MECCANO

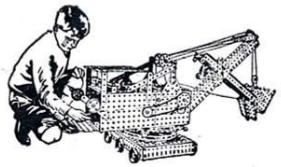
HORNBY'S ORIGINAL SYSTEM — FIRST PATENTED 1901

INSTRUCTIONS FOR OUTFITS F to L

PRICE
1/9

34F-L

13/854/8 (U.K.)



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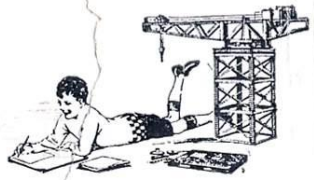


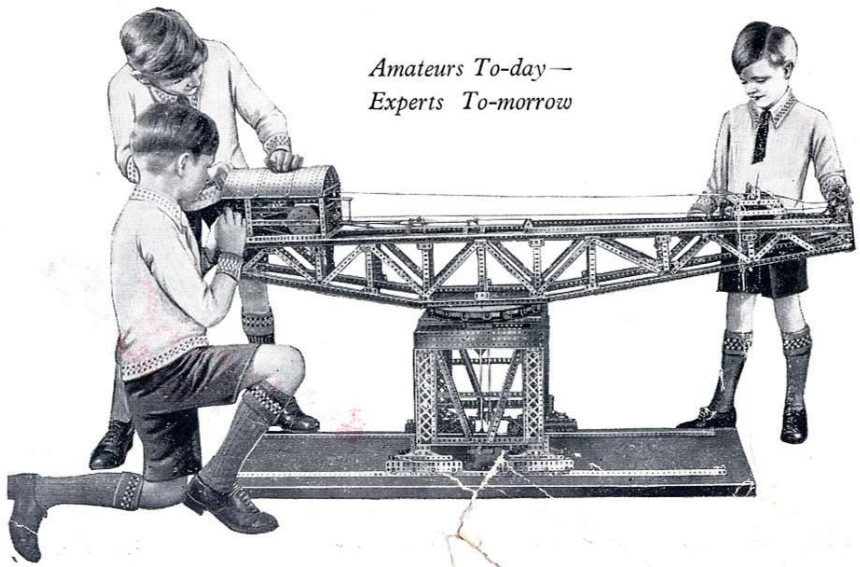
MODEL-BUILDING WITH MECCANO

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

Make the simple models first—they will provide hours of fun—and then try to improve them. Every model can be made in a dozen different ways. It is important to screw up all the nuts and bolts tightly to ensure that your models will be strong and firm when they are completed.

HOW TO BUILD UP YOUR OUTFIT

Meccano is sold in ten different Outfits, lettered A to L. All Meccano parts are of the same high quality and finish, but the larger Outfits contain a greater quantity and variety of parts, making possible the construction of more elaborate models. Each Outfit from A upwards may be converted into the one next higher by the purchase of an Accessory Outfit. Thus, Meccano Outfit A may be converted into a B by adding to it an Aa Accessory Outfit. A Ba would then convert it into a C Outfit, and so on. In this way, no matter with which Outfit you commence, you may build it up by degrees until you possess an L Outfit. It is important to remember that Meccano Parts may be bought separately at any time in any quantity from your Meccano dealer.



Amateurs To-day—
Experts To-morrow

ELECTRIC LIGHTING OF MECCANO MODELS

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

THE "MECCANO MAGAZINE"

The *Meccano Magazine* is specially written for Meccano boys. It tells them of the latest Meccano models ; what Meccano Clubs are doing ; how to correspond with other Meccano boys ; the Competitions that are running, etc. It contains splendid articles on such subjects as Railways, Famous Engineers and Inventors, Electricity, Chemistry, Bridges, Cranes, Wonderful Machinery, Aeronautics, Latest Patents, Radio, Stamps, Photography, Books and other topics of interest to boys, including suggestions from Meccano boys for new Meccano parts and correspondence columns in which the Editor replies to his readers' enquiries. The publishing date is the first of each month. If you are not already a reader of the *Meccano Magazine* 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 for boys, started at the request of boys, and as far as possible conducted by 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 the others to get the very best out of life. Write for full particulars and an application form to the Meccano Guild Secretary, Binns Road, Liverpool 13.

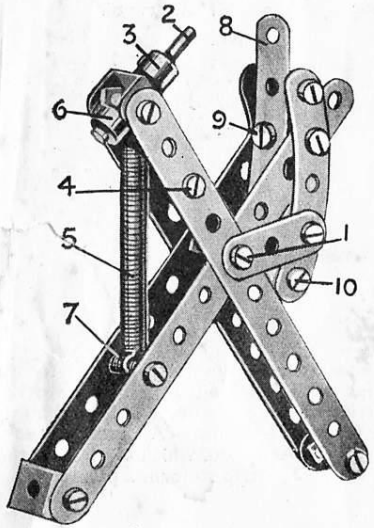
Meccano Clubs are founded and established under the guidance of the Guild Secretary at Headquarters, and at the present time there are active Clubs in nearly 250 towns and villages in the United Kingdom, and more than 100 in countries overseas. Each Club has its Leader, Secretary, Treasurer, and other officials, all of whom, with the exception of the Leader, are boys.

Special Merit Medallions are awarded to Club members for good work in connection with their Club, and recruiting medallions are awarded in connection with the Recruiting Campaign, full particulars of which will be sent on request.

MECCANO SERVICE

The service of Meccano does not end with selling an Outfit and an Instruction Manual. When you want to know something more about engineering than is now shown in our books, or when you strike a tough problem of any kind, write to us. We receive over 200 letters from boys every day all the year round. Although all kinds of queries are put to us on all manner of subjects, the main interest is, of course, engineering. No one has such a wonderful knowledge of engineering matters as that possessed by our staff of experts. This vast store of knowledge, gained only by many years of hard-earned experience, is at your service. *We want the Meccano boy of to-day to be the famous engineer of to-morrow.*

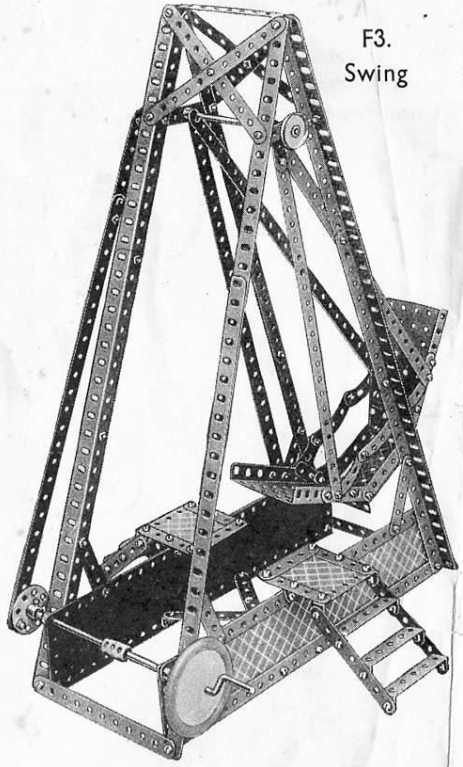
F1. Hand Punch



Parts required		
4	of No.	2
1	„ „	5
2	„ „	6a
4	„ „	11
4	„ „	12
1	„ „	18a
21	„ „	37
3	„ „	37a
1	„ „	43
1	„ „	59
1	„ „	62
2	„ „	90
1	„ „	111c

