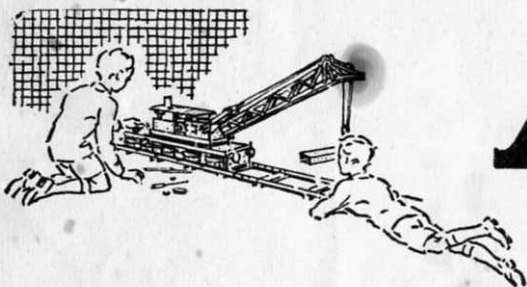


MECCANO

INSTRUCTIONS FOR
No. 3 OUTFIT

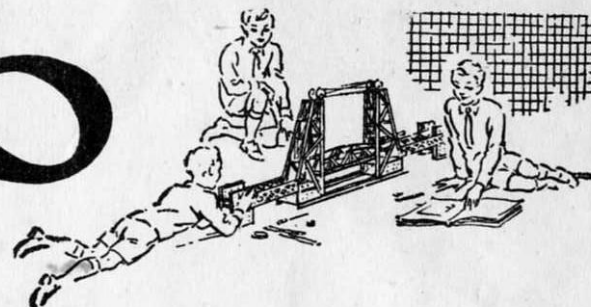
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45.3





MECCANO

Real Engineering in Miniature



MODEL-BUILDING WITH MECCANO

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

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

HOW TO BUILD UP YOUR OUTFIT

Meccano is sold in 11 different Outfits, ranging from No. 0 to No. 10. Each Outfit from No. 1 upwards can be converted into the one next larger by the purchase of an Accessory Outfit. Thus Meccano No. 1 Outfit can be converted into No. 2 Outfit by adding to it a No. 1a Accessory Outfit. No. 2a Outfit would then convert it into a No. 3, and so on. In this way, no matter with which Outfit you begin, you can build it up by degrees until you have a No. 10 Outfit.

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

Special Note.—The Meccano Plates (Flanged, Flat, Curved, etc.) are shown in the Manuals with diagonal white lines. In the new Meccano Outfits these parts are plain.

Several of the illustrations in this Manual show how miniature figures and various small articles can be introduced to add realism to the models. These are not included in the Outfit. Many of them are Meccano Dinky Toys that can be bought separately from your Meccano dealer.

THE "MECCANO MAGAZINE"

The "Meccano Magazine" is published specially for Meccano boys. Every month it describes and illustrates new Meccano models for Outfits of all sizes, and deals with suggestions from readers for new Meccano parts and for new methods of using the existing parts.

There are model-building competitions specially

planned to give an equal chance to the owners of small and large Outfits. In addition, there are splendid articles on such subjects as Railways, Famous Engineers and Inventors, Electricity, Chemistry, Bridges, Cranes and Aeroplanes, and special sections dealing with the latest Engineering, Aviation and Shipping News. Other pages deal with Stamp Collecting, and Books of interest to boys; and a feature of outstanding popularity is the section devoted to short articles from readers.

If you are not already a reader write to the Editor for full particulars, or order a copy from your Meccano dealer, or from any newsagent.

THE MECCANO GUILD

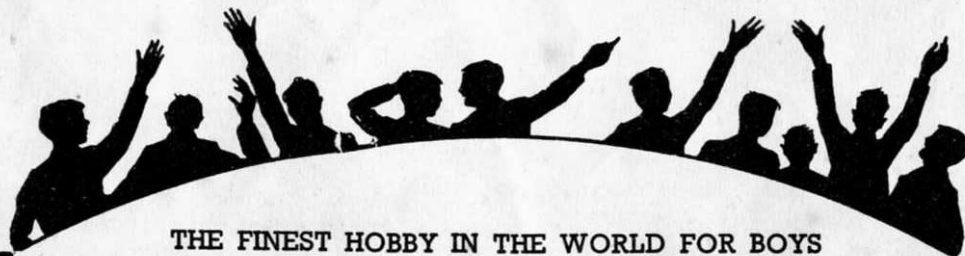
Every owner of a Meccano Outfit should join the Meccano Guild. This is a world-wide organisation, started at the request of Meccano boys. Its primary object is to bring boys together and to make them feel that they are all members of a great brotherhood, each trying to help others to get the very best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

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

MECCANO SERVICE

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

Whatever your problem may be, write to us about it. Do not hesitate. We shall be delighted to help you in any way possible.



THE FINEST HOBBY IN THE WORLD FOR BOYS

HOW TO BEGIN THE FUN

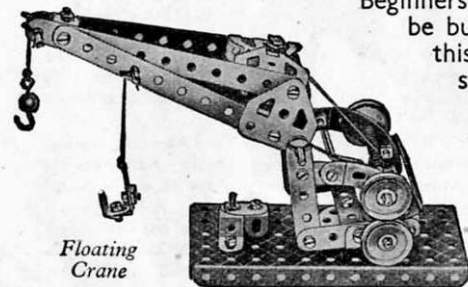
THE MOST FASCINATING OF ALL HOBBIES

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

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

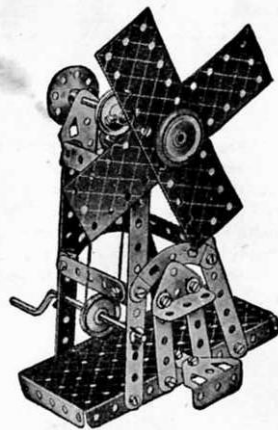
A FEW USEFUL HINTS

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



Floating Crane

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



Windmill

THE IMPORTANCE OF "LOCK-NUTTING"

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

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

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

MOTORS AND GEARING

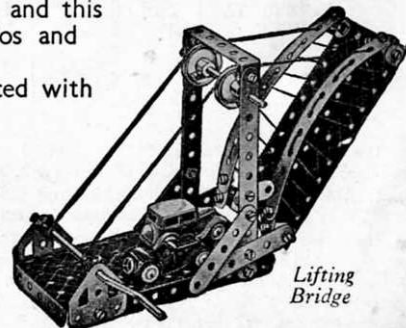
Models can be operated by means of either clockwork or electric motors.

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

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

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

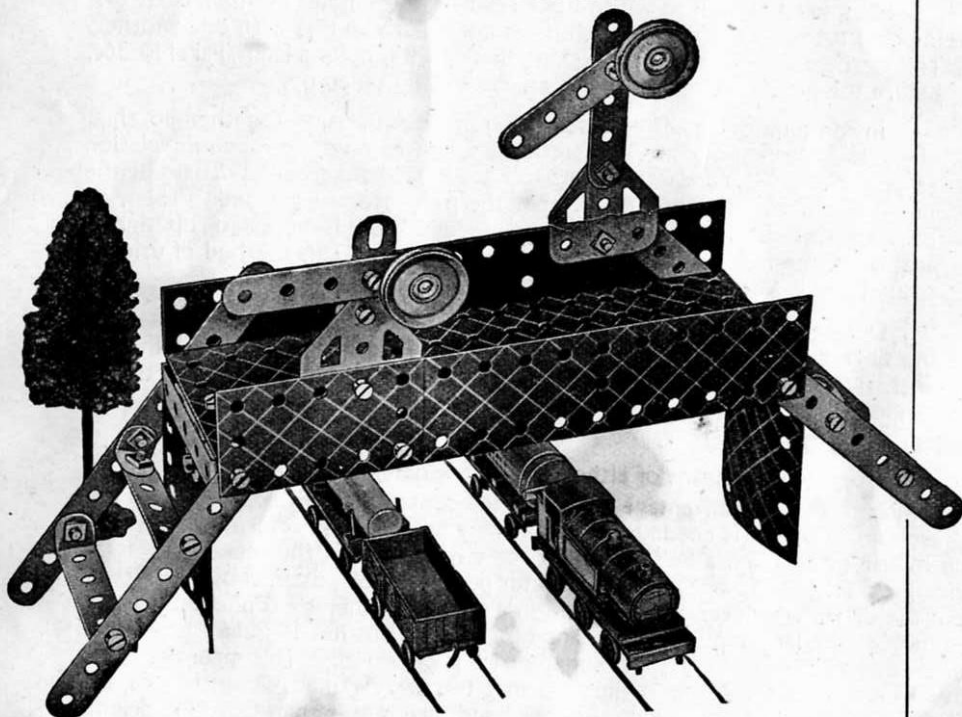
On account of wartime restrictions the only Meccano Motor at present available is the Magic Clockwork Motor.



Lifting Bridge

These Models can be built with MECCANO No. 2 Outfit (or No. 1 and No. 1a Outfits)

2.1 RAILWAY FOOTBRIDGE



Parts required

4 of No. 2	2 of No. 22	1 of No. 52	2 of No. 188
6 " " 5	32 " " 37	2 " " 111c	2 " " 189
2 " " 10	2 " " 37a	2 " " 126	1 " " 190
6 " " 12	2 " " 48a	2 " " 126a	2 " " 200

The span of the bridge is a $5\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate, extended by a $2\frac{1}{2}" \times 2\frac{1}{2}"$ Flexible Plate. Trunnions are bolted to each end of the span, and have $1\frac{1}{8}"$ radius Curved Plates fastened to them. The sides of the approach stairways are $5\frac{1}{2}"$ Strips. They are joined across by $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips and $2\frac{1}{2}"$ Strips fitted with Angle Brackets at each end.

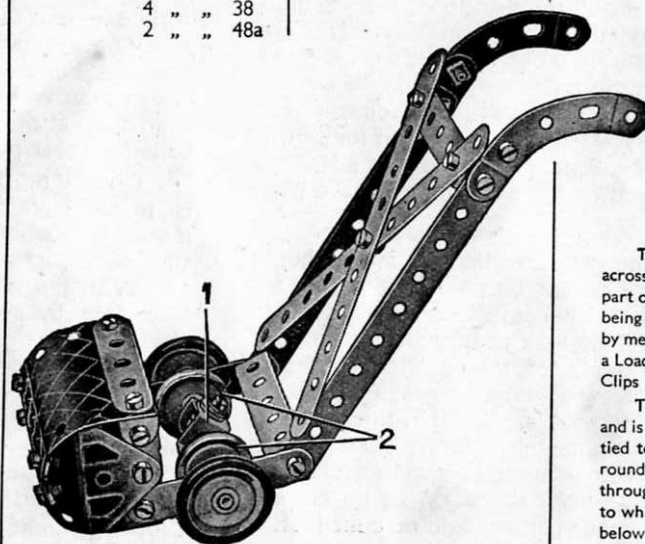
The signals are supported on Flat Trunnions bolted to the sides of the bridge. The smaller of the two signal posts is formed by two Fishplates, and the larger one is a $2\frac{1}{2}"$ Strip. The signal arms are $2\frac{1}{2}"$ Strips bolted to the posts in the second holes from one end. They are fitted at their shorter ends with 1" Pulleys, representing the spectacles, which are held in place by $\frac{3}{8}"$ Bolts passed through the Strips and inserted in their bosses.

2.2 LAWN MOWER

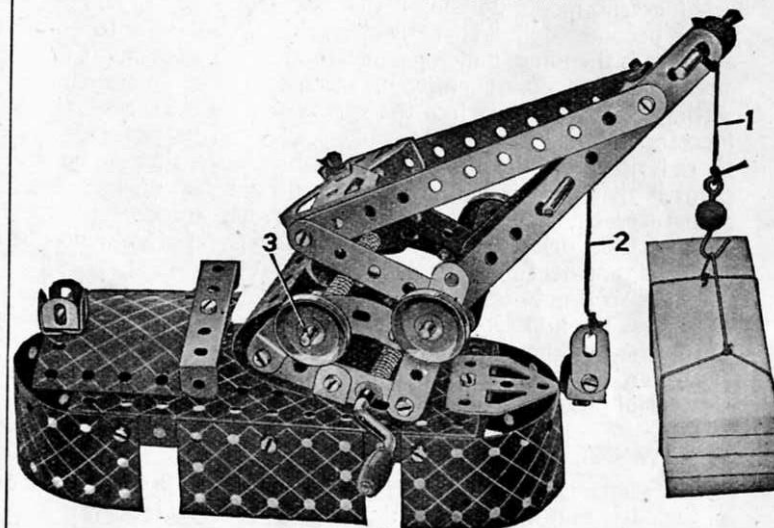
The "cutter" is made by bolting an Angle Bracket at each end of a Reversed Angle Bracket 1 and then sliding an Axle Rod through the free holes of the Brackets. The two Pulleys 2 are fixed to the Rod and pushed tightly against the "cutter" to make it rotate with the Rod as the wheels revolve. The wheels are 1" Pulleys fitted with Rubber Rings.

Parts required

4 of No. 2	2 of No. 90a
4 " " 5	1 " " 125
4 " " 10	2 " " 126
6 " " 12	2 " " 155
1 " " 16	2 " " 200
4 " " 22	
25 " " 37	
4 " " 38	
2 " " 48a	



2.3 FLOATING CRANE



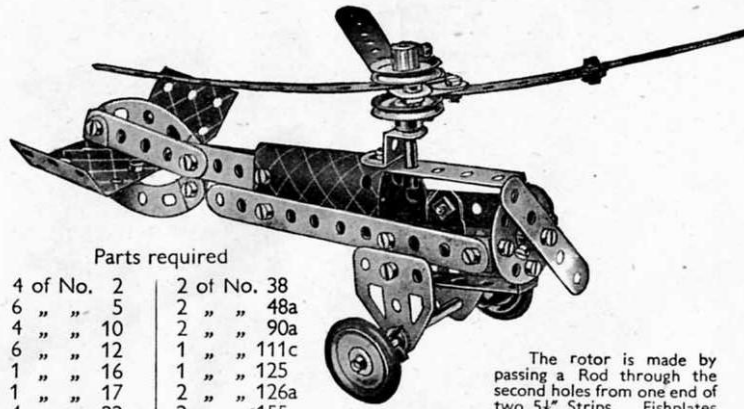
Parts required

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

The jib consists of $5\frac{1}{2}"$ Strips and $2\frac{1}{2}"$ Strips. At its upper end these are joined across by Angle Brackets, and at its lower end by Trunnions. Each side of the lower part of the crane consists of $2\frac{1}{2}"$ Strips and small radius Curved Strips, the two sides being connected by $2\frac{1}{2}" \times \frac{1}{2}"$ Double Angle Strips. The jib is pivoted to this structure by means of a $3\frac{1}{2}"$ 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 $\frac{3}{8}"$ 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 $\frac{1}{2}"$ Reversed Angle Bracket fixed to the Flanged Plate.

2.4 AUTOGIRO



Parts required

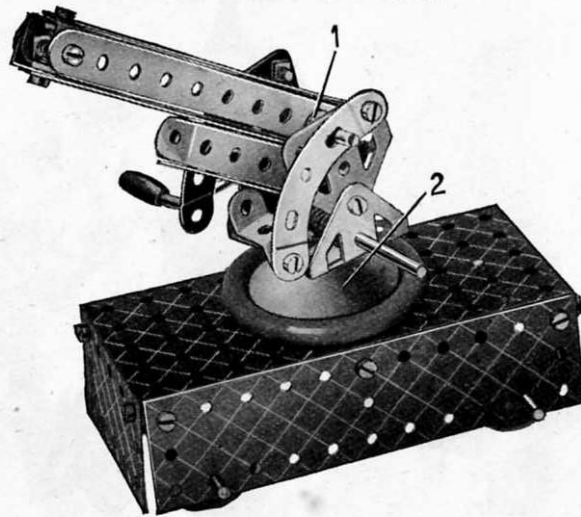
4 of No. 2	2 of No. 38
6 " " 5	2 " " 48a
4 " " 10	2 " " 90a
6 " " 12	1 " " 111c
1 " " 16	1 " " 125
1 " " 17	2 " " 126a
4 " " 22	2 " " 155
1 " " 24	2 " " 188
3 " " 35	1 " " 199
25 " " 37	

The rotor is made by passing a Rod through the second holes from one end of two 5 1/2" Strips. Fishplates are bolted to the short ends of the Strips and the third blade of the rotor is fixed to them as shown.

2.5 ANTI-AIRCRAFT GUN

Parts required

4 of No. 2
1 " " 5
6 " " 12
2 " " 16
2 " " 17
1 " " 19g
4 " " 22
1 " " 24
3 " " 35
26 " " 37
4 " " 38
2 " " 48a
1 " " 52
2 " " 90a
1 " " 125
2 " " 126
2 " " 126a
4 " " 155
1 " " 176
1 " " 187
2 " " 188
2 " " 189

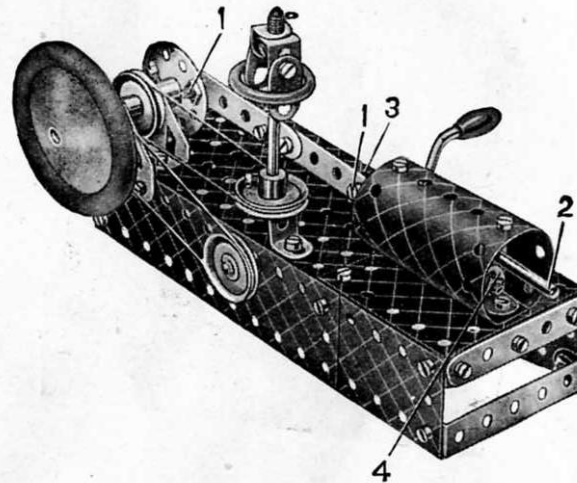


One end of a piece of Cord is fastened to the Crank Handle. It is wound round the Handle a few times and its other end is then fastened to the end of the gun. The two Trunnions are bolted to a Bush Wheel fixed on a 2" Rod that passes through the Road Wheel 2 and the Flanged Plate and is held in place by an Anchoring Spring. The Spring Clips at 1 space the gun barrel from the Flat Trunnions.

