angle Brackets.

Each side of the engine housing consists of a 5½" x 2½" and a 2½" x 2½" Flexible Plate. These are attached to the Flanged Plate 6 by Fishplates and to the front of the cab by Double Angle Strips 9. The top is filled in by a 5½" x 2½" Flanged Plate and a 1½" radius Curved Plate. The radiator is formed by a second 1½" radius Curved Plate.

The running plate above the wheels consists of 5½" Strips bolted to the Double Angle Strips 4 and 5. The 5½" Strips are extended on one side by two 2½" Strips, and on the other by a 2½" Strip and a 2½" x ½" Double Angle Strip. These Strips are supported by the Double Angle Strips 10.

The leading axle consists of a 3½" and a 2" Rod joined by a Rod Connector and supported in the main frames. The rear axle is a 4" Rod free to turn in two Reversed Angle Brackets. The Magic Motor is bolted to one of the main frames and drives a 1" Pulley on the leading axle.

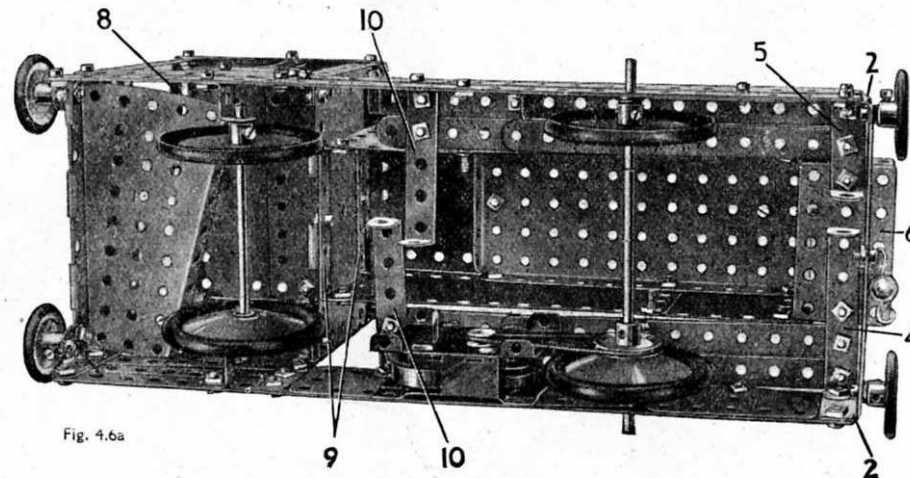
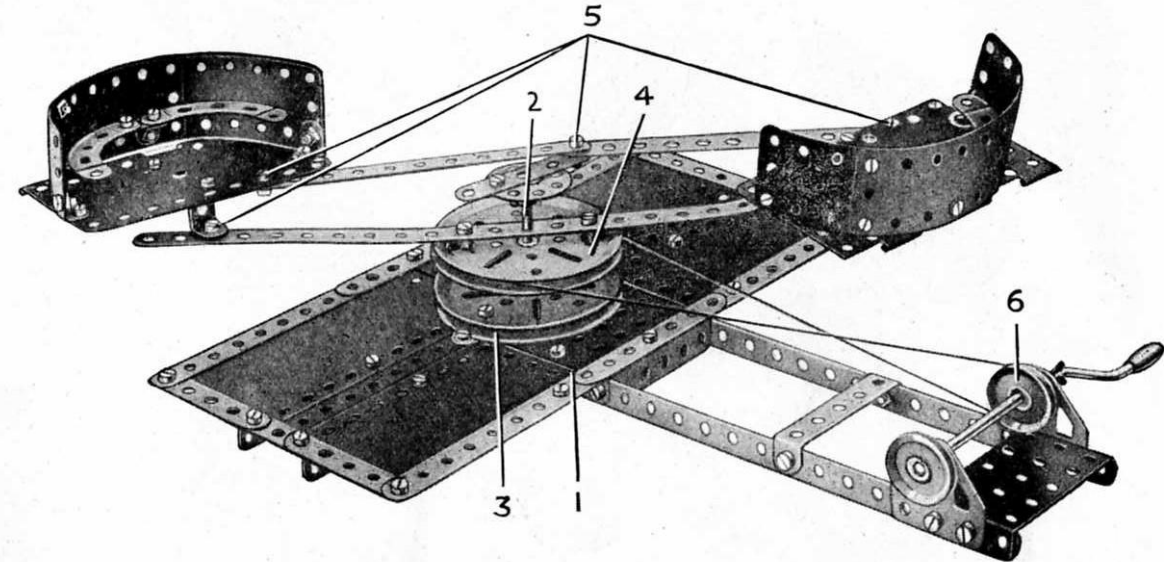


Fig. 4.6a

4.7 "WHIP" ROUNDABOUT



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

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

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

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

4.8 TANK LOCOMOTIVE

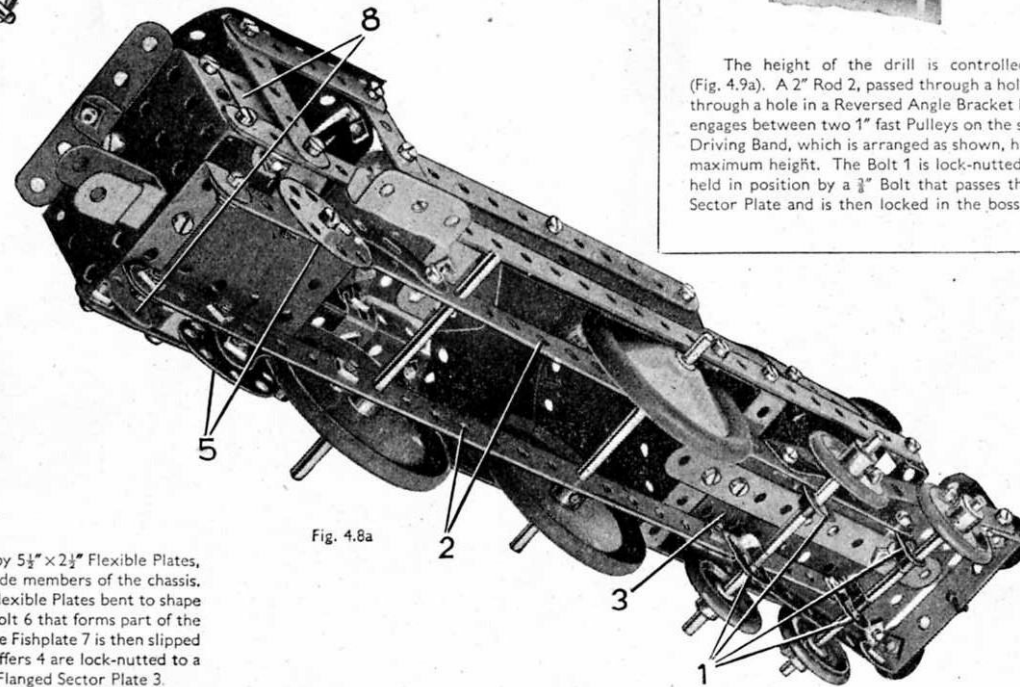
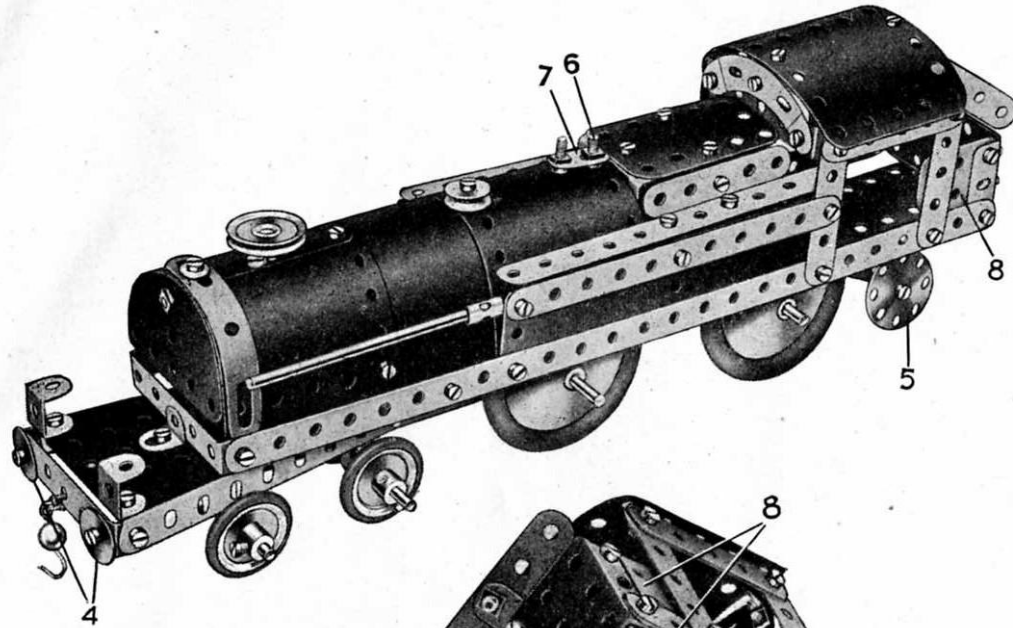


Fig. 4.8a

The construction of the model is commenced by building the chassis as shown in Fig. 4.8a. The Fishplates 1 must be bolted to the $12\frac{1}{2}$ " Strips 2 before the Flanged Sector Plate 3 is fitted. The Wheel Discs 5 rotate on $\frac{3}{8}$ " 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 $1\frac{1}{8}$ " 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 $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " 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 $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " 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 $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates bent to shape and bolted to the centre portion of the boiler. The $\frac{3}{8}$ " Bolt 6 that forms part of the safety valve is held in the top of the boiler by a nut, and the Fishplate 7 is then slipped over it and fastened in position by a further nut. The buffers 4 are lock-nutted to a $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip bolted to the flanges of the Flanged Sector Plate 3.

4.9 DRILLING MACHINE

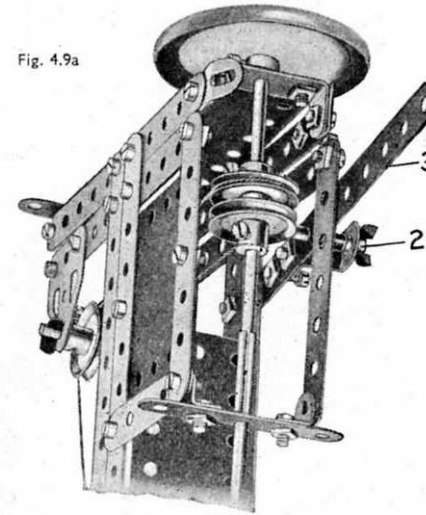
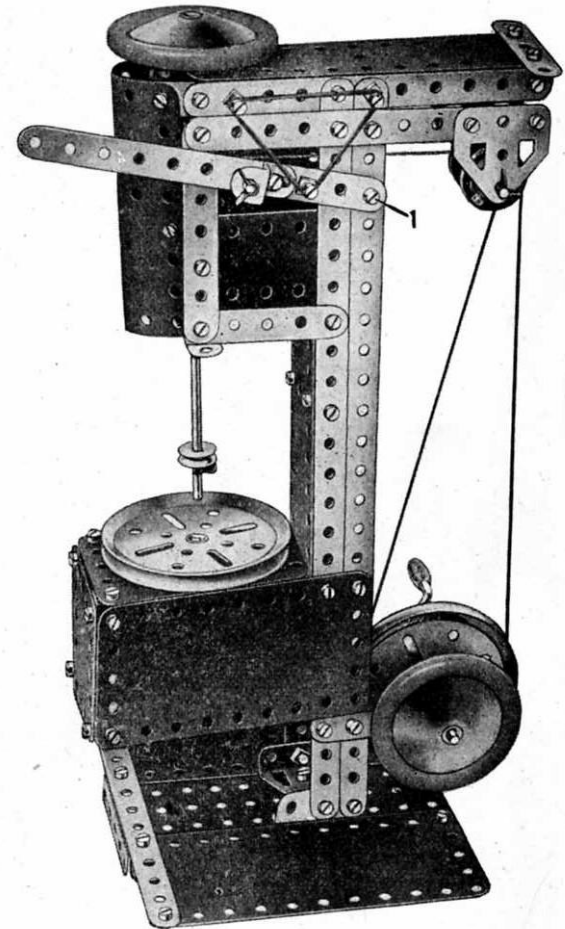


Fig. 4.9a

The height of the drill is controlled by the lever 3 (Fig. 4.9a). 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.



A Flanged Sector Plate that supports the drilling table is bolted to the $12\frac{1}{2}$ " Strips that form the main column of the machine. The sides of the table are filled in by two $4\frac{1}{2}$ " \times $2\frac{1}{2}$ " and one $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates joined by Angle Brackets. Two $2\frac{1}{2}$ " Strips bolted to the main column provide the bearings for the Crank Handle.

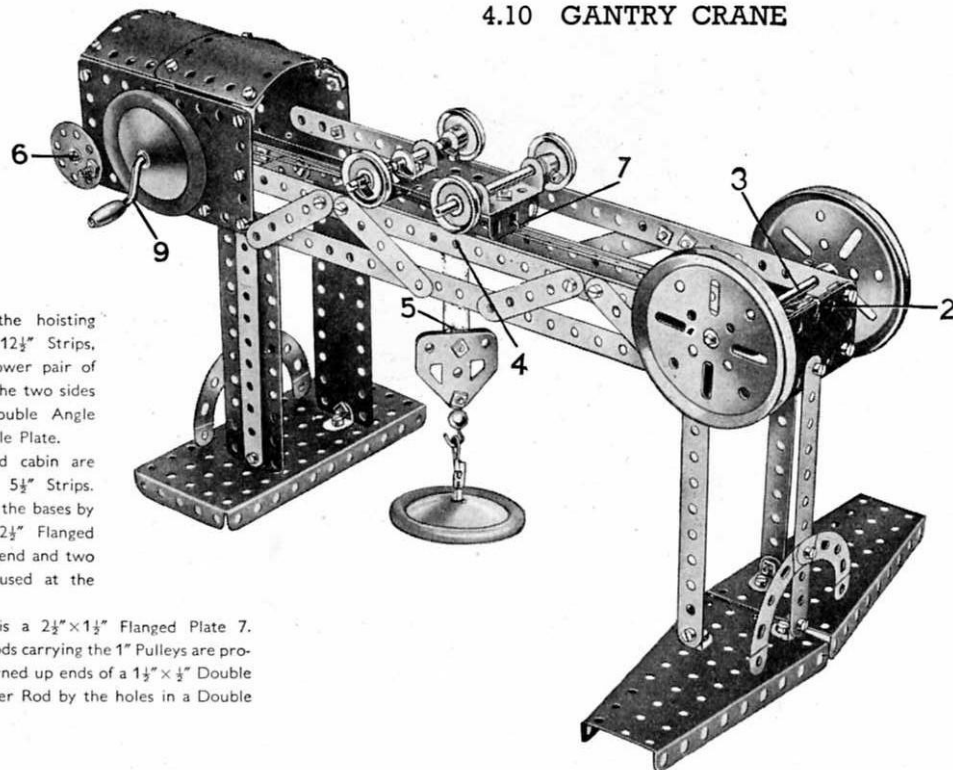
4.10 GANTRY CRANE

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 $1\frac{1}{2}"$ radius Curved Plates, is attached to the sides by means of Obtuse Angle Brackets at each corner as shown.

The rails on which the hoisting carriage travels are two $12\frac{1}{2}"$ Strips, which are braced to the lower pair of $12\frac{1}{2}"$ Strips by $2\frac{1}{2}"$ Strips. The two sides are spaced by $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips and a $2\frac{1}{2}" \times 1\frac{1}{2}"$ Flexible Plate.

The complete span and cabin are supported at each end by $5\frac{1}{2}"$ Strips. These Strips are attached to the bases by Angle Brackets. A $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate forms the base at one end and two Flanged Sector Plates are used at the other end.

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 $1"$ Pulleys 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

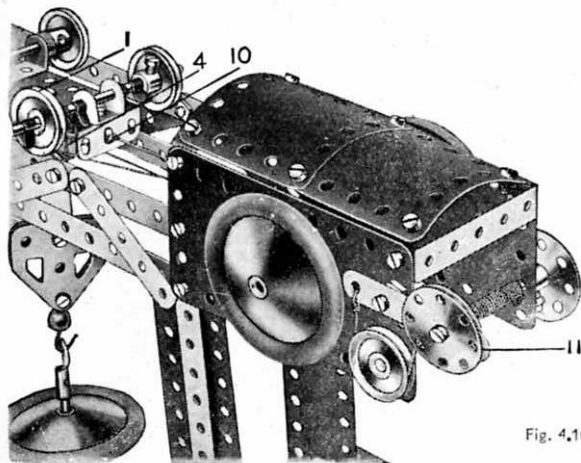


Bracket. The Bolt 1 (Fig. 4.10a) secures a Stepped Bent Strip 4 vertically to the underside of the Flanged Plate 7. A $1"$ Rod passes through the lower holes of the Stepped Bent Strip and is held in position by Spring Clips.

Two Flat Trunnions form the pulley block. They are fastened together at their wide ends by a $\frac{3}{8}"$ 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 (Fig. 4.10a). It is then passed round Rod 3, which carries the two $3"$ Pulleys, and is taken to the Crank Handle 9. The Cord is wound round the Crank Handle several times to enable it to grip the shaft, and finally is tied to the rear end of the carriage. The hoisting Cord is tied to Rod 6 fitted with a Bush Wheel, and wound round it several times. It is then taken over the $1"$ Rod held in the Stepped Bent Strip 4, round Pulley 5, back over the $1"$ Rod, and tied at 2-Strip 11 (Fig. 4.10a) is the lever of a band brake, the Cord of which passes around a $1"$ Pulley on Rod 6.

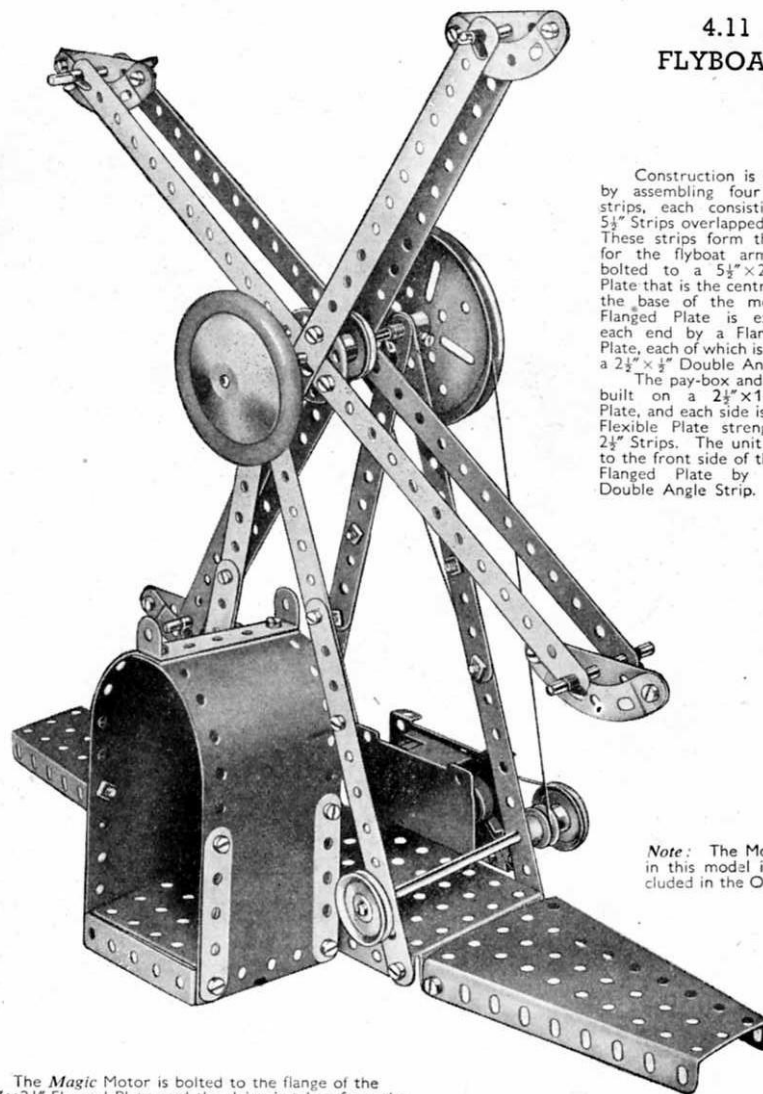
Fig. 4.10a



4.11 FLYBOATS

Construction is commenced by assembling four compound strips, each consisting of two $5\frac{1}{2}"$ Strips overlapped four holes. These strips form the supports for the flyboat arms and are bolted to a $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate that is the centre section of the base of the model. This Flanged Plate is extended at each end by a Flanged Sector Plate, each of which is attached by a $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strip.

The pay-box and entrance is built on a $2\frac{1}{2}" \times 1\frac{1}{2}"$ Flanged Plate, and each side is a $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plate strengthened by $2\frac{1}{2}"$ Strips. The unit is attached to the front side of the $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate by a $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strip.



Note: The Motor used in this model is not included in the Outfit.

The *Magic* Motor is bolted to the flange of the $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate, and the drive is taken from the pulley of the Motor to a $1"$ Pulley fastened on a Rod journaled in the 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.

4.12 TRACTION ENGINE

The boiler is built up from one $5\frac{1}{2}'' \times 2\frac{1}{2}''$ and two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates. The ashpan consists of two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates one at each side of the model connected by a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip. A Road Wheel which forms the boiler front, is held freely on a Rod by a Spring Clip.

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 (Fig. 4.12a) which pass through a connecting rod consisting of two Fishplates, are lock-nutted. A U-Section Curved Plate, bent so that its ends overlap one hole, is used for the chimney. The centre pin of a Hinged Flat Plate has been removed and the two parts used as flat plates 2 in the construction of the roof of the cab.

The $1\frac{1}{2}'' \times \frac{1}{2}''$ 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.

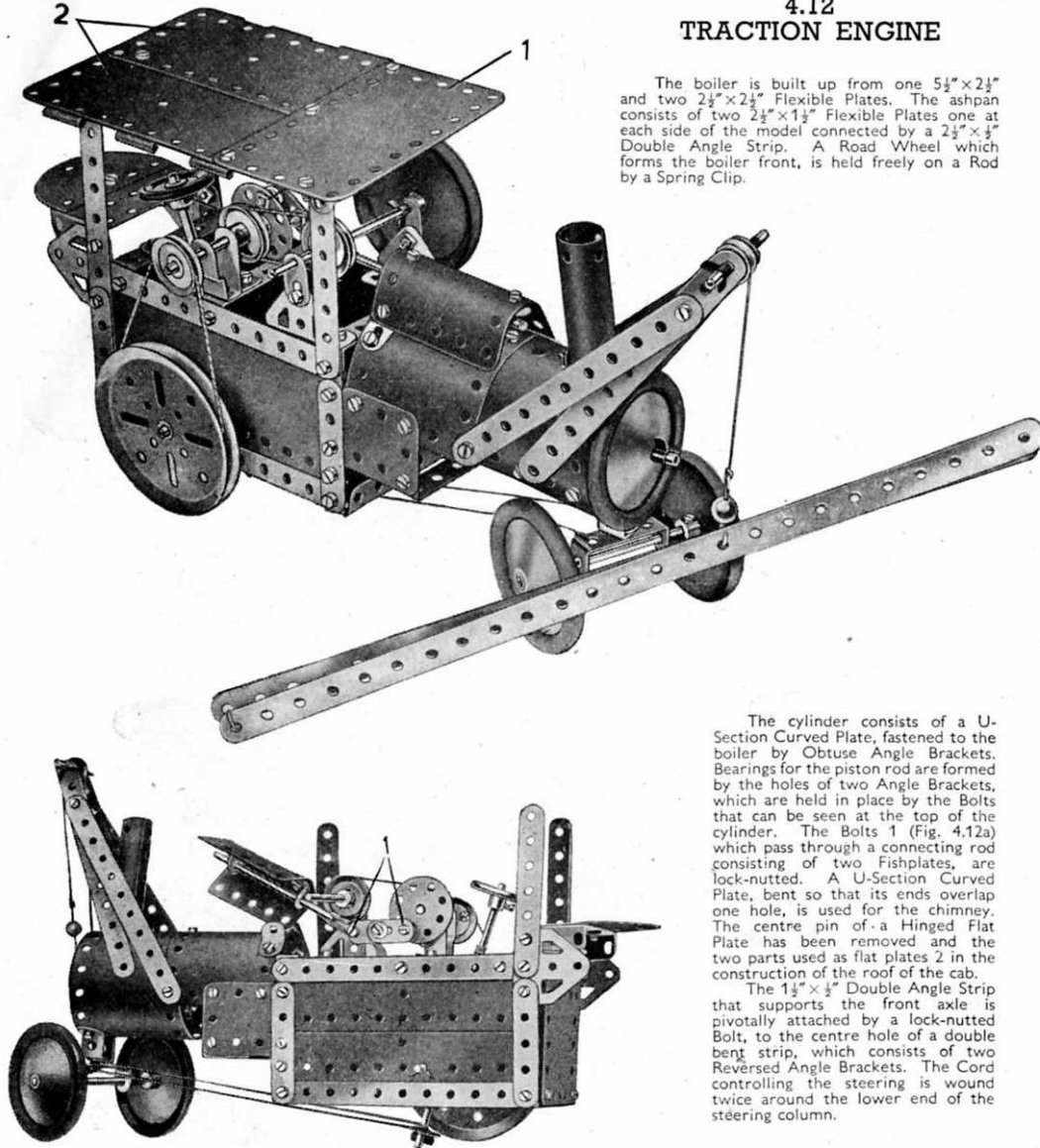


Fig. 4.12a

4.13 GIANT EXCAVATOR

The Cord 1 is fastened to a Crank Handle journaled in holes in the sides of the cab, and after passing round the $2\frac{1}{2}'' \times \frac{1}{2}''$ 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 5 and then wound round Rod 6. By turning the handle on the Bush Wheel 7 the bucket is raised or lowered.