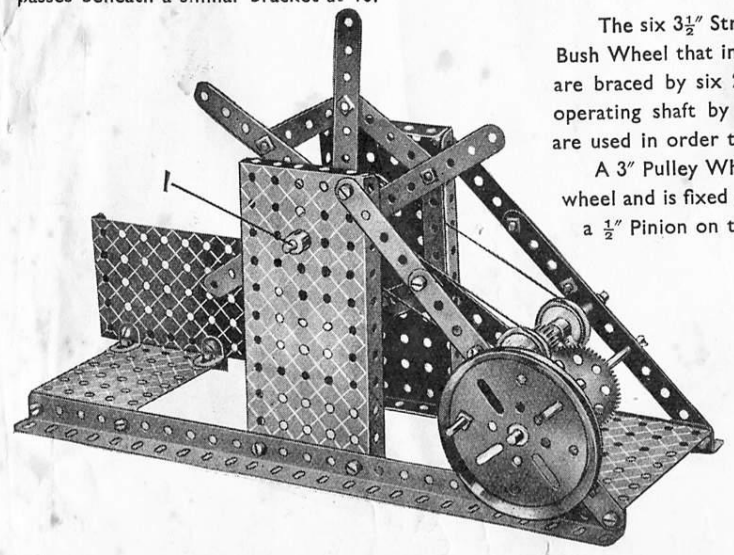
Two pairs of $5\frac{1}{2}''$ Strips are connected loosely towards their centres by means of Nuts and Bolts 1. The punch 2 consists of a $1\frac{1}{2}''$ Rod secured in the boss of a Crank 3, which is bolted to a Double Bracket secured at 4. A Spring 5 serves to open the handles after the punch has been used ; it is placed on the Rod 2 and held in position by means of a Collar 6, while its other end is attached to a $\frac{3}{8}''$ Bolt 7 passed through one pair of $5\frac{1}{2}''$ Strips. After passing through the paper the punch enters the end hole of a 3″ Strip 8. The latter is bolted at 9 to a Double Bracket, while its other end passes beneath a similar bracket at 10.

F3. Swing



Parts required		
9	of No.	1
8	„ „	2
5	„ „	3
2	„ „	4
12	„ „	5
8	„ „	8
8	„ „	12
4	„ „	12a
4	„ „	12c
1	„ „	15
1	„ „	16
1	„ „	19s
1	„ „	22
1	„ „	24
2	„ „	35
117	„ „	37
4	„ „	37a
4	„ „	38
8	„ „	48a
1	„ „	48b
1	„ „	51
2	„ „	54a
3	„ „	59
2	„ „	62
1	„ „	63
2	„ „	90
4	„ „	90a
2	„ „	111c
2	„ „	126
1	„ „	187
2	„ „	190
2	„ „	197

F2. Flax Cleaner



The six $3\frac{1}{2}''$ Strips forming the rotating frame are fastened to a Bush Wheel that in turn is attached to the Rod 1. The $3\frac{1}{2}''$ Strips are braced by six $2\frac{1}{2}''$ Strips. The drive is transmitted from the operating shaft by means of endless cords. Two separate cords are used in order to minimise slipping.

A 3″ Pulley Wheel is fitted with a Threaded Pin to form a hand wheel and is fixed on a Rod carrying a 57-teeth Gear. This drives a $\frac{1}{2}''$ Pinion on the Rod carrying the two 1″ Pulleys.

Parts required		
4	of No.	2
6	„ „	3
6	„ „	5
2	„ „	8
2	„ „	12
3	„ „	15a
1	„ „	19b
4	„ „	22
1	„ „	24
1	of No.	26
1	„ „	27a
1	„ „	35
34	„ „	37
3	„ „	38
1	„ „	40
2	„ „	52
3	„ „	53
4	„ „	59
1	„ „	115

F4. Railway Wagon Swivel Crane

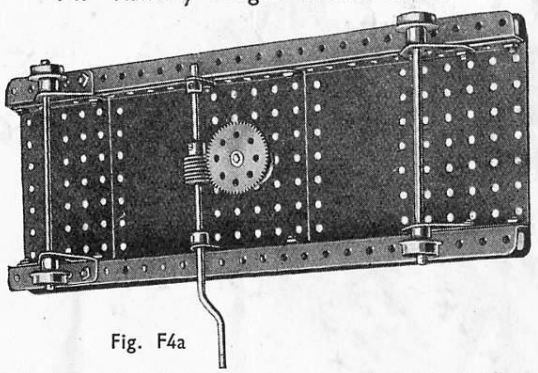
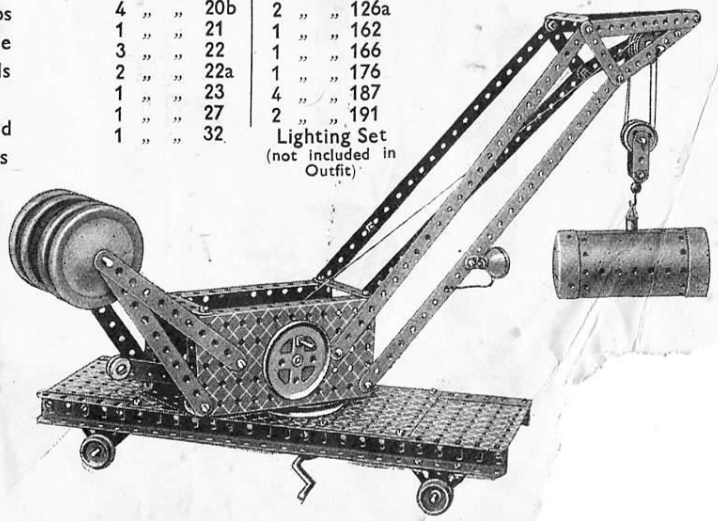


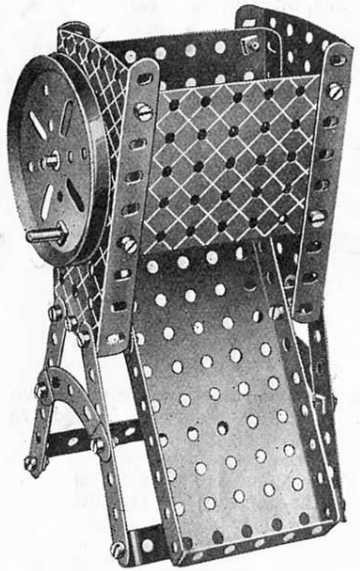
Fig. F4a

Each side girder of the travelling base is made up of two $12\frac{1}{2}''$ Angle Girders, and the built-up girders so formed are connected by three $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates. One is placed at each end and one in the centre, the spaces between them being filled by $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates. One set of axle bearings is formed by two Trunnions and the other by Flat Trunnions.

Parts required		
4	of No.	1
6	„ „	2
3	„ „	3
6	„ „	5
2	„ „	6a
4	„ „	8
3	„ „	10
1	„ „	11
2	„ „	15
2	„ „	16
3	„ „	18a
1	„ „	19
1	„ „	19b
2	„ „	20a
4	„ „	20b
1	„ „	21
3	„ „	22
2	„ „	22a
1	„ „	23
1	„ „	27
1	„ „	32
5	of No.	35
50	„ „	37
7	„ „	37a
15	„ „	38
1	„ „	40
1	„ „	48
2	„ „	52
3	„ „	53
1	„ „	57c
3	„ „	59
2	„ „	62
2	„ „	111
4	„ „	111c
2	„ „	115
2	„ „	126
2	„ „	126a
1	„ „	162
1	„ „	166
1	„ „	176
4	„ „	187
2	„ „	191
Lighting Set (not included in Outfit)		

The flanges of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates are bolted to a 3″ Pulley Wheel upon which the crane swivels, and the spindle of the Pulley Wheel is rotated by a Worm engaging the Gear Wheel (Fig. F4a). The long Crank Handle carrying the Worm is journalled in two Flat Brackets that are bolted to the side Girders.