2.6 GAS ENGINE

Parts required

3 of No. 5	33 of No. 37	1 of No. 126a
4 " " 10	3 " " 37a	1 " " 155
8 " " 12	4 " " 38	1 " " 176
2 " " 16	1 " " 40	1 " " 187
1 " " 17	2 " " 48a	2 " " 188
1 " " 19g	1 " " 52	2 " " 189
4 " " 22	1 " " 111c	1 " " 190
1 " " 24	1 " " 125	2 " " 200
4 " " 35	1 " " 126	

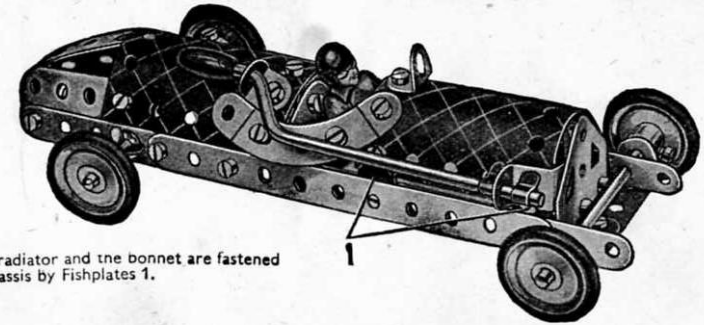


The bearings for the Rod representing the crankshaft are a Flat Trunnion and a Trunnion. The crankshaft carries a Road Wheel and a 1" Pulley at one end, a second 1" Pulley between the bearings, and a Bush Wheel at its other end.

The connecting rod is fastened to the Bush Wheel and to an Angle Bracket 3 by lock-nutted Bolts 1. The Rod 2 is held in the Angle Bracket 3 by means of Spring Clips, one on each side. An Angle Bracket 4, carrying a Fishplate is bolted inside the cylinder, and a similar arrangement is fitted at the other end. These form bearings for the Rod 2.

The model is operated by the Crank Handle, which carries also a 1" Pulley connected to one of the 1" Pulleys on the crankshaft by a belt of Cord. A second Cord drives the governor, which is mounted on a 3 1/2" Rod journalled in the 5 1/2" x 2 1/2" Flanged Plate and a Reversed Angle Bracket.

2.7 RACING CAR

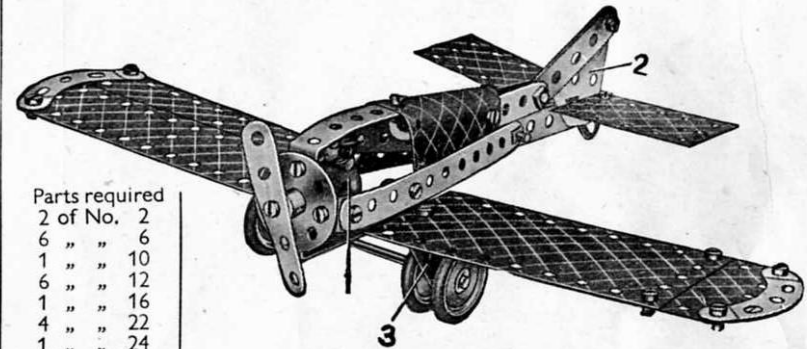


The radiator and the bonnet are fastened to the chassis by Fishplates 1.

Parts required

4 of No. 2	1 of No. 19g	2 of No. 38	1 of No. 126a
5 " " 5	4 " " 22	1 " " 48a	4 " " 155
4 " " 10	4 " " 35	2 " " 90a	1 " " 199
8 " " 12	30 " " 37	1 " " 125	1 " " 200
2 " " 16	1 " " 37a	1 " " 126	

2.8 LOW WING MONOPLANE



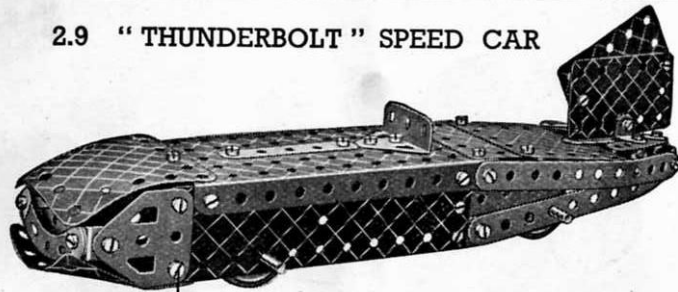
Parts required

2 of No. 2	2 of No. 126	2 of No. 189
6 " " 6	1 " " 126a	1 " " 190
1 " " 10	4 " " 155	1 " " 191
6 " " 12	2 " " 188	1 " " 199
1 " " 16		
4 " " 22		
1 " " 24		
23 " " 37		
2 " " 37a		
2 " " 38		
2 " " 48a		
2 " " 90a		
3 " " 111c		

The fin 2 is a Flat Trunnion, and it is clamped between the two 2 1/2" Strips. The bearings 3 for the axle of the landing wheels are Trunnions, bolted to the wings. The wings are attached to the fuselage by Angle Brackets.

These Models can be built with MECCANO No. 2 Outfit (or No. 1 and No. 1a Outfits)

2.9 "THUNDERBOLT" SPEED CAR

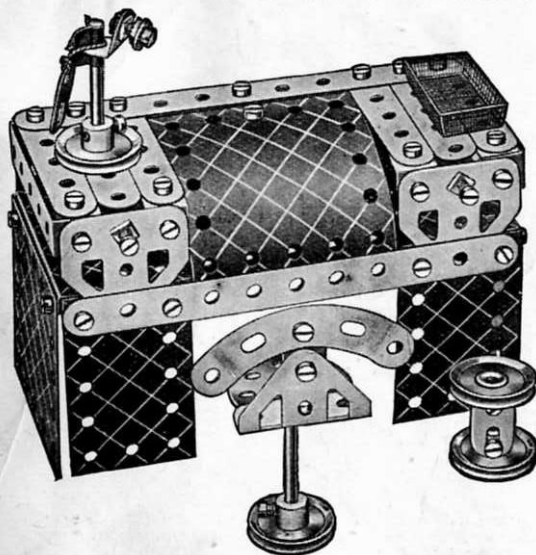


Parts required

4 of No. 2	1 of No. 52
6 " " 5	2 " " 90a
2 " " 10	1 " " 126
4 " " 12	2 " " 126a
2 " " 16	4 " " 155
4 " " 22	2 " " 188
39 " " 37	2 " " 189
38 " " 37a	2 " " 190
4 " " 38	2 " " 200
2 " " 48a	

A $5\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate, extended at the front by a $1\frac{1}{8}$ " radius Curved Plate and at the rear by two $2\frac{1}{2} \times 2\frac{1}{2}$ " Flexible Plates, forms the top of the car. The rear part of each side is formed by two $5\frac{1}{2}$ " Strips and a $2\frac{1}{2}$ " Strip, the former being connected together at the tail by Angle Brackets. Bolts 1 hold a $2\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strip that carries the $1\frac{1}{8}$ " radius Curved Plate forming the underside of the front cowl.

2.10 ROLL TOP DESK



Parts required

2 of No. 2	5
6 " " 5	5
4 " " 10	10
7 " " 12	12
2 " " 17	17
4 " " 22	22
1 " " 24	24
3 " " 35	35
38 " " 37	37
5 " " 37a	37a
1 " " 38	38
2 " " 48a	48a
1 " " 52	52
1 " " 90a	90a
3 " " 111c	111c
1 " " 126	126
2 " " 126a	126a
2 " " 188	188
1 " " 189	189
2 " " 190	190
1 " " 200	200

2.11 TRAVELLING CRANE

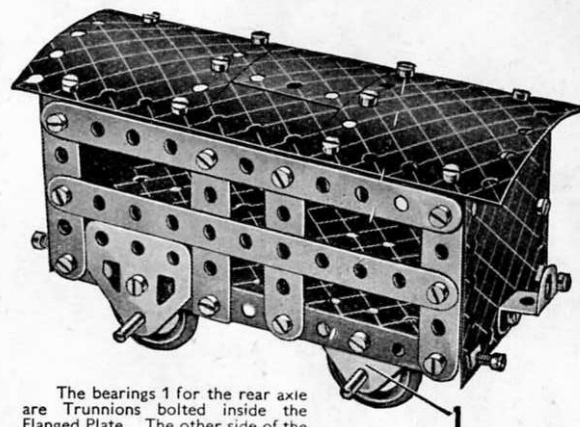


Parts required

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

A 2" Rod is secured in the boss of the Bush Wheel 3. It then passes through the Road Wheel and through the centre of a $2\frac{1}{2} \times \frac{1}{2}$ " Double Angle Strip bolted between the two Trunnions 1. A Washer and a Cord Anchoring Spring are pushed on to the Rod to hold it in position. The crane jib is attached to the Bush Wheel by the Angle Brackets 2.

2.12 CATTLE TRUCK



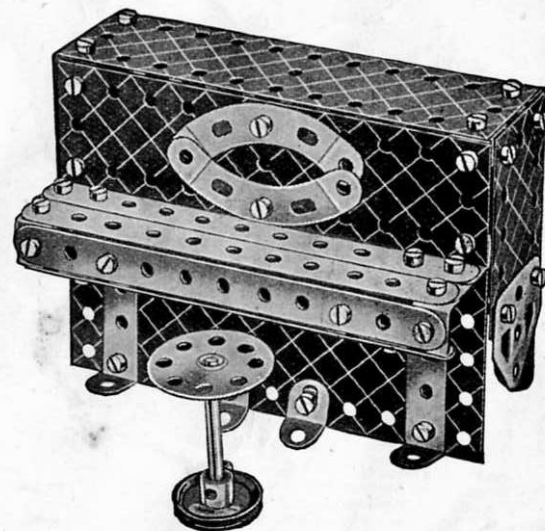
Parts required

4 of No. 2	2
6 " " 5	5
4 " " 10	10
5 " " 12	12
2 " " 16	16
4 " " 22	22
38 " " 37	37
8 " " 37a	37a
4 " " 38	38
2 " " 48a	48a
1 " " 52	52
4 " " 111c	111c
1 " " 125	125
2 " " 126	126
2 " " 126a	126a
4 " " 155	155
2 " " 188	188
2 " " 190	190
2 " " 200	200

The bearings 1 for the rear axle are Trunnions bolted inside the Flanged Plate. The other side of the truck is constructed in a similar manner to the side shown in the illustration.

2.13 PIANO

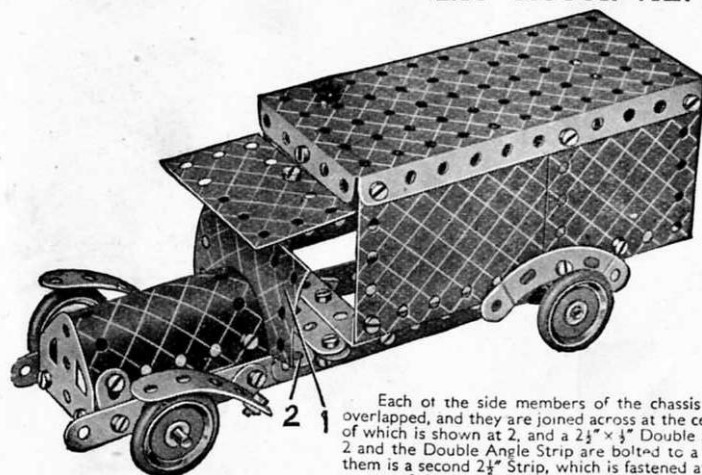
A $5\frac{1}{2} \times 2\frac{1}{2}$ " Flanged Plate is used for the upper part of the back and to each end of this a $2\frac{1}{2}$ " Strip is bolted to form the rear legs.



Parts required

4 of No. 2	2
4 " " 5	5
4 " " 10	10
8 " " 12	12
1 " " 17	17
1 " " 22	22
1 " " 24	24
38 " " 37	37
4 " " 38	38
2 " " 48a	48a
1 " " 52	52
2 " " 90a	90a
2 " " 126	126
2 " " 126a	126a
2 " " 188	188
2 " " 189	189
1 " " 190	190
1 " " 191	191

2.14 MOTOR VAN



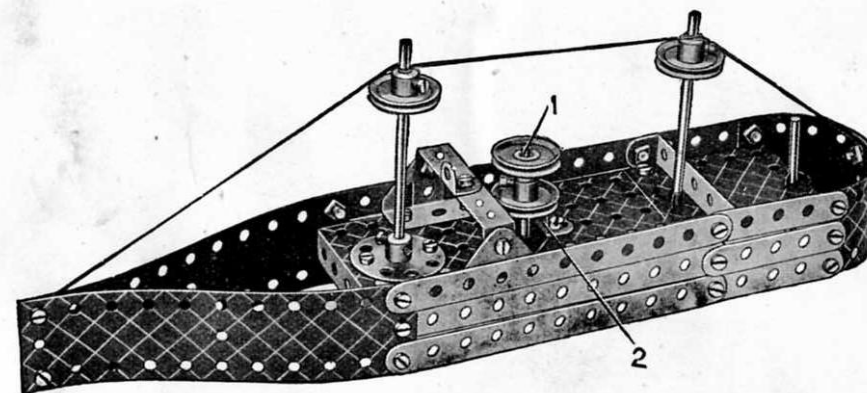
Each of the side members of the chassis consists of two $5\frac{1}{2}$ " Strips overlapped, and they are joined across at the centre by two $2\frac{1}{2}$ " Strips, one of which is shown at 2, and a $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip. The $2\frac{1}{2}$ " Strip 2 and the Double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

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

Parts required

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

2.16 STEAMSHIP



Parts required

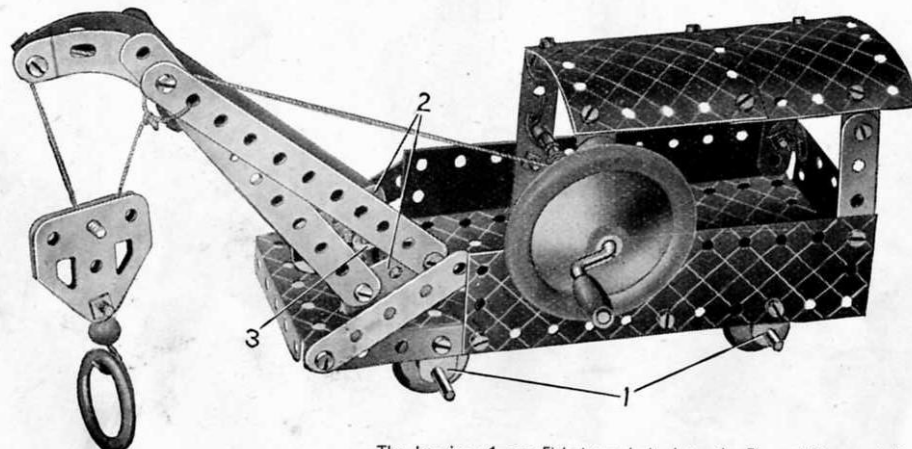
4 of No. 2
6 " " 5
1 " " 12
2 " " 16
2 " " 17
4 " " 22
1 " " 24
4 " " 35
34 " " 37
1 " " 40
2 " " 48a
1 " " 52
1 " " 125
2 " " 126
2 " " 188
2 " " 189
1 " " 190

The deck of the model is a $5\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flanged Plate extended by a $2\frac{1}{2}$ " \times $2\frac{1}{2}$ " Flexible Plate. A $2\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip fitted with an Angle Bracket represents the bridge, and it is supported by two Trunnions bolted to the deck. The funnel consists of a Rod 1 fitted with two 1" fast Pulleys. The Rod passes through the hole in a Reversed Angle Bracket 2 and then through the Flanged Plate.

2.15 RAILWAY BREAKDOWN CRANE

Parts required

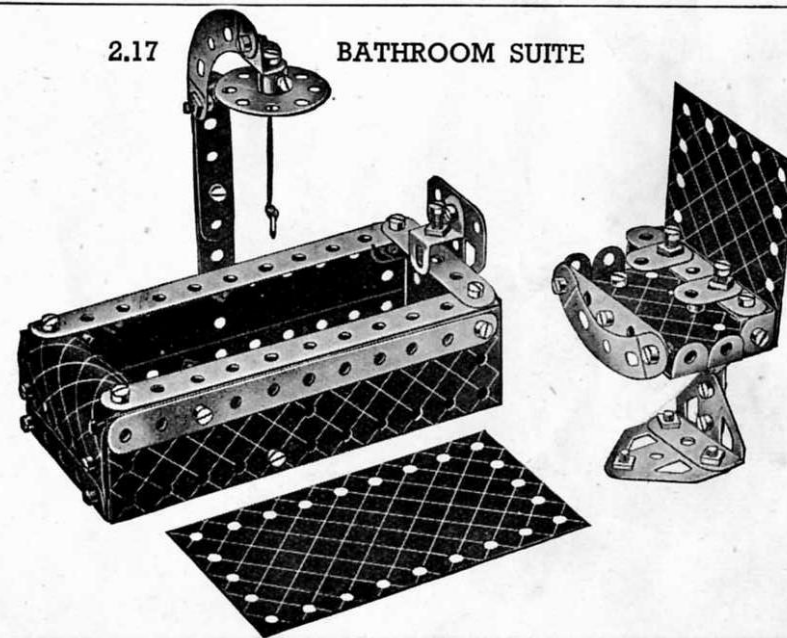
4 of No. 2
6 " " 5
4 " " 10
3 " " 12
2 " " 16
1 " " 17
1 " " 19g
4 " " 22
1 " " 24
2 " " 35
39 " " 37
3 " " 37a
3 " " 38
1 " " 40
2 " " 48a
1 " " 52
1 " " 57c
2 " " 90a
3 " " 111c
2 " " 126
2 " " 126a
1 " " 155
1 " " 176
1 " " 187



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.