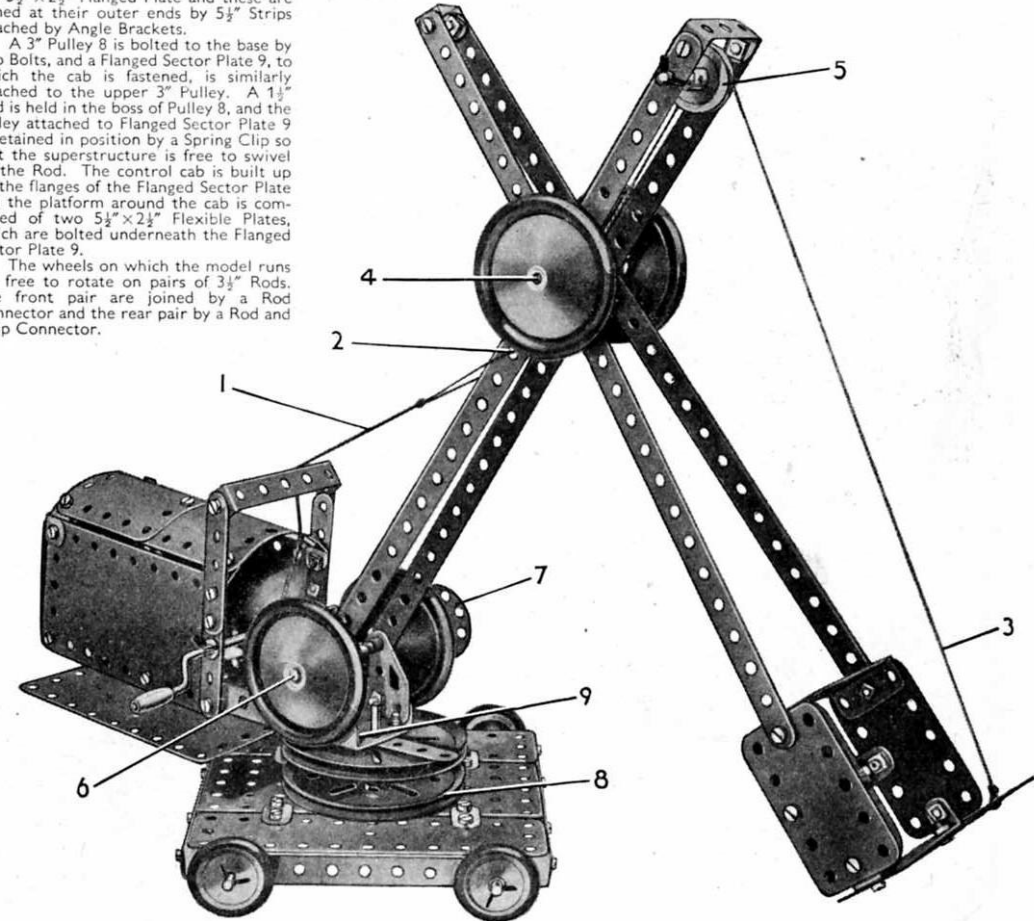
The bucket arm is pivoted on Rod 4, which passes through holes in the $12\frac{1}{2}''$ Strips forming the jib and the bucket arm. Road Wheels fastened at each end of Rod 4 retain it in position.

The bucket is assembled from two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ and two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates and one $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate. The $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate forming the bottom of the bucket is bolted to a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip.

The base is a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate extended at each side by a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate attached by two Fishplates. A $5\frac{1}{2}''$ Strip is bolted across each end of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate and these are joined at their outer ends by $5\frac{1}{2}''$ Strips attached by Angle Brackets.

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

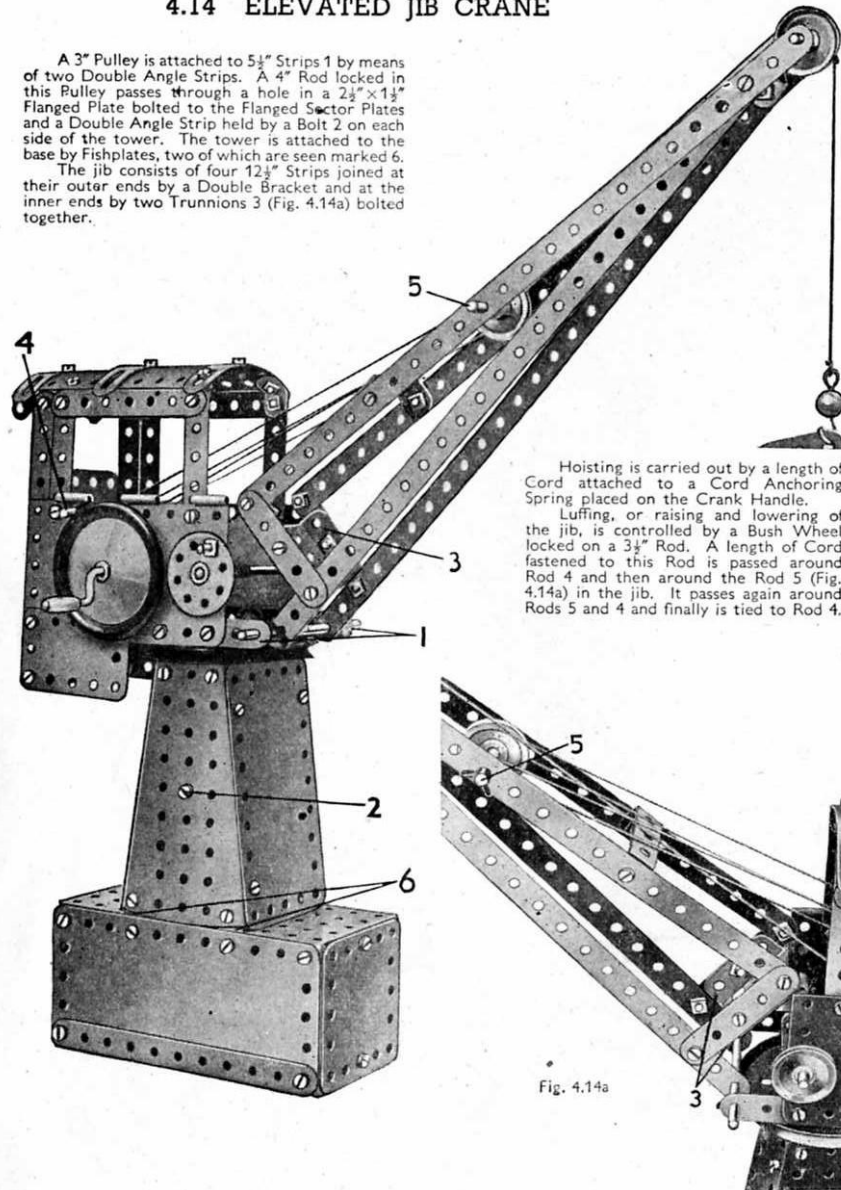
The wheels on which the model runs are free to rotate on pairs of $3\frac{1}{2}''$ Rods. The front pair are joined by a Rod Connector and the rear pair by a Rod and Strip Connector.



4.14 ELEVATED JIB CRANE

A 3" Pulley is attached to 5½" Strips 1 by means of two Double Angle Strips. A 4" Rod locked in this Pulley passes through a hole in a 2½"×1½" Flanged Plate bolted to the Flanged Sector Plates and a Double Angle Strip held by a Bolt 2 on each side of the tower. The tower is attached to the base by Fishplates, two of which are seen marked 6.

The jib consists of four 12½" Strips joined at their outer ends by a Double Bracket and at the inner ends by two Trunnions 3 (Fig. 4.14a) bolted together.

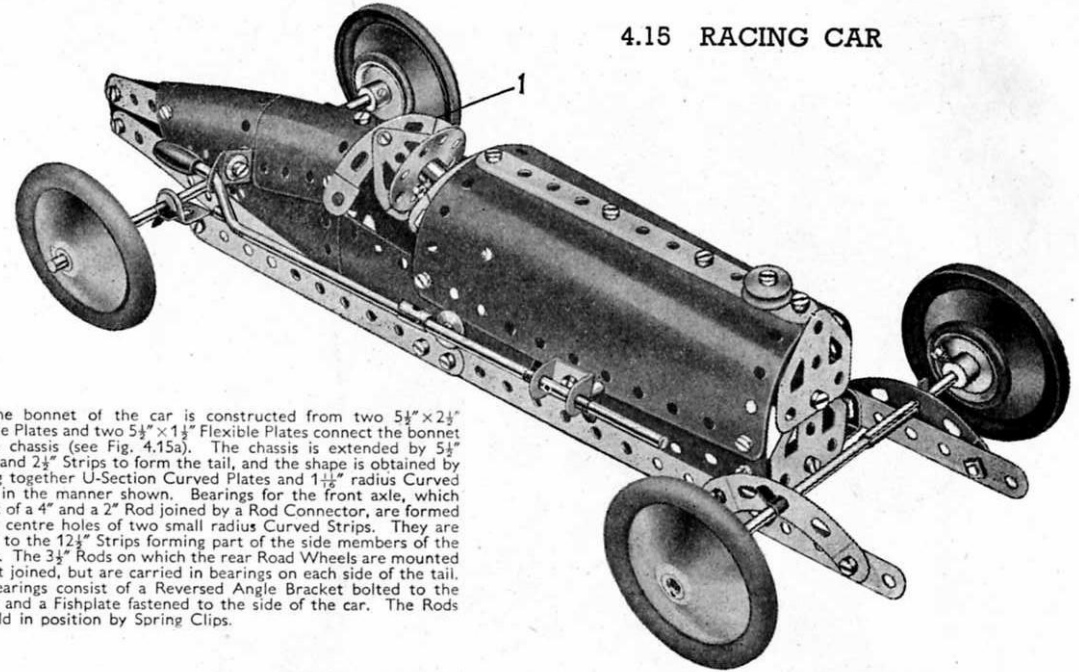


Hoisting is carried out by a length of Cord attached to a Cord Anchoring Spring placed on the Crank Handle.

Luffing, or raising and lowering of the jib, is controlled by a Bush Wheel locked on a 3½" Rod. A length of Cord fastened to this Rod is passed around Rod 4 and then around the Rod 5 (Fig. 4.14a) in the jib. It passes again around Rods 5 and 4 and finally is tied to Rod 4.

Fig. 4.14a

4.15 RACING CAR



The bonnet of the car is constructed from two 5½"×2½" Flexible Plates and two 5½"×1½" Flexible Plates connect the bonnet to the chassis (see Fig. 4.15a). The chassis is extended by 5½" Strips and 2½" Strips to form the tail, and the shape is obtained by bolting together U-Section Curved Plates and 1½" radius Curved Plates in the manner shown. Bearings for the front axle, which consist 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 12½" Strips forming part of the side members of the chassis. The 3½" Rods on which the rear Road Wheels are mounted are not joined, but are carried in bearings on each side of the tail. The bearings consist of a Reversed Angle Bracket bolted to the chassis and a Fishplate fastened to the side of the car. The Rods are held in position by Spring Clips.

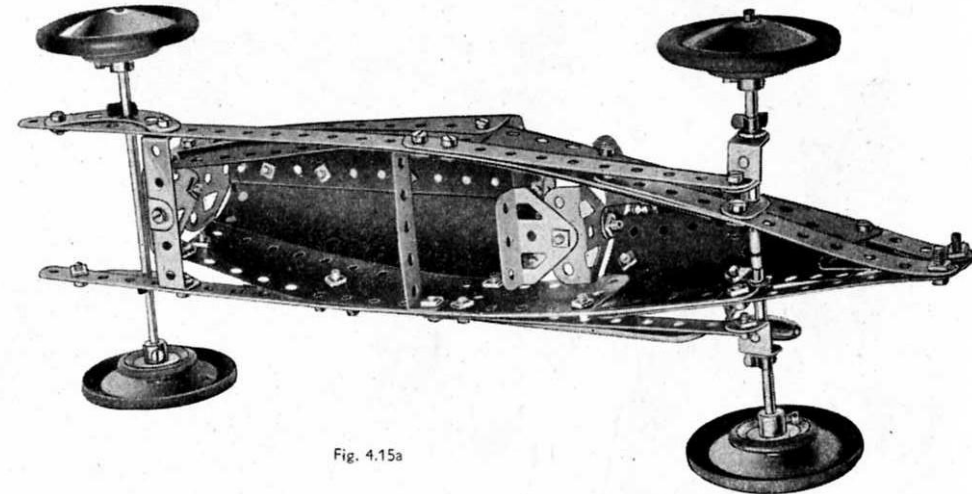
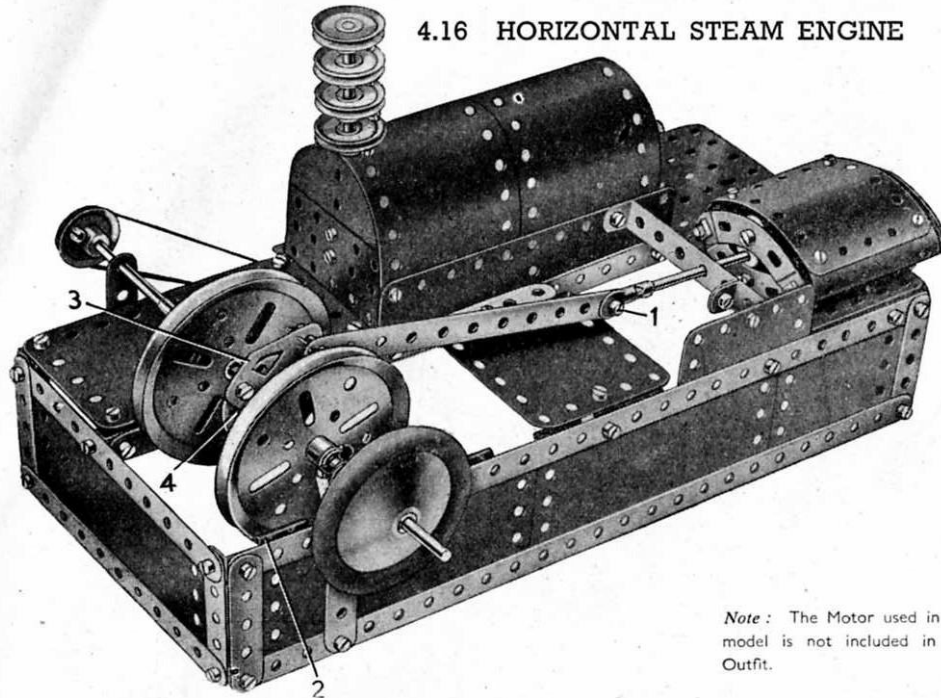


Fig. 4.15a

4.16 HORIZONTAL STEAM ENGINE



Note: The Motor used in this model is not included in this Outfit.

The Bolt 1 is lock-nutted. The centre pin is withdrawn from a Hinged Flat Plate and the halves used as flat plates at 2. The Flat Trunnion 3 is bolted to Bush Wheel 4 and forms one web of the crank. The Bush Wheel is fastened to a 2" Rod, which carries also a 3" Pulley, and a Rod Connector joins this Rod to a 3½" Rod that transmits the drive from the Magic Motor. The other web of the crank is made by bolting a Wheel Disc 5 (Fig. 4.16a) to a Flat Trunnion 6, one of the Bolts holding also a Reversed Angle Bracket 7. A Spring Clip 8 is fixed in the 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 bolted together as shown, and the complete unit is fastened in position to the 5½" x 2½" Flanged Plate that forms the base.

The boiler consists of two 5½" x 2½" Flexible Plates, bolted to 5½" x 1½" Flexible Plates, and its ends are closed by Semi-Circular Plates and a 2½" x 1½" Flexible Plate and a 2½" x 1½" Flanged Plate.

The chimney is a 4" Rod fitted with 1" Pulleys, and is held in place by a Cord Anchoring Spring. Fig. 4.16a shows the arrangement for driving the model with a Magic Motor.

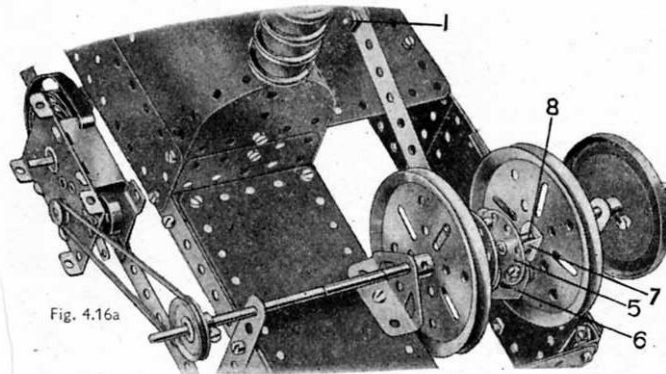
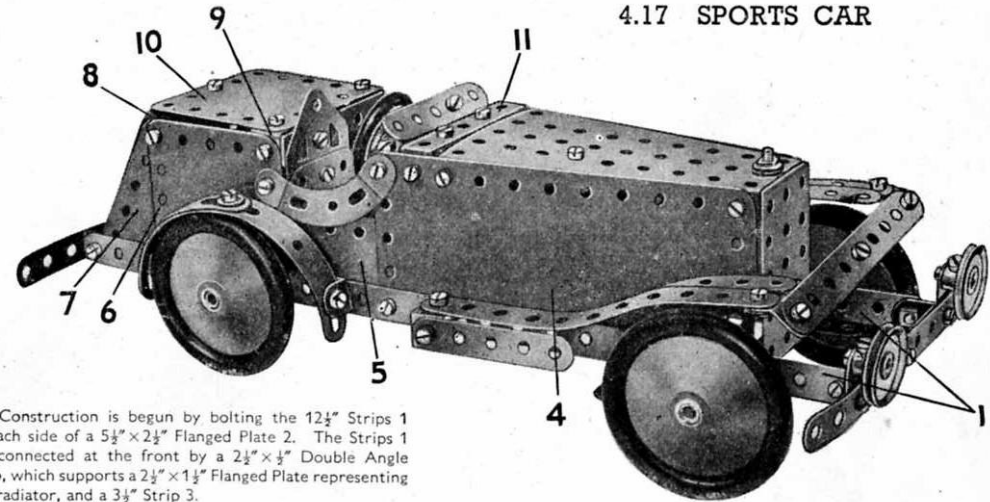


Fig. 4.16a

4.17 SPORTS CAR



Construction is begun by bolting the 12½" Strips 1 to each side of a 5½" x 2½" Flanged Plate 2. The Strips 1 are connected at the front by a 2½" x ½" Double Angle Strip, which supports a 2½" x 1½" Flanged Plate representing the radiator, and a 3½" Strip 3.

Each side of the model consists of a 5½" x 2½" Flexible Plate 4, a 5½" x 1½" Flexible Plate 5 and a 2½" x 2½" Flexible Plate 6. A Semi-Circular Plate 7 is bolted in position at a slight angle. The sides are joined at the rear by two 2½" x ½" Double Angle Strips 8 and 9. A 2½" x 2½" Flexible Plate is bolted to the Double Angle Strip 8 and a similar Plate 10 is attached by two Angle Brackets and an Obtuse Angle Bracket.

The top of the bonnet is represented by a Flanged Sector Plate extended by a 2½" x ½" Double Angle Strip 11. The windshield consists of a 2½" Strip, and is attached to an Obtuse Angle Bracket bolted to the Double Angle Strip 11.

The steering mechanism is built up by passing the ⅜" Bolts 12 (Fig. 4.17a) through the end hole of the Strip 3. The Angle Brackets 13 and 2½" Strips 14 are then held tightly on the Bolts by two nuts, leaving the Bolts free to turn in the Strip 3. The Strips 14 are connected by a lock-nutted 3½" Strip 15. This Strip is fitted with an Angle Bracket held by the Bolt 16, and a ⅜" Bolt 17.

The steering column consists of a 4" Rod journaled in an Angle Bracket 18 and the end hole of a 1½" x ½" Double Angle Strip bolted to the top of the bonnet. The steering column is fitted with a Rod and Strip Connector and a 2½" Strip 19.

The end of this Strip engages between the Angle Bracket and the Bolt 17 on the Strip 15. The Road Wheels are locked on ⅜" Bolts passed through the Angle Brackets 13.

Each of the front mudguards is formed by two 5½" Strips. These are bent slightly and attached to Double Brackets bolted to the chassis. The rear mudguards consist of Formed Slotted Strips, and are fastened to the chassis by Angle Brackets. The 5½" Strips representing the front and rear bumpers are bolted to 2½" x ½" Double Angle Strips.

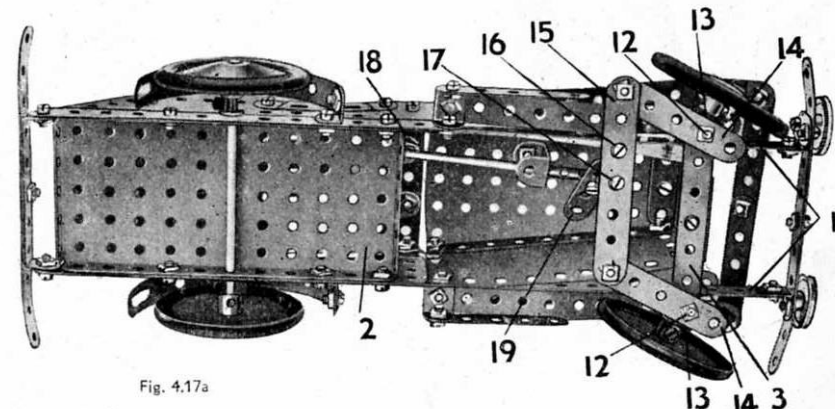


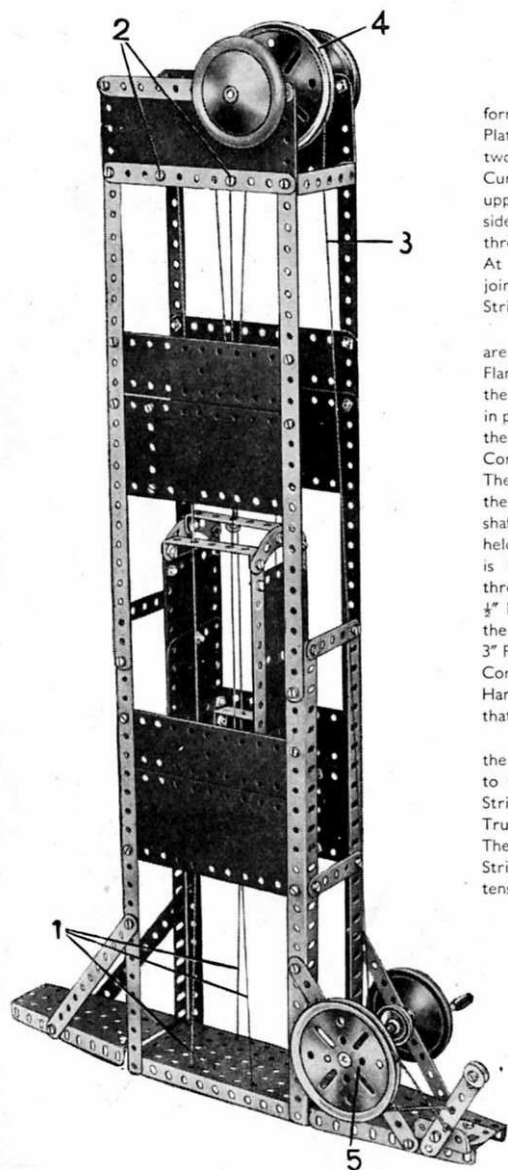
Fig. 4.17a

5.1 ELEVATOR

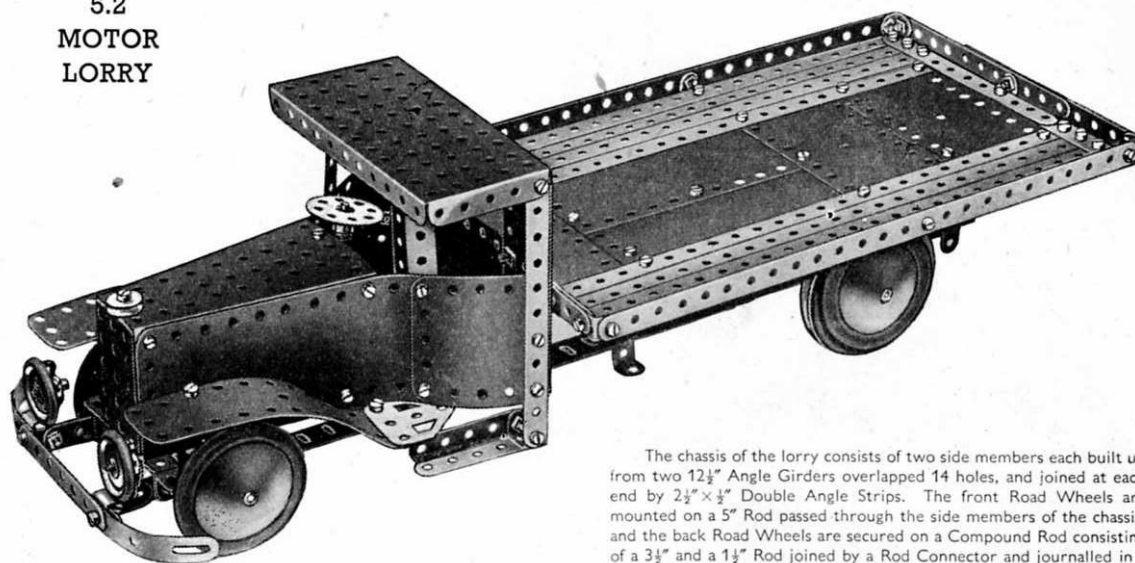
Each side of the elevator is formed by two $2\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates joined together and bolted to two $5\frac{1}{2}"$ Strips. A small radius Curved Strip is bolted across the upper ends of the $5\frac{1}{2}"$ Strips, and the sides are connected at the top by three $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips. At their lower ends the sides are joined by two $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips.