F5. Oil Cake Chopper

Fig. F5a shows the hand wheel and shaft removed from the model. It will be seen that the chopping mechanism is represented by Flat Brackets clamped between two pairs of 1″ fast Pulley Wheels.

Parts required			Parts required		
4	of No.	3	1	of No.	52
6	„ „	10	2	„ „	53
1	„ „	15	2	„ „	54a
1	„ „	19b	1	„ „	59
4	„ „	22	2	„ „	90a
24	„ „	37	1	„ „	115
2	„ „	48b	2	„ „	125

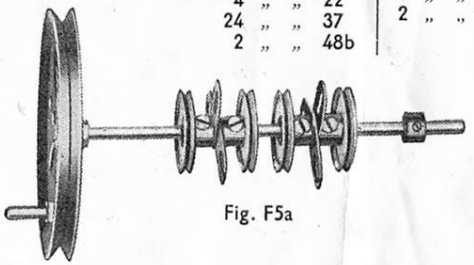
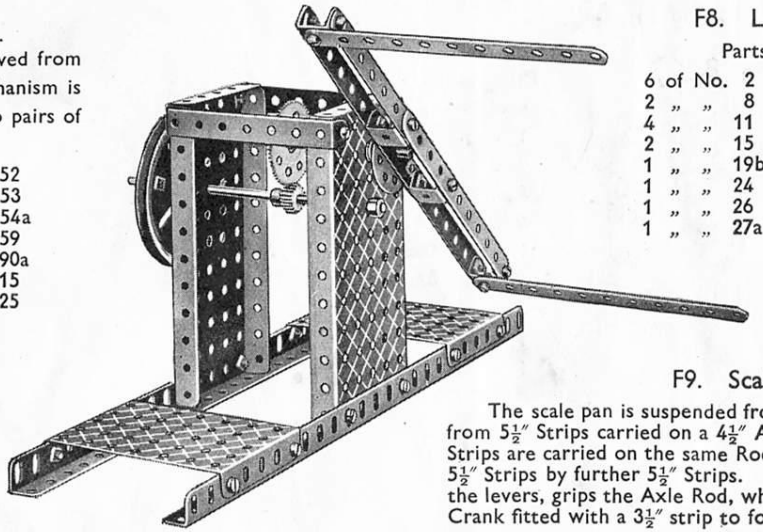


Fig. F5a



F8. Lace Jennier

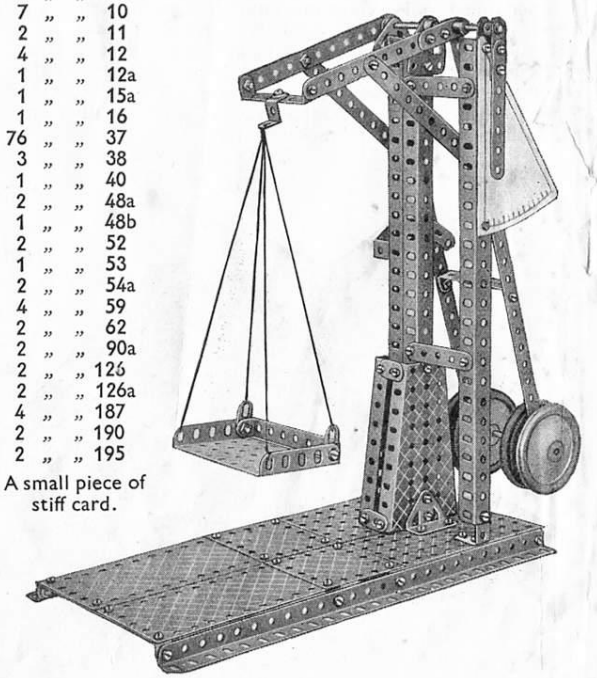
Parts required			Parts required		
6	of No.	2	28	of No.	37
2	„ „	8	1	„ „	37a
4	„ „	11	4	„ „	38
2	„ „	15	2	„ „	48b
1	„ „	19b	2	„ „	52
1	„ „	24	2	„ „	53
1	„ „	26	2	„ „	59
1	„ „	27a	1	„ „	115

F9. Scales

The scale pan is suspended from a lever formed from 5½″ Strips carried on a 4½″ Axle Rod. Two 12½″ Strips are carried on the same Rod and braced to the 5½″ Strips by further 5½″ Strips. A Crank, bolted to the levers, grips the Axle Rod, which carries another Crank fitted with a 3½″ strip to form a pointer.

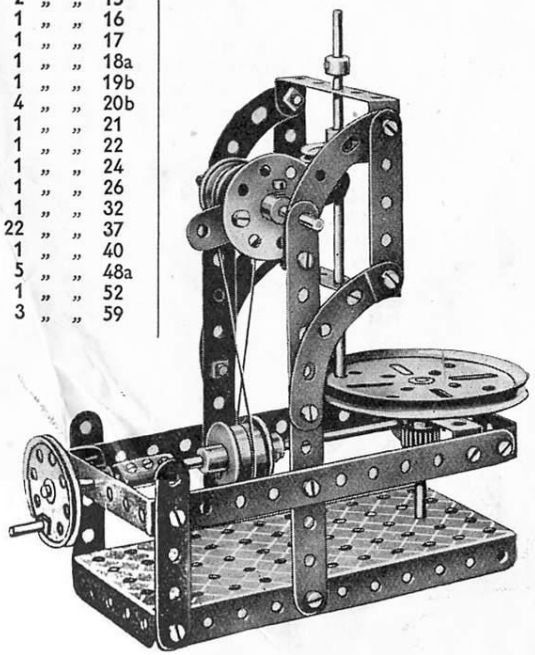
Parts required			Parts required		
2	of No.	1	1	of No.	63
5	„ „	2	4	„ „	90a
4	„ „	3	1	„ „	115
2	„ „	6a			
5	„ „	8			
7	„ „	10			
2	„ „	11			
4	„ „	12			
1	„ „	12a			
1	„ „	15a			
1	„ „	16			
76	„ „	37			
3	„ „	38			
1	„ „	40			
2	„ „	48a			
1	„ „	48b			
2	„ „	52			
1	„ „	53			
2	„ „	54a			
4	„ „	59			
2	„ „	62			
2	„ „	90a			
2	„ „	126			
2	„ „	126a			
4	„ „	187			
2	„ „	190			
2	„ „	195			

A small piece of stiff card.



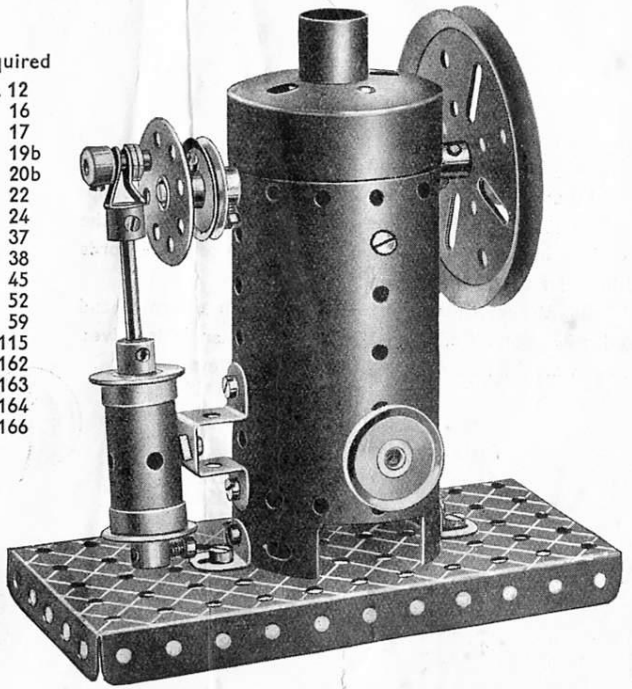
F6. Auto Dial Press

Parts required			Parts required		
4	of No.	2	1	of No.	63
5	„ „	5	4	„ „	90a
2	„ „	15	1	„ „	115
1	„ „	16			
1	„ „	17			
1	„ „	18a			
1	„ „	19b			
4	„ „	20b			
1	„ „	21			
1	„ „	22			
1	„ „	24			
1	„ „	26			
1	„ „	32			
22	„ „	37			
1	„ „	40			
5	„ „	48a			
1	„ „	52			
3	„ „	59			