1 of No. 188
2 " " 189
1 " " 190
2 " " 200

2.17 BATHROOM SUITE

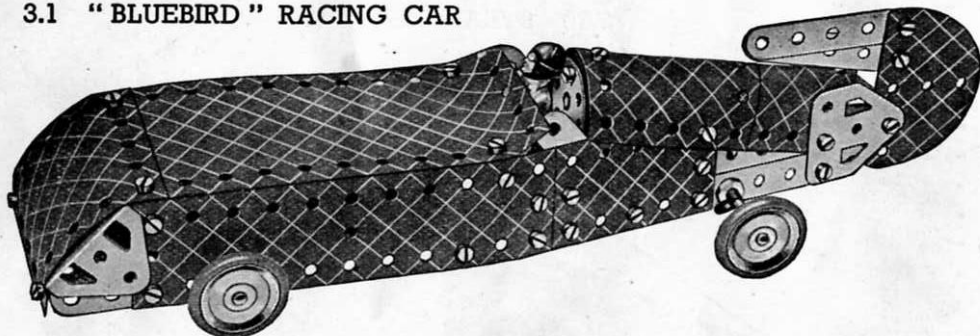


Parts required

4 of No. 2
6 " " 5
4 " " 10
8 " " 12
1 " " 24
40 " " 37
6 " " 37a
2 " " 38
2 " " 48a
1 " " 52
2 " " 90a
4 " " 111c
1 " " 125
2 " " 126
2 " " 126a
2 " " 188
2 " " 189
1 " " 190
1 " " 191
1 " " 199
1 " " 200

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

3.1 "BLUEBIRD" RACING CAR



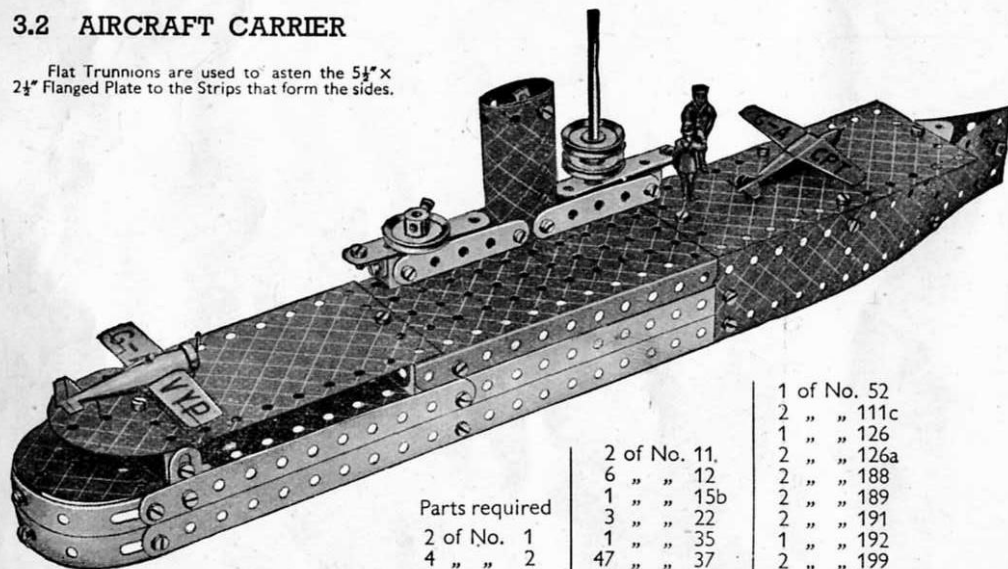
The $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate is used for the front end of the chassis, and the two $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates are bolted on each side in the third hole from the front end of the chassis. The two $5\frac{1}{2}''$ Strips forming the rear end of the chassis overlap the $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates one hole.

Parts required

2 of No. 2	1 of No. 24a	2 of No. 126	1 of No. 192
6 " " 5	2 " " 35	2 " " 126a	2 " " 199
2 " " 10	39 " " 37	4 " " 155	1 " " 200
3 " " 12	4 " " 38	2 " " 188	2 " " 214
2 " " 16	1 " " 48a	2 " " 189	
4 " " 22	1 " " 52		

3.2 AIRCRAFT CARRIER

Flat Trunnions are used to asten the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate to the Strips that form the sides.



Parts required	2 of No. 11.	1 of No. 52
2 of No. 1	6 " " 12	2 " " 111c
4 " " 2	1 " " 15b	1 " " 126
6 " " 5	3 " " 22	2 " " 126a
4 " " 10	1 " " 35	2 " " 188
	47 " " 37	2 " " 189
	2 " " 37a	2 " " 191
	1 " " 48a	1 " " 192
		2 " " 199
		2 " " 214
		4 " " 215

3.3. MARINE ENGINE

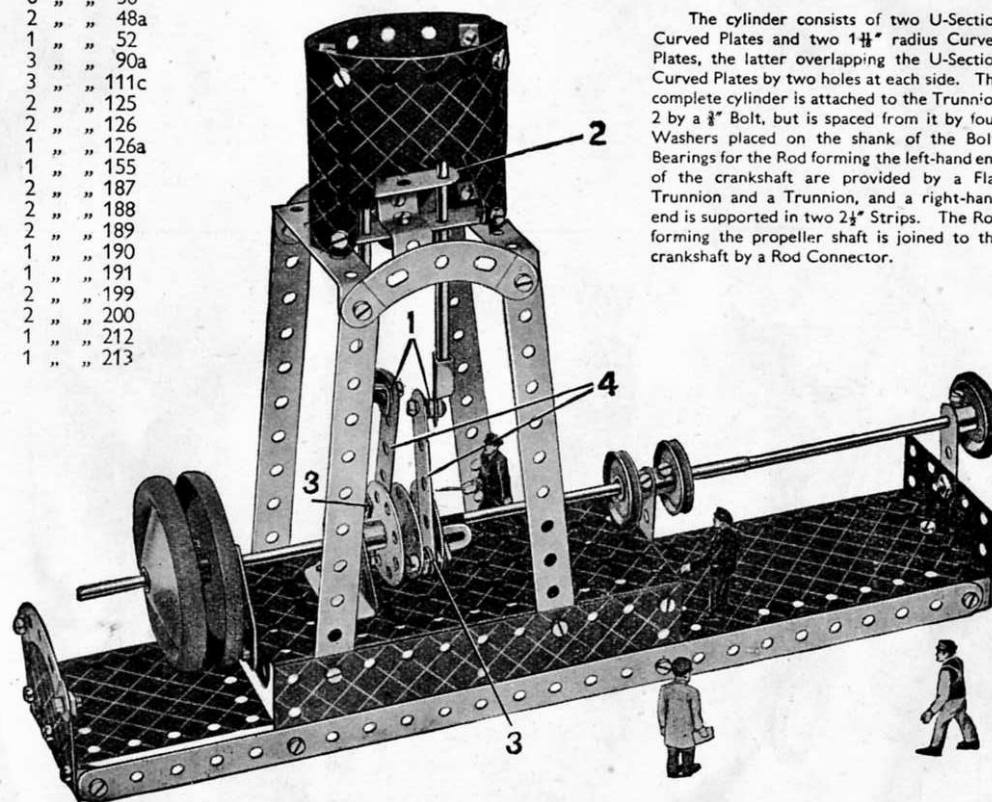
Parts required

2 of No. 1
4 " " 2
5 " " 5
8 " " 12
2 " " 15b
3 " " 16
3 " " 22
1 " " 24
2 " " 24a
4 " " 35
47 " " 37
9 " " 37a
6 " " 38
2 " " 48a
1 " " 52
3 " " 90a
3 " " 111c
2 " " 125
2 " " 126
1 " " 126a
1 " " 155
2 " " 187
2 " " 188
2 " " 189
1 " " 190
1 " " 191
2 " " 199
2 " " 200
1 " " 212
1 " " 213

Bolts 1 are lock-nutted. The Bolts 3 are $\frac{1}{2}''$ long and are lock-nutted twice as shown. The $2\frac{1}{2}''$ Strips 4 must be quite free to move when the crankshaft is rotated.

The left-hand piston rod is held by two Spring Clips, one at each side of the Angle Bracket pivotally fastened by the Bolts 1. Inside the cylinder the Rods slide through holes in a $2\frac{1}{2}''$ 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 $1''$ Pulleys passes through the centre hole in the outer Wheel Disc. A $\frac{1}{2}'' \times \frac{1}{2}''$ 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.



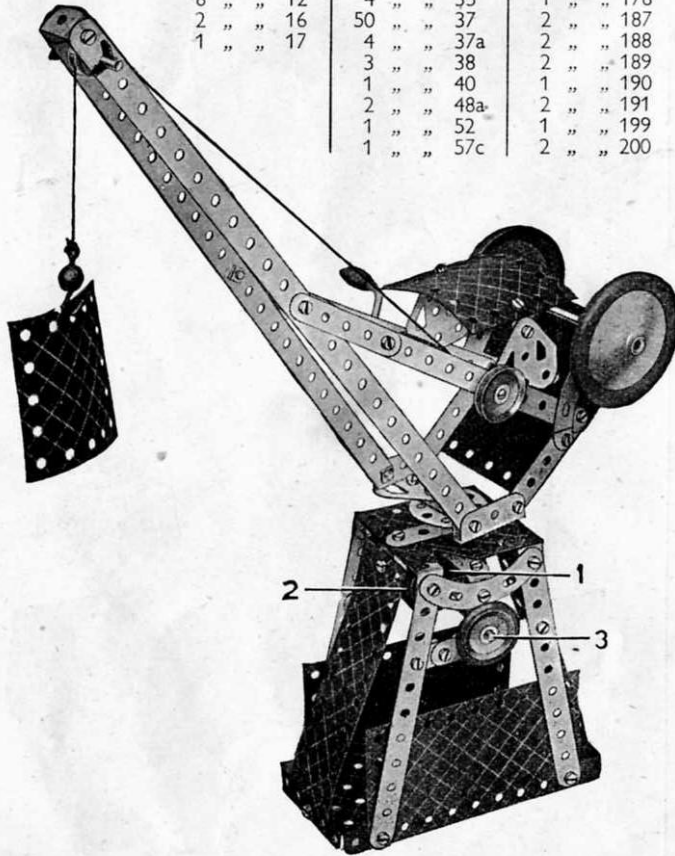
The cylinder consists of two U-Section Curved Plates and two $1\frac{1}{4}''$ radius Curved Plates, the latter overlapping the U-Section Curved Plates by two holes at each side. The complete cylinder is attached to the Trunnion 2 by a $\frac{1}{2}''$ Bolt, but is spaced from it by four Washers placed 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 a right-hand end is supported in two $2\frac{1}{2}''$ Strips. The Rod forming the propeller shaft is joined to the crankshaft by a Rod Connector.

3.4 SWIVELLING JIB CRANE

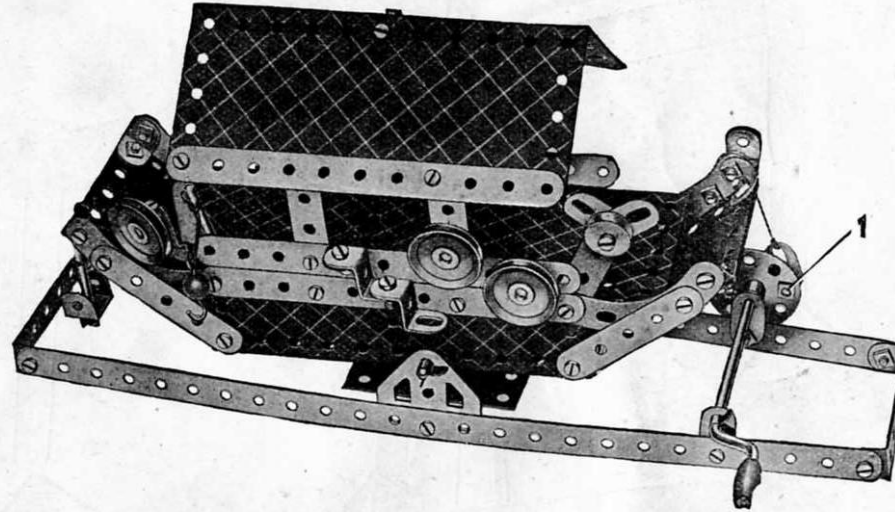
A 1" fast Pulley 1 is fastened to the lower end of a 2" Rod, which passes into and is held in the boss of the Bush Wheel. The Pulley rests on the tyre of Pulley Wheel 2, which is fastened on Rod 3. When the Rod 3 is rotated the jib is caused to swivel. Supports for Rod 3 are formed by Fishplates, which are bolted through their elongated holes to the 2½" Strips shown in the illustration. The roof of the cab is fastened by means of Angle Brackets to two Flat Trunnions, and these in turn are bolted to the compound Strips bracing the jib.

Parts required

2 of No. 1	1 of No. 18a	4 of No. 90a
6 " " 2	1 " " 19g	4 " " 111c
9 " " 5	4 " " 22	2 " " 126
4 " " 10	1 " " 23	2 " " 126a
1 " " 11	1 " " 24	2 " " 155
8 " " 12	4 " " 35	1 " " 176
2 " " 16	50 " " 37	2 " " 187
1 " " 17	4 " " 37a	2 " " 188
	3 " " 38	2 " " 189
	1 " " 40	1 " " 190
	2 " " 48a	2 " " 191
	1 " " 52	1 " " 199
	1 " " 57c	2 " " 200



3.5 NOAH'S ARK



Parts required

2 of No. 1	1 of No. 18a	1 of No. 40	2 of No. 126
6 " " 2	1 " " 19g	1 " " 44	2 " " 126a
9 " " 5	3 " " 22	2 " " 48a	1 " " 176
5 " " 10	1 " " 23	1 " " 52	2 " " 188
2 " " 11	1 " " 24	1 " " 57c	2 " " 189
8 " " 12	6 " " 35	4 " " 90a	2 " " 190
1 " " 16	50 " " 37	5 " " 111c	2 " " 191
1 " " 17	3 " " 37a	2 " " 125	2 " " 192

A 5½" × 2½" Flanged Plate is used for the bottom of the ark and 5½" × 2½" Flexible Plates and 5½" Strips form the sides. The deck is fastened to the sides by ½" × ½" Angle Brackets.

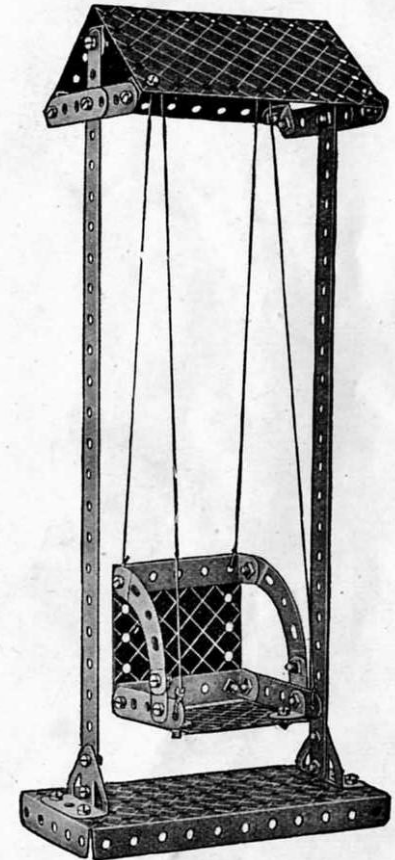
The ark is pivoted on a 3½" Rod journalled in Flat Trunnions, the Rod passing through the flanges of the baseplate at the fifth holes from the end near the Crank Handle. The Crank Handle carries a Bush Wheel, and to this a Fishplate is lock-nutted at 1. A length of Cord is attached to the free hole of the Fishplate and is then tied to a Double Bracket bolted to the sides of the ark. When the Crank Handle is rotated, the downward motion of the Fishplate causes one end of the ark to be pulled down, but as the Fishplate rises again, the ark returns to its original position.

3.6 SWING

Two 2½" Strips overlapped one hole are attached to the tops of the 12½" Strips by ½" × ½" Angle Brackets.

Parts required

2 of No. 1	2 of No. 48a
6 " " 5	1 " " 52
2 " " 10	2 " " 90a
8 " " 12	2 " " 126
34 " " 37	2 " " 190
1 " " 40	2 " " 191

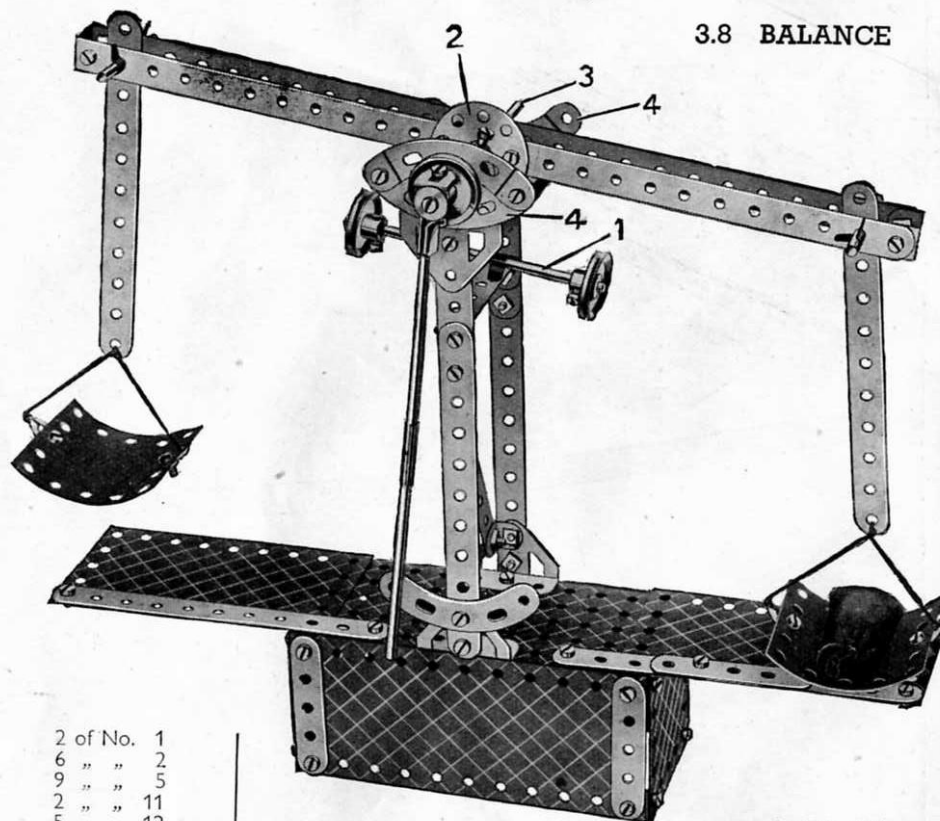


These Models can be built with MECCANO No. 3 Outfit (or No. 2 and No. 2a Outfits)

3.7 DENTIST'S CHAIR

Parts required

4 of No. 2	1 of No. 48a
8 " " 5	1 " " 52
2 " " 10	2 " " 90a
3 " " 12	1 " " 190
1 " " 24	1 " " 191
36 " " 37	1 " " 200
1 " " 37a	



3.8 BALANCE

2 of No. 1	2
6 " " 2	5
9 " " 5	11
2 " " 11	12
5 " " 12	15b
2 " " 16	17
2 " " 17	22
4 " " 24	35
1 " " 35	37
50 " " 37	

Parts required

4 of No. 37a	1 of No. 52
5 " " 38	4 " " 90a
1 " " 40	4 " " 111c
1 " " 44	1 " " 125
2 " " 48a	2 " " 126

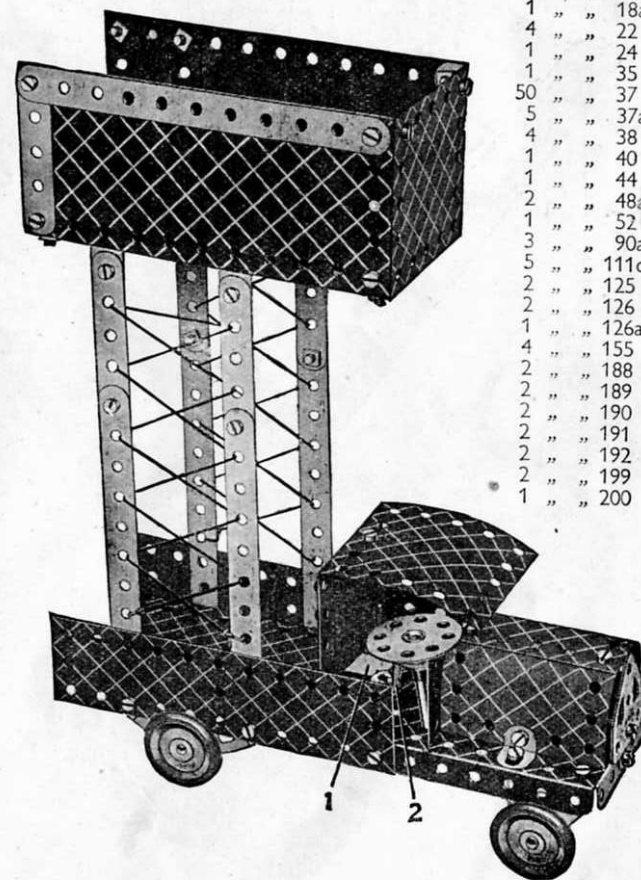
2 of No. 126a	2
2 " " 190	2
2 " " 191	2
2 " " 192	1
2 " " 200	1
1 " " 212	2
1 " " 213	2
2 " " 215	

One of the $12\frac{1}{2}$ " Strips that form the beam of the balance is bolted across a Bush Wheel 2. The $3\frac{1}{2}$ " Rod 3 that is locked in the boss of the Bush Wheel rests on the two Curved Strips 4.