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

A length of Cord passes around the rim of the 3" Pulley 5 and is tied to the brake lever, 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.



5.2 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 journaled in a similar manner to the front axle.

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

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

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

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

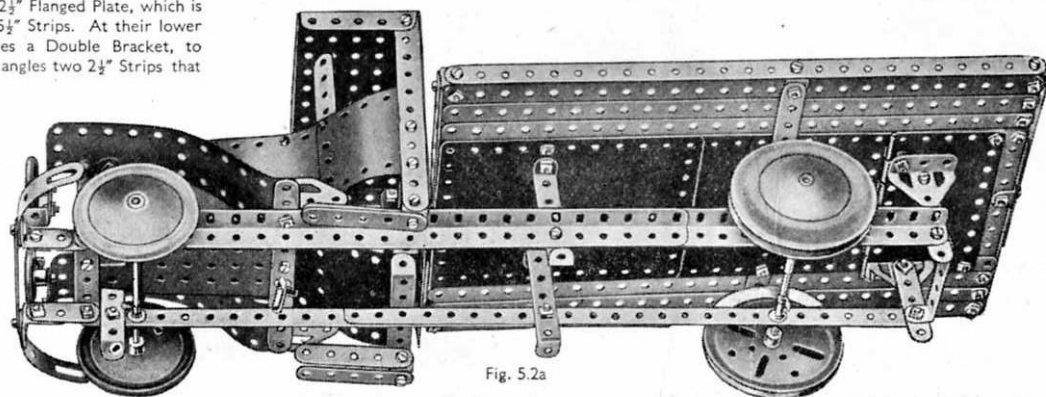


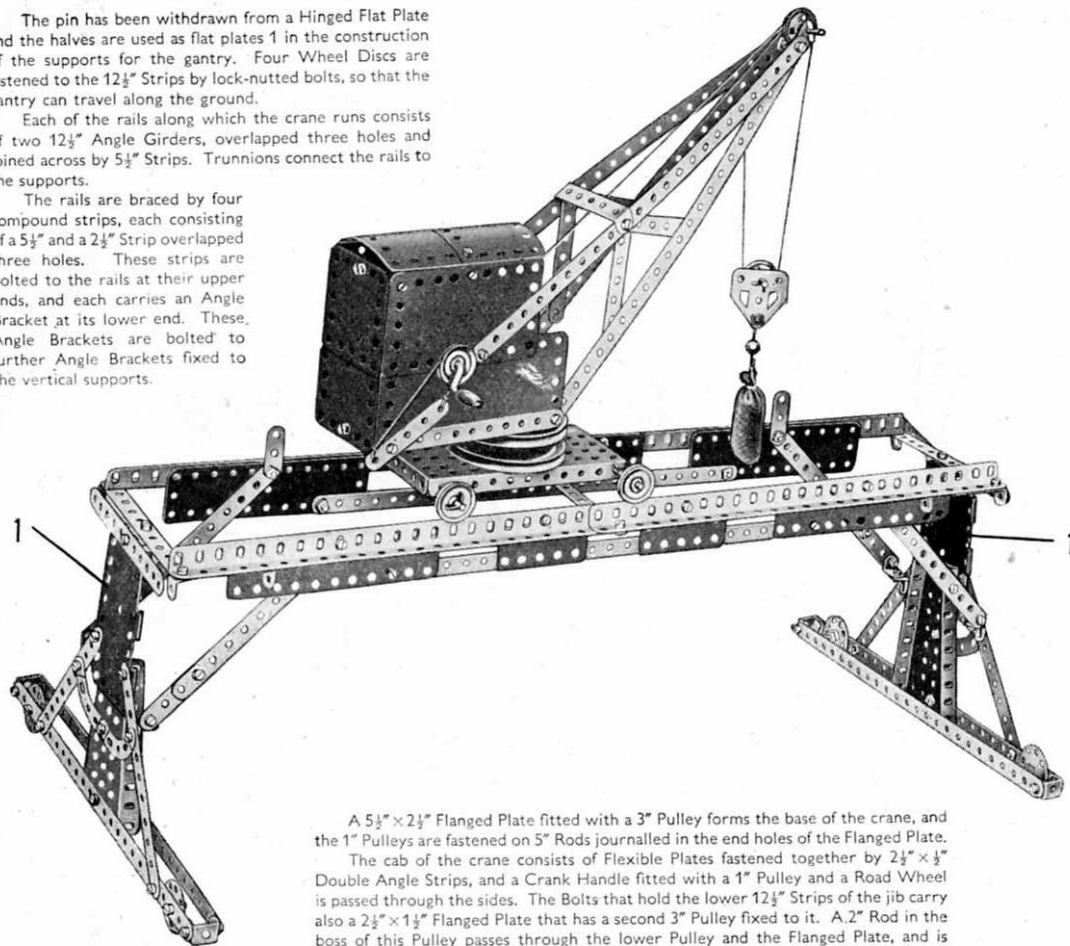
Fig. 5.2a

5.3 TRAVELLING GANTRY CRANE

The pin has been withdrawn from a Hinged Flat Plate and the halves are used as flat plates 1 in the construction of the supports for the gantry. Four Wheel Discs are fastened to the $12\frac{1}{2}$ " 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.

The rails are braced by four compound strips, each consisting of a $5\frac{1}{2}$ " and a $2\frac{1}{2}$ " Strip overlapped three holes. These strips are bolted to the rails at their upper ends, and each carries an Angle Bracket at its lower end. These Angle Brackets are bolted to further Angle Brackets fixed to the vertical supports.



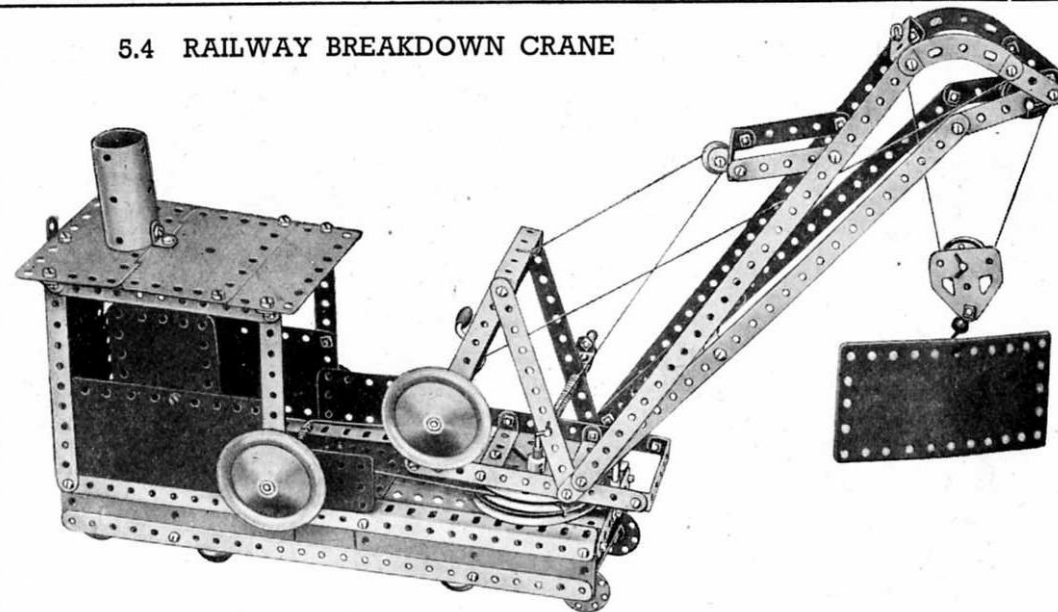
A $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate fitted with a 3" Pulley forms the base of the crane, and the 1" Pulleys are fastened on 5" Rods journaled in the end holes of the Flanged Plate.

The cab of the crane consists of Flexible Plates fastened together by $2\frac{1}{2}$ " \times $\frac{1}{2}$ " 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 $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " 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 the Flanged Plate, 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.

Stops to limit the travel of the crane along the rails are provided by $1\frac{1}{2}$ " Strips. These are bolted in a vertical position to the $12\frac{1}{2}$ " Angle Girders forming the rails as shown in the illustration. The rails are extended downwards by $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " and $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates. These Plates are joined along their lower edges by $12\frac{1}{2}$ " Strips.

5.4 RAILWAY BREAKDOWN CRANE



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 $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate and a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate, overlapping one hole, are attached to the Angle Girders by Fishplates. The framework on which the jib is pivoted is fastened to a 3" Pulley by two $\frac{3}{4}$ " Bolts which have two Washers on their shanks for spacing purposes. The $\frac{3}{4}$ " 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. 5.4a) 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 $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate and two $2\frac{1}{2}$ " Strips overlapped three holes.

The bogies are connected by a Driving Band, and the Bolts 1 are lock-nutted. Luffing of the jib is controlled by the built-up crank handle, consisting of a Double Bracket fitted with an Angle Bracket that carries a Pivot Bolt. The Bolt holding the Angle Bracket clamps the Double Bracket to the Rod.

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

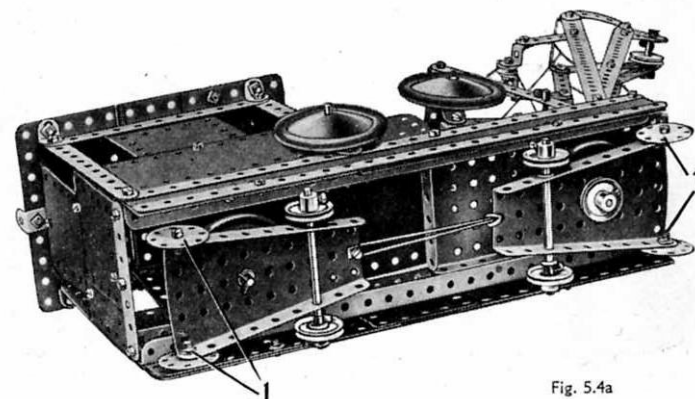
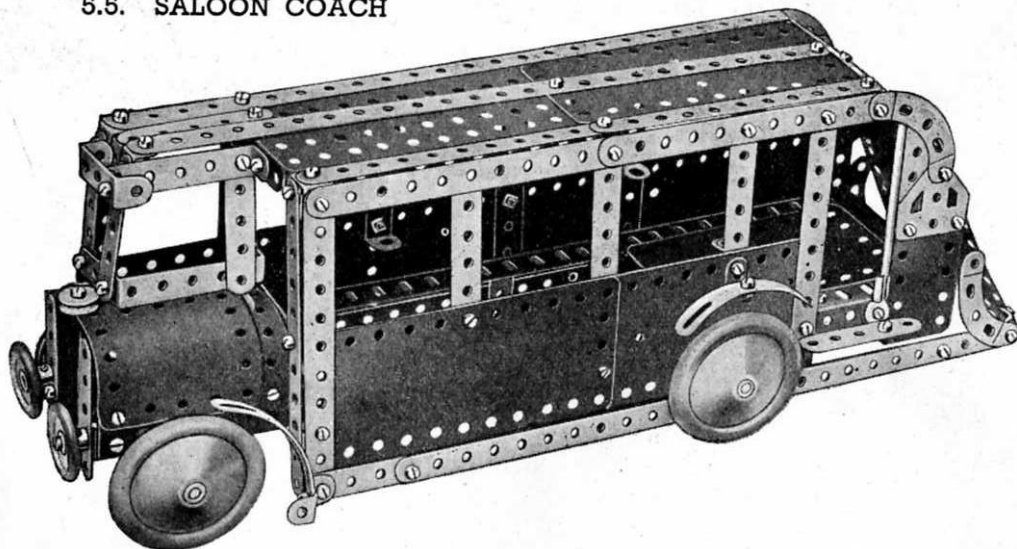


Fig. 5.4a

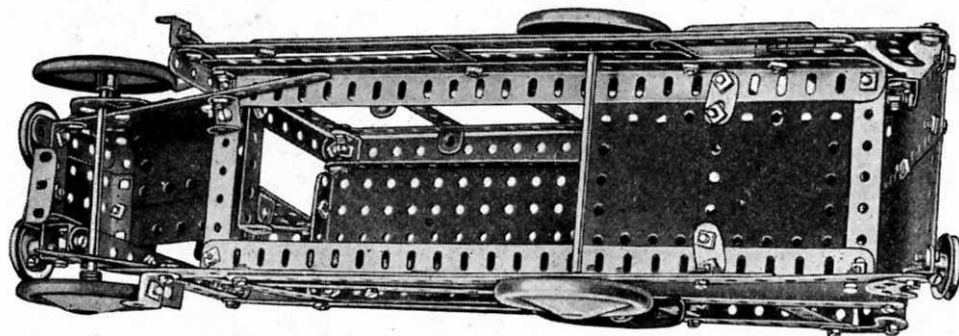
5.5. SALOON COACH



Two 12 1/2" Angle Girders joined by 3 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 1/2" Strips to which a 5 1/2" x 2 1/2" Flanged Plate and two 5 1/2" x 1 1/2" Flexible Plates are fastened by Angle Brackets. The curved back of the coach is formed by two 1 1/2" radius Curved Plates, a 5 1/2" x 1 1/2" Flexible Plate, and a 5 1/2" x 2 1/2" Flexible Plate. The Flexible Plates are curved and bolted to the 1 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 (Fig. 5.5a).

The bonnet is built up from two U-section Curved Plates and a 2 1/2" x 1 1/2" Flexible Plate. The radiator is a 2 1/2" x 1 1/2" Flanged Plate.



5.6 TRAVELLING CRANE

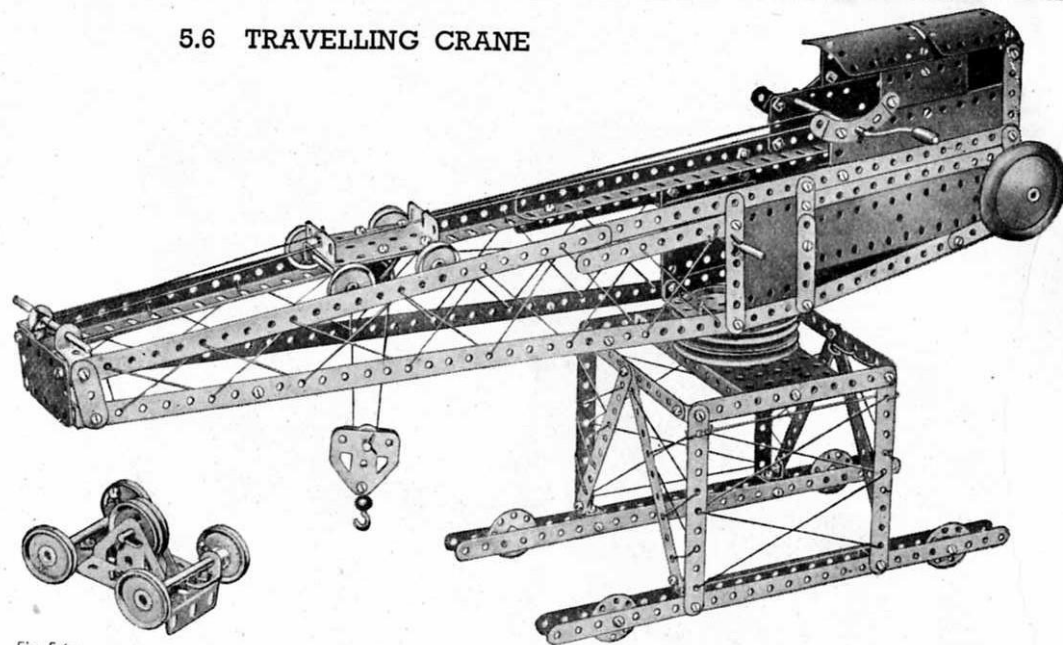


Fig. 5.6c

The construction of the superstructure and jib will be clear from the illustration. The Wheel Discs representing the wheels are held on lock-nutted bolts so that they are free to turn. In Fig. 5.6a 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 3/8" Bolts, which hold also a 2 1/2" x 1/2" Double Angle Strip fixed along the length of the jib on the underside of the 3" Pulley, so that its ends form a bearing between the two Pulleys. A 3 1/2" Rod fastened in the boss of the upper 3" Pulley passes through the boss of the lower 3" Pulley, which is bolted to a 5 1/2" x 2 1/2" Flanged Plate forming part of the superstructure. The Rod is retained in position below the Flanged Plate by a 1" Pulley as shown in Fig. 5.6b.

The hoisting carriage is shown in Fig. 5.6c; it runs on rails formed by Angle Girders at the top of the jib. A Cord is tied to the front end of the carriage, and is taken over a 3 1/2" Rod at the jib head and wound six times around the Crank Handle. It is then tied to the rear of the carriage.

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

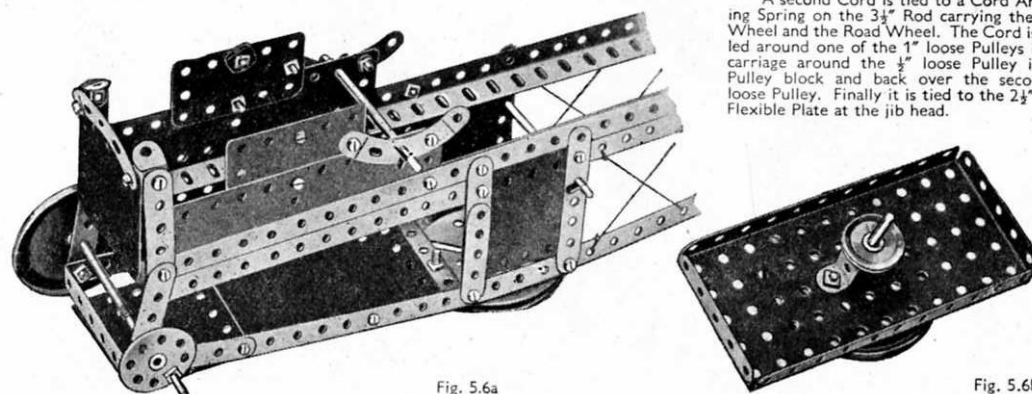


Fig. 5.6a

Fig. 5.6b

5.7 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. 5.7a) the two 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.

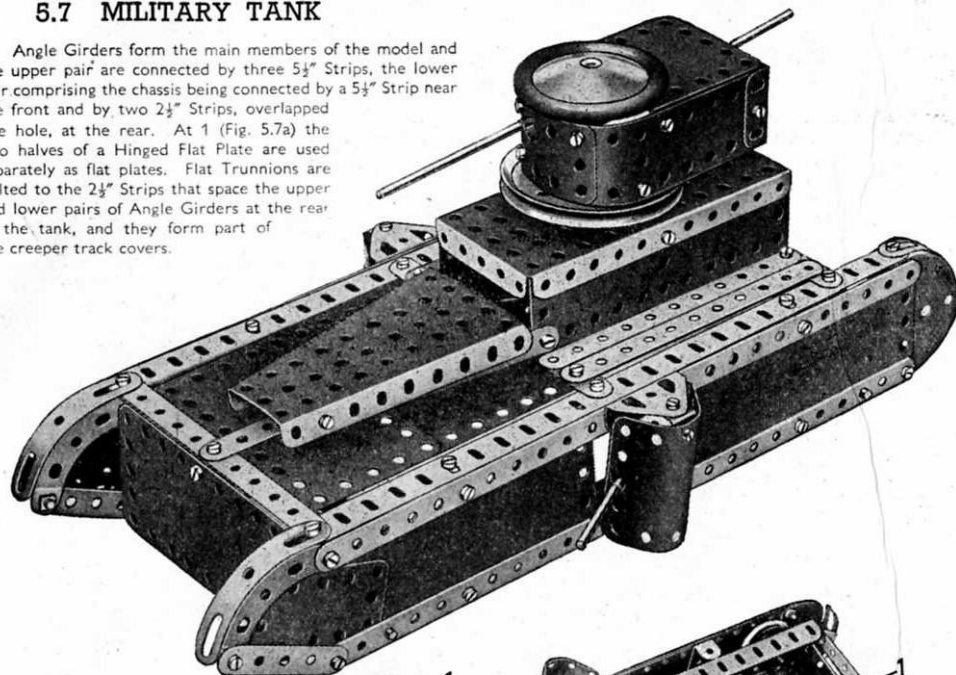


Fig. 5.7a

The revolving gun turret is shown in Fig. 5.7b. 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 $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate and through a Double Bent Strip. A 1" Pulley retains the complete unit in position. The Flanged Sector Plate shown in the general view is bolted to a second Flanged Sector Plate and overlaps it by eight holes.

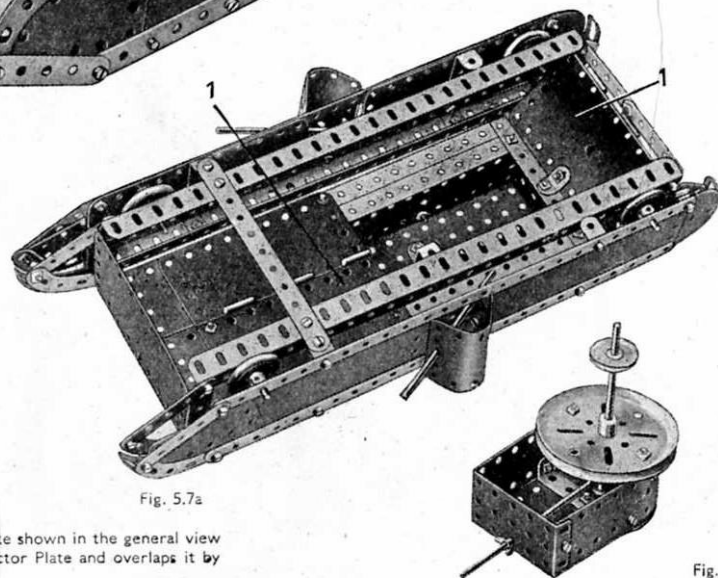
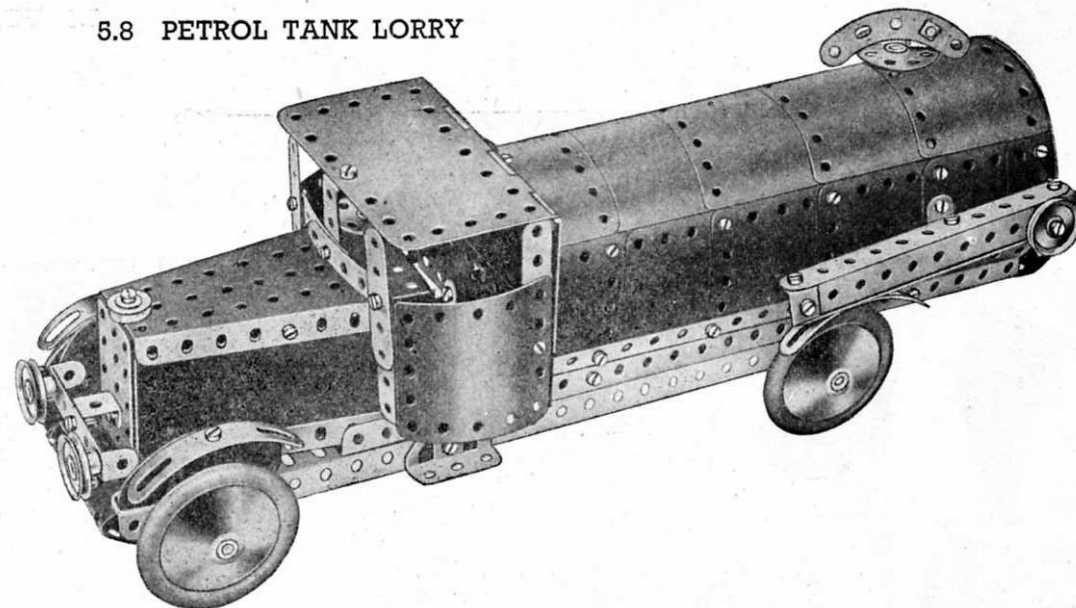


Fig. 5.7b

5.8 PETROL TANK LORRY



The chassis of the model is shown in Fig. 5.8a. Each side member consists of two $12\frac{1}{2}$ " Angle Girders overlapped 18 holes and bolted together. Flanged Sector Plates are used for the top and bottom of the bonnet, and $4\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates form the sides and are bolted on the inside of the flanges.

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

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

In Fig. 5.8a 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.