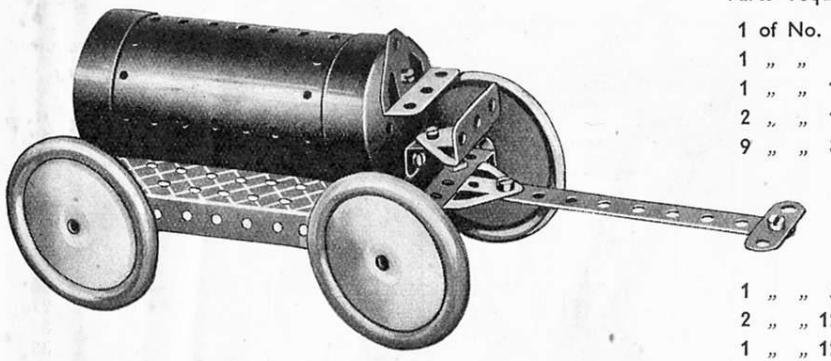


F7. Vertical Steam Engine

Parts required			Parts required		
2	of No.	12	1	of No.	63
1	„ „	16	4	„ „	90a
1	„ „	17	1	„ „	115
1	„ „	19b			
2	„ „	20b			
3	„ „	22			
1	„ „	24			
9	„ „	37			
2	„ „	38			
1	„ „	45			
1	„ „	52			
1	„ „	59			
1	„ „	115			
1	„ „	162			
1	„ „	163			
1	„ „	164			
1	„ „	166			



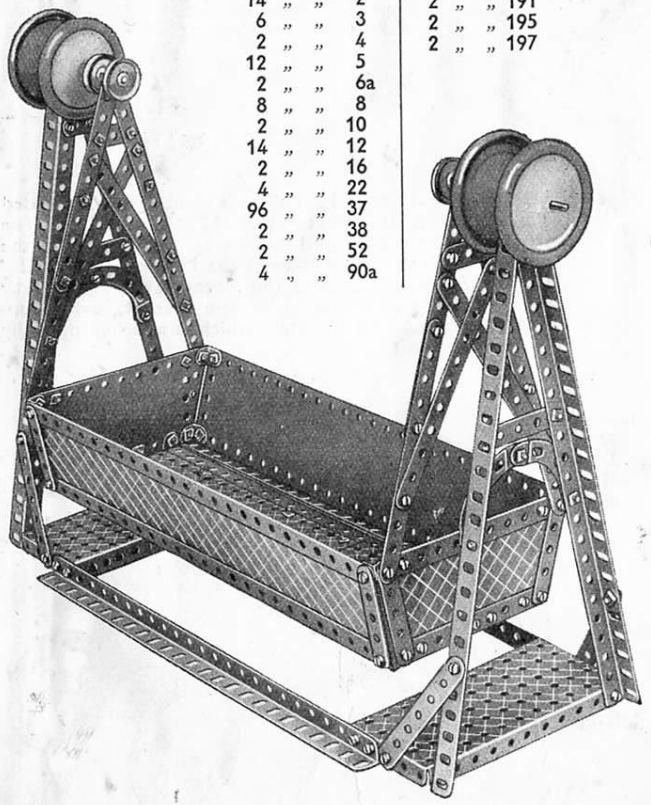
F10. Tank Wagon



Parts required

1	of No.	2
1	„ „	6a
1	„ „	12
2	„ „	16
9	„ „	37
1	„ „	52
2	„ „	126
1	„ „	126a
1	„ „	162
4	„ „	187

F11. Swing Cot

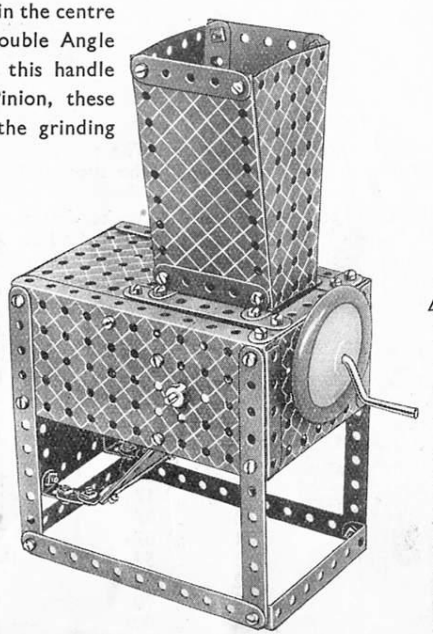


Parts required

6	of No.	1
14	„ „	2
6	„ „	3
2	„ „	4
12	„ „	5
2	„ „	6a
8	„ „	8
2	„ „	10
14	„ „	12
2	„ „	16
4	„ „	22
96	„ „	37
2	„ „	38
2	„ „	52
4	„ „	90a
4	of No.	187
1	„ „	190
2	„ „	191
2	„ „	195
2	„ „	197

F12. Coffee Grinder

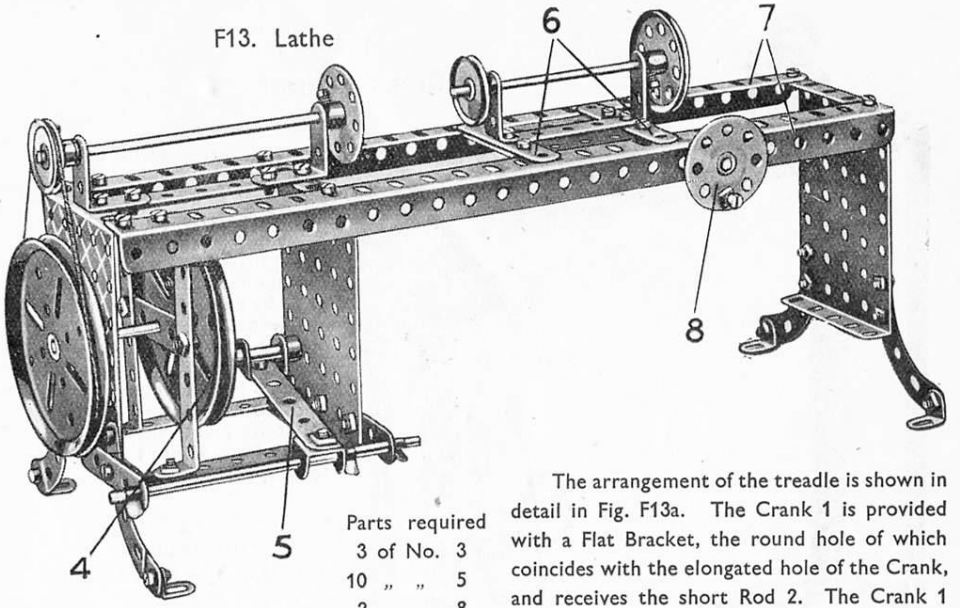
The $3\frac{1}{2}''$ Crank Handle forming the operating handle is fitted with a Road Wheel and is journalled at its inner end in the centre hole of a $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip. A Worm on this handle meshes with a $\frac{1}{2}''$ Pinion, these two parts forming the grinding mechanism.