The Rod 1, by which the balance is adjusted, is pushed through the two holes of a Stepped Bent Strip fastened to the Bush Wheel 2 by a Reversed Angle Bracket. The $5\frac{1}{2}$ " Strips from which the scale pans are suspended are pivoted at their upper ends on 2" Rods, which are passed through holes in the $12\frac{1}{2}$ " Strips of the beam.

3.9 TOWER WAGON

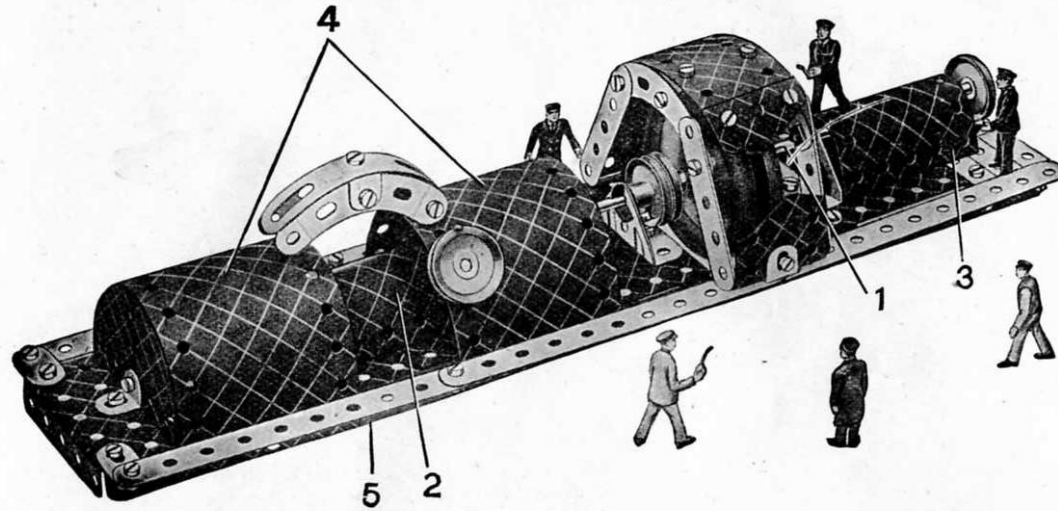
A Stepped Bent Strip 1 is bolted in a horizontal position in the centre of the Flanged Plate, and a $2\frac{1}{2}$ " Curved Strip is bolted on top of it by the centre hole to form a seat. A Reversed Angle Bracket 2 is then bolted in one of the elongated holes of the Curved Strip to form a bearing for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



Parts required

6 of No. 2	5
1 " " 10	11
2 " " 11	12
8 " " 12	16
2 " " 16	18a
1 " " 18a	22
4 " " 22	24
1 " " 24	35
1 " " 35	37
50 " " 37	37a
5 " " 37a	38
4 " " 38	40
1 " " 40	44
1 " " 44	48a
2 " " 48a	52
1 " " 52	90a
3 " " 90a	111c
5 " " 111c	125
2 " " 125	126
2 " " 126	126a
1 " " 126a	155
4 " " 155	188
2 " " 188	189
2 " " 189	190
2 " " 190	191
2 " " 191	192
2 " " 192	199
2 " " 199	200
1 " " 200	

3.10 ELECTRIC GENERATING SET



The base is constructed by bolting two 12 $\frac{1}{2}$ " Strips to the flanges of a 5 $\frac{1}{2}$ " \times 2 $\frac{1}{2}$ " Flanged Plate 5, and joining them at their free ends by a 2 $\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strip. The space between the 12 $\frac{1}{2}$ " Strips is then filled in by Flexible Plates and 2 $\frac{1}{2}$ " Strips. The Rods that form the shaft of the machine are joined together at 1 by a Rod Connector. The bearings for the shaft are formed by two Trunnions. In the illustration part of the Flexible Plate has been cut away to show the structure of the armature and the commutator. The commutator consists of two 1" Pulleys and the armature of two Road Wheels, the bosses of which are placed in contact with each other.

The connecting pipe is formed from two 2 $\frac{1}{2}$ " Curved Strips and one 3" Formed Slotted Strip joined together at their centre holes by a Double Bracket, and is fastened to the turbine by means of an Angle Bracket. The U-Section Curved Plate 2 is held by a Spring Clip slipped on the upper end of a 2" Rod. One end of the Rod is passed through the middle hole in the top of the Plate, and its other end is then pushed through the Flexible Plate forming the base. The Rod is held by a Spring Clip underneath the Plate. The U-Section Curved Plate 3 is fixed to the base by an Angle Bracket on the rear side of the model. The two Flexible Plates 4 are bolted to the flanges of the 5 $\frac{1}{2}$ " \times 2 $\frac{1}{2}$ " Flanged Plate 5. The 1" Pulley representing the steam control is held by a $\frac{3}{4}$ " Bolt, which passes through a hole in one of the Flexible Plates 4, and is locked in the boss of the Pulley.

Parts required

2 of No. 1	1 of No. 16	1 of No. 52	1 of No. 189
6 " " 2	1 " " 18a	4 " " 90a	1 " " 190
8 " " 5	4 " " 22	1 " " 111c	1 " " 191
3 " " 10	4 " " 35	2 " " 125	2 " " 192
2 " " 11	50 " " 37	2 " " 126	2 " " 199
8 " " 12	1 " " 38	2 " " 187	1 " " 213
1 " " 15b	2 " " 48a	1 " " 188	2 " " 214
1 of No. 215			

3.11 TROTTING CAR

The seat of the car consists of two 2 $\frac{1}{2}$ " \times 1 $\frac{1}{2}$ " Flexible Plates, overlapped two holes, and it carries at each end a Trunnion. The 3" Formed Slotted Strips that form the mudguards are supported by Reversed Angle Brackets 2, which are spaced from the Flexible Plate by three Washers. The axle consists of two 2" Rods joined by a Rod Connector, and is journaled in the Trunnions.

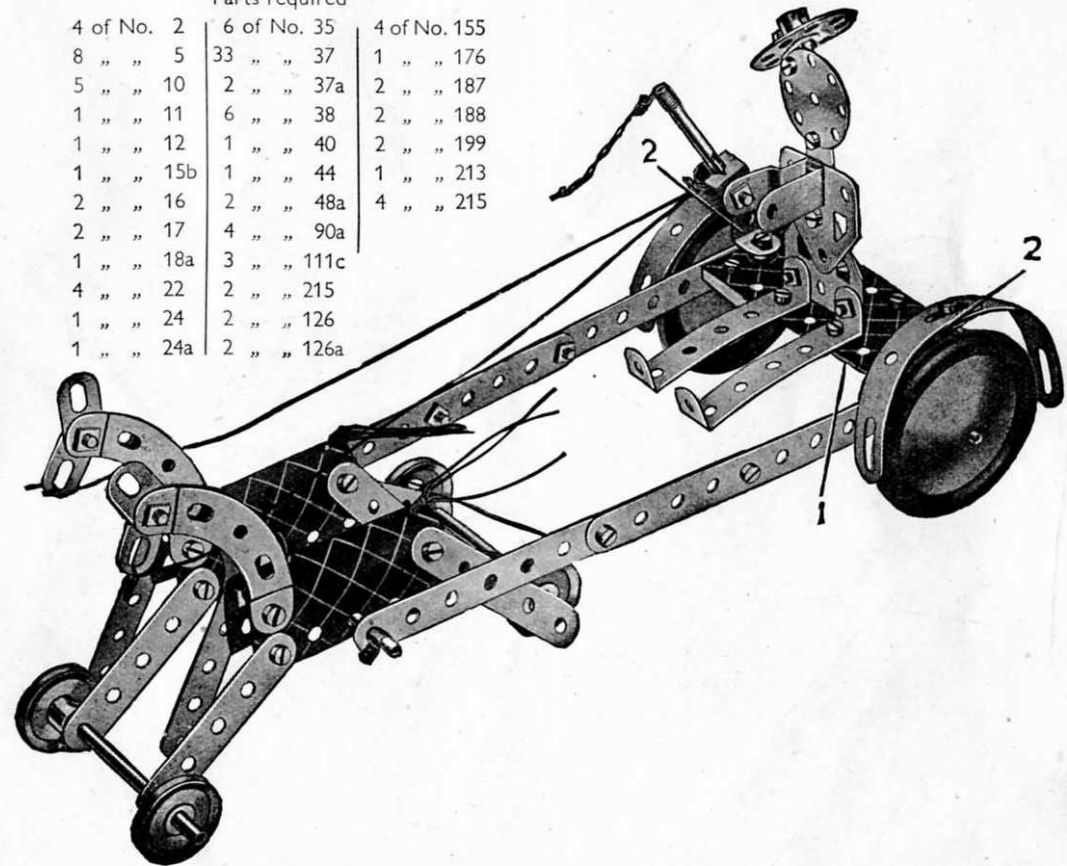
Each of the horses is built up as follows. Four 2 $\frac{1}{2}$ " Strips are bolted to a U-Section Curved Plate in the positions shown to form the legs, and two 2 $\frac{1}{2}$ " small radius Curved Strips represent the neck. A Rod is pushed through the centre holes of the U-Section Curved Plates and is supported in the end holes of the shafts. Two 3 $\frac{1}{2}$ " Rods carrying 1" Pulleys at each of their ends are journaled in the end holes of two of the forelegs and two of the hind-legs of the horses, as shown.

The driver's body is made with two Flat Trunnions, which are bolted together and then fitted with 2 $\frac{1}{2}$ " \times $\frac{1}{2}$ " Double Angle Strips to represent legs. The Bolt that fixes the Stepped Bent Strip to the body holds also a Fishplate that supports a Wheel Disc representing the head. An Angle Bracket bolted to the Disc secures a Bush Wheel that has a $\frac{3}{4}$ " Bolt fixed in its boss by its screw.

The whip is a 2" Rod held by Spring Clips in a Double Bracket, and the lash is attached to it by a Cord Anchoring Spring. The reins are fastened to the Fishplates that form the horses' heads, and also to the Double Bracket to which the whip is fixed. Short lengths of Cord fastened to the U-Section Curved Plates represent the horses' tails.

Parts required

4 of No. 2	6 of No. 35	4 of No. 155
8 " " 5	33 " " 37	1 " " 176
5 " " 10	2 " " 37a	2 " " 187
1 " " 11	6 " " 38	2 " " 188
1 " " 12	1 " " 40	2 " " 199
1 " " 15b	1 " " 44	1 " " 213
2 " " 16	2 " " 48a	4 " " 215
2 " " 17	4 " " 90a	
1 " " 18a	3 " " 111c	
4 " " 22	2 " " 215	
1 " " 24	2 " " 126	
1 " " 24a	2 " " 126a	



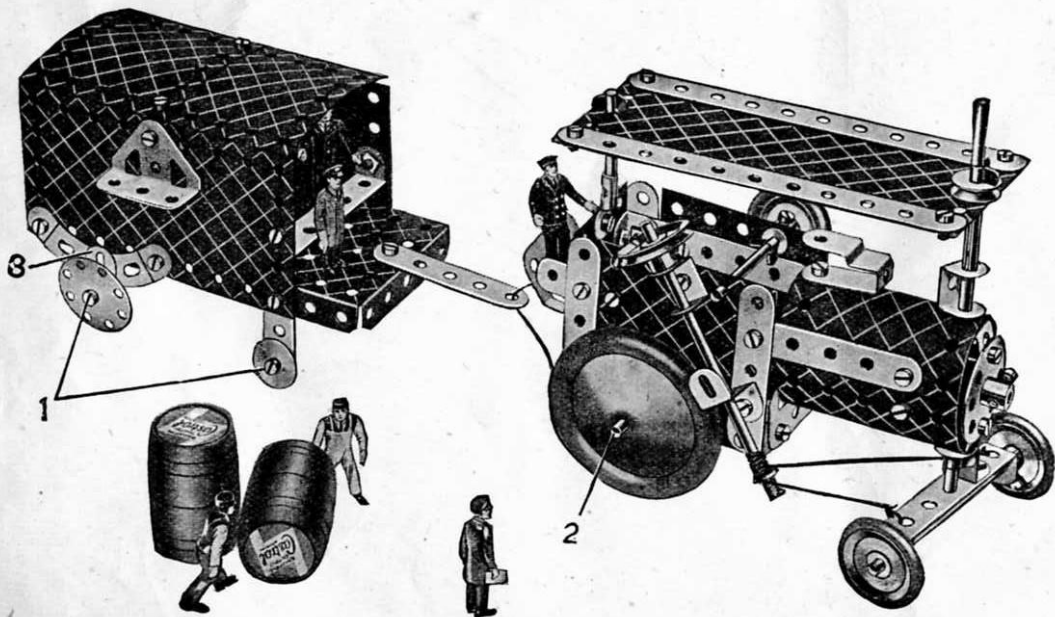
3.12 STEAM TRACTOR AND TRAILER

The steering column, a $3\frac{1}{2}$ " Rod, is supported in the holes of a Double Bracket and a Reversed Angle Bracket bolted to the side of the cab. Cord is wound round the lower part of the Rod and its ends are tied to the $2\frac{1}{2}$ " x $\frac{1}{2}$ " Double Angle Strip that carries the front axle. Care must be taken that the Cord is wound tightly round the Rod, or it will slip when the steering wheel is rotated. The Rod 2 is supported in holes in the Flexible Plates that form the sides of the cab.

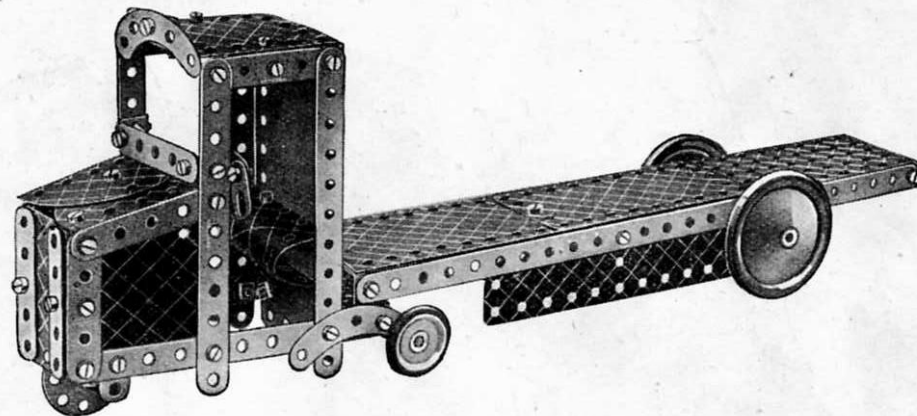
The Bush Wheel that forms the front of the boiler has two Angle Brackets bolted to it and a Rod passes through the free holes of these Brackets to hold the Bush Wheel in position. This Rod is joined by a Rod Connector to a 2" Rod that forms the chimney. The roof of the cab consists of a $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flexible Plate, and is held in position by Spring Clips placed on the two Rods that pass through it. The Fishplates 3 are bolted in the centre holes of the $2\frac{1}{2}$ " Curved Strips. The Bolts 1 are lock-nutted in position and the Wheel Discs turn freely on them.