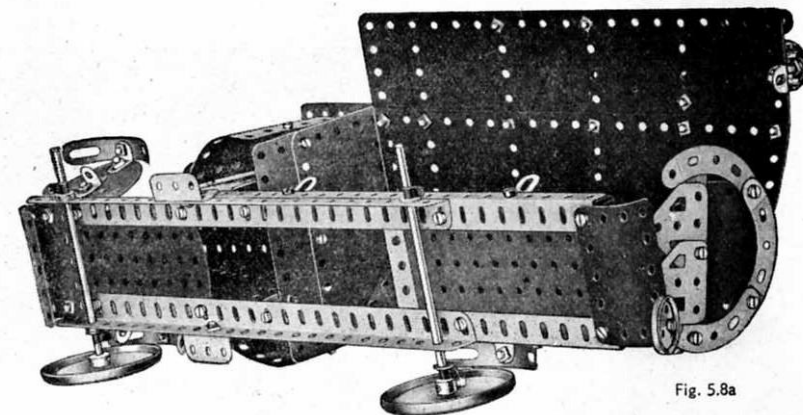
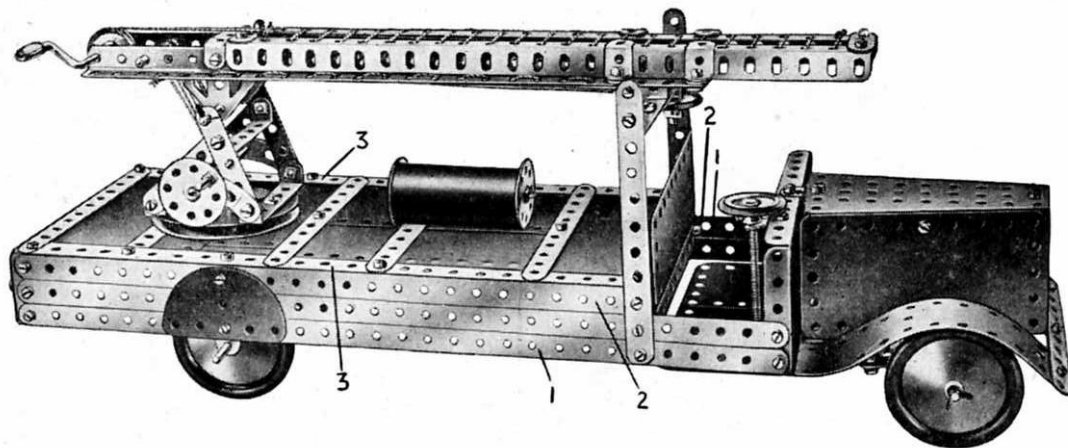


Fig. 5.8a

5.9 FIRE ENGINE



side of the model a second $2\frac{1}{2}$ " Strip 4, a Double Bracket and a third $2\frac{1}{2}$ " Strip 5, are assembled on a $\frac{3}{8}$ " Bolt and held tightly with a nut.

The free ends of the Strips 4 and 14 are now lock-nutted to the track rod 15.

The steering column is a 3" Screwed Rod journalled in Fishplates attached to the Flanged Plate. A $2\frac{1}{2}$ " Strip 6, bent upward slightly, is fastened to the Screwed Rod by two nuts and is connected to the Strip 5 by two $2\frac{1}{2}$ " Strips overlapped three holes. The front end of this compound strip is held between two nuts on a Bolt passed through the Strip 5. It should be noted that the Strip 5 is also bent upward slightly.

Details of the escape are shown in Fig. 5.9b. It is built up on a 3" Pulley locked on a 2" Rod. This Rod passes through the centre holes of a compound plate made by bolting the halves of a Hinged Flat Plate to the Strips 3. A 1" Pulley on the 2" Rod holds the escape in position. The Angle Girders 7 are joined at the top by a $2\frac{1}{2}$ " Strip, and at their lower ends by the $1\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strip 8.

The extending section of the escape is made by two Angle Girders joined at each end by $1\frac{1}{2}$ " Strips. These Girders pass over the Angle Girders 7 and slide under the Reversed Angle Brackets 9, each of which is spaced from the Girders 7 by two Washers. A length of Cord tied to the $1\frac{1}{2}$ " Strip 10 passes around a Pulley on the Crank Handle, and around a second Pulley 11 locked on a 1" Rod journalled in a Stepped Bent Strip. This Cord is then fastened to the Strip 10.

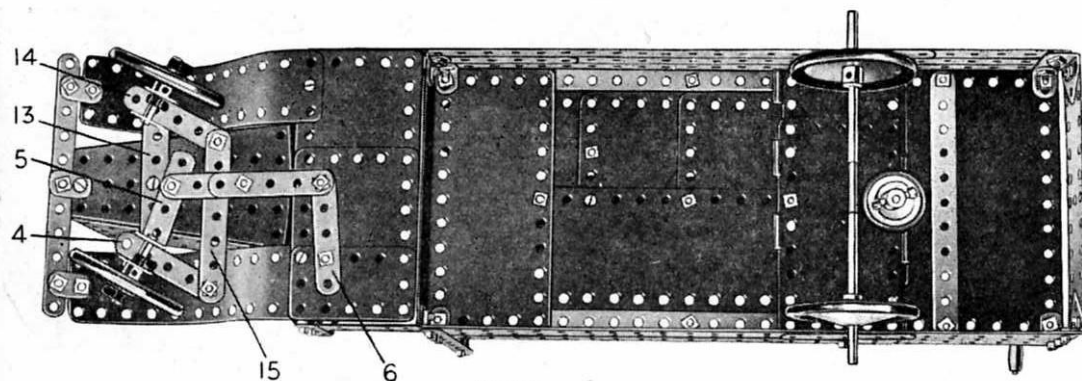


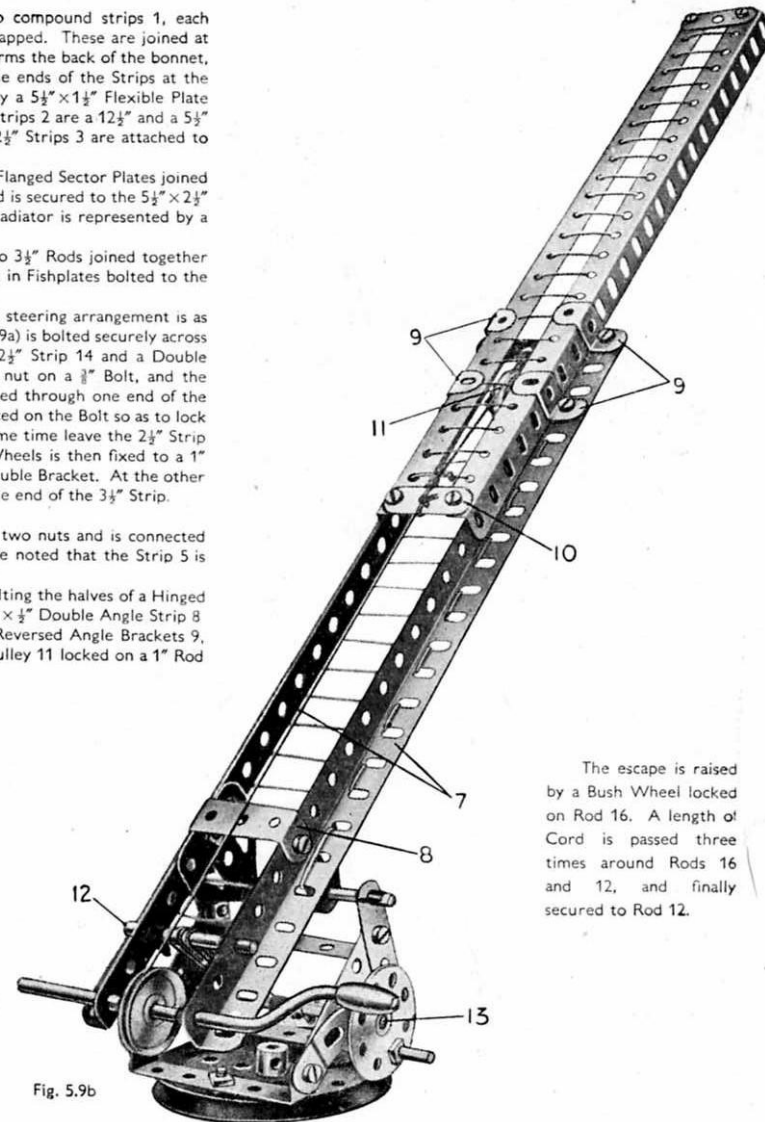
Fig. 5.9a

The body is built up on two compound strips 1, each consisting of two $12\frac{1}{2}$ " Strips overlapped. These are joined at the front by a Flanged Plate that forms the back of the bonnet, and a Trunnion is bolted across the ends of the Strips at the rear. The Trunnions are joined by a $5\frac{1}{2}$ " x $1\frac{1}{2}$ " Flexible Plate strengthened by a $5\frac{1}{2}$ " Strip. The strips 2 are a $12\frac{1}{2}$ " and a $5\frac{1}{2}$ " Strip overlapped six holes. The $12\frac{1}{2}$ " Strips 3 are attached to the sides by Angle Brackets.

The bonnet is made from two Flanged Sector Plates joined by two $4\frac{1}{2}$ " x $2\frac{1}{2}$ " Flexible Plates, and is secured to the $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flanged Plate by Fishplates. The radiator is represented by a $2\frac{1}{2}$ " x $1\frac{1}{2}$ " Flanged Plate.

The rear axle is formed by two $3\frac{1}{2}$ " Rods joined together by a Rod Connector and journalled in Fishplates bolted to the chassis.

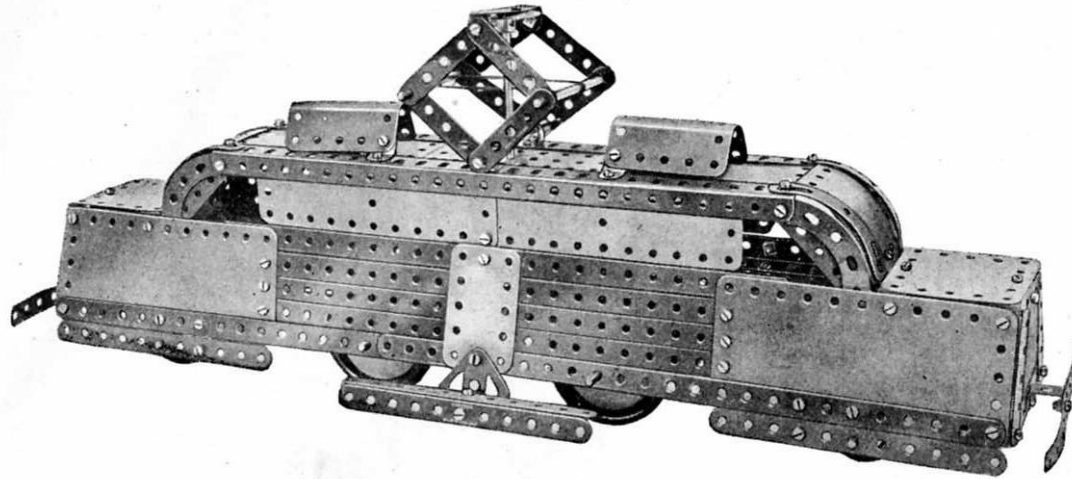
The front wheel mounting and steering arrangement is as follows. First, a $3\frac{1}{2}$ " Strip 13 (Fig. 5.9a) is bolted securely across the underside of the bonnet. A $2\frac{1}{2}$ " Strip 14 and a Double Bracket are then held freely by a nut on a $\frac{3}{8}$ " Bolt, and the remaining shank of the bolt is passed through one end of the $3\frac{1}{2}$ " Strip. A second nut is then placed on the Bolt so as to lock it firmly to the Strip, but at the same time leave the $2\frac{1}{2}$ " Strip free to pivot. One of the Road Wheels is then fixed to a 1" Rod held by a Spring Clip in the Double Bracket. At the other end of the Bolt is then lock-nutted to the end of the $3\frac{1}{2}$ " Strip.



The escape is raised by a Bush Wheel locked on Rod 16. A length of Cord is passed three times around Rods 16 and 12, and finally secured to Rod 12.

Fig. 5.9b

5.10 ELECTRIC LOCOMOTIVE



Each side of the model consists of two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates that overlap the ends of three $12\frac{1}{2}''$ Strips and a $12\frac{1}{2}''$ Angle Girder by three holes. The Flexible Plates are joined at their lower edges by a compound Strip consisting of two $12\frac{1}{2}''$ Strips overlapped nine holes.

The upper edges of the sides are connected, at each end, by two $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips, and these Strips also support a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate. The lower edges are connected at each end, by a $3\frac{1}{2}''$ Strip attached to the sides by Angle Brackets. The front and the rear of the locomotive are filled in by $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates bolted to the $3\frac{1}{2}''$ Strips, and by $2\frac{1}{2}''$ Strips also attached to the $3\frac{1}{2}''$ Strips.

The centre of the roof consists of a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate fitted at each side with a $12\frac{1}{2}''$ Angle Girder. Two $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates are held between the vertical flange of the Angle Girder and the Flanged Plate on each side of the model, and the Flexible Plates are attached by a Fishplate to the sides. The Flanged Plate of the roof is extended on each side by a $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate and a $1\frac{1}{2}''$ radius Curved Plate.

Each side of the current collector consists of $2\frac{1}{2}''$ Strips, pairs of which are lock-nutted to an Angle Bracket and a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip respectively. They are pivoted together on $3\frac{1}{2}''$ Rods, and a Driving Band is stretched between the Rods as shown. The Bush Wheel carries in its boss a $5''$ Rod that passes through a Double Bent Strip and the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate.

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

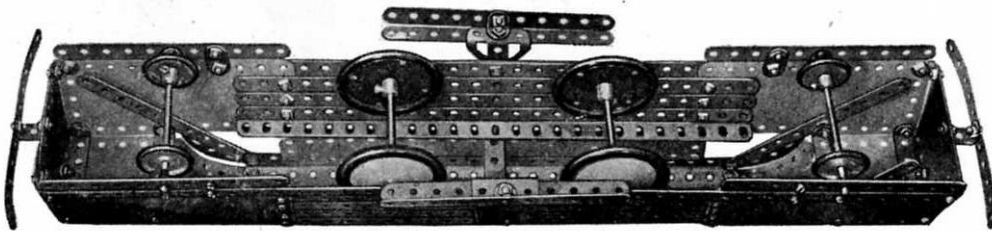


Fig. 5.10a

5.11 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 the bottom by a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip, in the centre by a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip, and at the top by a Stepped Bent Strip. A $1\frac{1}{2}''$ Rod locked in the boss of the upper $3''$ Pulley passes through a second $3''$ Pulley bolted to the base, and is held in position by a Spring Clip. The Double Bracket at the upper ends of the $12\frac{1}{2}''$ Strips is lock-nutted to the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate.

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

Cord is tied to a Fishplate on the $2''$ Rod in the jib post and is taken around a $1''$ Pulley on 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.

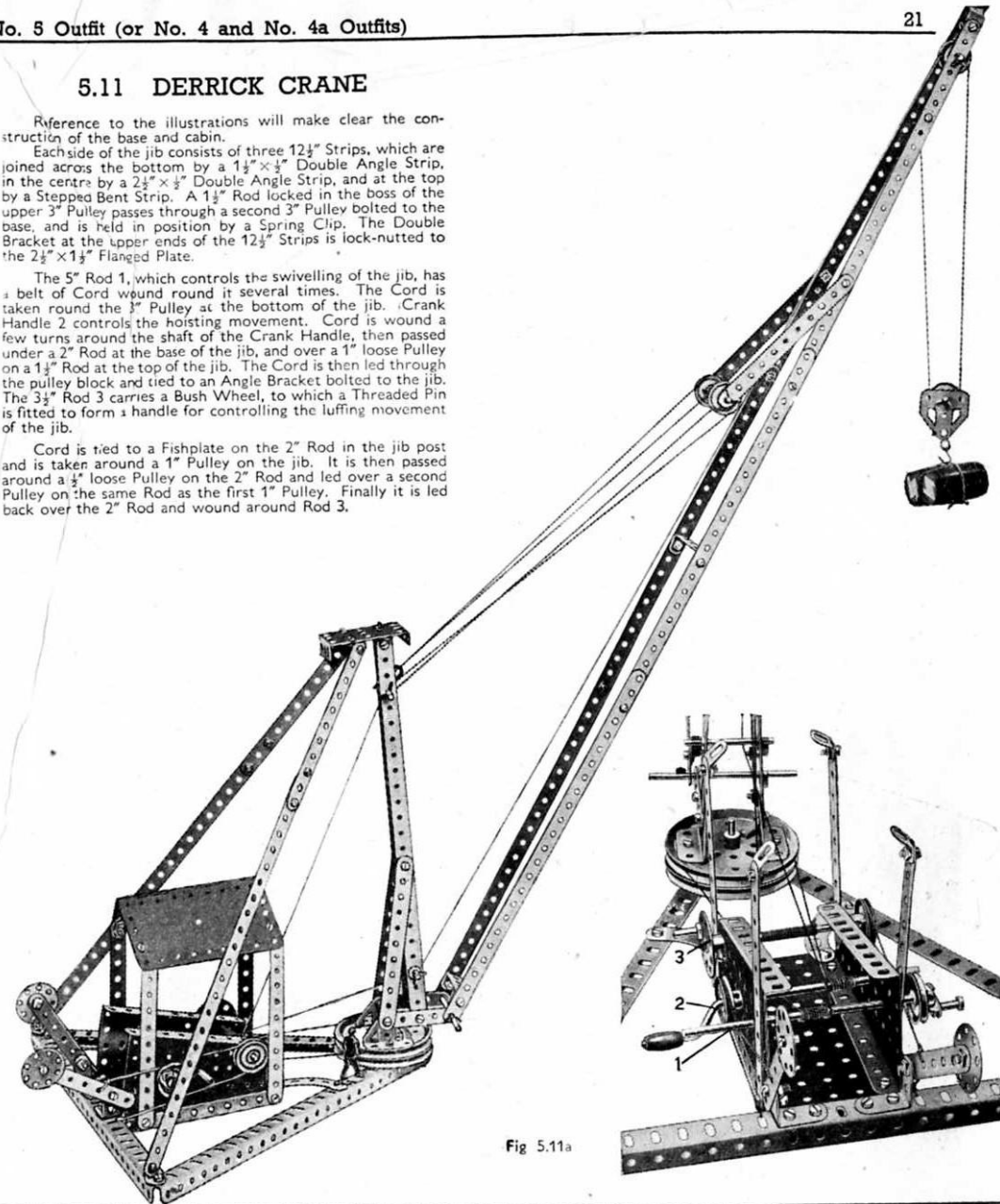
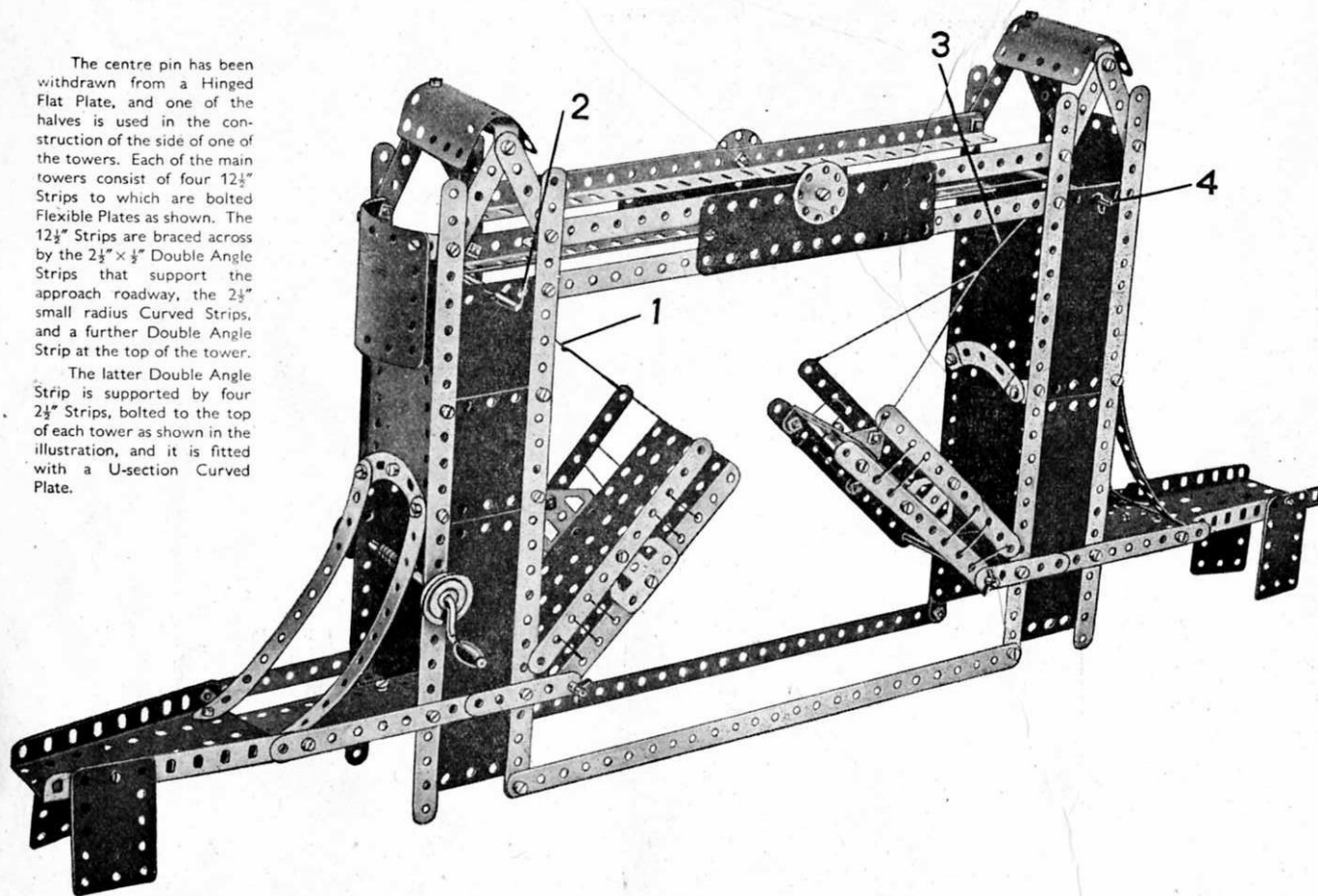


Fig. 5.11a

5.12 BASCULE BRIDGE

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 consist of four $12\frac{1}{2}"$ Strips to which are bolted Flexible Plates as shown. The $12\frac{1}{2}"$ Strips are braced across by the $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips that support the approach roadway, the $2\frac{1}{2}"$ small radius Curved Strips, and a further Double Angle Strip at the top of the tower.

The latter Double Angle Strip is supported by four $2\frac{1}{2}"$ Strips, bolted to the top of each tower as shown in the illustration, and it is fitted with a U-section Curved Plate.



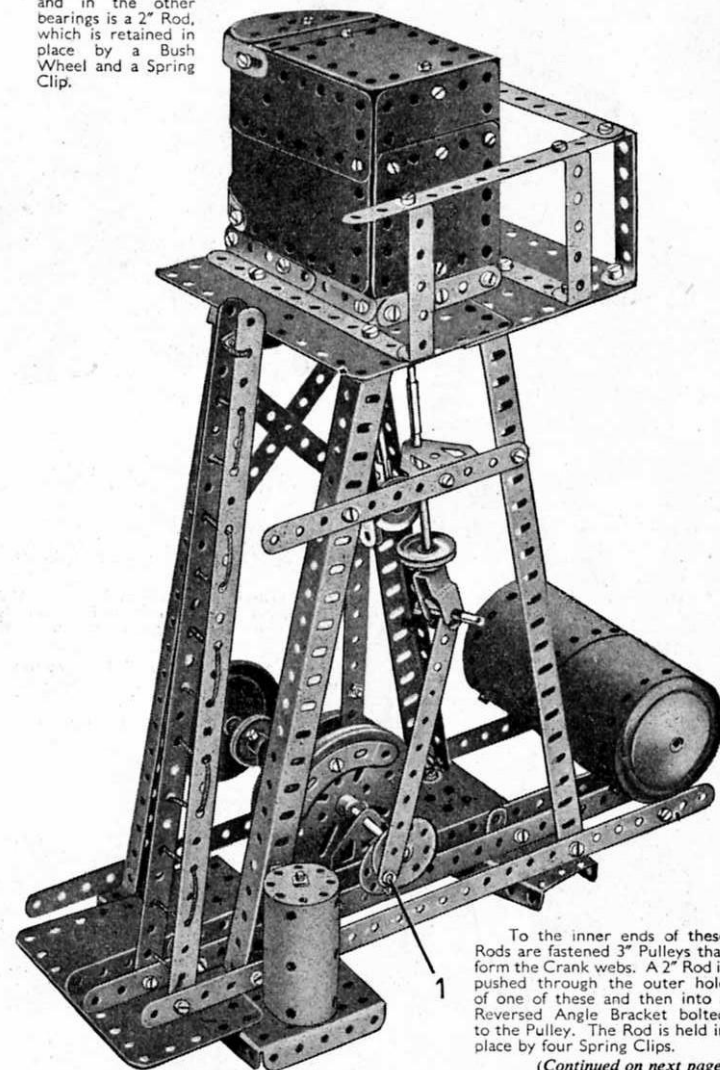
The U-section Curved Plates are spaced from the $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips by three Washers. The two towers are joined across the top by four Angle Girders, and at the bottom by two $12\frac{1}{2}"$ Strips.