Parts required

6	of No.	2
6	„ „	3
8	„ „	5
2	„ „	10
8	„ „	12
4	„ „	12c
1	„ „	15a
1	„ „	19s
1	„ „	26
1	„ „	32
60	„ „	37
2	„ „	48b
2	„ „	52
3	„ „	53
2	„ „	54a
3	„ „	59
1	„ „	187
2	„ „	190
2	„ „	191
1	„ „	193

F13. Lathe



Parts required

3	of No.	3
10	„ „	5
2	„ „	8
1	„ „	10
2	„ „	11
4	„ „	12
2	„ „	12a
2	„ „	15a
2	„ „	16
1	„ „	17
1	„ „	18a
2	„ „	19b
1	„ „	21
2	„ „	22
1	„ „	24
3	„ „	35
44	„ „	37
2	„ „	37a
4	„ „	38
1	„ „	40
1	„ „	46
2	„ „	48b
3	„ „	53
4	„ „	59
1	„ „	62
4	„ „	90a
1	„ „	111c
1	„ „	115

The arrangement of the treadle is shown in detail in Fig. F13a. The Crank 1 is provided with a Flat Bracket, the round hole of which coincides with the elongated hole of the Crank, and receives the short Rod 2. The Crank 1 is free to turn about a Threaded Pin 3, secured to the 3″ Pulley Wheel 4, and once the latter is set in motion it can be kept in rotation by working the treadle 5. The Strips 6 of the saddle (Fig. F13) are duplicated and their ends form slots to receive the flanges of the Angle Girders 7. The hand wheel 8 is a dummy one, but if desired it may be arranged to operate the saddle by an endless rope device.

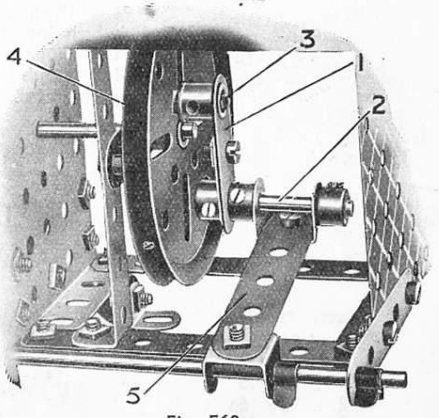
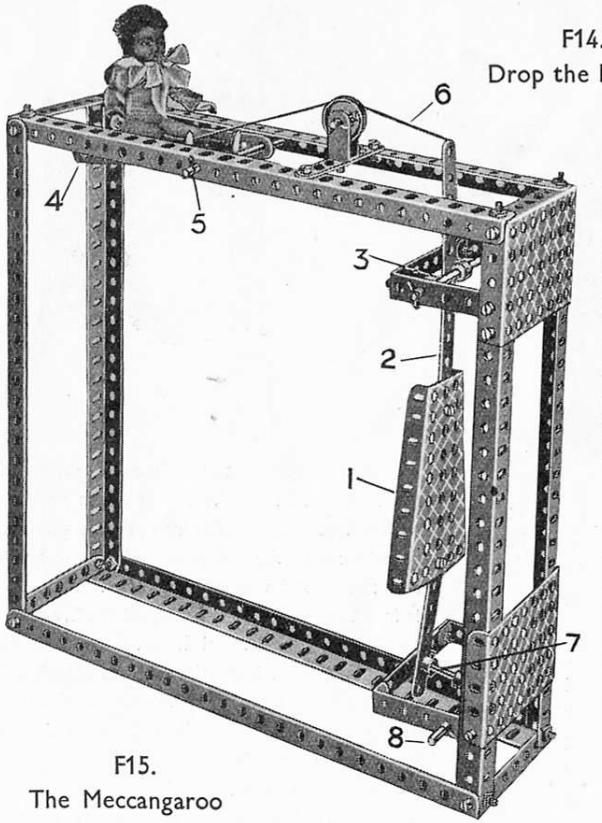


Fig. F13a

F14. Drop the Nigger



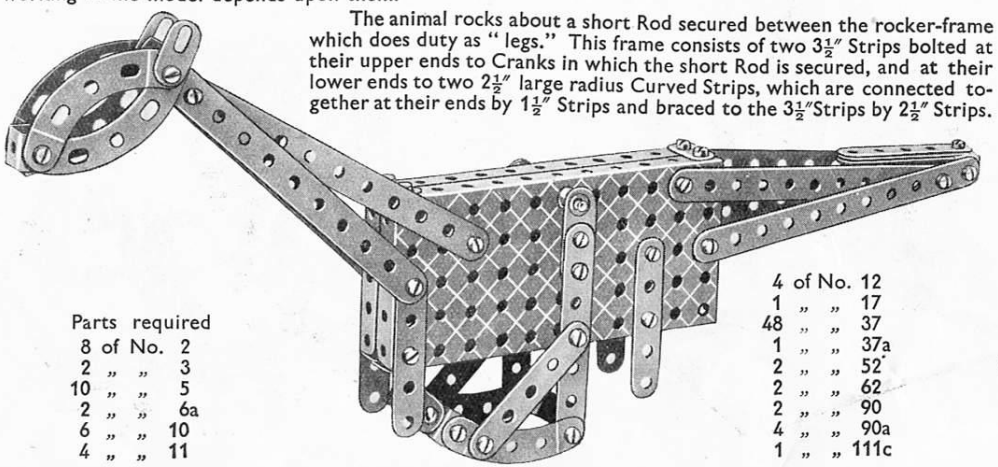
The Sector Plate 1 is a target, which, when hit, allows the nigger to be dropped. The Plate 1 is carried on the Strip 2 pivoted at 3. The weight of the nigger is supported on another Sector Plate 4, pivoted at 5, by means of the cord 6 and keeps the lower end of the Strip 2 hard against a short Rod 7 pivoted at 8. When the target is hit and knocked back the Rod 7 is released and falls about its pivot, allowing the Sector Plate 4 with the nigger to drop.

Parts required

1	of No.	1	33	of No.	37
6	„ „	3	1	„ „	40
8	„ „	8	1	„ „	44
1	„ „	12	4	„ „	48a
3	„ „	15a	2	„ „	53
2	„ „	17	2	„ „	54
1	„ „	22	3	„ „	59
6	„ „	35	1	„ „	63

F15. The Meccangaroo

When placed upon an incline the " Meccangaroo " will " walk " with a quaint action. The positions of the various Strips in relation to the body should be reproduced as accurately as possible, for the successful working of the model depends upon them.

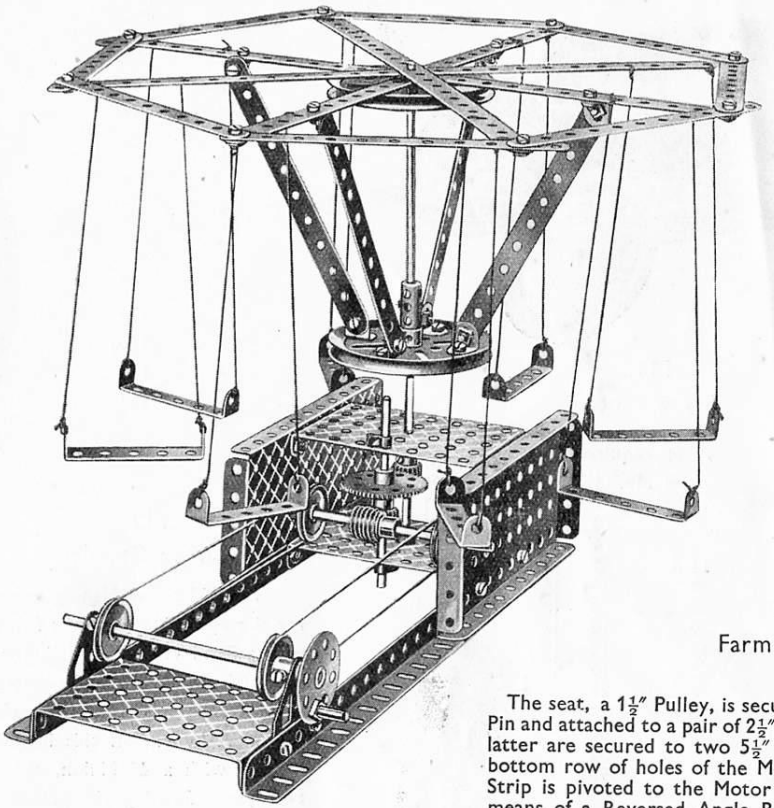


The animal rocks about a short Rod secured between the rocker-frame which does duty as " legs." This frame consists of two $3\frac{1}{2}$" Strips bolted at their upper ends to Cranks in which the short Rod is secured, and at their lower ends to two $2\frac{1}{2}$" large radius Curved Strips, which are connected together at their ends by $1\frac{1}{2}$" Strips and braced to the $3\frac{1}{2}$"Strips by $2\frac{1}{2}$" Strips.