Parts required

4 of No. 2	1 of No. 23	2 of No. 48a	2 of No. 188
9 " " 5	1 " " 24	1 " " 52	2 " " 190
5 " " 10	2 " " 24a	2 " " 90a	2 " " 191
2 " " 11	4 " " 35	4 " " 111c	1 " " 192
8 " " 12	43 " " 37	2 " " 125	2 " " 199
2 " " 15b	8 " " 37a	2 " " 126	2 " " 200
2 " " 16	6 " " 38	2 " " 126a	1 " " 212
2 " " 17	2 " " 38d	3 " " 155	1 " " 213
1 " " 18a	1 " " 40	1 " " 176	1 " " 214
4 " " 22	1 " " 44	2 " " 187	



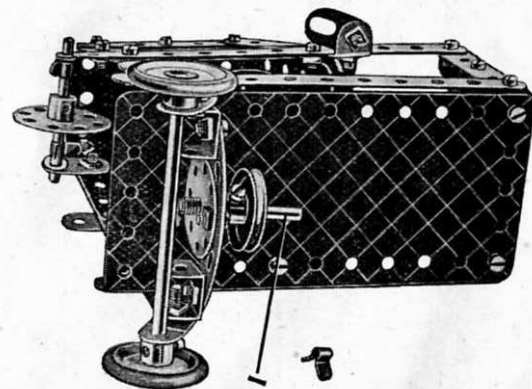
3.13 MECHANICAL HORSE AND TRAILER



Parts required

2 of No. 1	1 of No. 52
6 " " 2	4 " " 90a
9 " " 5	6 " " 111c
4 " " 10	2 " " 125
2 " " 11	2 " " 126
8 " " 12	2 " " 126a
2 " " 16	2 " " 155
1 " " 17	1 " " 176
1 " " 18a	2 " " 187
3 " " 22	1 " " 188
1 " " 24	2 " " 189
1 " " 24a	2 " " 190
4 " " 35	2 " " 191
56 " " 37	1 " " 192
50 " " 37a	1 " " 199
2 " " 38	1 " " 200
2 " " 48a	2 " " 214

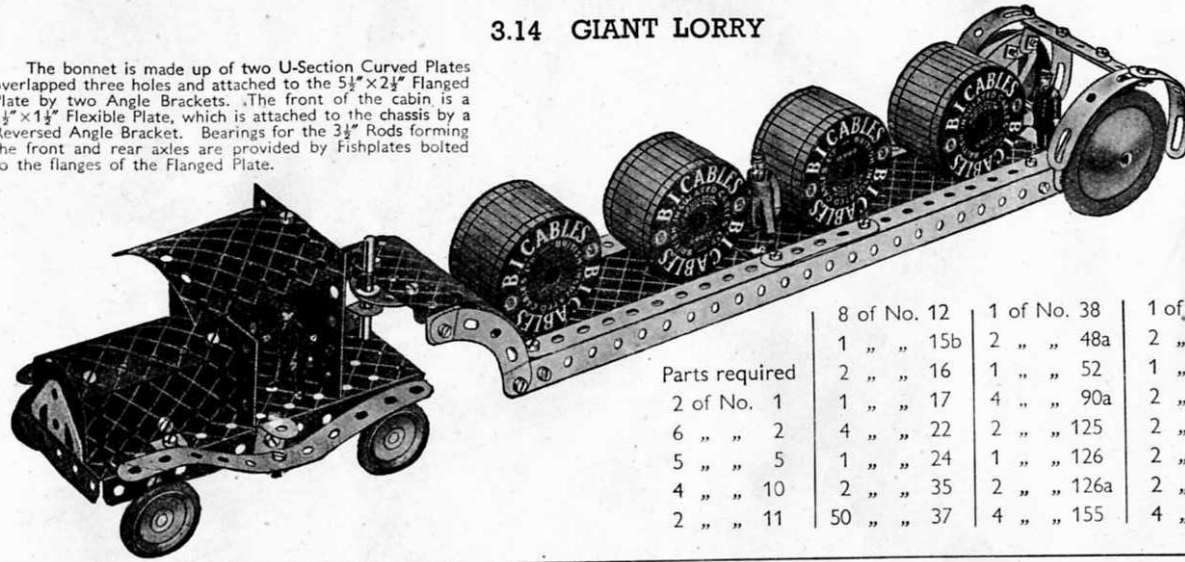
The chassis of the mechanical horse is built up on two $5\frac{1}{2}$ " Strips extended at the rear by $2\frac{1}{2}$ " Curved Strips that provide bearings for the rear axle. The method of building up the bonnet and cab is clear from the illustration. The rear ends of the $5\frac{1}{2}$ " Strips are joined by a Curved Strip and two Double Brackets. At the centre of the Curved Strip is bolted a Wheel Disc through which passes a $1\frac{1}{2}$ " Rod 1. This Rod engages in the centre hole of the Plate at the front of the trailer, and is retained in place by a Spring Clip and a Cord Anchoring Spring. A 1" Pulley and two Washers space the end of the trailer from the Wheel Disc. Bearings for the rear axle are provided by Flat Trunnions.



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

3.14 GIANT LORRY

The bonnet is made up of two U-Section Curved Plates overlapped three holes and attached to the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate by two Angle Brackets. The front of the cabin is a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate, which is attached to the chassis by a Reversed Angle Bracket. Bearings for the $3\frac{1}{2}''$ Rods forming the front and rear axles are provided by Fishplates bolted to the flanges of the Flanged Plate.

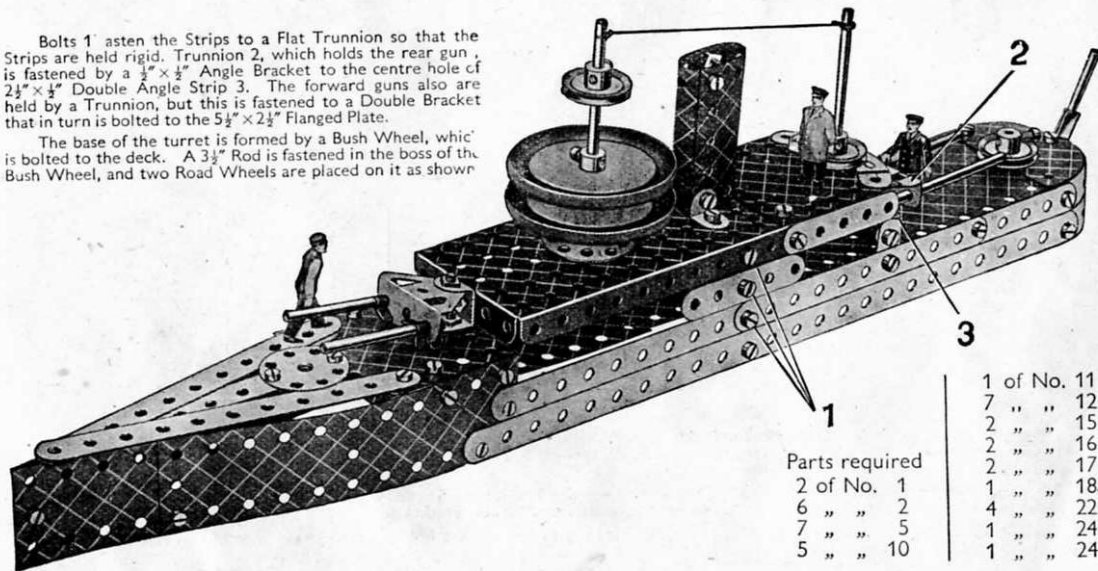


Parts required	8 of No. 12	1 of No. 38	1 of No. 176
2 of No. 1	1 " " 15b	2 " " 48a	2 " " 187
6 " " 2	2 " " 16	1 " " 52	1 " " 188
5 " " 5	1 " " 17	4 " " 90a	2 " " 190
4 " " 10	4 " " 22	2 " " 125	2 " " 192
2 " " 11	1 " " 24	1 " " 126	2 " " 199
	2 " " 35	2 " " 126a	2 " " 200
	50 " " 37	4 " " 155	4 " " 215

3.15 BATTLE CRUISER

Bolts 1' asten the Strips to a Flat Trunnion so that the Strips are held rigid. Trunnion 2, which holds the rear gun, is fastened by a $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Bracket to the centre hole of $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 3. The forward guns also are held by a Trunnion, but this is fastened to a Double Bracket that in turn is bolted to the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate.

The base of the turret is formed by a Bush Wheel, which is bolted to the deck. A $3\frac{1}{2}''$ Rod is fastened in the boss of the Bush Wheel, and two Road Wheels are placed on it as shown.

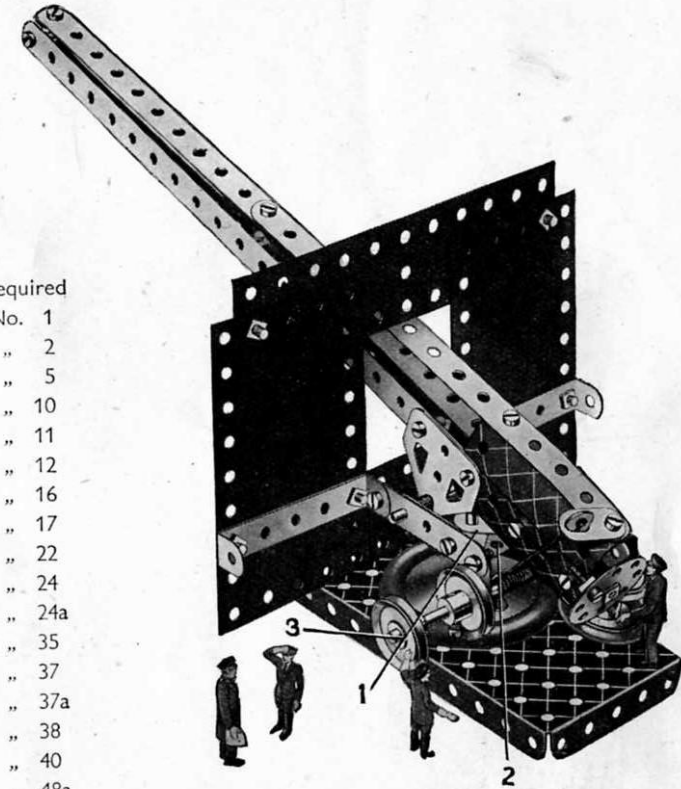


Parts required	1 of No. 11	6 of No. 35
2 of No. 1	7 " " 12	50 " " 37
6 " " 2	2 " " 15b	6 " " 37a
7 " " 5	2 " " 16	1 " " 38d
5 " " 10	2 " " 17	1 " " 40
	1 " " 18a	2 " " 48a
	4 " " 22	1 " " 52
	1 " " 24	1 " " 90a
	1 " " 24a	6 " " 111c
		2 " " 126
		2 " " 126a
		1 " " 176
		2 " " 187
		2 " " 188
		2 " " 189
		2 " " 190
		1 " " 191
		1 " " 192
		1 " " 199
		2 " " 200
		1 " " 212
		1 " " 214
		4 " " 215

3.16 NAVAL GUN

Parts required

2 of No. 1	5 " " 2
3 " " 5	3 " " 10
2 " " 11	2 " " 12
1 " " 16	2 " " 17
4 " " 22	1 " " 24
1 " " 24a	4 " " 35
28 " " 37	2 " " 37a
5 " " 38	1 " " 40
2 " " 48a	1 " " 52
2 " " 111c	2 " " 126
2 " " 126a	1 " " 155
1 " " 176	1 " " 187
1 " " 188	1 " " 189
2 " " 191	2 " " 199

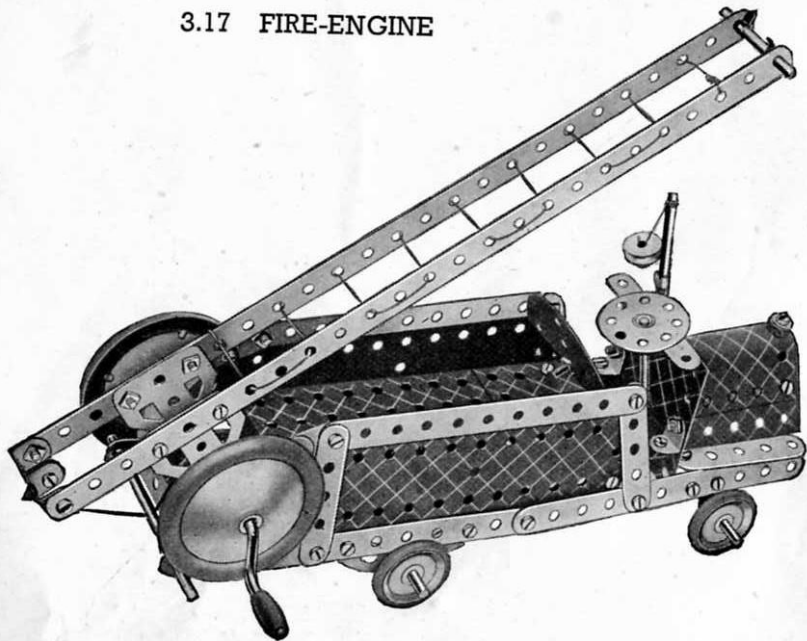


The Flexible Plates forming the gun shield are astened by means of Double Angle Strips and $2\frac{1}{2}''$ Strips to two Trunnions 1. The Trunnions are bolted to Bush Wheel 2. A $2''$ Rod held in the boss of the Bush Wheel passes through a Road Wheel and the centre hole of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates. The Rod is fastened underneath the Flanged Plate by a Cord Anchoring Spring so that the gun is free to swivel.

The elevation of the gun is controlled by Rod 3. Cord is wound round the Rod, then passed through the hole of a Fishplate fastened at the rear end of the gun, and knotted to a Washer as shown. The Wheel Disc at the end of the gun is fastened by an Angle Bracket to the U-Section Curved Plates representing the breech.

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

3.17 FIRE-ENGINE



Parts required

2 of No. 1	2 of No. 125
6 " " 2	2 " " 126
8 " " 5	2 " " 126a
5 " " 10	4 " " 155
2 " " 11	1 " " 176
7 " " 12	2 " " 187
2 " " 15b	2 " " 188
2 " " 16	2 " " 189
1 " " 17	2 " " 190
1 " " 19g	1 " " 192
4 " " 22	1 " " 199
1 " " 23	1 " " 212
1 " " 24	1 " " 214
6 " " 35	
50 " " 37	
6 " " 37a	
5 " " 38	
1 " " 40	
2 " " 48a	
1 " " 52	
4 " " 90a	
6 " " 111c	

Two Flat Trunnions are bolted to the bottom of the ladder, and the shaft of the Crank Handle shown in Fig. 3.17a 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 side 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.

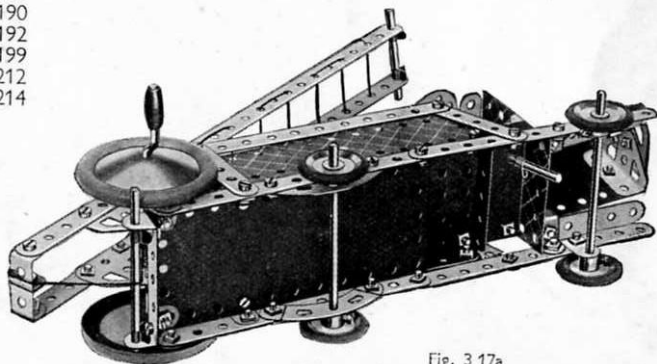
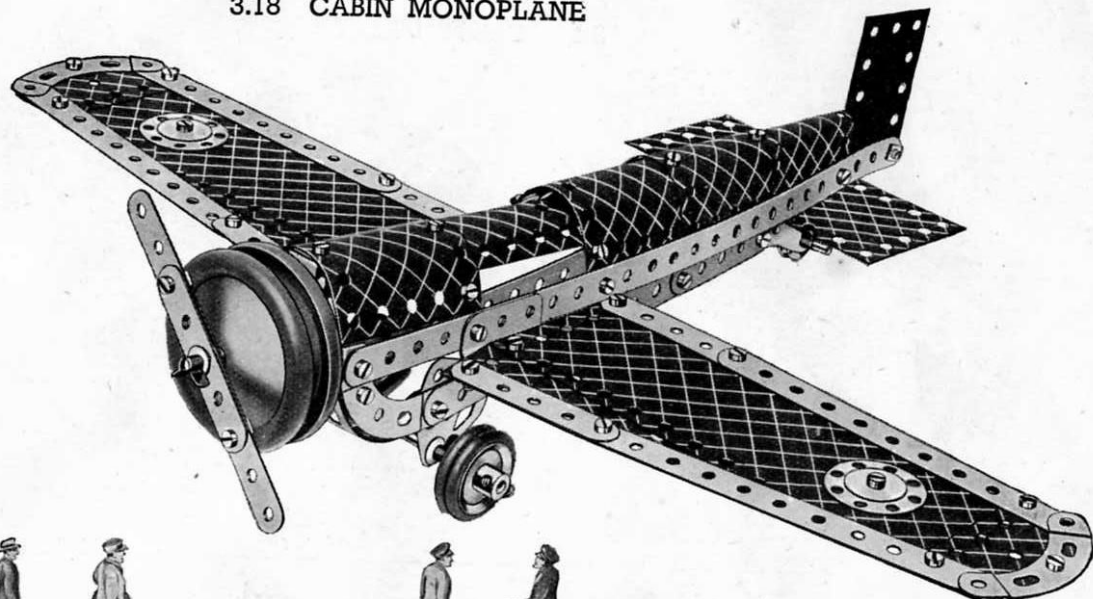


Fig. 3.17a

3.18 CABIN MONOPLANE



Parts required

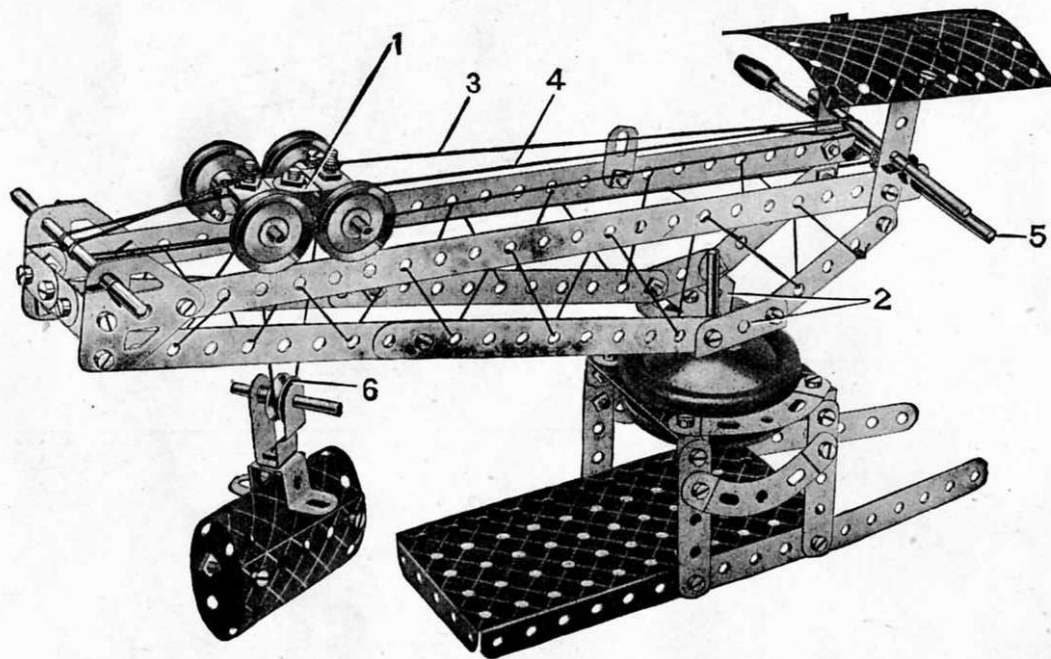
2 of No. 1	4 of No. 22	1 of No. 44	2 of No. 188
6 " " 2	1 " " 23	2 " " 48a	2 " " 189
9 " " 5	1 " " 24	4 " " 90a	2 " " 190
5 " " 10	2 " " 24a	6 " " 111c	1 " " 191
1 " " 11	5 " " 35	2 " " 125	2 " " 192
8 " " 12	50 " " 37	2 " " 126	2 " " 199
1 " " 16	6 " " 37a	2 " " 126a	2 " " 200
1 " " 17	5 " " 38	4 " " 155	2 " " 214
1 " " 18a	2 " " 38d	2 " " 187	2 " " 215

The engine and propeller are attached by fastening a Bush Wheel to the nose of the fuselage by two Angle Brackets. A 2" Rod is locked in the boss of the Bush Wheel and forms the support for the Road Wheels and the compound strip representing the propeller.