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

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

5.13 MARINE ENGINE

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

(Continued on next page)

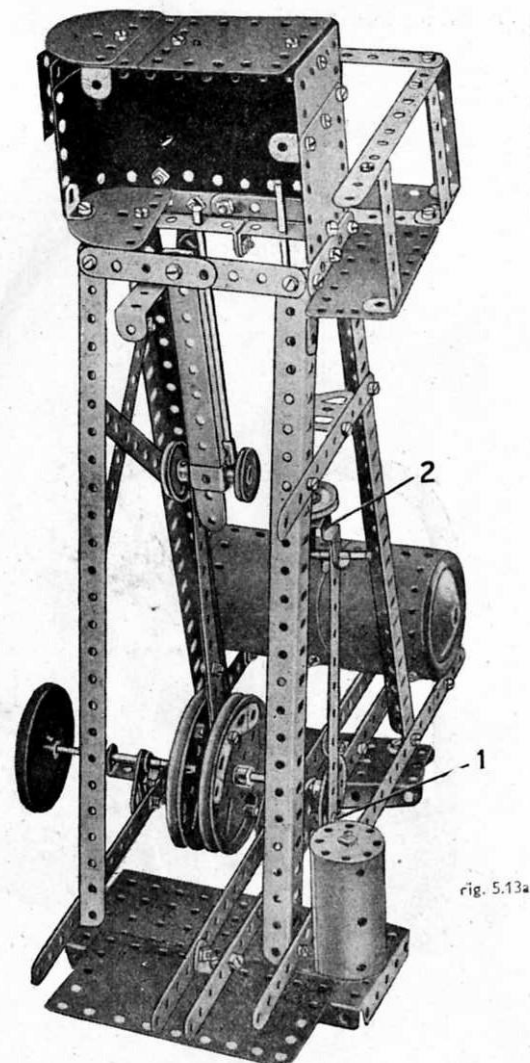
5.13
MARINE
ENGINE—
continued

fig. 5.13a

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

5.14 PITHEAD GEAR

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

Construction of the model is commenced by bolting together two $12\frac{1}{2}$ " Angle Girders overlapped to make a compound angle girder $19\frac{1}{2}$ " long. Two such compound girders are required to form the long sides of the base.

The rear side of the engine house is a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate bolted to one of the compound $19\frac{1}{2}$ " girders, and the rear side consists of a Flanged Sector Plate and a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flanged Plate, which are bolted to the rear $19\frac{1}{2}$ " compound angle girder.

The steam cylinder of the engine is represented by a $2\frac{1}{2}$ " Cylinder, which is lock-nutted so that it is free to pivot on the $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate. The Cylinder ends are Wheel Discs held in place by passing a 3" Screwed rod through holes in their circumference and screwing nuts on each end of it. The cylinder is fitted with a piston rod consisting of a $4\frac{1}{2}$ " Rod, which carries at its outer end a Rod and Strip Connector. The Rod and Strip Connector pivots on a Threaded Pin, fixed in a hole of a Bush Wheel mounted on a 5" Rod journaled in the sides of the engine house, and is retained in position on the Pin by a Cord Anchoring Spring.

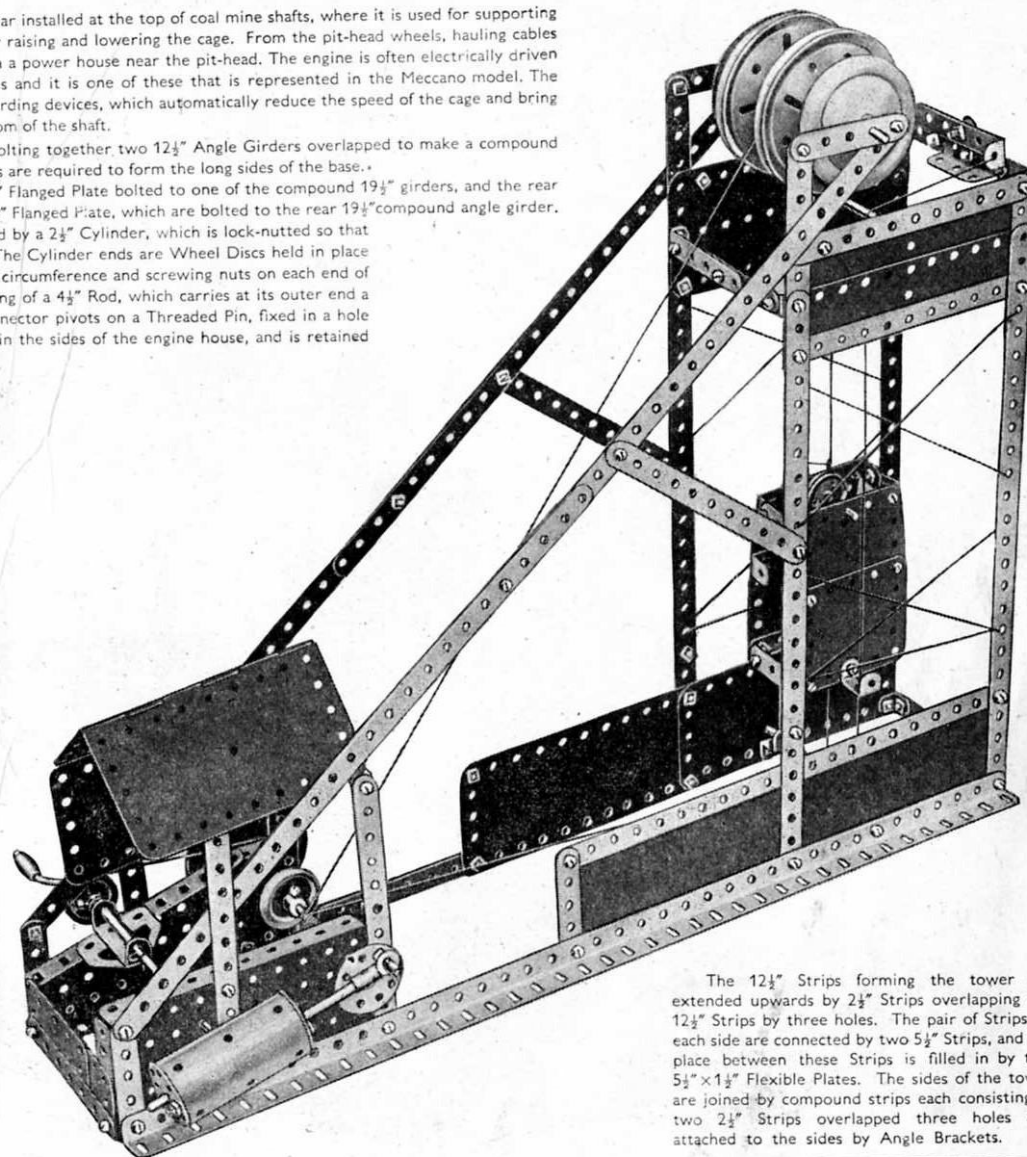
The roof of the engine house consists of a Hinged Flat Plate, which is attached by means of Obtuse Angle Brackets to the upper ends of four $5\frac{1}{2}$ " Strips bolted vertically to the $12\frac{1}{2}$ " Angle Girders of the base.

A 1" Pulley on the Crank Handle is connected by a belt of Cord to a similar Pulley on the 5" Rod of the winding gear. The Crank Handle is mounted in a $1\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip fixed to a Flat Trunnion, which is bolted to one of the Flanged Sector Plates.

The pulley-gear at the pit-head is arranged as follows. A 5" Rod is journaled in the holes of the two $2\frac{1}{2}$ " Strips at the top of the shaft tower, and it carries at its centre a 1" fast Pulley. On each side of this Pulley are a 3" Pulley and a Road Wheel. Just below the $2\frac{1}{2}$ " Strips are two $5\frac{1}{2}$ " Strips, and passed through these is a 4" Rod, which is held in place by Spring Clips. Directly beneath this Rod, at the bottom of the tower, is a $3\frac{1}{2}$ " Rod, which is supported in the holes of two Reversed Angle Brackets. This rod carries a $\frac{1}{2}$ " Loose Pulley held in place between two Spring Clips.

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

The arrangement of the cage winding Cord is as follows. A length of Cord is tied through one of the holes in a 1" loose Pulley mounted on a Rod at the top of the cage, and then is passed over the 1" fast Pulley placed between the two 3" Pulleys at the top of the tower. It is then wound for about six turns around the 5" Rod in the engine house, and then led around the $\frac{1}{2}$ " loose Pulley at the bottom of the shaft. Finally the Cord is made fast in another hole of the 1" loose Pulley in the cage.



The $12\frac{1}{2}$ " Strips forming the tower are extended upwards by $2\frac{1}{2}$ " Strips overlapping the $12\frac{1}{2}$ " Strips by three holes. The pair of Strips on each side are connected by two $5\frac{1}{2}$ " Strips, and the place between these Strips is filled in by two $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates. The sides of the tower are joined by compound strips each consisting of two $2\frac{1}{2}$ " Strips overlapped three holes and attached to the sides by Angle Brackets.

5.15 PADDLE STEAMER

Each side of the hull consists of a $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plate 1 at the bow, a $2\frac{1}{2}" \times 2\frac{1}{2}"$ Plate 2, half of a Hinged Flat Plate 3, a second $5\frac{1}{2}" \times 2\frac{1}{2}"$ Plate 4 and a $2\frac{1}{2}" \times 2\frac{1}{2}"$ Plate 5. They are joined at the bow to a U-section Curved Plate and at the stern to two $1\frac{1}{2}"$ radius Curved Plates. A $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate 6 (Fig. 5.15a) is bolted in position amidships and a Flanged Sector Plate 7 in the bows. A Flanged Sector Plate 8 extended by a Semi-Circular Plate fills in the stern. The $4\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plate 9 is attached by $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips to $5\frac{1}{2}"$ Strips. These Strips are secured to $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips bolted to the Flanged Plate.

The paddle wheels are represented by 3" Pulleys fixed on a 4" Rod journalled in the centre holes of the halves of the Hinged Flat Plate. The paddle casings are made by clamping a $2\frac{1}{2}" \times 1\frac{1}{2}"$ Flexible plate between three $2\frac{1}{2}"$ Strips bridged by a $5\frac{1}{2}"$ Strip, and are attached to the upper part of the hull by Reversed Angle Brackets held to the casing by Bolt 13 on each side.

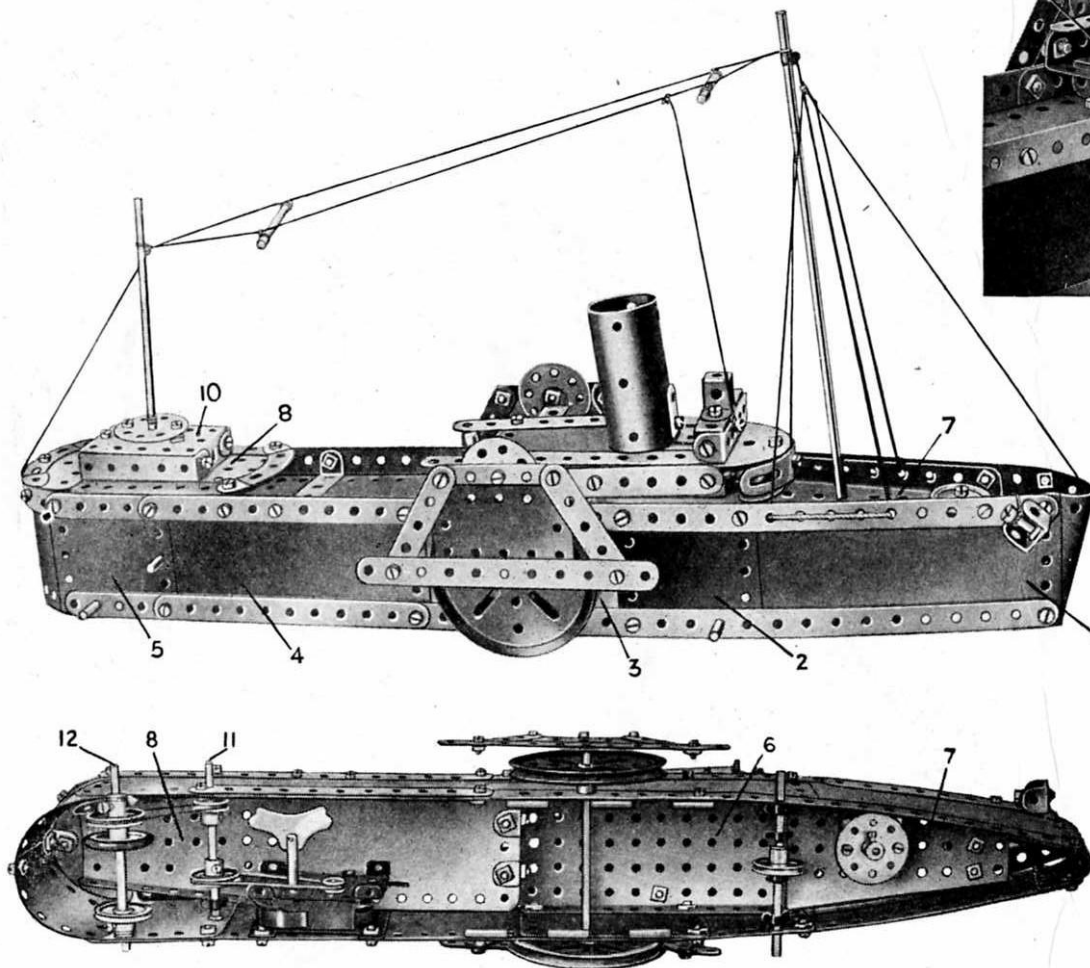


Fig. 5.15b

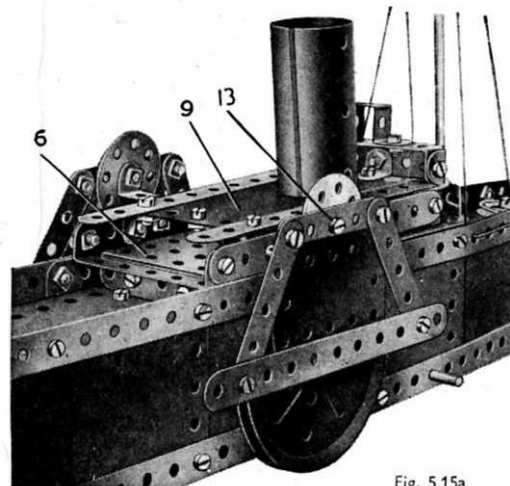


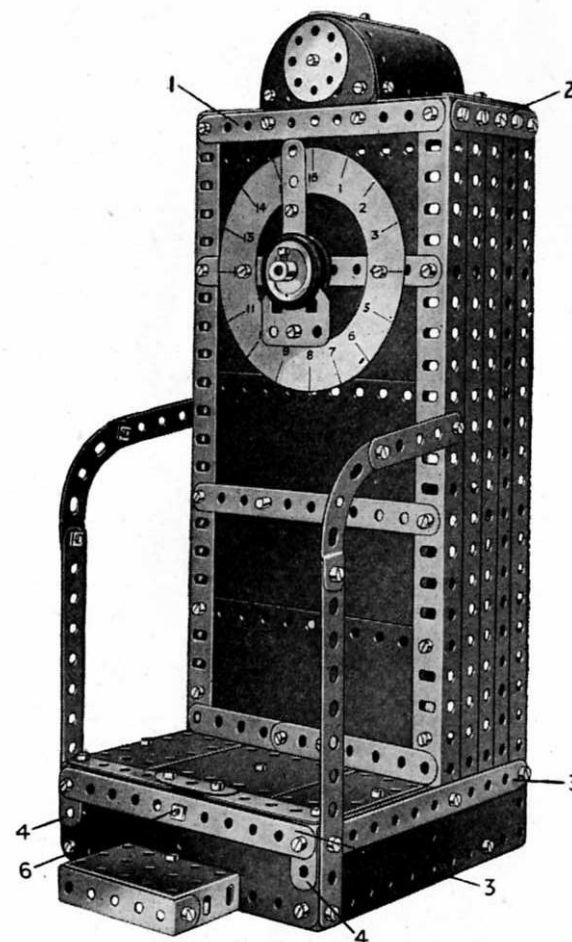
Fig. 5.15a

The forward mast is formed by a 5" and 4" Rod joined by a Rod Connector, and it is "stepped" or mounted in a Bush Wheel bolted to the Sector Plate 7. The second mast is passed through a Wheel Disc bolted to the $2\frac{1}{2}" \times 1\frac{1}{2}"$ Flanged Plate 10, and held by a Cord Anchoring Spring and a Spring Clip. The Wheel Disc is spaced from the Plate 10 by two nuts.

The method of mounting a *Magic* Motor to drive the model is shown in Fig. 5.15b. The drive from the Motor is taken to a 1" Pulley on Rod 11. A $\frac{1}{2}"$ Pulley on this Rod is connected by a Driving Band to a 1" Pulley on Rod 12, and a 1" Pulley fitted with a Rubber Ring on the same Rod contacts the ground and so drives the model along.

Note: The *Magic* Motor used in this model is not included in the Outfit.

5.16 PLATFORM WEIGHING MACHINE



The upright column is formed by four $12\frac{1}{2}"$ Angle Girders joined by the $5\frac{1}{2}"$ Strips 1 and $2\frac{1}{2}"$ Strips 2. Each side is filled in by three $12\frac{1}{2}"$ Strips. The front is completed by four $4\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plates, and a $2\frac{1}{2}" \times 2\frac{1}{2}"$ and a $4\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plate overlapped three holes.

The base is built up from the $5\frac{1}{2}"$ Strips 3 and $5\frac{1}{2}" \times 1\frac{1}{2}"$ Flexible Plates. Two $2\frac{1}{2}" \times 1\frac{1}{2}"$ Flexible Plates are attached to Double Angle Strips bolted to the $1" \times 1"$ Angle Brackets 4. The weighing platform consists of half of a Hinged Flat Plate secured to the $5\frac{1}{2}"$ Strips 5 (Fig. 5.16a) by a Double Bracket. The Strips 5 are pivoted by a $1\frac{1}{2}"$ Rod to a second Double Bracket fastened to the base by Bolt 6.

(Continued on next page)

5.16 PLATFORM WEIGHING MACHINE—continued

A 3" Pulley is locked on the Rod 7. The 3½" Strips 8 are joined by a 1½" × ½" Double Angle Strip and attached to the 3" Pulley. The Strips 8 are connected by a 5½" Strip and an Angle Bracket to the levers 5 in the base. The balance weight consists of two Road Wheels locked on a 2" Rod mounted in the Strips 8.

The 3" Pulley is connected to a 1" Pulley on the Rod 9 by a belt of Cord.

The pointer, mounted on Rod 9, is made from two 2½" Strips overlapped three holes and a Flat Trunnion clamped between two 1" Pulleys fitted with Rubber Rings.

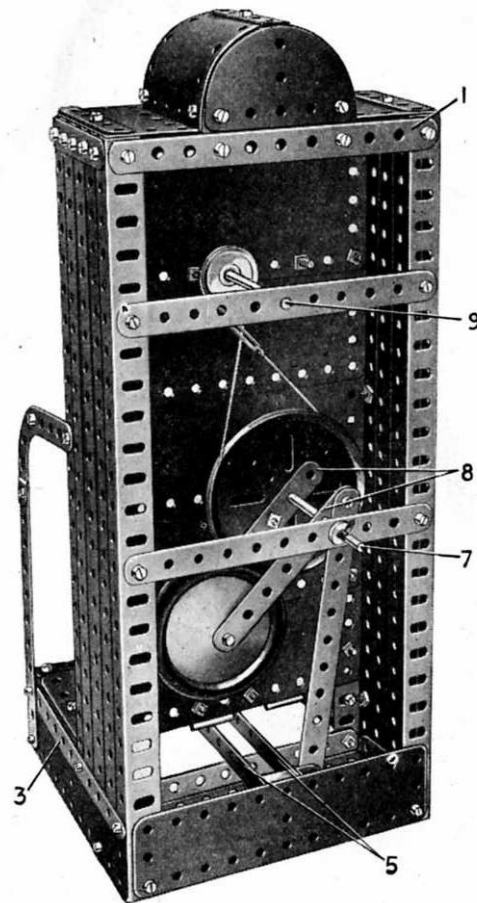


Fig. 5.16a

5.17
AUTOMATIC
SHIP-COALER

The construction of the cabin, hoisting carriage and truck are shown in Figs. 5.17a and 5.17c. The 2½" × 1½" Flanged Plate is lock-nutted to the 1½" radius Curved Plates (Fig. 5.17b) which are overlapped three holes. The built up pulley on the same 4" Rod as the Road Wheels consists of two ½" Washers spaced by two Washers, and is retained in position by two Spring Clips.

The rails on which the grab hoist and truck run are Angle Girders. Those forming the rails for the grab hoist are bolted at their inner ends to the rear pair of 5½" Strips at the top of the tower, but are not connected to the second pair of Strips. This enables the hoist to travel the full length of the rails. The Wheel Discs that form the wheels of the grab hoist revolve on bolts lock-nutted to the 2½" × ½" Double Angle Strips.

The grab consists of 2½" small radius Curved Strips bolted to 3½" Strips, and the 5½" × 1½" 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 3½" Rod in the tower, and then around a 1½" 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 ½" loose Pulley on the 3½" Rod halfway up the tower, and around the built-up pulley on the Rod that carries the Road Wheels. It is then wound around the Crank Handle.

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

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

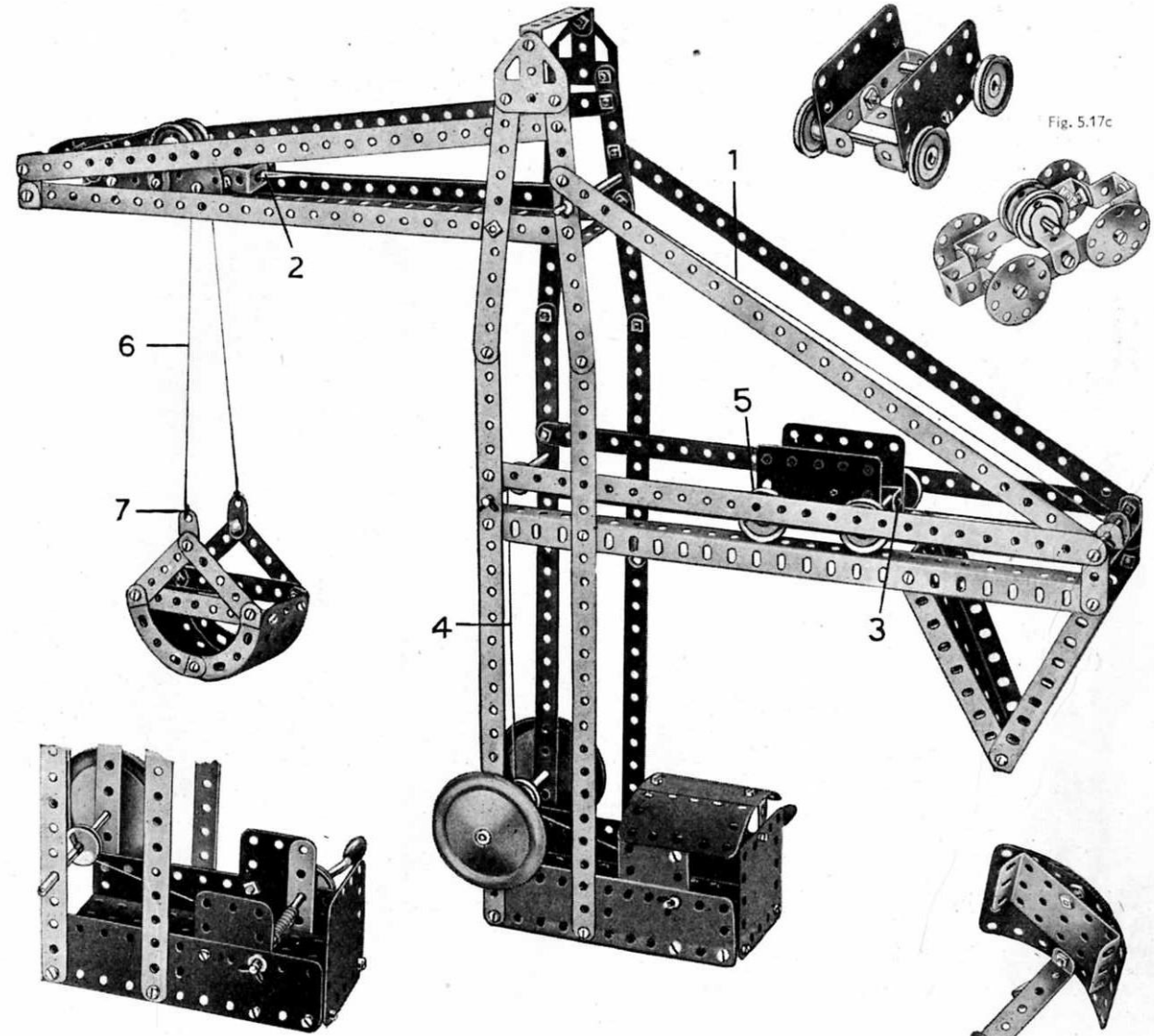
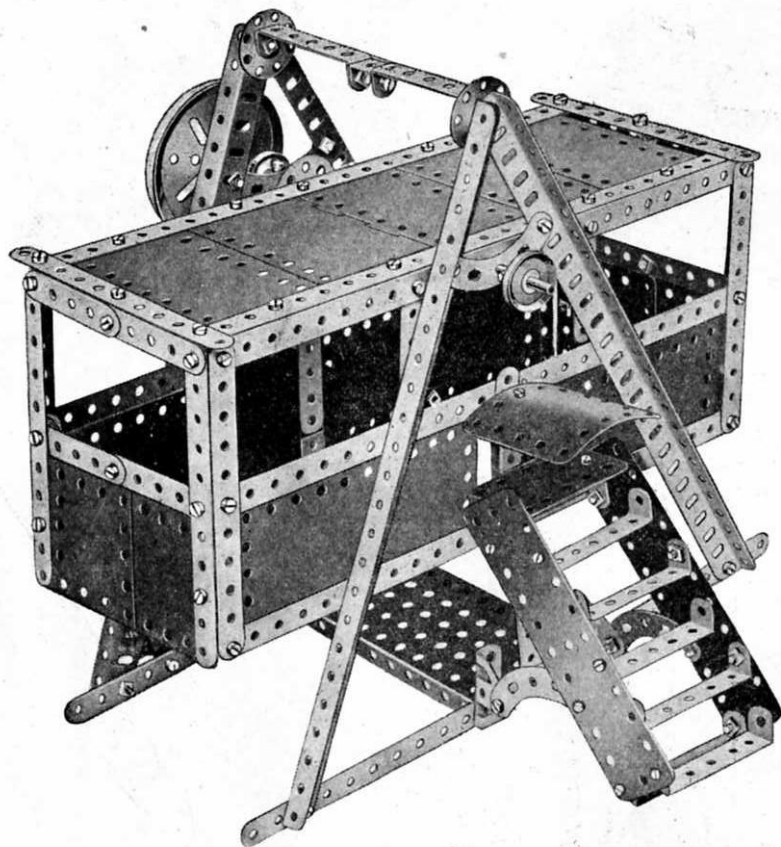


Fig. 5.17a

Fig. 5.17b

5.18 GIANT SWING BOAT



The main supports for the swing boats are formed by $12\frac{1}{2}$ " Angle Girders, which are bolted to a base made by fastening two $12\frac{1}{2}$ " Strips to a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate. The steps are supported by two $2\frac{1}{2}$ " small radius Curved Strips, bolted to the sides of the staircase and to two Trunnions fastened to the base. The platform at the top consists of a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plate held in position by two 1 " \times 1 " Angle Brackets.