Parts required

8	of No.	2	4	of No.	12
2	„ „	3	1	„ „	17
10	„ „	5	48	„ „	37
2	„ „	6a	1	„ „	37a
6	„ „	10	2	„ „	52
4	„ „	11	2	„ „	62
			2	„ „	90
			4	„ „	90a
			1	„ „	111c

F16. Roundabout

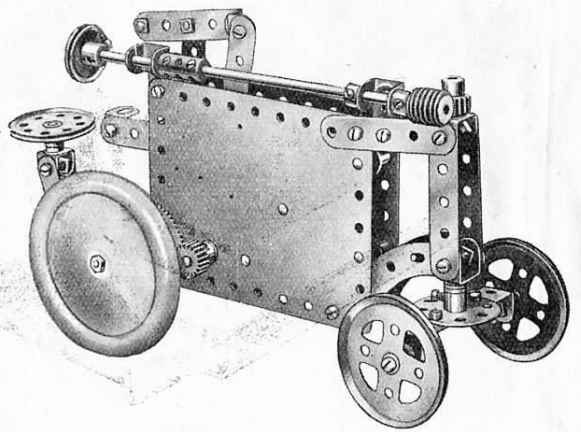


Parts required

4	of No.	1	1	of No.	27a
12	„ „	2	1	„ „	32
2	„ „	8	28	„ „	37
8	„ „	12	7	„ „	37a
1	„ „	15	5	„ „	38
3	„ „	15a	1	„ „	48a
1	„ „	16	2	„ „	59
2	„ „	19b	1	„ „	63
4	„ „	22	4	„ „	90a
1	„ „	24	2	„ „	111
2	„ „	26	1	„ „	111c
1	„ „	27a	1	„ „	115
1	„ „	32	1	„ „	125
2	„ „	35	2	„ „	187
36	„ „	37			
2	„ „	40			
8	„ „	48a			
2	„ „	52			
3	„ „	53			
2	„ „	59			
1	„ „	63			
1	„ „	115			
2	„ „	126a			

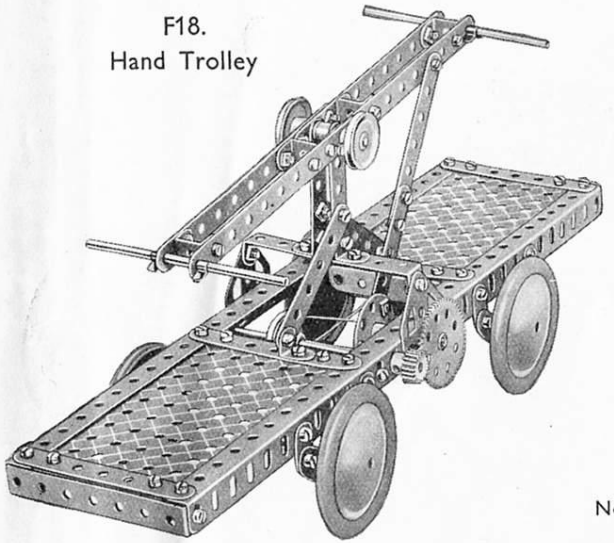
F17. Farm Tractor

The seat, a $1\frac{1}{2}$" Pulley, is secured on a Threaded Pin and attached to a pair of $2\frac{1}{2}$" Curved Strips. The latter are secured to two $5\frac{1}{2}$" Strips fixed in the bottom row of holes of the Motor plates. A $2\frac{1}{2}$" Strip is pivoted to the Motor reversing lever by means of a Reversed Angle Bracket, and is supported by a $1\frac{1}{2}$" Strip which is attached pivotally to the Motor.



No. 2 Clockwork Motor (not included in Outfit)

F18. Hand Trolley



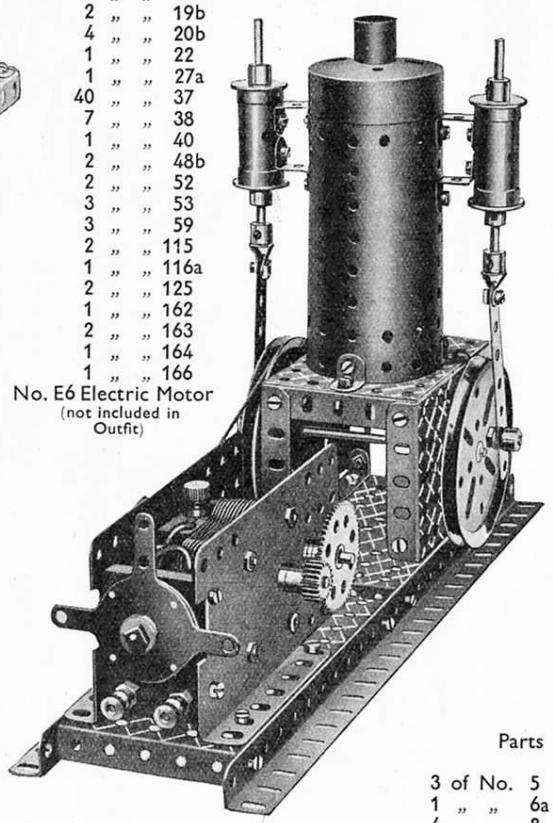
Parts required

4 of No.	2	3 of No.	15a	2 of No.	37a
6 „ „	3	2 „ „	15b	6 „ „	38
2 „ „	4	2 „ „	18a	1 „ „	40
3 „ „	5	4 „ „	22	1 „ „	45
2 „ „	6a	1 „ „	24	2 „ „	48b
4 „ „	8	1 „ „	26	2 „ „	52
8 „ „	10	1 „ „	27a	2 „ „	59
4 „ „	11	4 „ „	35	4 „ „	90a
4 „ „	12	70 „ „	37	2 „ „	126a
		4 of No.	187		