The wings are attached to the fuselage by $\frac{1}{2} \times \frac{1}{2}$ " Angle Brackets and Trunnions. The tail wheel is supported on a $1\frac{1}{2}$ " Rod journaled in the holes of a Stepped Bent Strip fastened to the fuselage by a Double Bracket.

The Rod on which the double landing wheels are mounted passes through the holes in the narrow ends of two Flat Trunnions bolted to the fuselage.

3.19 BLOCK-SETTING CRANE



Parts required

2 of No. 1	4 of No. 37a
6 " " 2	6 " " 38
8 " " 5	1 " " 40
5 " " 10	1 " " 44
2 " " 11	2 " " 38a
4 " " 12	1 " " 52
1 " " 15b	4 " " 90a
2 " " 16	4 " " 111c
2 " " 17	2 " " 125
1 " " 18a	2 " " 126
1 " " 19g	2 " " 126a
4 " " 22	1 " " 176
1 " " 23	2 " " 187
1 " " 24	2 " " 188
6 " " 35	2 " " 199
50 " " 37	2 " " 200

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 $\frac{1}{2}$ " 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 $2\frac{1}{2}$ " x $1\frac{1}{2}$ " 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 journalled in the Flat Trunnion 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 3 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.

Parts required

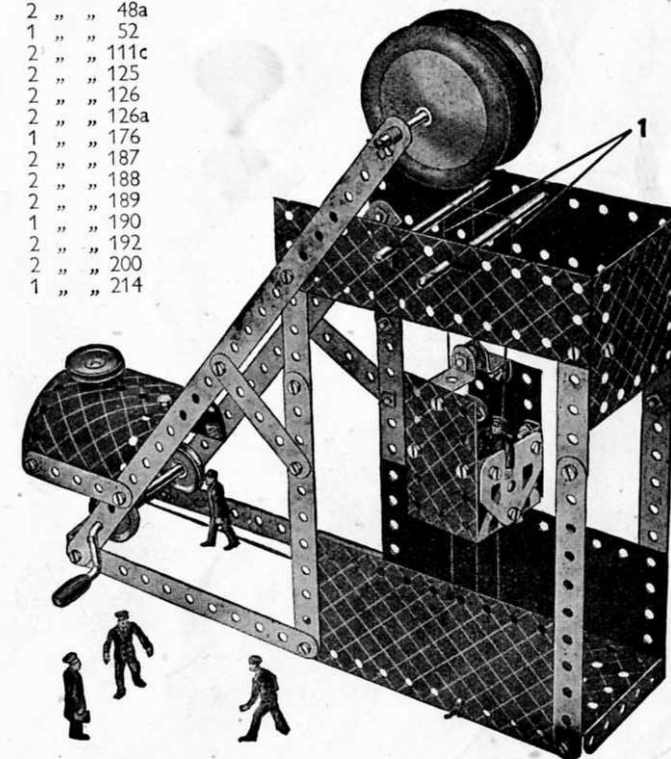
2 of No. 1	1
6 " " 2	2
8 " " 5	5
1 " " 10	10
1 " " 11	11
7 " " 12	12
1 " " 15b	15b
2 " " 16	16
1 " " 18a	18a
1 " " 19g	19g
4 " " 22	22
1 " " 24	24
6 " " 35	35
41 " " 37	37
1 " " 37a	37a
6 " " 38	38
1 " " 40	40
2 " " 48a	48a
1 " " 52	52
2 " " 111c	111c
2 " " 125	125
2 " " 126	126
2 " " 126a	126a
1 " " 176	176
2 " " 187	187
2 " " 188	188
2 " " 189	189
1 " " 190	190
2 " " 192	192
2 " " 200	200
1 " " 214	214

3.20 PITHEAD GEAR

A $3\frac{1}{2}$ " Rod is journalled in the top holes of the $12\frac{1}{2}$ " Strips. Between the two Road Wheels on this Rod is a $1\frac{1}{2}$ " fast Pulley, over which the cord controlling the cage passes. A Cord Anchoring Spring is pushed on one end of the Rod, and a Bush Wheel is fixed to the other end. The cage is built up from Trunnions and Flat Trunnions, and the $2\frac{1}{2}$ " x $1\frac{1}{2}$ " Flexible Plates that form its sides are fastened to the Flat Trunnions by Angle Brackets.

A $\frac{3}{8}$ " Bolt is passed through the holes of Reversed Angle Brackets bolted to the top of the cage, and Washers are placed on its shank for spacing purposes.

The guides 1 for the cage consist of a piece of Cord which is passed over two Rods as shown and then led downward and through two holes in the Flanged Plate that forms the base. Washers are tied to each end of the Cord underneath the Plate, to maintain it in tension.



3.21 TANK

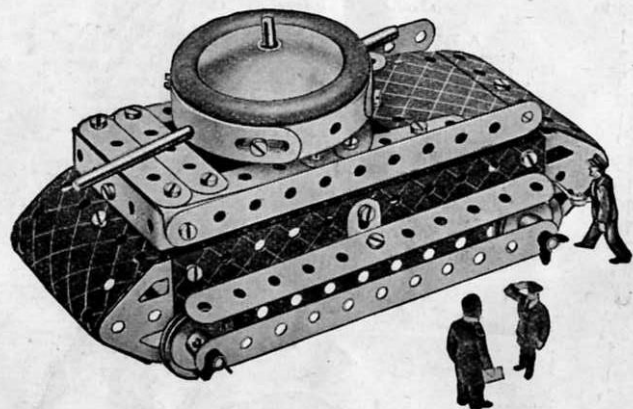


Fig. 3.21a

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. 3.21a. 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.

Parts required

6 of No.	2
7 " "	5
2 " "	10
8 " "	12
2 " "	15b
2 " "	16
1 " "	17
4 " "	22
1 " "	24
6 " "	35
40 " "	37
1 " "	38
1 " "	48a
1 " "	52
1 " "	90a
1 " "	125
2 " "	126
2 " "	126a
1 " "	176
1 " "	187
2 " "	189
1 " "	190
2 " "	199
4 " "	215

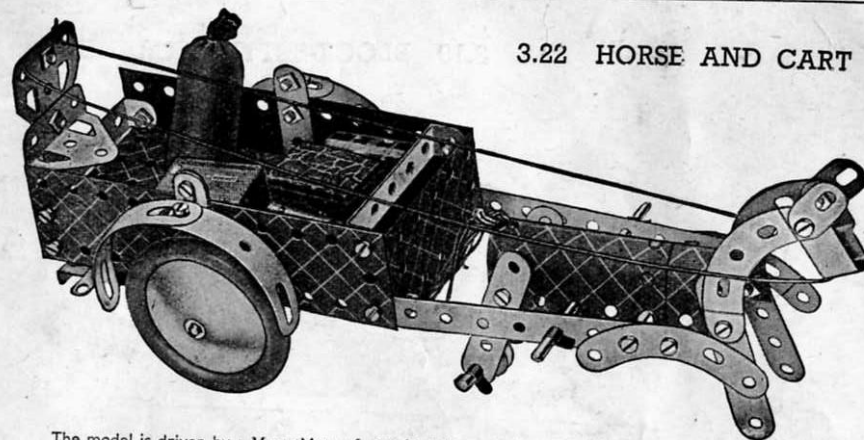
1 *Magic Motor* (Not included in Outfit)

Parts required

2 of No.	2	2 of No.	48a
7 " "	5	1 " "	52
2 " "	10	4 " "	90a
2 " "	12	1 " "	125
2 " "	16	1 " "	126
1 " "	17	1 " "	126a
1 " "	23	2 " "	187
4 " "	35	1 " "	188
35 " "	37	2 " "	189
2 " "	38	2 " "	199
1 " "	40	4 " "	215
1 " "	44		

1 *Magic Motor* (not included in Outfit)

3.22 HORSE AND CART



The model is driven by a *Magic Motor* fastened underneath the $5\frac{1}{2}$ " x $2\frac{1}{2}$ " 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 journalled in the bottom holes of the Strips forming the hind-legs of the horse, so that the model will travel smoothly along the ground.

3.23 ROUNDABOUT

Parts required

2 of No.	1	4 of No.	37a
6 " "	2	4 " "	38
8 " "	5	1 " "	40
4 " "	10	2 " "	38a
2 " "	11	1 " "	52
8 " "	12	4 " "	90a
1 " "	16	4 " "	111c
1 " "	17	2 " "	125
1 " "	18a	2 " "	126
1 " "	19g	2 " "	126a
4 " "	22	1 " "	187
1 " "	24	2 " "	188
6 " "	35	2 " "	191
50 " "	37	2 " "	199

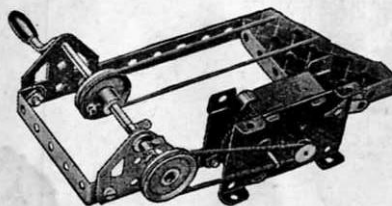


Fig. 3.23a

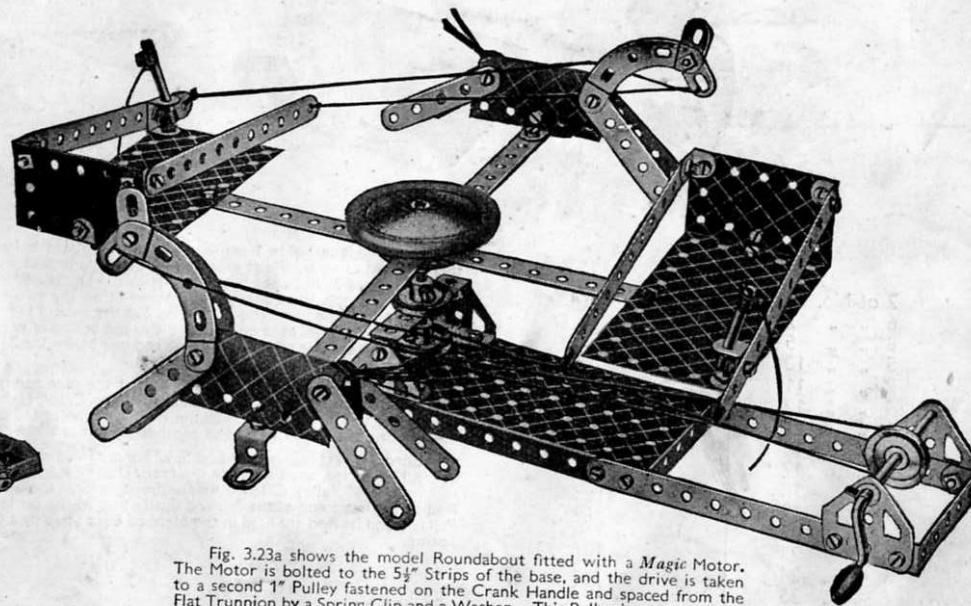
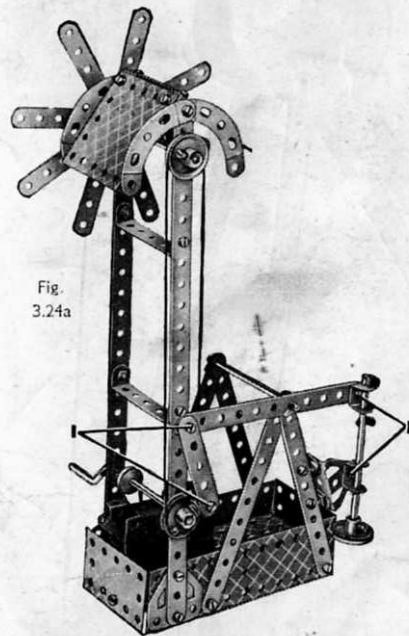


Fig. 3.23a shows the model Roundabout fitted with a *Magic Motor*. The Motor is bolted to the $5\frac{1}{2}$ " Strips of the base, and the drive is taken to a second 1" Pulley fastened on the Crank Handle and spaced from the Flat Trunnion by a Spring Clip and a Washer. This Pulley is removed from the end of the pivot rod of the roundabout underneath the $5\frac{1}{2}$ " x $2\frac{1}{2}$ " Flanged Plate.

3.24 WINDMILL PUMP

Up and down motion of the pumping shaft is obtained from a crank fastened to the end of the Crank Handle. The crank is formed by securing an Angle Bracket to the boss of a 1" Pulley, two Washers being used between the Bracket and the boss. A 2½" Strip is pivoted to the crank and to the pumping beam, the other end of which is pivotally attached to a Double Bracket on the pump rod. The Bolts 1 are lock-nutted. The 1" Pulley on the Crank Handle is connected by a belt of Cord to the shaft carrying the sails. The *Magic Motor* is bolted by its flanges to the baseplate, and the drive is taken from the pulley of the Motor to a ½" Pulley fixed on the shaft of the Crank Handle, if desired the Motor may be dispensed with and the model operated by hand.

Fig.
3.24a

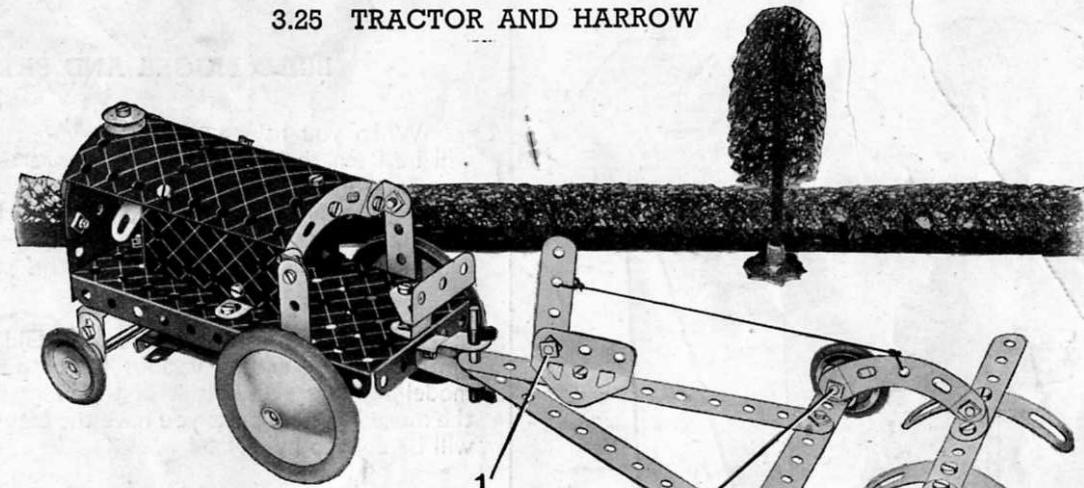
Parts required

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

2 of No. 16
1 " " 19g
3 " " 22
1 " " 24
4 " " 35
39 " " 37
3 " " 37a
2 " " 38
1 " " 40

2 of No. 48a
1 " " 52
4 " " 90a
1 " " 126
2 " " 126a
2 " " 188
2 " " 189
2 " " 190
1 <i>Magic Motor</i> (not included in Outfit)

3.25 TRACTOR AND HARROW



The rear axle is passed through the bottom holes of two 2½" Strips that are bolted to the flanges of the 5½" x 2½" Flanged Plate forming the chassis. The construction of the bonnet and radiator is clearly shown in the illustration.

The fan consists of two Fishplates held against the head of a ¾" Bolt by a nut. The ¾" Bolt is fastened to the radiator by means of two more nuts. The engine itself is represented by two U-Section Curved Plates, bolted together so that they overlap two holes, and then fastened to the Flanged Plate by two Angle Brackets.

The wheels of the harrow are held by ¾" Bolts in Reversed Angle Brackets at each end of a 5½" Strip. Small radius Curved Strips are fastened to the Reversed Angle Brackets by lock-nutted bolts, and Cord is attached to the centre holes of one of these and also to the operating lever, which is held by lock-nuts to a Trunnion. By moving the lever forward the harrow may be raised from the ground when not in use.

The Bolts 1 shown in both illustrations are lock-nutted.