The $1\frac{1}{2}$ " radius Curved Plate is fastened to a Double Bent Strip bolted to one end of a $5\frac{1}{2}$ " Strip, the other end of which is fastened to the base.

The swing-boat is pivoted on a compound rod consisting of 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 model is driven by means of a Crank Handle journalled in holes in two Flanged Sector Plates as shown in Fig. 5.18a below. The Sector Plates are bolted at their lower ends to a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flanged Plate and to two Double Brackets. The Crank Handle carries a 1 " Pulley, which is connected by a Driving Band to a 3 " Pulley fixed on a 2 " Rod also journalled in the Flanged Sector Plates. A $5\frac{1}{2}$ " Strip is attached to a Pivot Bolt fixed in the 3 " Pulley, and its other end is pivoted on a bolt lock-nutted to another 3 " Pulley fixed on the pivot rod of the swing-boat.

If desired, a *Magic Motor* can be used to drive the model, and the method of fixing it in place is shown in Fig. 5.18a. The Motor should be bolted direct to the base, and the Pulley on its driving shaft then connected by a Driving Band to a second 1 " Pulley mounted on the Crank Handle.

Note : The Motor used in this model is not included in the Outfit.

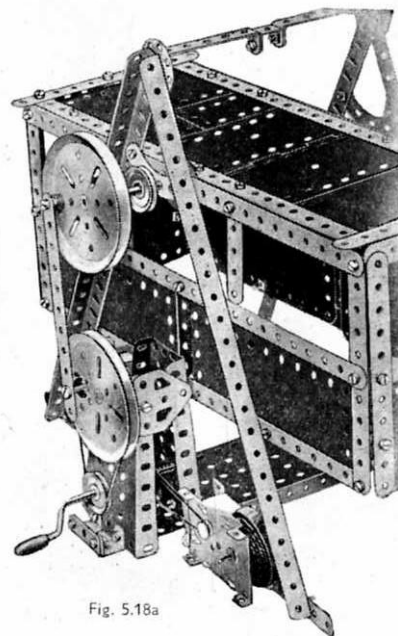
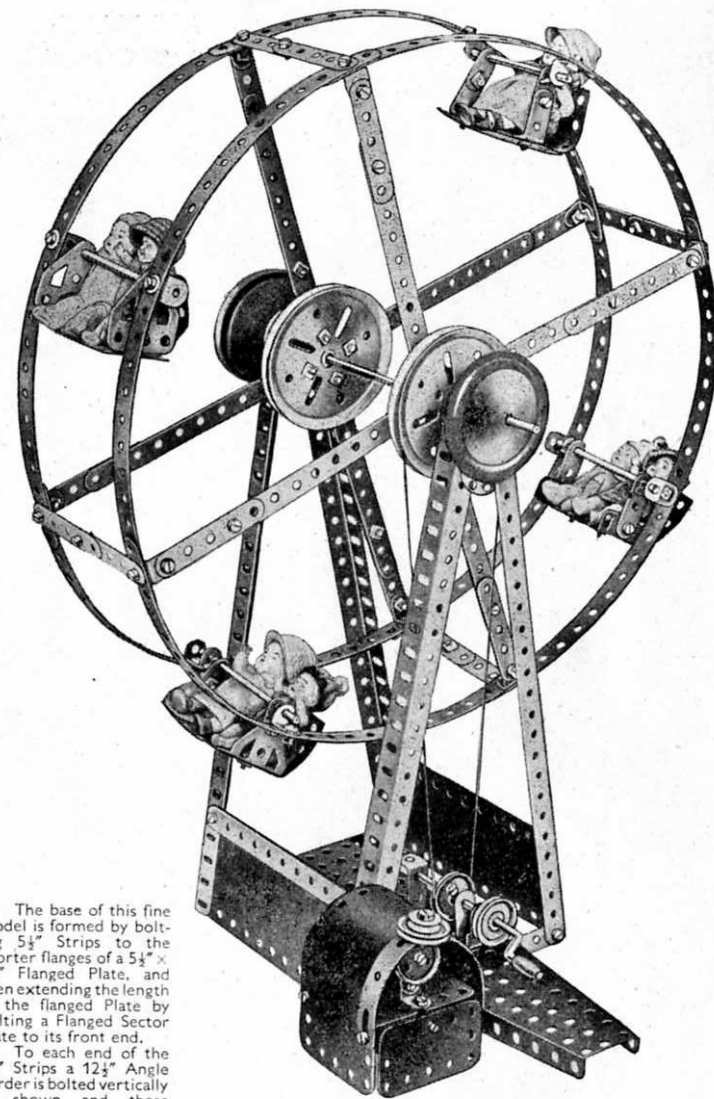


Fig. 5.18a

5.19 BIG WHEEL



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

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

(Continued on next page)

5.19 BIG WHEEL—continued

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

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

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

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

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

5.20 INDUSTRIAL TRACTOR

Each side of the chassis consists of two $12\frac{1}{2}$ " Angle Girders 1, (Fig. 5.20a), and two $12\frac{1}{2}$ " Strips 2 and 3. The chassis members are joined together at the rear by a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flanged Plate, and at the front by two Double Angle Strips 4 (Fig. 5.20b). Three $5\frac{1}{2}$ " Strips are attached to Flat Trunnions and bolted to the Double Angle Strips.

The sides of the bonnet are formed by $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates, and the radiator consists of a $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate and a Semi-Circular Plate secured to a Double Angle Strip 5. The back of the bonnet is constructed in the same way as the radiator, and the top is made by bending a $4\frac{1}{2}$ " \times $2\frac{1}{2}$ " and two $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates and securing them to the sides.

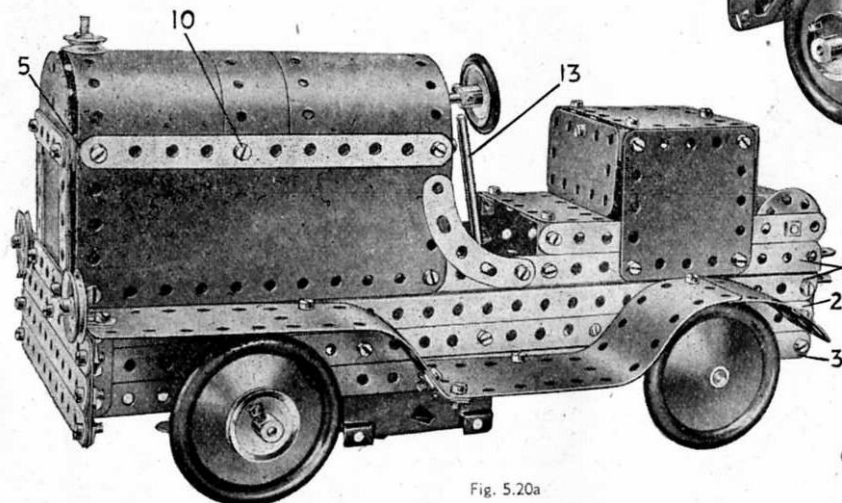
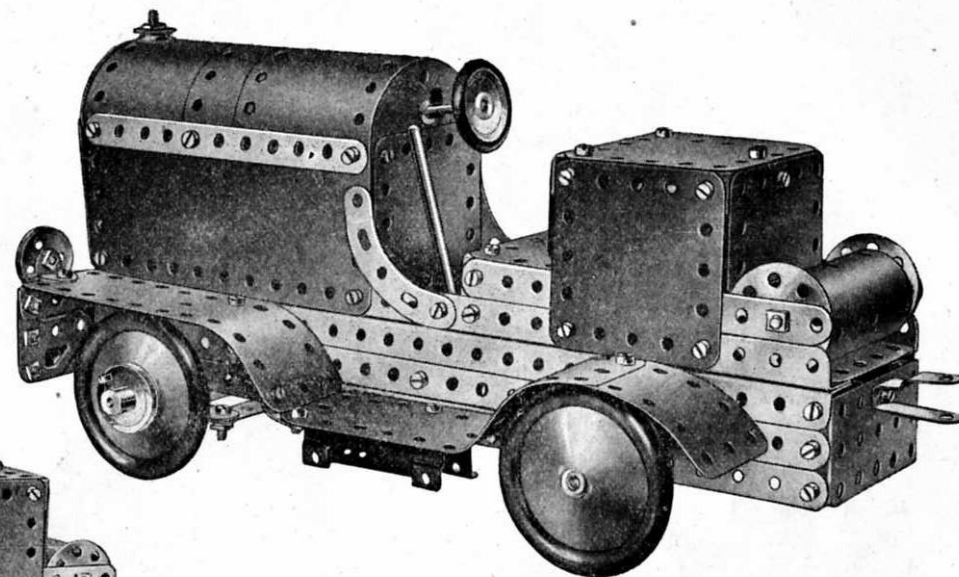


Fig. 5.20a

The mudguards on each side of the model consist of one $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " and two $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates bolted together and attached to the chassis by four Angle Brackets, the Fishplates 6 and the Trunnions 7.

The front axle beam is made by overlapping a $2\frac{1}{2}$ " and a $3\frac{1}{2}$ " Strip three holes, and it is attached to the chassis by a $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip. Each Road Wheel is free to turn on a $1\frac{1}{2}$ " Rod passed through a Double Bracket and held in position by a Spring Clip. The $\frac{3}{4}$ " Bolts 8 pass through the centre hole of a $2\frac{1}{2}$ " Strip and the Double Bracket, and are lock-nutted to the axle beam.

Steering is controlled by a Bush Wheel locked on a 5" Rod 9. The Rod is supported in the Semi-Circular Plate and a Double Angle Strip held by the Bolt 10. A compound Strip consisting of two $2\frac{1}{2}$ " Strips bolted together is secured to the Bush Wheel, and is connected to the track rod by a Threaded Pin passed through the slotted hole of an Angle Bracket 11.



A Magic Motor can be fitted as shown in Fig. 5.20b. The drive from the Motor is taken to a 1" Pulley on a $3\frac{1}{2}$ " Rod mounted in the chassis. A $\frac{1}{2}$ " Pulley on this Rod drives a 1" Pulley on the rear axle, which is formed by a $3\frac{1}{2}$ " and a 2" Rod joined by a Rod Connector. The Motor is controlled by a Rod 13, attached to the Motor brake lever by a Rod and Strip Connector.

Note: The Motor used in this model is not included in the Outfit.

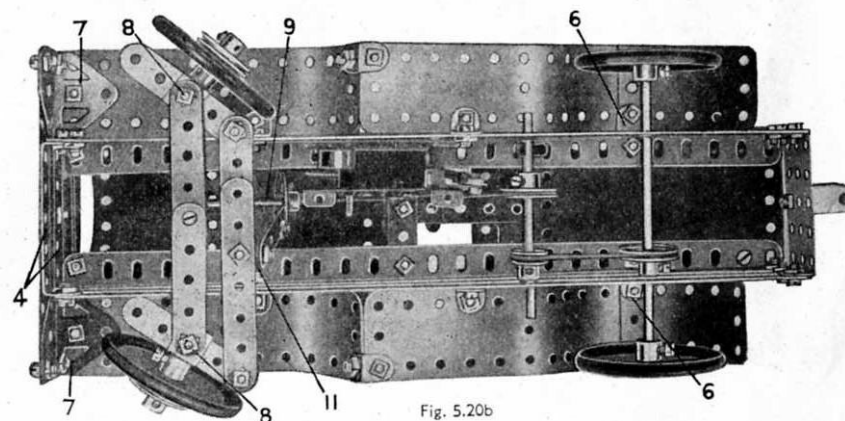


Fig. 5.20b

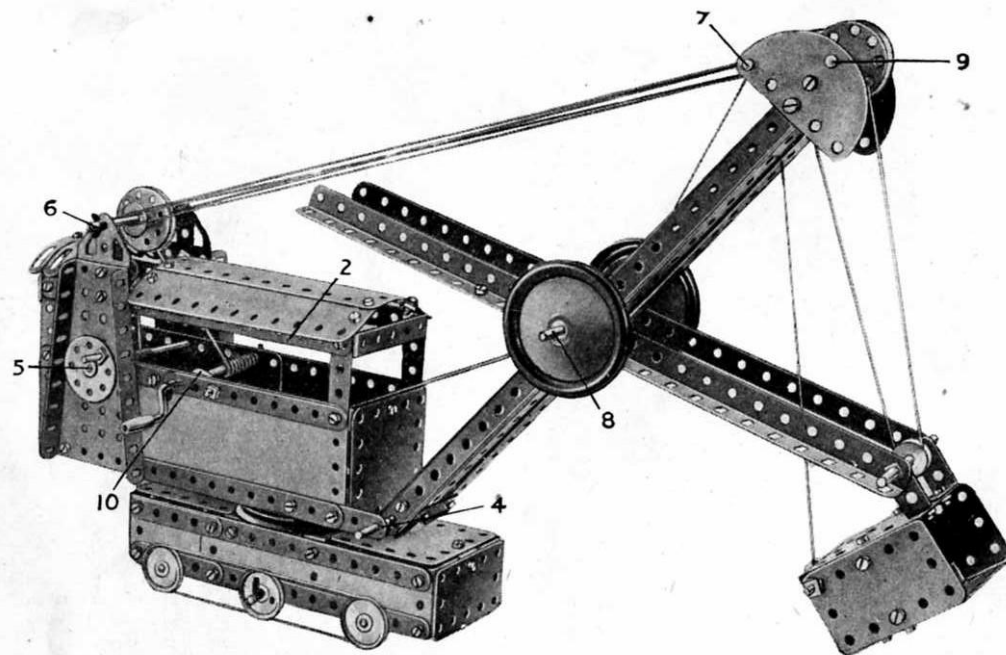
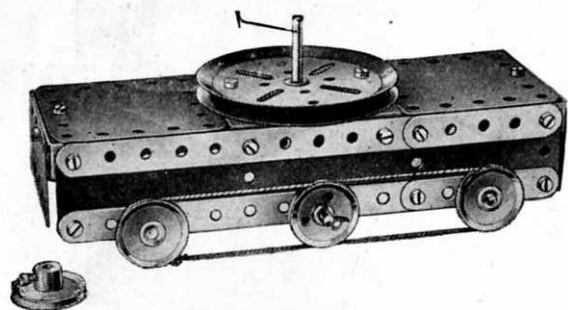


Fig. 5.21a



5.21 MECHANICAL SHOVEL

Each side of the tractor unit is formed by a $5\frac{1}{2}$ " Strip extended by a $2\frac{1}{2}$ " Strip, and by two $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates. The sides are joined by four Double Angle Strips, and a 3" Pulley is bolted to the inner pair of these. The 1" Pulleys are fastened to $3\frac{1}{2}$ " Rods, and a length of Cord represents the creeper tracks.

The sides of the cab consist of a $4\frac{1}{2}$ " \times $2\frac{1}{2}$ " and a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate overlapped five holes and bolted to a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate. A Trunnion secured to the front of the plate is passed over the Rod 1 (Fig. 5.21a) and a 1" Pulley is used to keep the cab in position. The sides are joined at the front by two Double Angle Strips and a $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate bolted in position. A similar Plate is attached at the rear.

The cab roof consists of two $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plates and is secured to Obtuse Angle Brackets bolted to the Compound Strips 2. These Strips are formed by a $5\frac{1}{2}$ " Strip and a $3\frac{1}{2}$ " Strip overlapped two holes. The rear portion of the roof is made by securing three Formed Slotted Strips to a $1\frac{1}{2}$ " Double Angle Strip 3 (Fig. 5.21b), which is attached by a $\frac{1}{2}$ " Bolt to a Fishplate, six Washers being used for spacing purposes.

The jib consists of two U-section Girders joined at each end by a $1\frac{1}{2}$ " Strip, and it pivots about a $3\frac{1}{2}$ " Rod journaled in the $2\frac{1}{2}$ " Strips 4. Each girder is made from a $12\frac{1}{2}$ " Strip and an Angle Girder secured together by Angle Brackets. The jib is luffed by a length of Cord extending from the Rod 5. This is passed over Rod 6, around Rod 7 and again over Rods 6 and 7, and finally secured to Rod 6.

The shovel arm consists of two $12\frac{1}{2}$ " Angle Girders joined by a $2\frac{1}{2}$ " Strip and pivoted on Rod 8. The shovel is made from two $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " and two $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates joined together by four Angle Brackets. The back is a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flanged Plate and is attached by lock-nuts. The shovel is pivoted on the arm by a 3" Screwed Rod. It is operated by a length of Cord from the Crank Handle. This Cord passes over two built-up Pulleys on Rods 6 and 9, around a $\frac{1}{2}$ " Pulley on the Screwed Rod, and is then fastened in the jib head. Each of the built-up Pulleys consist of two Wheel Discs separated by two Washers and fastened between Spring Clips.

The back of the shovel is released to discharge its contents by means of Cord from the $2\frac{1}{2}$ " Strip 10. This Cord passes over the jib and is tied to a Rod and Strip Connector fitted with a 1" Rod. The Rod passes through a Double Bracket on the back of the shovel and into a Fishplate bolted to the lower $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate.

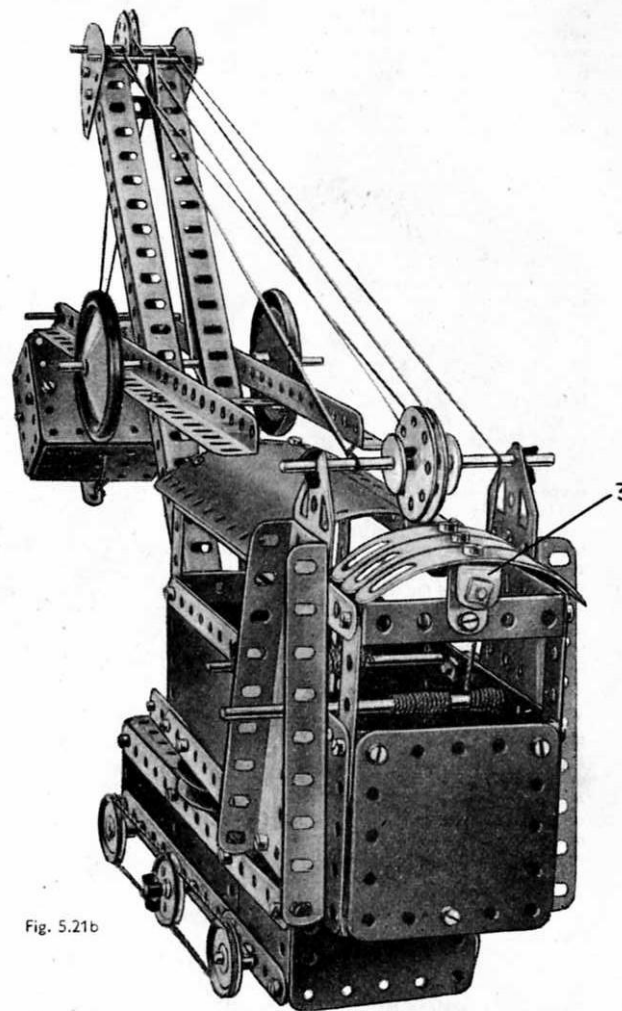


Fig. 5.21b

5.22 HAMMERHEAD CRANE

The upper girders of the jib are each made by bolting $12\frac{1}{2}$ " Strips to a $2\frac{1}{2}$ " Strip attached to a Flanged Sector Plate. The lower girders are also formed by two $12\frac{1}{2}$ " Strips, and these are joined to the Flanged Sector Plate at the centre and connected to the upper girders by $2\frac{1}{2}$ " Strips at each end as shown. The Flanged Sector Plates are attached to two $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strips bolted across a 3" Pulley and the free ends of the $12\frac{1}{2}$ " Strips are also connected by $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strips. The rear section of the jib is braced by a diagonal $12\frac{1}{2}$ " Strip at each side. This is bolted to the rear of the jib and attached to a Fishplate bolted to the Flanged Sector Plate. The forward section of the jib is braced by Strips of various sizes as shown.

The pin is removed from a Hinged Flat Plate, and the halves used separately to form the sides of the cab. The roof consists of two $1\frac{1}{8}$ " radius Curved Plates braced by Formed Slotted Strips. It is attached by Obtuse Angle Brackets to two $5\frac{1}{2}$ " and two $2\frac{1}{2}$ " Strips bolted to the sides of the cab.

The top of the tower consists of a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate bolted to the $5\frac{1}{2}$ " Strips 1. It is extended on each side by a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate. The 3" Pulley 2 is attached to the Flanged Plate by two Reversed Angle Brackets and two Double Brackets. A second 3" Pulley is secured to the jib by two Double Angle Strips and is free to turn about a 2" Rod locked in the Pulley 2. The jib is held in position by a Road Wheel.

The travelling carriage consists of a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flanged Plate. The wheels are locked on $3\frac{1}{2}$ " Rods journaled in a $1\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip and two Angle Brackets.