F20. Two-Cylinder Vertical Steam Engine

Parts required

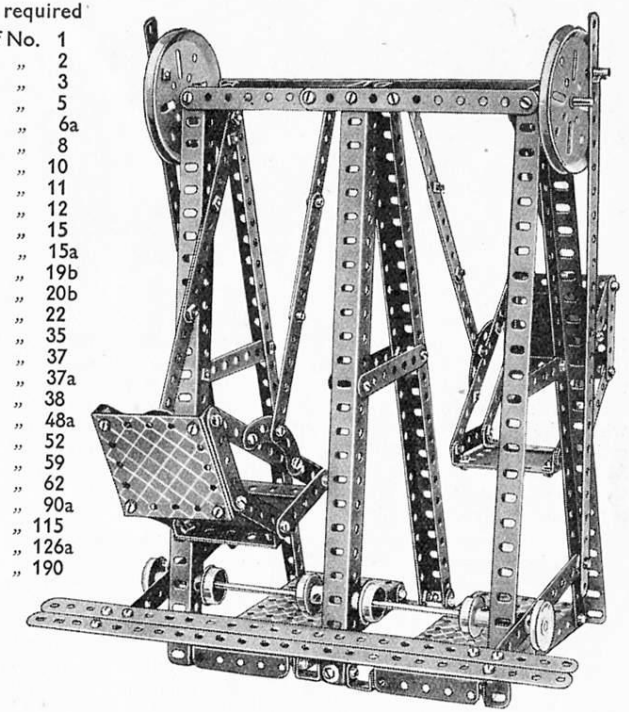
2 of No.	3	
2 „ „	8	
2 „ „	11	
3 „ „	12	
4 „ „	16	
2 „ „	19b	
4 „ „	20b	
1 „ „	22	
1 „ „	27a	
40 „ „	37	
7 „ „	38	
1 „ „	40	
2 „ „	48b	
2 „ „	52	
3 „ „	53	
3 „ „	59	
2 „ „	115	
1 „ „	116a	
2 „ „	125	
1 „ „	162	
2 „ „	163	
1 „ „	164	
1 „ „	166	
No. E6 Electric Motor (not included in Outfit)		



F21. Swing Boat

Parts required

4 of No.	1	
18 „ „	2	
4 „ „	3	
12 „ „	5	
2 „ „	6a	
8 „ „	8	
2 „ „	10	
4 „ „	11	
4 „ „	12	
2 „ „	15	
2 „ „	15a	
2 „ „	19b	
4 „ „	20b	
2 „ „	22	
8 „ „	35	
106 „ „	37	
2 „ „	37a	
2 „ „	38	
8 „ „	48a	
2 „ „	52	
4 „ „	59	
2 „ „	62	
4 „ „	90a	
2 „ „	115	
2 „ „	126a	
4 „ „	190	

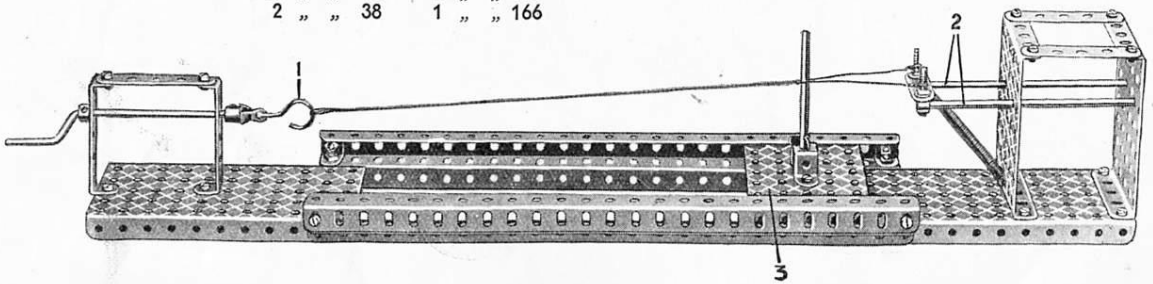


F22. Flex Making Machine

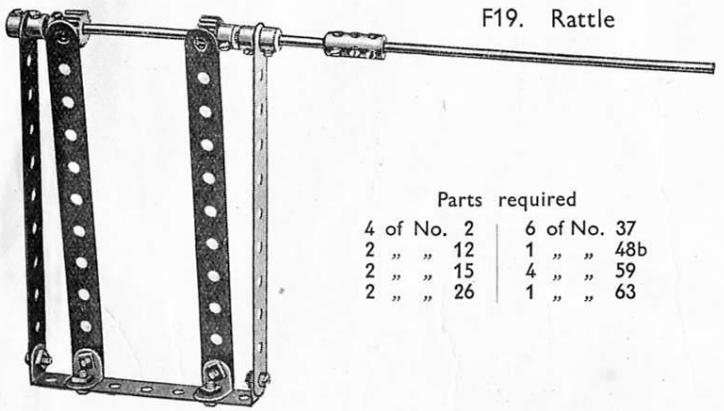
Parts required

3 of No.	5	1 of No.	40
1 „ „	6a	1 „ „	43
4 „ „	8	1 „ „	45
4 „ „	12	2 „ „	48a
2 „ „	15a	2 „ „	52
1 „ „	16	3 „ „	53
1 „ „	19s	1 „ „	57c
2 „ „	35	3 „ „	59
32 „ „	37	2 „ „	115
2 „ „	38	1 „ „	166

The two wires to be twisted are fixed at one end of the machine to a Hook 1 which is attached by an End Bearing to the Crank Handle. At the other end the wires are looped over two Threaded Pins fixed by Collars to the spring controlled Rods 2. The $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate 3 carrying a $3\frac{1}{2}''$ Rod is free to slide in the built-up channel girders, and as the Crank Handle is turned it is pushed ahead of the twisting wires, so keeping the finished flex even. As the wires shorten through twisting, the Rods 2 slide longitudinally, extending the Spring.



F19. Rattle



Parts required

4 of No.	2	6 of No.	37
2 „ „	12	1 „ „	48b
2 „ „	15	4 „ „	59
2 „ „	26	1 „ „	63

F23. Paddle Steamer

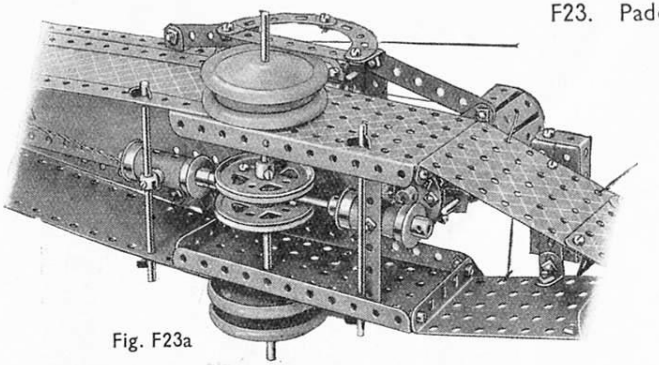


Fig. F23a

The Road Wheels forming the paddles are attached to $3\frac{1}{2}''$ Rods, to the inner ends of which 2″ Pulleys are fixed (Fig. F23a), and the 2″ Pulleys are connected together rigidly by a $\frac{3}{4}''$ Bolt that is locked in position by nuts. This Bolt forms also a pivot for two small Fork Pieces (one of which is taken from a Swivel Bearing) to which the piston rods of the oscillating cylinders are fixed. The cylinders pivot about $4\frac{1}{2}''$ Rods, one cylinder being mounted on a $3\frac{1}{2}''\times\frac{1}{2}''$ Double Angle Strip while the other is attached rigidly to a Collar by a Bolt on which are placed two Washers. The Collar is secured, of course, to the Rod.