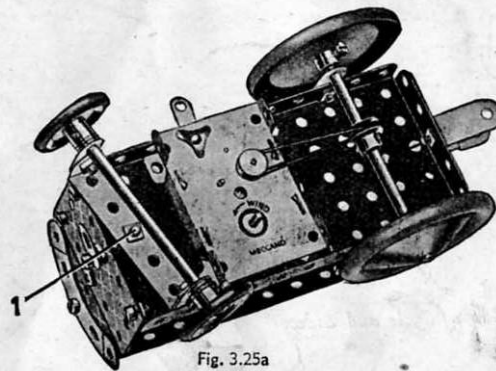


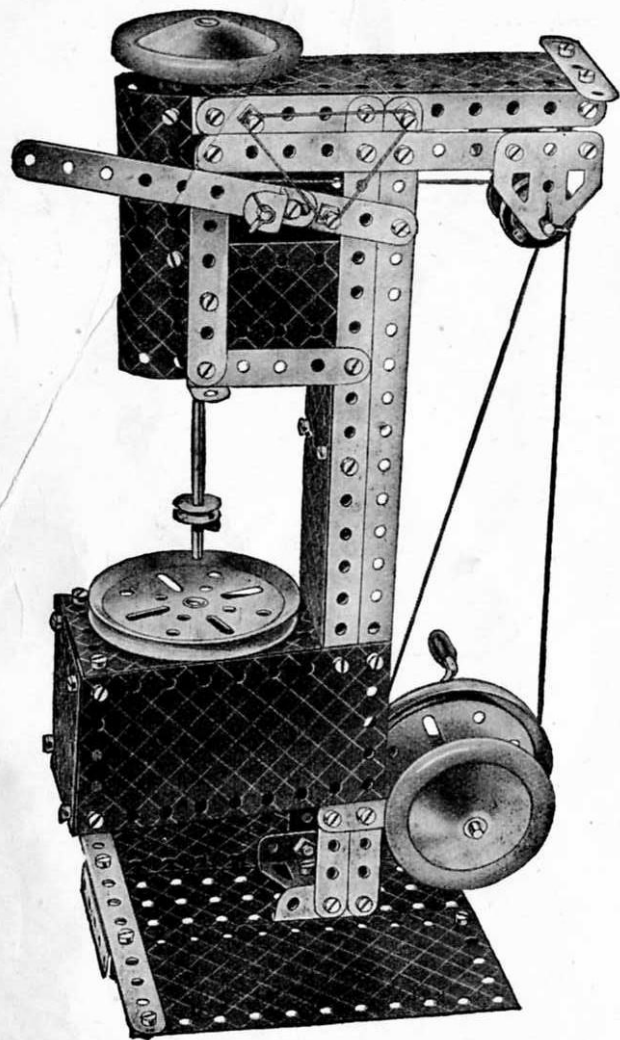
Fig. 3.25a

Parts required

5 of No. 2
3 " " 5
5 " " 10
2 " " 11
8 " " 12
2 " " 16
1 " " 18a

4 of No. 22
1 " " 23
2 " " 35
46 " " 37
10 " " 37a
6 " " 38
1 " " 44
1 " " 38a
1 " " 52
4 " " 90a
5 " " 111c

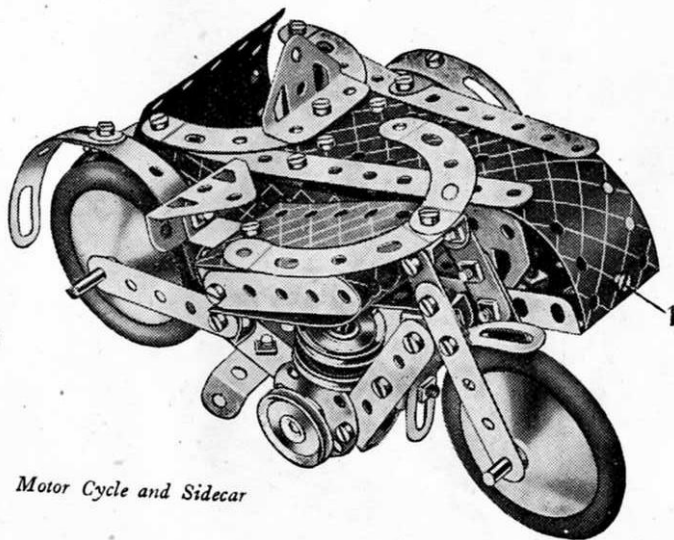
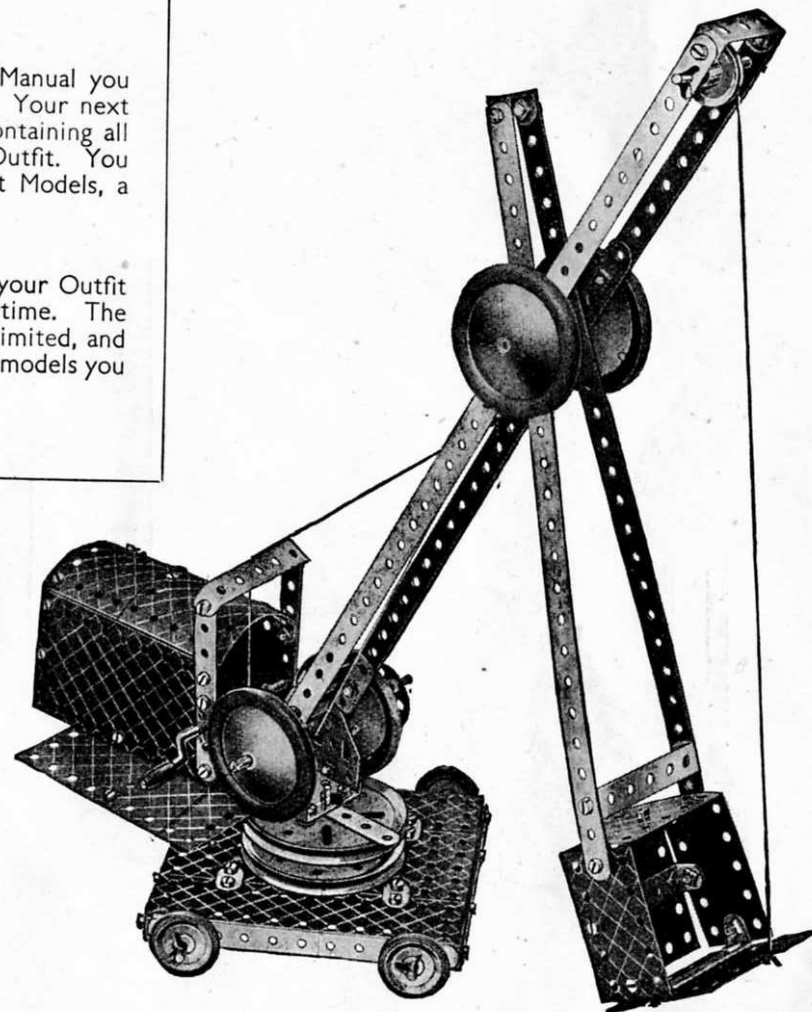
2 of No. 125
2 " " 126
4 " " 155
2 " " 187
1 " " 188
2 " " 199
2 " " 200
1 " " 214
4 " " 215
1 <i>Magic Motor</i> (not included in Outfit)

*Drilling Machine*

BUILD BIGGER AND BETTER MODELS

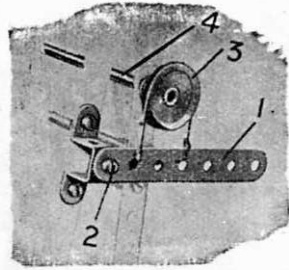
When you have built all the models shown in this Manual you will be keen to build bigger and more elaborate models. Your next step is to purchase a Meccano No. 3a Accessory Outfit containing all the parts required to convert your No. 3 into a No. 4 Outfit. You will thus be able to build the full range of No. 4 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.

*Motor Cycle and Sidecar**Giant Excavator*

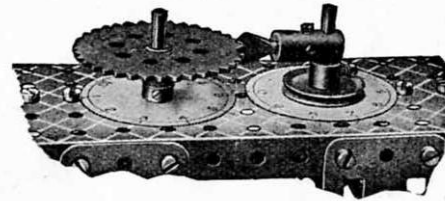
Here are a few simple and interesting movements showing how easily real mechanisms can be reproduced with Meccano.

STRAP AND LEVER BRAKE



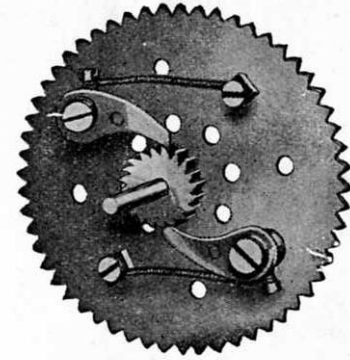
This device will be found very useful as a quick emergency hand-brake. Although it is the simplest of such devices, it is also one of the most valuable and can be used in a great variety of models.

INTERMITTENT ROTARY MOTION



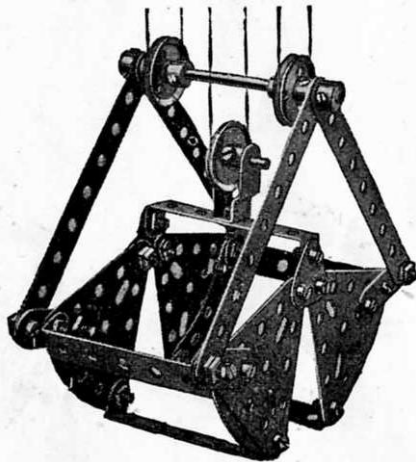
Intermittent rotary motion can be obtained by means of the above device. Such an arrangement is useful in revolution counters, measuring machines, etc. In addition to mechanisms that give true intermittent motion, different types of cams that convert a regular rotary motion into a constant or intermittent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

PAWL AND RATCHET MOVEMENT



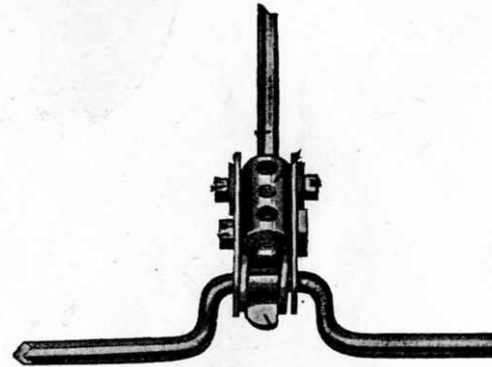
By means of this device it is possible to construct certain types of automatic brakes and free wheels. The illustration shows the method of building up a free-wheel unit.

GRABS



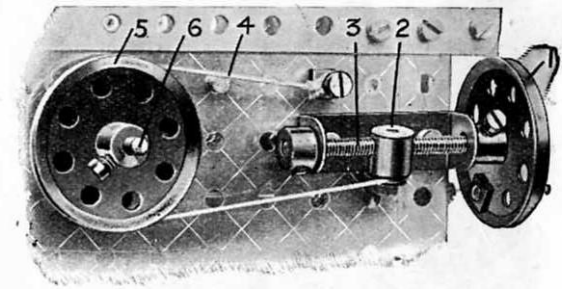
Here is a typical example of the many kinds of grab that can be constructed from Meccano. If the grab is fitted to a model crane ship-coaler, all its movements can be controlled from an operating box built into the frame of the model. The outer sides of the jaws may be filled in with cardboard and the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

BIG END FOR MECCANO CRANKSHAFT



A Spring Clip is first clipped on to the centre of the cranked portion of the Crankshaft, and on each side of this is carried a Washer. On the outside of each of the Washers is placed a $1\frac{1}{2}$ " Strip, and these are connected together by means of a Coupling. A $\frac{1}{2}$ " Bolt passes completely through the two $1\frac{1}{2}$ " Strips at their centre holes and also through the inner transverse tapped hole of the Coupling. The outer tapped holes are fitted with Set-Screws, under the heads of which a Washer is placed.

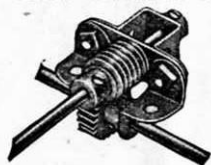
STRAP AND SCREW BRAKE



The type of brake shown above is used to apply a constant retarding effect to a rotating shaft. It can thus be utilised in a crane to prevent the load from falling back when the winding spindle is released. An advantage of the brake is that the speed of the shaft to which it is applied can be varied as required; the retarding action of the brake cannot vary when once set unless the hand wheel is turned.

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

WORM AND PINION BEARING

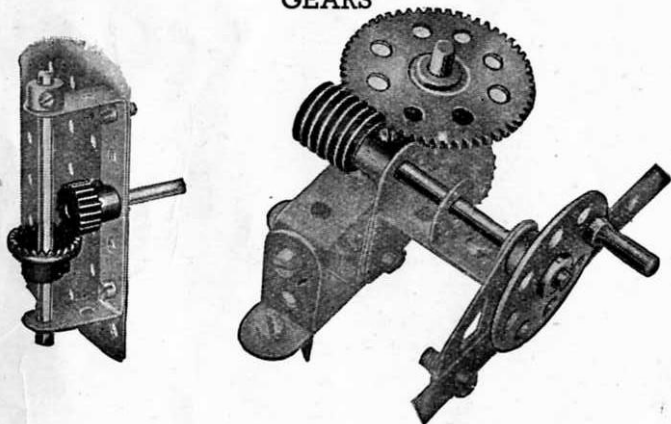


The compact rear axle drive unit illustrated above is intended chiefly for use in small models of motor cars. Two Corner Angle Brackets are secured by Bolts passing through their elongated holes to a $1\frac{1}{2}$ " Strip, to which a Double Bent Strip also is secured. The Rod carrying the Worm is passed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

The driven Rod is journalled in the Corner Angle Brackets and carries a Pinion that engages with the Worm.

A feature of this bearing that should not be overlooked is that the useful gear ratio of 25:1 is provided by employing a $\frac{3}{4}$ " Pinion.

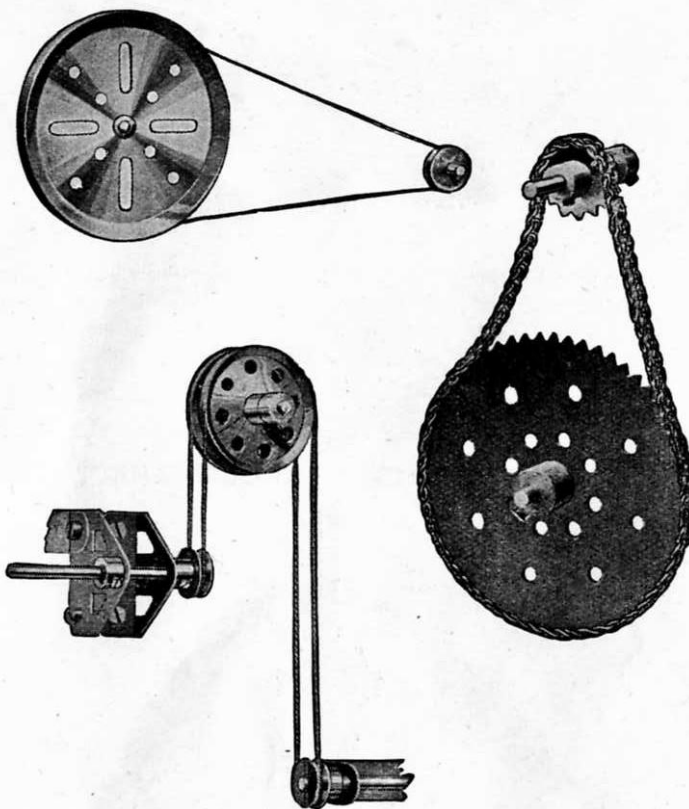
GEARS



The Meccano system includes a wide range of Gear Wheels, Bevel Gears, Pinions, Contrate Wheels and Worms in various sizes. All manner of interesting movements can be obtained by the use of these gears.

How a drive can be transmitted from a vertical to a horizontal shaft, or vice versa, is shown on the left. On the right the Worm engaged with a Gear Wheel gives a very great reduction in shaft speed.

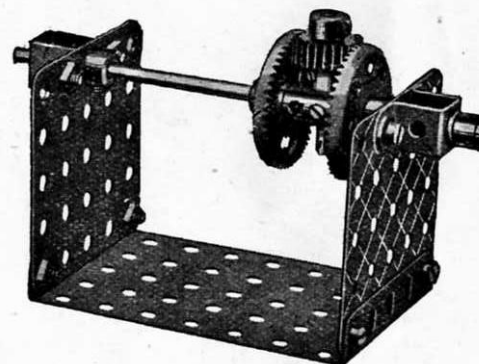
BELT AND CHAIN DRIVES



Above we show examples of belt and chain drive. The movements illustrated require no explanation excepting, perhaps, the lower belt drive, which shows a simple method for transmitting the drive from one shaft to another when the shafts are not in line.

Cords usually take the place of belts in Meccano models but miniature belting can be made from strips of canvas, indiarubber, etc., in which case Flanged Wheels should be used instead of grooved Pulleys.

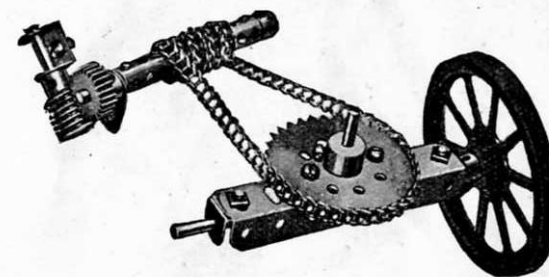
EPICYCLIC TRANSMISSION GEAR



Practically every type of mechanical power transmission gear can be reproduced with Meccano.

The device illustrated is designed to provide a gear ratio between two shafts mounted in direct line with one another. Its chief merit lies in the compactness of its construction and lack of external bearings.

STEERING GEARS



The various types of steering mechanism commonly in use on vehicles of all descriptions can readily be reproduced with Meccano.

In the example illustrated, the road wheels are controlled by an endless Sprocket Chain operated by a Worm and Pinion mechanism.