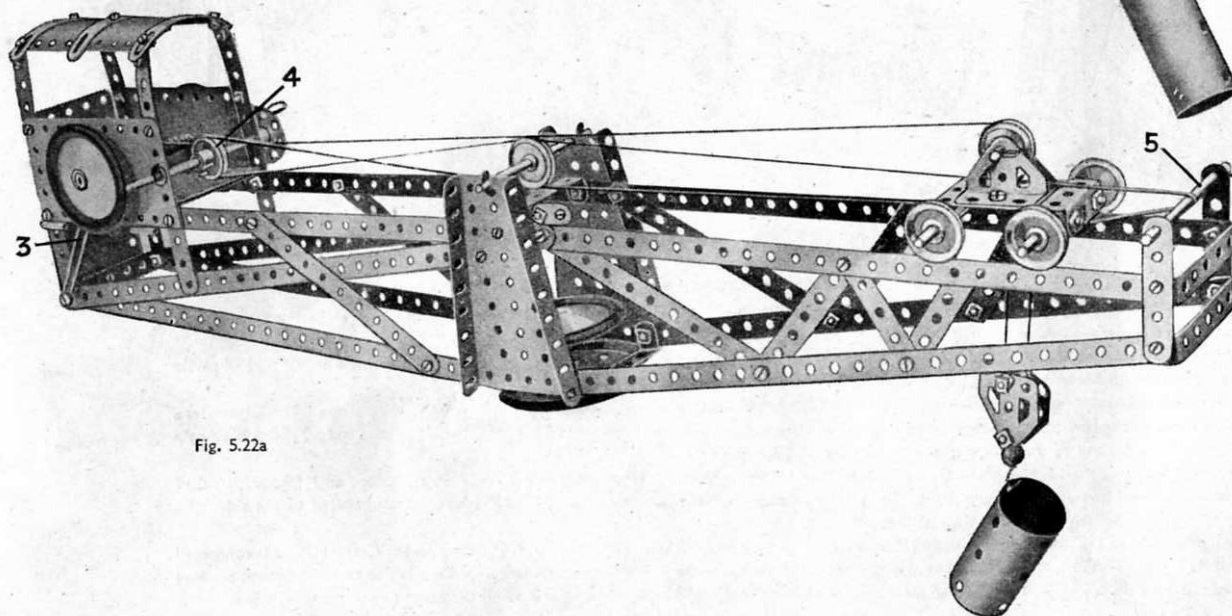
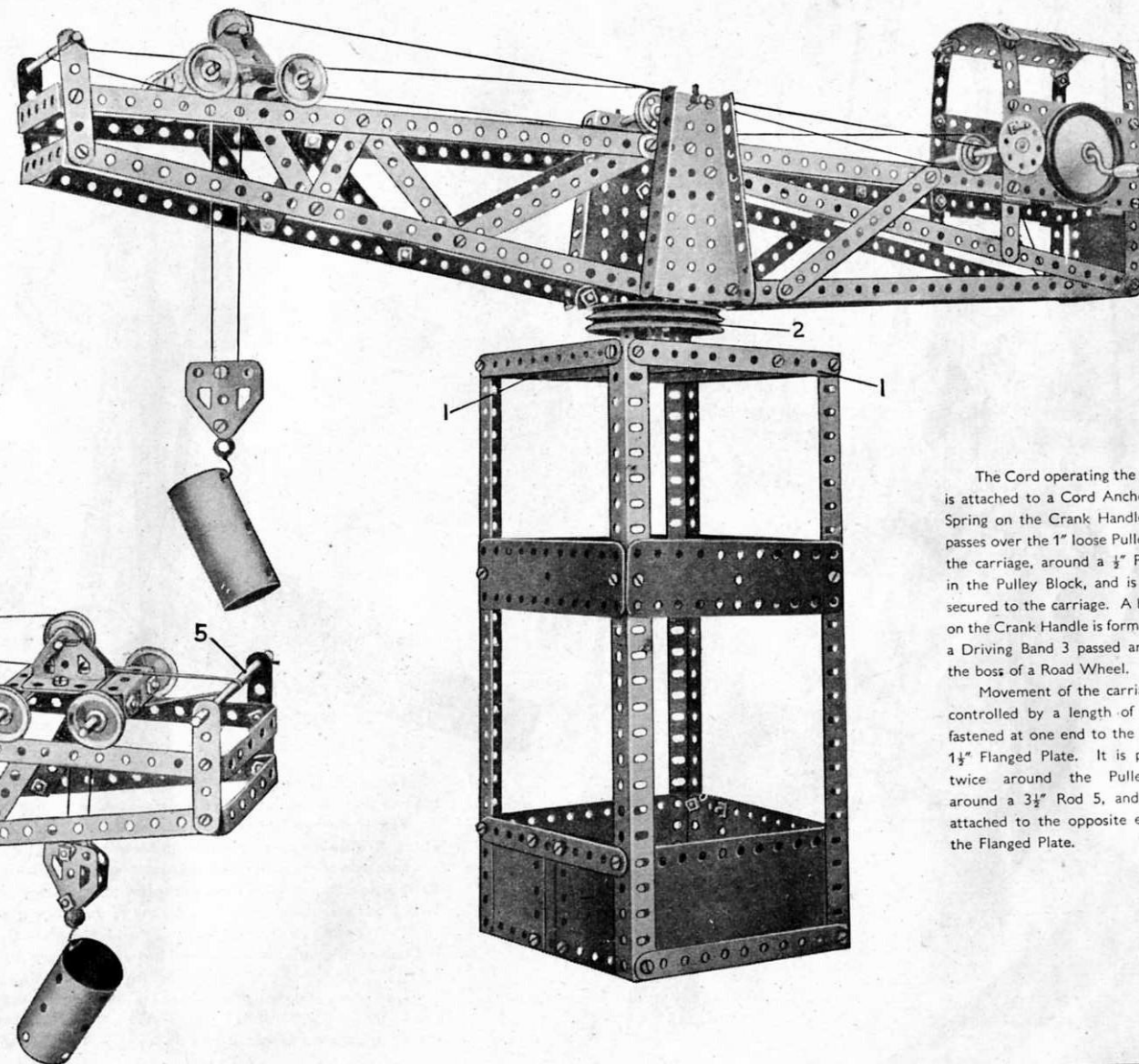


Fig. 5.22a



The Cord operating the hoist is attached to a Cord Anchoring Spring on the Crank Handle. It passes over the 1" loose Pulley on the carriage, around a $\frac{1}{2}$ " Pulley in the Pulley Block, and is then secured to the carriage. A brake on the Crank Handle is formed by a Driving Band 3 passed around the boss of a Road Wheel.

Movement of the carriage is controlled by a length of Cord fastened at one end to the $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flanged Plate. It is passed twice around the Pulley 4, around a $3\frac{1}{2}$ " Rod 5, and then attached to the opposite end of the Flanged Plate.

5.23 TRANSPORTER BRIDGE

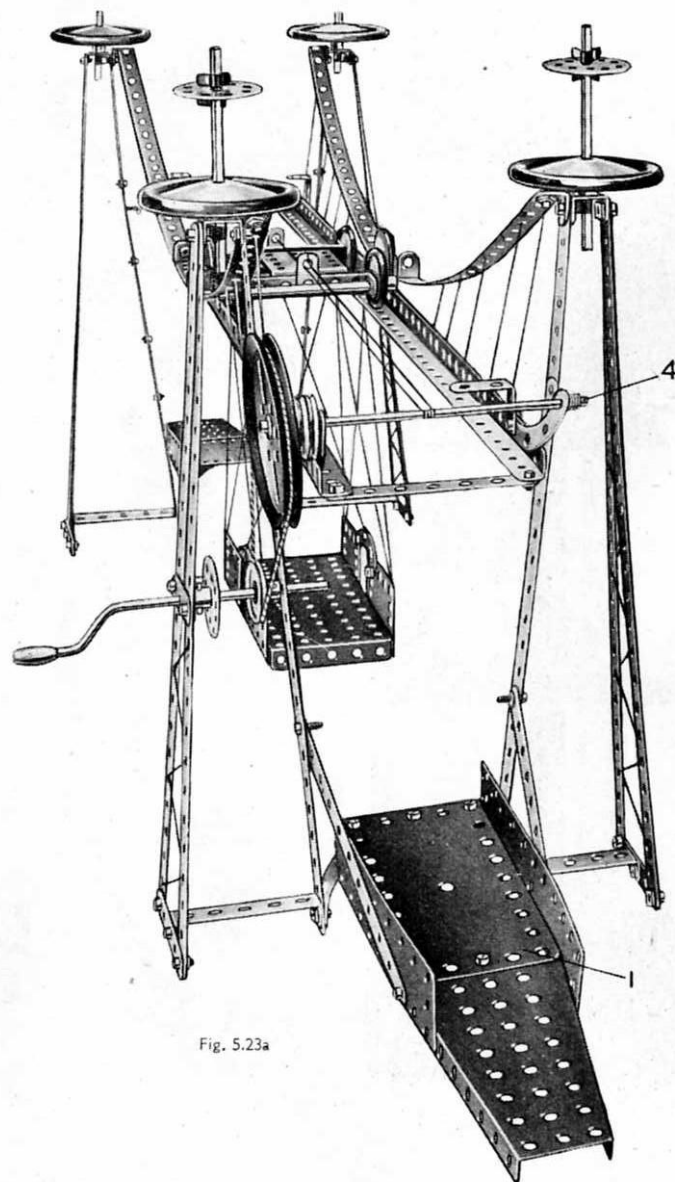
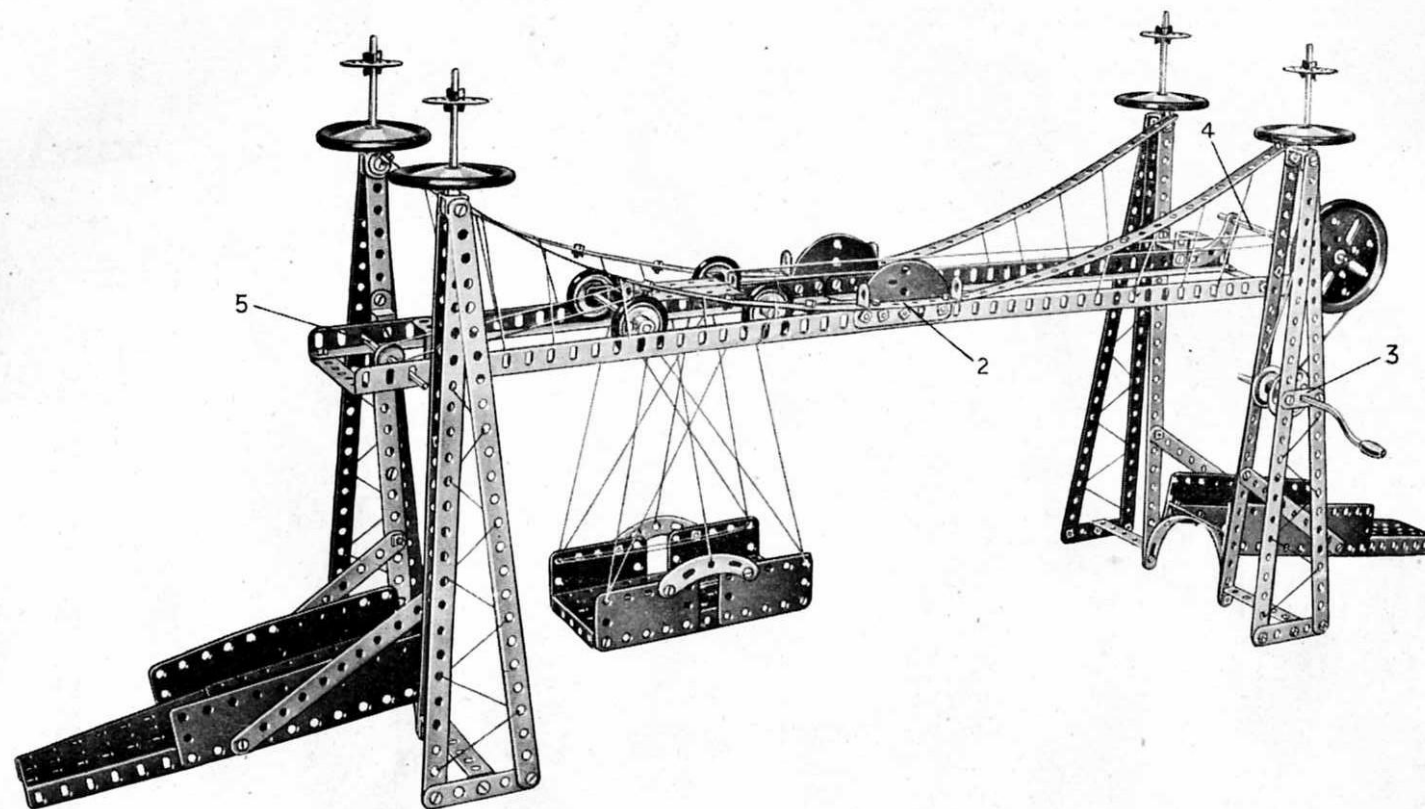


Fig. 5.23a



Two of the four supporting towers are built from three $12\frac{1}{2}$ " Strips joined at the top by a Double Bracket. The remaining towers are constructed similarly but two of the strips used in them are made up from one $2\frac{1}{2}$ " and two $5\frac{1}{2}$ " Strips.

Each of the approach roadways consist of half of a Hinged Flat Plate 1 (Fig. 5.23a) and a Flanged Sector Plate. The sides are formed by $5\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates. The approaches are attached to Formed Slotted Strips bolted to the bases of the tower.

Each side of the runway for the travelling carriage is formed by two $12\frac{1}{2}$ " Angle Girders joined at the centre by a Semi-Circular Plate. The Girders are attached to a Reversed Angle Bracket bolted to each tower. The suspension links are each built up from three $5\frac{1}{2}$ " Strips, two $2\frac{1}{2}$ " Strips and a $2\frac{1}{2}$ " Double Angle Strip 2, and are attached to the towers and to the centre of the Angle Girders by Angle Brackets.

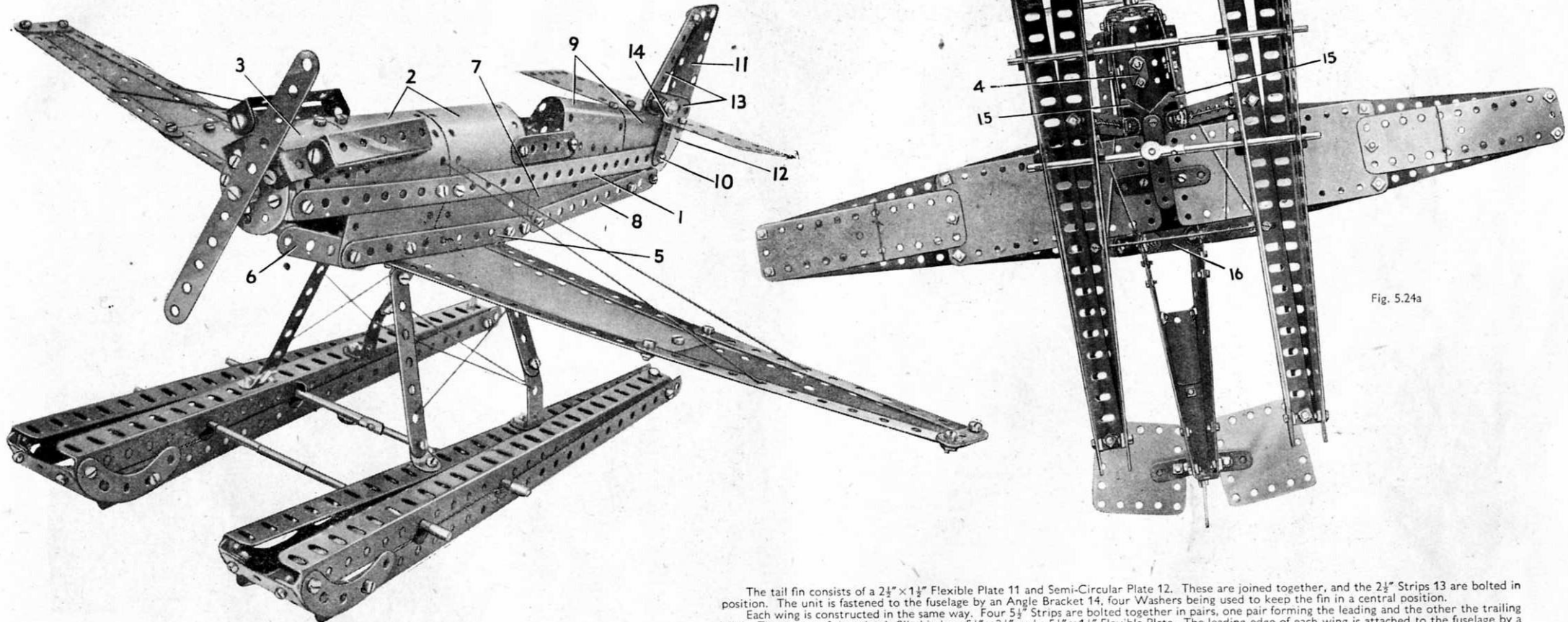
The travelling carriage consists of a $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flanged Plate, and runs on four $1\frac{1}{2}$ " Pulleys fitted with Rubber Rings. The Pulleys are locked on $3\frac{1}{2}$ " Rods journaled in Double Angle Strips bolted to each end of the Flanged Plate. The transporter carriage is made from four $2\frac{1}{2}$ " \times $1\frac{1}{2}$ " Flexible Plates bolted to the sides of a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate, and is suspended from the travelling carriage by Cord.

The carriage is operated by a Crank Handle supported in a $12\frac{1}{2}$ " Strip of one of the towers and in a $1\frac{1}{2}$ " Strip 3. A $1\frac{1}{2}$ " Pulley on the Crank Handle is connected by a belt of Cord with a $3\frac{1}{2}$ " Pulley on the Rod 4, which is journaled in Curved Strips bolted to the Angle Girders. A length of Cord is tied to a Fishplate at one end of the carriage and taken around a $\frac{1}{2}$ " Pulley on Rod 5. It is then given several turns around Rod 4 and tied to a Fishplate at the other end of the travelling carriage.

5.24 RACING SEAPLANE

The fuselage is built up on two 12½" Strips, one of which can be seen at 1. These Strips are attached at the nose to a Bush Wheel by Angle Brackets and at the tail to a Double Bracket. The 5½" × 2½" Flexible Plates 2 are then carefully bent and bolted to the Strips 1. A 2½" × 1½" Flexible Plate 3 is held in position by a Fishplate 4 (Fig. 5.24a). A 5½" Strip 5 and a 2½" Strip 6, are bolted on each side to the lower ends of the Plates 2.

A 5½" × 1½" Flexible Plate 7 and a 5½" Strip 8 are bolted to each side of the fuselage. The Strips 8 are joined by a Double Bracket, and are connected to the 12½" Strips 1 by Fishplates. Two U-section Curved Plates 9 are bolted together and held in position by a Bolt 10 on each side of the model.



The propeller consists of a 5½" Strip pivoted on a ½" Bolt held in the Bush Wheel forming the nose of the fuselage. The exhaust manifolds on each side are represented by two 2½" × ½" Double Angle Strips, bolted together and attached to a Reversed Angle Bracket fixed to the Bush Wheel.

Fig. 5.24a

The tail fin consists of a 2½" × 1½" Flexible Plate 11 and Semi-Circular Plate 12. These are joined together, and the 2½" Strips 13 are bolted in position. The unit is fastened to the fuselage by an Angle Bracket 14, four Washers being used to keep the fin in a central position.

Each wing is constructed in the same way. Four 5½" Strips are bolted together in pairs, one pair forming the leading and the other the trailing edge. The centre of the wing is filled in by a 5½" × 2½" and a 5½" × 1½" Flexible Plate. The leading edge of each wing is attached to the fuselage by a Trunnion 15 (Fig. 5.24a), and the trailing edge to a 1½" × ½" Double Angle Strip 16.

Construction of the floats is clear from the illustrations. They are joined to the fuselage by four struts, the front pair consisting of 3½" Strips, and the rear pair of two 2½" × ½" Double Angle Strips and two 2½" Strips bolted together. The float tie rods are formed by four 3½" Rods. Two of these are joined by a Rod Connector, and the remaining two by a Rod and Strip Connector.

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

5.25 HEAVY GOODS LORRY

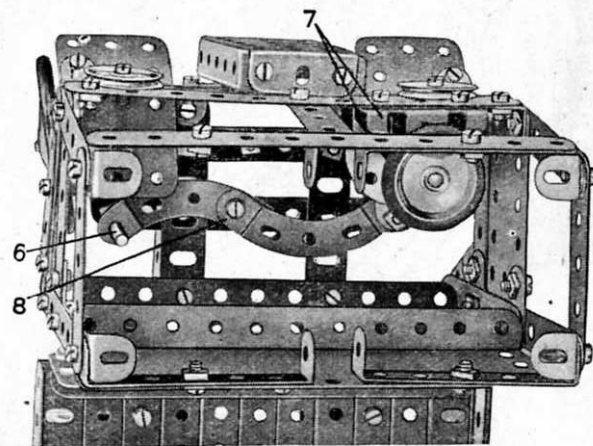
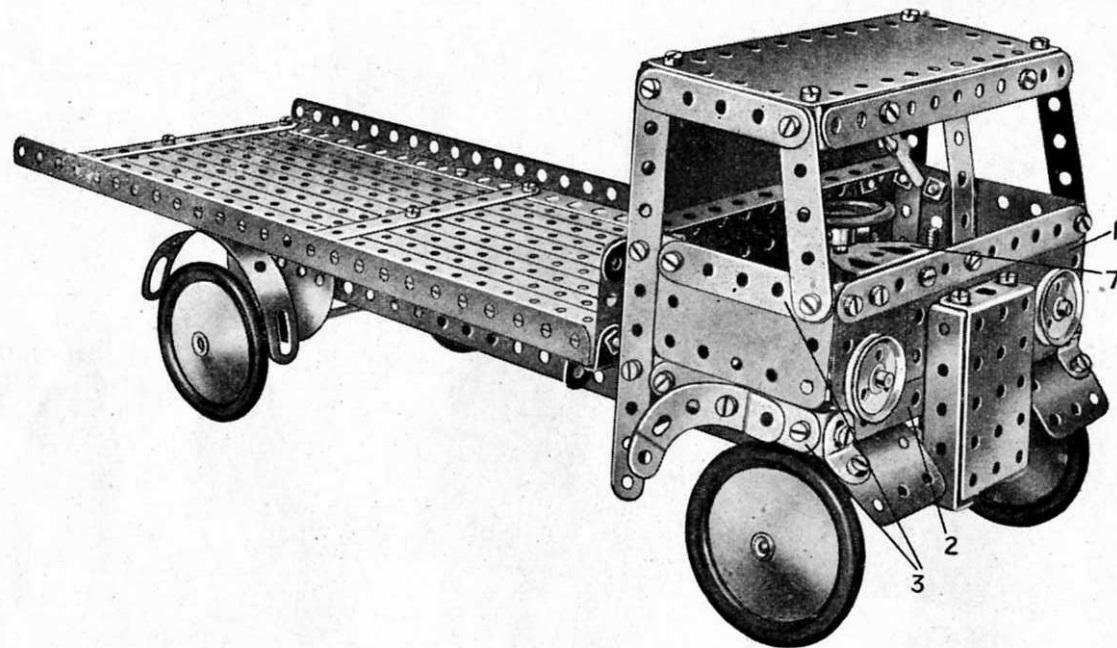


Fig. 5.25a

The 12 1/2" Strips forming the loading platform are clamped securely between three pairs of 5 1/2" Strips.

The platform is attached to the chassis by Reversed Angle Brackets 9 and 1" x 1" Angle Brackets 10.

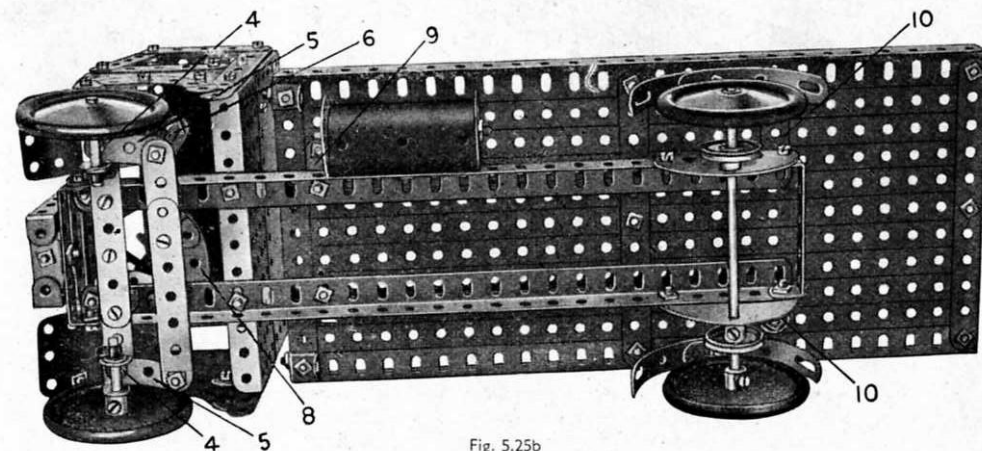
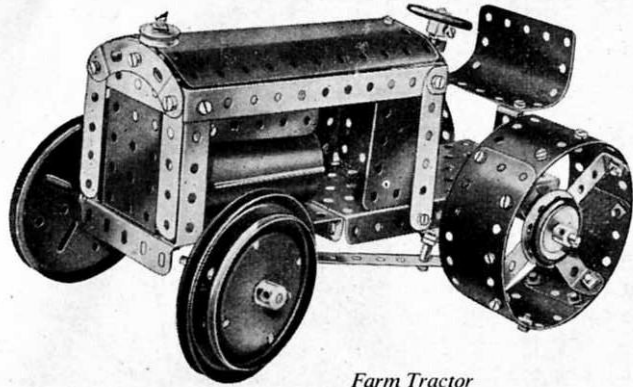


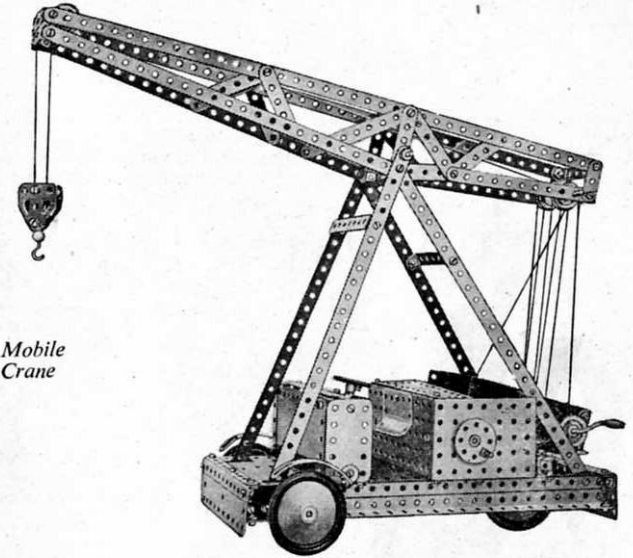
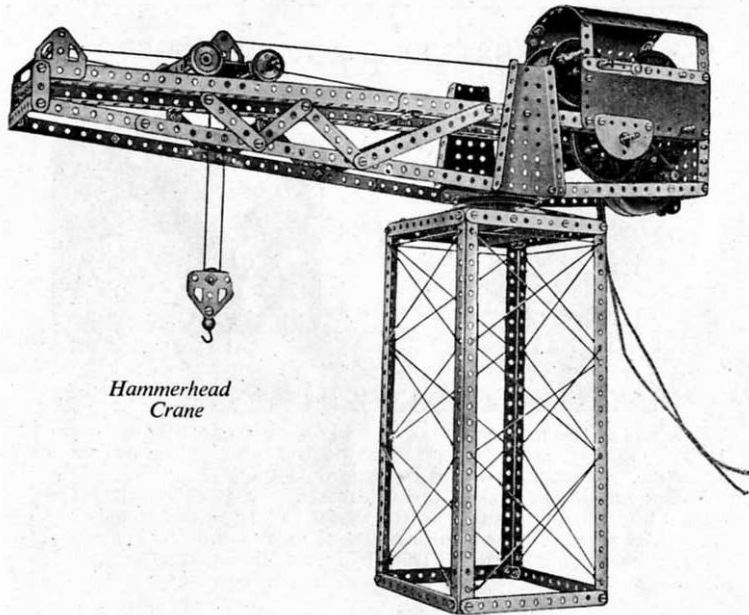
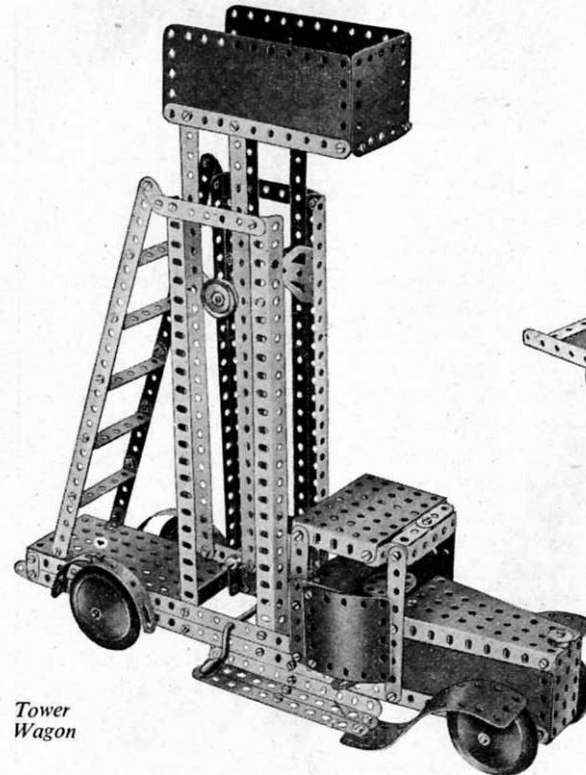
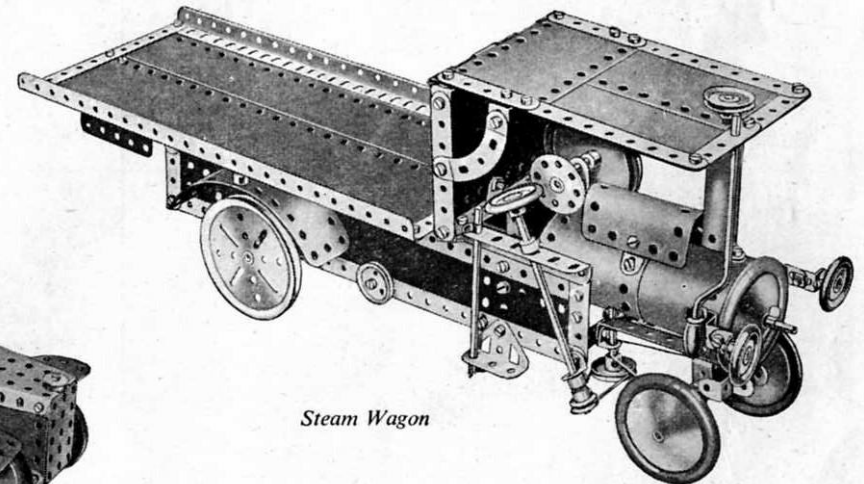
Fig. 5.25b

*Farm Tractor*

BUILD BIGGER AND BETTER MODELS

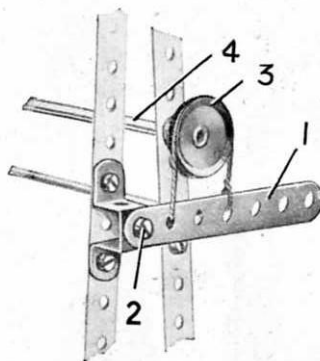
When you have built all the models shown in this Book of Instructions, you will be keen to build bigger and more elaborate models. Your next step is to purchase a Meccano No. 5a Accessory Outfit containing all the parts required to convert your No. 5 into a No. 6 Outfit. You will then be able to build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

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

*Mobile Crane**Hammerhead Crane**Tower Wagon**Steam Wagon*

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

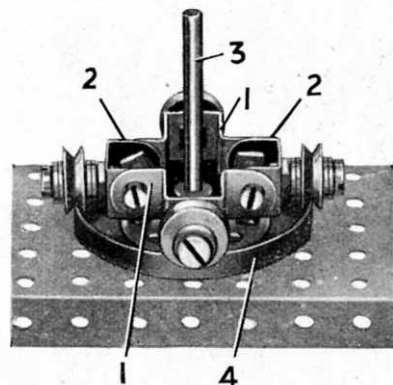
USEFUL BAND BRAKE



S.M.111. The brake lever consists of a $3\frac{1}{2}$ " Strip 1, pivotally attached at a suitable point on the frame of the model, to be fitted, by means of a lock-nutted $\frac{3}{8}$ " Bolt 2. The driven shaft 4 is fitted at one end with a 1" fast Pulley 3 round which a short length of cord is passed. The two ends of this Cord are secured to the brake lever at the points shown in the illustration.

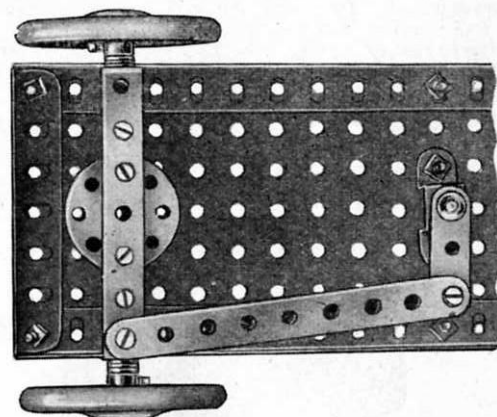
If increased braking effect is desired a larger Pulley may be used in place of the 1" fast Pulley 3, the brake lever 1 being attached in a lower position if necessary. Alternatively a weight can be hung from the end of the brake lever.

BUILT UP ROLLER BEARING



S.M.136. The spider frame is built up from Double Bent Strips 1 connected together by two Double Brackets 2. The four wheels used are represented by $\frac{1}{2}$ " loose Pulleys journalled on Pivot Bolts secured to the outer ends of the four arms of the frame. Four Washers, two on each side of the Pulleys are passed on to the shank of each of the Pivot Bolts that are attached to the Double Brackets 2. In the case of the other two Pivot Bolts, two Washers are placed against the external side only of the Pulley.

SIMPLE STEERING GEAR



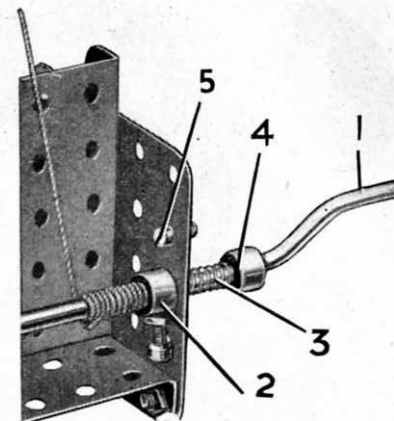
S.M.162. The simple steering gear will be found suitable for most small model vehicles.

In this example the two front wheels are mounted on separate stub axles that are secured to each end of a rigid front axle. The base of the chassis consists of two long Angle Girders connected together at the front end by a $3\frac{1}{2}$ " Angle Girder and filled in along their length by means of $5\frac{1}{2} \times 3\frac{1}{2}$ " Flat Plates.

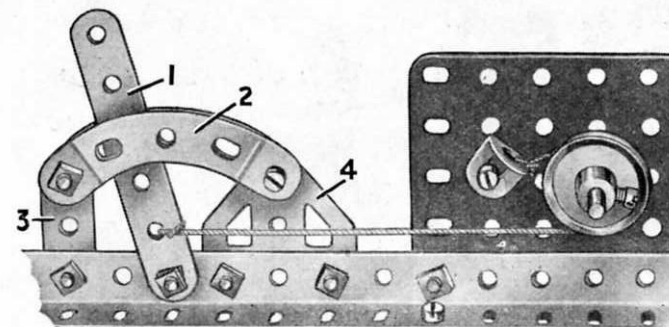
The front axle, a $3\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strip, is pivotally mounted at its centre on a Bush Wheel and short Rod. It is fitted, $\frac{1}{2}$ " from each end, with a $\frac{1}{2} \times \frac{1}{2}$ " Angle Bracket, this forming the inner bearing for its respective stub axle. The outer bearing for the axle consists of the upturned lug of the Double Angle Strip. One end of this latter part is fitted with a pivotally attached $4\frac{1}{2}$ " Strip, by means of which the front axle is linked up to a Crank fixed to the steering column.

SAFETY CATCH FOR CRANE WINDING GEAR

S.M.125. The Compression Spring 3 is mounted on the Crank Handle 1 between the Collar 4 and a Washer, and normally holds the Collar 2 against the inner side of the plate. The Collar 2 is fitted with a $\frac{3}{8}$ " Bolt, and if the Crank Handle commences to rotate, the head of this Bolt strikes against the stop 5 and prevents further movement.



BRAKE LEVER and QUADRANT



S.M.112. This mechanism is a form of band brake in which the lever 1 can be held in any position by means of the quadrant 2. In this way varying pressures can be applied to the Pulley forming the brake drum.

One end of the brake Cord is attached to a $\frac{1}{2} \times \frac{1}{2}$ " Angle Bracket bolted in a suitable position on the model. After passing round the 1" fast Pulley forming the brake drum the Cord is secured at the next to bottom hole of a 3" Strip 1. This Strip forms the brake lever, and it is secured to the frame of the model by a lock-nutted Bolt.

CONTENTS OF MECCANO OUTFITS

O	Oa	1	1a	2	2a	3	3a	4	4a	No.	Description of Parts	5	5a	6	6a	7	7a	8	8a	9	9a	10
—	—	—	—	—	—	—	—	—	—	1	Perforated Strips, 12" x 1/2"	10	2	12	—	12	2	14	—	14	10	24
—	—	—	—	—	—	—	—	—	—	1a	"	14	—	14	—	—	—	—	—	2	6	6
4	4	4	4	4	4	4	4	4	4	1b	"	—	—	—	—	—	—	—	3	24	12	36
—	—	—	—	—	—	—	—	—	—	2	"	2	2	2	2	2	2	2	2	8	6	8
—	—	—	—	—	—	—	—	—	—	2a	"	—	—	—	—	—	—	—	2	6	12	18
—	—	—	—	—	—	—	—	—	—	3	"	—	—	—	—	—	—	—	2	8	12	18
2	2	2	2	2	2	2	2	2	2	4	"	12	12	12	12	12	12	12	18	36	72	108
—	—	—	—	—	—	—	—	—	—	5	"	—	—	—	—	—	—	—	2	6	12	18
—	—	—	—	—	—	—	—	—	—	6	"	2	2	2	2	2	2	2	2	6	12	18
—	—	—	—	—	—	—	—	—	—	6a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	7	Angle Girders, 24" x 1 1/2"	4	4	4	4	4	4	4	2	10	6	8
—	—	—	—	—	—	—	—	—	—	7a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	8	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	8a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	8b	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	9	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	9a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	9b	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	9c	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	9d	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	9e	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	9f	"	—	—	—	—	—	—	—	—	—	—	—
4	4	4	4	4	4	4	4	4	4	10	Fishplates	8	8	8	8	8	8	8	2	2	2	2
—	—	—	—	—	—	—	—	—	—	11	Double Brackets	—	—	—	—	—	—	—	—	—	—	—
4	4	4	4	4	4	4	4	4	4	12	Angle Brackets, 12" x 1/2"	12	12	12	12	12	12	12	3	23	12	24
—	—	—	—	—	—	—	—	—	—	12a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	12b	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	12c	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	13	Obtuse Angle Brackets, 3" x 3"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	13a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	13b	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	14	Axle Rods, 1 1/2"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	15	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	15a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	15b	"	—	—	—	—	—	—	—	—	—	—	—
1	1	2	—	—	—	—	—	—	—	16	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	16a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	16b	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	17	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	17a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	18	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	18a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	18b	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	19	Pulleys, 3" diam. with boss and screw	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	19b	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	19c	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	19d	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	19e	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	19f	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	19g	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	19h	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	20	Pulleys, 3" diam. with boss and screw	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	20a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	20b	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	21	Flanged Wheels, 3" diam.	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	21a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	22	Pulleys, 1 1/2" diam. with boss and screw	—	—	—	—	—	—	—	—	—	—	—
2	2	4	—	—	—	—	—	—	—	22a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	22b	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	23	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	23a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	24	Bush Wheels, 1 1/2" diam. without hush	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	24a	"	—	—	—	—	—	—	—	—	—	—	—
1	1	1	1	1	2	2	2	2	2	25	Pinions, 2 1/2" diam., 25 teeth	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	25a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	26	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	26a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	26b	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	27	Gear Wheels, 1 1/2" diam., 50 teeth	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	27a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	27b	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	27c	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	27d	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	28	Contrate Wheels, 1 1/2" diam., 95 teeth	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	29	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	30	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	30a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	30c	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	31	Gear Wheels, 1 1/2" diam., 48 teeth	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	31a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	32	Worms, 3/4" diam., 38 teeth	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	32a	"	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	33	Spacers	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	34	Box Spacers	—	—	—	—	—	—	—	—	—	—	—
—	—																					

Continued on following page

CONTENTS OF MECCANO OUTFITS (Continued)

[illegible]

Full instructions for building a fine range of models are included with each Outfit.

THE MECCANO SYSTEM

The foregoing list contains all the Meccano parts that are included in Outfits. It shows which parts are required to build up any Outfit into the one next larger. Thus it is helpful to boys who wish to add a few parts from time to time instead of buying an Accessory Outfit. It also enables a boy to check the contents of his Outfit at intervals, so that he can note and replace any missing parts.

There are in addition many Meccano parts that are not included in Outfits. These parts will be found in the illustrated list in the following pages, which includes every part in the Meccano System.

3
Perforated Strips

No.	1.	12 $\frac{1}{2}$ "	No.	3.	3 $\frac{1}{2}$ "
1a.	9 $\frac{1}{2}$ "		4.	3 $\frac{1}{2}$ "	
1b.	7 $\frac{1}{2}$ "		5.	2 $\frac{1}{2}$ "	
2.	5 $\frac{1}{2}$ "		6.	2 $\frac{1}{2}$ "	
2a.	4 $\frac{1}{2}$ "		6a.	1 $\frac{1}{2}$ "	

9^a
Angle Girders

7.	24 $\frac{1}{2}$ "	9a.	4 $\frac{1}{2}$ "
7a.	18 $\frac{1}{2}$ "	9b.	3 $\frac{1}{2}$ "
8.	12 $\frac{1}{2}$ "	9c.	3 $\frac{1}{2}$ "
8a.	9 $\frac{1}{2}$ "	9d.	2 $\frac{1}{2}$ "
8b.	7 $\frac{1}{2}$ "	9e.	2 $\frac{1}{2}$ "
9.	5 $\frac{1}{2}$ "	9f.	1 $\frac{1}{2}$ "

10 Fishplate
11 Double Bracket
12 Angle Bracket, $\frac{1}{2} \times \frac{1}{2}$
12a. " " $\frac{1}{2} \times \frac{1}{2}$
12b. " " $\frac{1}{2} \times \frac{1}{2}$
12c. Obtuse Angle Bracket, $\frac{1}{2} \times \frac{1}{2}$

17
Axle Rods

13.	11 $\frac{1}{2}$ "	16.	3 $\frac{1}{2}$ "
13a.	8 $\frac{1}{2}$ "	16a.	2 $\frac{1}{2}$ "
14.	6 $\frac{1}{2}$ "	16b.	2 $\frac{1}{2}$ "
15.	5 $\frac{1}{2}$ "	17.	2 $\frac{1}{2}$ "
15a.	4 $\frac{1}{2}$ "	18a.	1 $\frac{1}{2}$ "
15b.	4 $\frac{1}{2}$ "	18b.	1 $\frac{1}{2}$ "

19h
Crank Handle, $\frac{3}{4}$ " Shaft with grip
19h. " " $\frac{3}{4}$ " " without grip
19s. " " $\frac{3}{4}$ " " without grip

20 Spoked Wheel, 3" diam.
19^a Flanged Wheel, $1\frac{1}{2}$ " diam.
20b. " " " "

22 Pulleys
19b. 3" diam. with boss and screw
19c. 6" " " " " "
20a. 2" " " " " "
21. 1 $\frac{1}{2}$ " " " " " "
22. 1" " " " " "
22a. 1" " without " " "
23. " " with " " "
23a. " " with " " "

24 Bush Wheel, $1\frac{1}{2}$ " diam.
24a. Wheel Disc, $1\frac{1}{2}$ " diam., without bush

26
Pinion, $\frac{1}{2}$ " diam., $\frac{1}{4}$ " face, 25 teeth
25. " " " " " " 25
25b. " " " " " " 25
26. " " " " " " 19
26a. " " " " " " 19
26b. " " " " " " 19

27 Gear Wheels
27. $1\frac{1}{2}$ " diam., 50 teeth,
27a. $1\frac{1}{2}$ " " 57
27b. $3\frac{1}{2}$ " " 133
27c. $2\frac{1}{2}$ " " 95

28 Contrate Wheel, $1\frac{1}{2}$ " diam., 50 teeth
29. " " " " 25

30^a & 30^c
30. Bevel Gear, $\frac{1}{2}$ " diam., 26 teeth (for use in pairs)
30a. " " $\frac{1}{2}$ " " 16 " Can only be used together
30c. " " $1\frac{1}{2}$ " " 48 " "

31 Gear Wheel, 1" diam., $\frac{1}{4}$ " face, 38 teeth
32 Worm, $\frac{1}{2}$ " diam.

34 Spanner
34b. Box Spanner

35 Spring Clip
36. Screwdriver
36a. " " " " " "
36c. Drift (for levering bolt holes into line)
37. Nut and Bolt, $\frac{3}{8}$ "
37a. Nut
37b. Bolt, $\frac{3}{8}$ "
38. Washer
38d. " $\frac{3}{8}$ "
40. Hank of Cord

41 Propeller Blade

43 Tension Spring, 2" long

44 Bent Strip, stepped
45 Double Bent Strip
46 Double Angle Strip, $2\frac{1}{2} \times 1$
47. " " " " $2\frac{1}{2} \times 1$
47a. " " " " 3×1
48. " " " " 1×1
48a. " " " " 2×1
48b. " " " " 3×1
48c. " " " " 4×1
48d. " " " " 5×1

50 Slide Piece

52 Flanged Plate, $2\frac{1}{2} \times 1\frac{1}{2}$
52. " " $5 \times 2\frac{1}{2}$
52a. Flat Plate, 5×3
53. Flanged Plate, $3 \times 2\frac{1}{2}$
53a. Flat Plate, $4 \times 2\frac{1}{2}$

54 Flanged Sector Plate, $4\frac{1}{2}$ " long

55 Perforated Strip, slotted, $5\frac{1}{2}$ " long
55a. " " " " 2"

57^a Hook, Loaded, Large
57b. " " Small

58 Spring Cord, 40" Length
58a. Coupling Screw for Spring Cord
58b. Hook for Spring Cord

59 Collar, with screw

61 Windmill Sail

62 Crank
62a. Threaded Crank
62b. Double Arm Crank

63 Coupling
63b. Strip Coupling
63c. Threaded Coupling

64 Threaded Boss
65 Centre Fork
69. Set Screw, $\frac{1}{8}$ "
69a. Grub Screw, $\frac{1}{8}$ "
69b. " " $\frac{1}{8}$ "
69c. " " $\frac{1}{8}$ "

76 Flat Plate, $5\frac{1}{2} \times 2\frac{1}{2}$
72. " " $2\frac{1}{2} \times 2\frac{1}{2}$
73. " " $3 \times 1\frac{1}{2}$
76. Triangular Plate, $2\frac{1}{2}$ "
77. " " 1"

80^a
Screwed Rods
78. 11 $\frac{1}{2}$ " 80b. 4 $\frac{1}{2}$ "
79. 8" 80c. 3"
79a. 6" 81. 2"
80. 5" 82. 1"
80a. 3 $\frac{1}{2}$ "

89 Curved Strip, $5\frac{1}{2}$ ", 10" radius
89a. " " stepped, 3", $1\frac{1}{2}$ " radius
89b. Curved Strip, stepped, 4", $4\frac{1}{2}$ " radius
90. Curved Strip, $2\frac{1}{2}$ ", $2\frac{1}{2}$ " radius
90a. " " stepped, $2\frac{1}{2}$ ", $1\frac{1}{2}$ " radius

94 Sprocket Chain, 40" length
95. " Wheel, 2" diam., 36 teeth
95a. " " $1\frac{1}{2}$ " " 28 "
95b. " " 3" " 56 "
96. " " 1" " 18 "
96a. " " $\frac{3}{4}$ " " 14 "

99 Braced Girders
97. $3\frac{1}{2}$ " long 99a. $9\frac{1}{2}$ " long
97a. 3" " 99b. 7 $\frac{1}{2}$ " "
98. 2 $\frac{1}{2}$ " " 100. 5 $\frac{1}{2}$ " "
99. 12 $\frac{1}{2}$ " " 100a. 4 $\frac{1}{2}$ " "

101 Heald, for looms
102 Single Bent Strip

103^a Flat Girders
103. 5 $\frac{1}{2}$ " long 103e. 3" long
103a. 9 $\frac{1}{2}$ " " 103f. 2 $\frac{1}{2}$ " "
103b. 12 $\frac{1}{2}$ " " 103g. 2" "
103c. 4 $\frac{1}{2}$ " " 103h. 1 $\frac{1}{2}$ " "
103d. 3 $\frac{1}{2}$ " " 103k. $\frac{1}{2}$ " "

104 Shuttle, for looms
105 Reed Hook, for looms

106 Wood Roller
106a. Sand Roller

108 Corner Gusset
109 Face Plate, $2\frac{1}{2}$ " diam.

110 Rack Strip, $3\frac{1}{2}$ " long
110a. Bolt, $\frac{3}{8}$ " 111c. Bolt, $\frac{3}{8}$ "
111. " $\frac{1}{2}$ " 111d. " $1\frac{1}{2}$ "
111a. " $\frac{1}{2}$ "

113 Girder Frame

114 Hinge
115 Threaded Pin
116. Fork Piece, Large
116a. " Small
117. Steel Ball, $\frac{3}{8}$ " diam.

118 Hub Disc, $5\frac{1}{2}$ " diam.

No. 120b. Compression Spring, $\frac{1}{8}$ " long

120^b



122. Miniature Loaded Sack



123

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



125



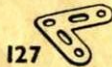
126

126. Trunnion



126^a

126a. Flat Trunnion



127

127. Bell Crank
128. Bell Crank, with Boss

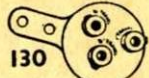


128



129

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



130

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



130^a



131

131. Dredger Bucket
132. Flywheel, $2\frac{1}{2}$ " diam.



132



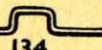
133

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



133^a

No. 134. Crank Shaft, 1" stroke

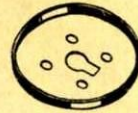


134



136

136. Handrail Support
136a. Handrail Coupling
137. Wheel Flange



137



136^a



138^a

138a. Ship Funnel



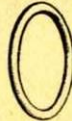
139

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



140

140. Universal Coupling



142

142. Rubber Ring (to fit 3" diam. rim)
142a. Motor Tyre (to fit 2" diam. rim)
142b. " " " 3"
142c. " " " 1"
142d. " " " $1\frac{1}{2}$ "



142^a



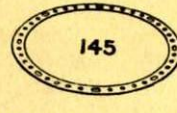
143

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

No. 144. Dog Clutch

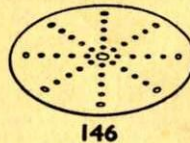


144



145

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



146



147 & 148

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



151

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



154^a & 154^b

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



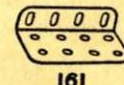
157

157. Fan, 2" diam.

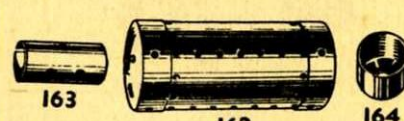


160

160. Channel Bearing, $1\frac{1}{2}$ " x $1\frac{1}{2}$ " x $\frac{1}{2}$ "
161. Girder Bracket, 2" x $1\frac{1}{2}$ " x $\frac{1}{2}$ "



161



163

162



164

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

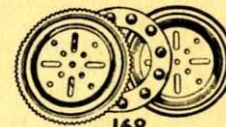


165



166

165. Swivel Bearing
166. End
167b. Flanged Ring, $9\frac{3}{8}$ " diam.



168

168. Ball Bearing, 4" diam.
168a. " Race, flanged disc, $3\frac{1}{2}$ " diam.
168b. " " toothed " 4" diam.
168c. " Cage, $3\frac{1}{2}$ " diam., complete with balls.



171

171. Socket Coupling



175

175. Flexible Coupling Unit



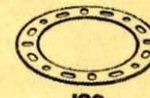
176

176. Anchoring Spring for Cord



179

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



180

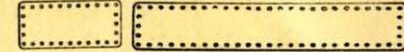


185



187

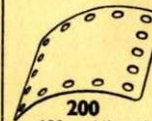
No. 185. Steering Wheel, $1\frac{1}{2}$ " diam.
186. Driving Band, $2\frac{1}{2}$ " (Light)
186a. " " " 10"
186b. " " " 10"
186c. " " " 15" (Heavy)
186d. " " " 20"
187. Road Wheel, $2\frac{1}{2}$ " diam.
187a. Conical Disc, $1\frac{1}{2}$ " diam.



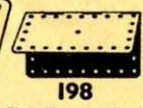
192

197

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



198



199

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



211^a & 211^b

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

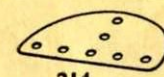


212

212. Rod and Strip Connector
213. Rod Connector



213



214

214. Semi-Circular Plate, $2\frac{1}{2}$ "
215. Formed Slotted Strip, 3"



215



216

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