CONTENTS OF MECCANO OUTFITS

No.	Description	0	1	1a	2	2a	3	3a	4	4a	5	5a	6	6a	7	7a	8	8a	9	9a	10
1	Perforated Strips, 12"	...	...	...	...	...	2	2	4	6	10	2	12	...	12	2	14	...	14	10	24
1a	" " 9"	...	...	...	...	...	2	2	8	6	14	...	14	...	14	3	21	...	24	6	36
1b	" " 7"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
2	" " 5"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
2a	" " 4"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
3	" " 3"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
4	" " 2"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
5	" " 1"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
6	" " 1"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
6a	Angle Girders, 24"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
7	" " 18"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
7a	" " 12"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
8	" " 9"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
8a	" " 7"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
8b	" " 5"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
9	" " 4"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
9a	" " 3"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
9b	" " 2"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
9c	" " 1"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
9d	" " 1"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
9e	" " 1"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
9f	" " 1"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
10	Fishplates	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
11	Double Brackets	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
12	Angle Brackets, 12"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
12a	" " 12"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
12b	" " 12"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
12c	Obtuse Angle Brackets, 12"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
13	Axle Rods, 11"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
13a	" " 8"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
14	" " 6"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
15	" " 5"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
15a	" " 4"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
15b	" " 3"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
16	" " 2"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
16a	" " 1"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
16b	" " 1"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
17	" " 1"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
18	" " 1"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
18a	" " 1"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
18b	" " 1"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
19	Pulleys, 3" with screws	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
19b	Crank Handles, 31" shaft with Erindol grip	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
19c	" " 31" shaft without Erindol grip	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
20	Flanged Wheels, 12" diameter	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
20a	Pulleys, 2" with screws	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
20b	Flanged Wheels, 12" diameter	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
21	Pulleys, 1 1/2" with screws	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
22	" " 1" without screws	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
22a	" " 1" with	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
23	" " 1" with	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
23a	Bush Wheels, 1 1/2" diam.	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
24	Wheel Discs, 1 1/2" diam.	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
25	Pinions, 1/2" diam., 1" face	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
25a	" " 1/2" diam.	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
26	" " 1/2" diam.	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
26a	" " 1/2" diam.	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
26b	" " 1/2" diam.	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
27	Gear Wheels, 50 teeth	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
27a	" " 133	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
27b	" " 95	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
27c	Contrate Wheels, 1 1/2" diam.	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
28	" " 1 1/2" diam.	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
29	Bevel Gears, 1/2" 26 teeth	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
30	" " 1 1/2" 48	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
30a	Gear Wheels, 1" 38 teeth	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
30c	Worms, 1/2" diam.	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
31	Spanners, 1/2" diam.	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
32	Box Spanners	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
34	Spring Clips	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
34b	Screwdrivers (extra long)	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
35	Drifts	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
36	Nuts	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
36c	Bolts, 3/8"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
37	Washers	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
37a	" " 3/8"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
38	Hanks of Cords	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
38d	Propeller Blades	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
41	Tension Springs	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
43	Bent Strips, Stepped	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
44	Double Bent Strips	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
45	" " Angle Strips, 2 1/2" x 1 1/2"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
46	" " 2 1/2" x 1 1/2"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
47	" " 2 1/2" x 1 1/2"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
47a	" " 2 1/2" x 1 1/2"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
48	" " 2 1/2" x 1 1/2"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
48a	" " 2 1/2" x 1 1/2"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
48b	" " 2 1/2" x 1 1/2"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
48c	" " 2 1/2" x 1 1/2"	...	...	...	...	...	2	2	2	2	2	2	2	...	2	6	6	...	6	6	18
48d	" " 2 1/2" x 1 1/2"	...	...	...	...	...	2	2													

No.	Description	0	1	1a	2	2a	3	3a	4	4a	5	5a	6	6a	7	7a	8	8a	9	9a	10
89	Curved Strips, 5 1/2" Stepped	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
89a	" " 2 1/2" Stepped	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
90	" " 2 1/2" Stepped	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
90a	" " 2 1/2" Stepped	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
94	Sprocket Chain, 40" lengths	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
95	Sprocket Wheels, 2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
95a	" " 1 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
95b	" " 3"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
96	" " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
96a	" " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
100	Braced Girders, 5 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
102	Single Bent Strips	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103	Flat Girders, 5 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103a	" " 12 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103b	" " 4 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103c	" " 3 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103d	" " 2 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103e	" " 2 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103f	" " 2 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103g	" " 1 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103h	" " 1 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
103k	" " 7 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
108	Corner Gussets	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
109	Face Plates, 2 1/2" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
110	Rack Strips, 3 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
111	Bolts, 3/8"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
111a	" " 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
111c	" " 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
114	Hinges	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
115	Threaded Pins	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
116	Fork Pieces, Large	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
116a	" " Small	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
117	Steel Balls, 3/8" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
118	Hub Discs, 5 1/2" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
120b	Compression Springs	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
124	Reversed Angle Brackets, 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
125	" " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
126	Trunnions	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
126a	" " 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
128	Flat Trunnions	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
129	Ball Cranks, with boss	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
130	Toothed Segments, 1 1/2" rad	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
130a	Eccentrics, Triple Throw, 1 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
132	Eccentrics, Single Throw, 1 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
133	Flywheels, 2 1/2" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
133a	Corner Brackets, 1 1/2" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
134	Crank Shafts, 1" stroke	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
136	Handrail Supports	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
136a	" " Couplings	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
137	Wheel Flanges	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
140	Universal Couplings	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
142a	Motor Tyres, 3"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
143	Circular Girders, 5 1/2" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
144	Dog Clutches	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
145	Circular Strips, 7 1/2" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
146	" " 4" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
146a	" " 4" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
147a	Pawls	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
147b	Pivot Bolt with 2 Nuts	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
147c	Pawls without Boss	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
154a	Corner Angle Brackets, 1"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
154b	" " L.H.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
155	Rubber Rings, for 1" pulley	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
157	Fans, 2" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
160	Channel Bearings, 1 1/2" x 1 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
161	Girder Brackets, 2" x 1 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
162	Boiler with Ends, Complete	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
162a	Boiler Ends	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
163	Boilers without Ends	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
164	Sleeve Pieces	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
165	Chimney Adaptors	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
166	Swivel Bearings	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
167a	End Bearings	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
167b	Flanged Ring, 9 1/2" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
168	Ball Bearings, 4" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
171	Socket Couplings	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
175	Flexible Couplings	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
176	Anchor Springs for Cord	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
179	Rod Sockets	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
185	Steering Wheel, 1 1/2" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
186	Driving Bands, 2 1/2" Light	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
186a	" " 10"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
186b	" " 10" Heavy	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
186c	" " 15"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
186d	" " 20"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
186e	" " 20"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
187	Road Wheels, 1 1/2" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
187a	Conical Disc, 1 1/2" diam.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
188	Flexible Plates, 5 1/2" x 2 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
189	" " 5 1/2" x 2 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
190	" " 5 1/2" x 2 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
190a	" " 5 1/2" x 2 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
191	" " 5 1/2" x 2 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
192	" " 5 1/2" x 2 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
196	Strip Plates, 12 1/2" x 2 1/2"	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
197	" " 12 1/2" x 2 1/2"	...	...	...														

3
Perforated Strips

No. 1. 12 1/2"	No. 3. 3 1/2"
1a. 9 1/2"	4. 3 1/2"
1b. 7 1/2"	5. 2 1/2"
2. 5 1/2"	6. 2 1/2"
2a. 4 1/2"	6a. 1 1/2"

9a
Angle Girders

7. 24 1/2"	9a. 4 1/2"
7a. 18 1/2"	9b. 3 1/2"
8. 12 1/2"	9c. 3 1/2"
8a. 9 1/2"	9d. 2 1/2"
8b. 7 1/2"	9e. 2 1/2"
9. 5 1/2"	9f. 1 1/2"

10 Fishplates
11 Double Brackets
12 Angle Brackets, 1" x 1"
12a. " " " 1" x 1"
12b. " " " 1" x 1"
12c. Obtuse Angle Brackets, 1/2" x 1/2"

10 Fishplates
11 Double Brackets
12 Angle Brackets, 1" x 1"
12a. " " " 1" x 1"
12b. " " " 1" x 1"
12c. Obtuse Angle Brackets, 1/2" x 1/2"

13. 11 1/2"
13a. 8"
14. 6 1/2"
15. 5"
15a. 4 1/2"
15b. 4"

16. 3 1/2"
16a. 2 1/2"
16b. 3"
17. 2"
18a. 1 1/2"
18b. 1"

19h
19g. Crank Handles, 3 1/2" with Erinoid grip
19h. " " 5 1/2" without
19s. " " 3 1/2" without

20 Spoked Wheels, 3" diam.
20a. Flanged Wheels, 1 1/2" diam.
20b. " " 1 1/2" "

19a. Spoked Wheels, 3" diam.
20. Flanged Wheels, 1 1/2" diam.
20b. " " 1 1/2" "

19c. 3" diam. with boss and screw
19c. 6" " " " " "
20a. 2" " " " " "
21. 1 1/2" " " " " "
22. 1" " " " " "
22a. 1" " without " " "
23. 1/2" " " with " " "
23a. 1/2" " " with " " "

24. Bush Wheels, 1 1/2" diam.
24a. Wheel Disc, 1 1/2" diam., without bush

25. Pinions, 1/2" diam., 25 teeth
25a. " " " 25 "
25b. " " " 25 "
26. " " " 19 "
26a. " " " 19 "
26b. " " " 19 "

27 Gear Wheels
27a. 50 teeth, 1 1/2" diam.
27b. 57 " 1 1/2" "
27c. 133 " 3 1/2" "
27d. 95 " 2 1/2" "

28. Contrate Wheels, 1 1/2" diam., 50 teeth
29. " " " 25 "

30a & 30b. Bevel Gears, 1/2" diam., 26 teeth (for use in pairs)
30a. " " 1 1/2" " 16 " } Can only be
30c. " " 1 1/2" " 48 " } used together

31. Gear Wheels, 1" diam., 1/2" face, 38 teeth
32. Worms, 1/2" diam.

34. Spanners
34b. Box Spanners

35. Spring Clips
35s. " " box of 20
36. Screwdrivers
36a. " Extra Long
36c. Drift (for levering bolt holes into line)
37. Nuts and Bolts, 1/2" " box of 12
37a. Nuts " " box of 50
37b. Bolts, 1/2" " box of 50
37f. Nuts and Bolts, 3/8" " box of 50
37g. " " " 3/8" " box of 144
38. Washers " " pkt. of 20
38s. " " " 3/8" " box of 60
38d. " " " 1/2" " pkt. of 12
40. Hanks of Cord

41. Propeller Blades

43. Tension Springs, 2" long

44. Bent Strips, stepped
45. Double Bent Strips
46. Double Angle Strips, 2 1/2" x 1"
47. " " " 2 1/2" x 1"
47a. " " " 3 1/2" x 1"
48. " " " 1 1/2" x 1"
48a. " " " 2 1/2" x 1"
48b. " " " 3 1/2" x 1"
48c. " " " 4 1/2" x 1"
48d. " " " 5 1/2" x 1"

50. Slide Pieces

51. Flanged Plates, 2 1/2" x 1 1/2"
52. " " 5 1/2" x 2 1/2"
52a. Flat Plates, 5 1/2" x 3 1/2"
53. Flanged Plates, 3 1/2" x 2 1/2"
53a. Flat Plates, 4 1/2" x 2 1/2"

54. Flanged Sector Plates, 4 1/2" long

55. Perforated Strips, slotted, 5 1/2" long
55a. " " " 2 1/2" long

57b. Hooks, Loaded, Large
57c. " " Small

58. Spring Cord, 40" Length
58a. Coupling Screws for Spring Cord
58b. Hooks for Spring Cord

59. Collars, with screws

61. Windmill Sails

62. Cranks
62a. Threaded Cranks
62b. Double Arm Cranks

63. Couplings
63b. Strip Couplings
63c. Threaded Couplings

64. Threaded Bosses
65. Centre Forks
69. Set Screws, 1/4"
69a. Grub Screws, 1/4"
69b. " " 1/4"
69c. " " 1/4"

70. Flat Plates, 5 1/2" x 2 1/2"
72. " " 2 1/2" x 2 1/2"
73. " " 3" x 1 1/2"
76. Triangular Plates, 2 1/2"
77. " " 1"

80a. Screwed Rods
80b. 11 1/2" 4 1/2"
80c. 8" 3"
81. 6" 2"
82. 5" 1"
80a. 3 1/2"

89. Curved Strips, 5 1/2", 10" radius
89a. " 4" to circle, stepped, 1 1/2" radius
89b. Curved Strips, 4", stepped, 4 1/2" radius, 8" to circle
90. Curved Strips, 2 1/2", 2 1/2" radius
90a. " 2 1/2", stepped, 1 1/2" radius, 4" to circle

94. Sprocket Chain, 40" length
95. " Wheels, 36 teeth, 2" diam.
95a. " 28 " 1 1/2" "
95b. " 56 " 3" "
96. " 18 " 1" "
96a. " 14 " 1/2" "

99. Braced Girders
97. 3 1/2" long
97a. 3" " 99a. 9 1/2" long
98. 2 1/2" " 99b. 7 1/2" "
99. 12 1/2" " 100. 5 1/2" "
100a. 4 1/2" "

101. Heads, for looms
102. Single Bent Strips

103. 5 1/2" long
103a. 9 1/2" " 103e. 3" long
103b. 12 1/2" " 103f. 2 1/2" "
103c. 4 1/2" " 103g. 2" "
103d. 3 1/2" " 103h. 1 1/2" "
103k. 7 1/2" "

104. Shuttles, for looms
105. Reed Hooks, for looms

106. Wood Rollers
106a. Sand Rollers

108. Corner Gusset
109. Face Plates, 2 1/2" diam.

110. Rack Strips, 3 1/2" long
110a. Bolts, " 6 1/2" " 111c. Bolts, 3/8"
111. " 1/2" " 111d. " 1 1/2"

113. Girder Frames

114. Hinges
115. Threaded Pins
116. Fork Pieces, Large
116a. " Small
117. Steel Balls, 3/8" diam.

118. Hub Discs, 5 1/2" diam.

120^a

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



122

122. Miniature Loaded Sacks



123

123. Cone Pulleys, $1\frac{1}{2}$ ", 1" and $\frac{3}{4}$ " diam.



125

124. Reversed Angle Brackets, 1" $\frac{1}{2}$ "



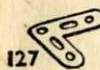
126

126. Trunnions



126^a

126a. Flat Trunnions



127

127. Bell Cranks



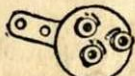
128

128. Bell Cranks, with Boss



129

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



130

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



130a

130a. Eccentrics, Single Throw, $\frac{1}{2}$ "



131

131. Dredger Buckets



132

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



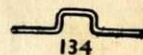
133

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



133^a

133a. " " 1"



134

No. 134. Crank Shafts, 1" stroke



136

136. Handrail Supports



137

136a. Handrail Couplings



136A

137. Wheel Flanges



138^a

138a. Ships' Funnels



139

139. Flanged Brackets (right)

139a. " " (left)



140

140. Universal Couplings



142

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



142A

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

142b. " " " 3" " "

142c. " " " 1" " "

142d. " " " 1 $\frac{1}{2}$ " " "



143

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



144

No. 144. Dog Clutches

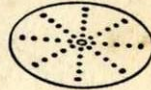


145

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

146. " Plates, 6" " "

146a. " " 4" " "



146



147 & 148

147. Pawls, with Pivot Bolt and Nuts

147a. Pawls

147b. Pivot Bolts with 2 Nuts

147c. Pawls without boss

148. Ratchet Wheels



151

151. Pulley Blocks, Single Sheave

152. " " Two " "

153. " " Three " "



154^a & 154^b

154a. Corner Angle Brackets, $\frac{1}{2}$ " (right-hand)

154b. Corner Angle Brackets, $\frac{1}{2}$ " (left-hand)

155. Rubber Rings (for 1" Pulleys)



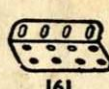
157

157. Fans, 2" diam.



160

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



161

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



163



162

No. 162. Boilers, complete, 5" long x $2\frac{1}{2}$ " diam.

162a. " Ends, $2\frac{1}{2}$ " diam. x $\frac{1}{2}$ in.

162b. " without ends, $4\frac{1}{2}$ " long x $2\frac{1}{2}$ " diam.

163. Sleeve Pieces, $1\frac{1}{2}$ " long x $\frac{1}{2}$ " diam.

164. Chimney Adaptors, $\frac{3}{8}$ " diam. x $\frac{1}{2}$ " high



164



165

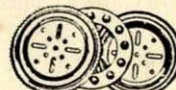
165. Swivel Bearings

166. End " "

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



166



168

168. Ball Bearings, 4" diam.

168a. " Races, flanged discs, $3\frac{1}{2}$ " diam.

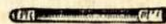
168b. " " toothed " 4" diam.

168c. " Cages, $3\frac{1}{2}$ " diam., complete with balls.



171

171. Socket Couplings



175

175. Flexible Coupling Units



176

176. Anchoring Springs for Cord



179

179. Rod Sockets



180

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



185

No. 185. Steering Wheels, $1\frac{1}{2}$ " diam.

186. Driving Bands, $2\frac{1}{2}$ " (Light)

186a. " " 6" " "

186b. " " 10" " "

186c. " " 10" (Heavy)

186d. " " 15" " "

186e. " " 20" " "

187. Road Wheels, $2\frac{1}{2}$ " diam.

187a. Conical Disc, $1\frac{1}{2}$ " diam.



187



192

Flexible Plates.

188. $2\frac{1}{2}$ " x $1\frac{1}{2}$ "

189. $5\frac{1}{2}$ " x $1\frac{1}{2}$ "

190. $2\frac{1}{2}$ " x $2\frac{1}{2}$ "

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



197

191. $4\frac{1}{2}$ " x $2\frac{1}{2}$ "

192. $5\frac{1}{2}$ " x $2\frac{1}{2}$ "

Strip Plates.

196. $9\frac{1}{2}$ " x $2\frac{1}{2}$ "

197. $12\frac{1}{2}$ " x $2\frac{1}{2}$ "



200



198

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

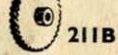
199. Curved Plates, U-Section

$2\frac{1}{2}$ " x $2\frac{1}{2}$ " x $\frac{1}{8}$ " radius

200. " " $2\frac{1}{2}$ " x $2\frac{1}{2}$ " x $1\frac{1}{8}$ " radius



211A



211B

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

211b. " " $1\frac{1}{2}$ "



212

212. Rod and Strip Connectors



213

213. Rod Connectors



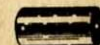
215

214. Semi-Circular Plates $2\frac{1}{2}$ "



214

215. Formed Slotted Strips 3"



216

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