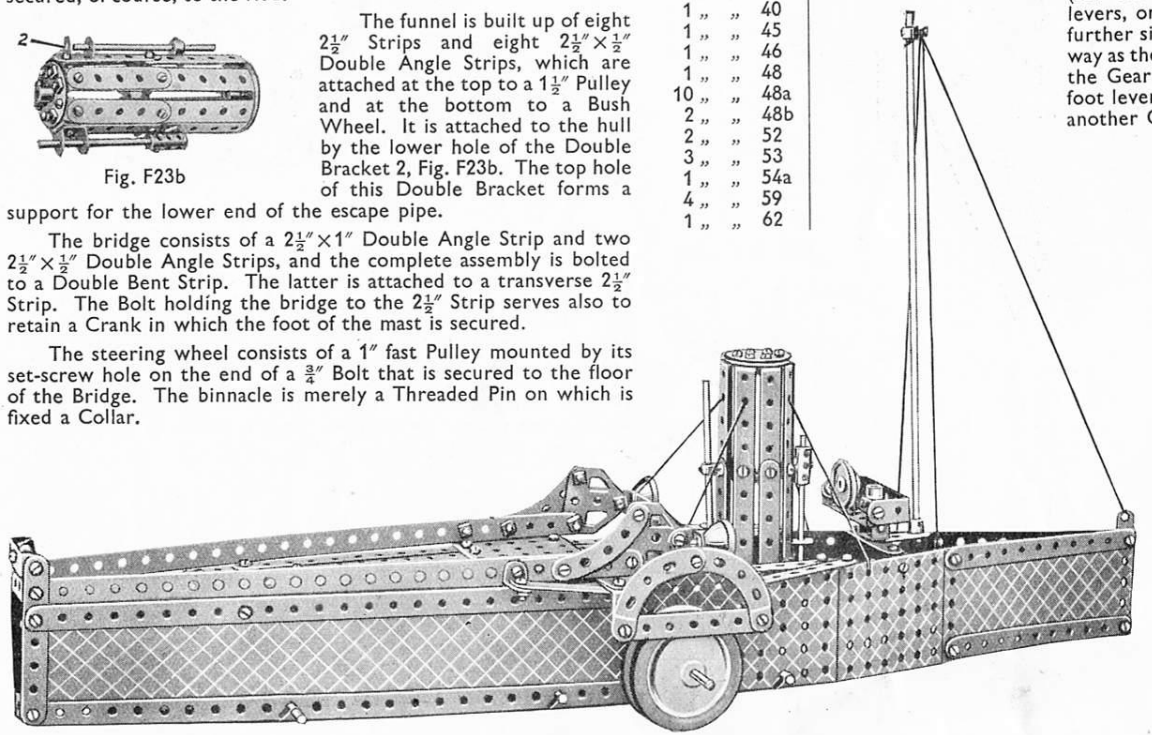
Fig. F23b

The funnel is built up of eight $2\frac{1}{2}''$ Strips and eight $2\frac{1}{2}''\times\frac{1}{2}''$ Double Angle Strips, which are attached at the top to a $1\frac{1}{2}''$ Pulley and at the bottom to a Bush Wheel. It is attached to the hull by the lower hole of the Double Bracket 2, Fig. F23b. The top hole of this Double Bracket forms a support for the lower end of the escape pipe.

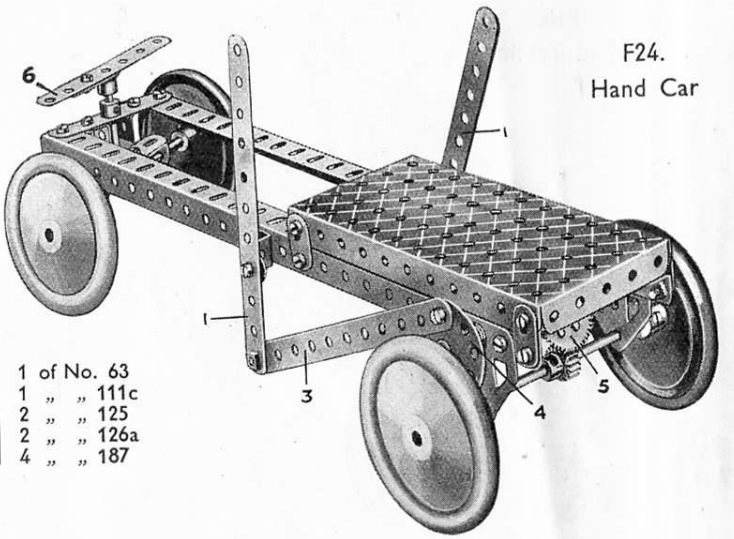
The bridge consists of a $2\frac{1}{2}''\times1''$ Double Angle Strip and two $2\frac{1}{2}''\times\frac{1}{2}''$ Double Angle Strips, and the complete assembly is bolted to a Double Bent Strip. The latter is attached to a transverse $2\frac{1}{2}''$ Strip. The Bolt holding the bridge to the $2\frac{1}{2}''$ Strip serves also to retain a Crank in which the foot of the mast is secured.

The steering wheel consists of a 1″ fast Pulley mounted by its set-screw hole on the end of a $\frac{3}{4}''$ Bolt that is secured to the floor of the Bridge. The binnacle is merely a Threaded Pin on which is fixed a Collar.

Parts required	
6 of No. 1	1 of No. 63
8 „ „ 2	2 „ „ 90
4 „ „ 3	4 „ „ 90a
2 „ „ 4	2 „ „ 111
12 „ „ 5	1 „ „ 115
6 „ „ 10	1 „ „ 116a
3 „ „ 11	2 „ „ 126
12 „ „ 12	2 „ „ 126a
4 „ „ 12a	2 „ „ 163
1 „ „ 13	1 „ „ 165
2 „ „ 15a	4 „ „ 187
2 „ „ 15b	1 „ „ 190
4 „ „ 16	1 „ „ 191
2 „ „ 17	1 „ „ 193
2 „ „ 20a	2 „ „ 195
4 „ „ 20b	2 „ „ 197
1 „ „ 21	Lighting Set (not included in Outfit.)
3 „ „ 22	
1 „ „ 24	
8 „ „ 35	
116 „ „ 37	
2 „ „ 37a	
7 „ „ 38	
1 „ „ 40	
1 „ „ 45	
1 „ „ 46	
1 „ „ 48	
10 „ „ 48a	
2 „ „ 48b	
2 „ „ 52	
3 „ „ 53	
1 „ „ 54a	
4 „ „ 59	
1 „ „ 62	



F24. Hand Car

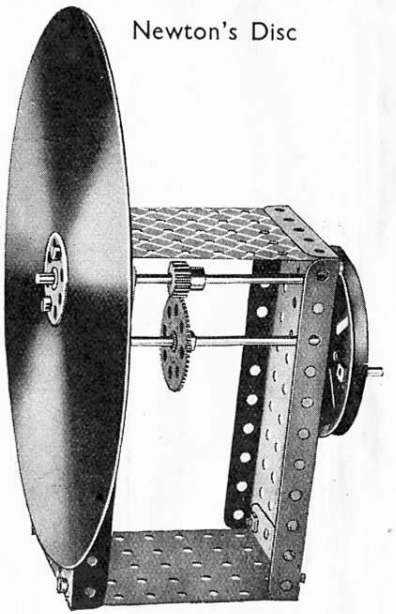


Parts required	
4 of No. 2	1 of No. 63
1 „ „ 3	1 „ „ 111c
1 „ „ 5	2 „ „ 125
2 „ „ 8	2 „ „ 126a
4 „ „ 10	4 „ „ 187
2 „ „ 15	
1 „ „ 16	
1 „ „ 17	
1 „ „ 24	
1 „ „ 26	
1 „ „ 27a	
4 „ „ 35	
26 „ „ 37	
5 „ „ 37a	
4 „ „ 38	
1 „ „ 45	
1 „ „ 48a	
1 „ „ 52	
1 „ „ 59	
2 „ „ 62	

The hand levers 1 are each pivotally attached to the car by a Bolt and two Nuts (see Standard Mechanism No. 1) and are connected in a similar manner to two further levers, one of which, seen at 3, is pivoted to a Bush Wheel 4 while the other, on the further side of the model, is pivoted to a Coupling, which serves as a crank in the same way as the Bush Wheel 4. Both Bush Wheel and Coupling are secured to the Rod carrying the Gear Wheel 5, and motion is thus transmitted to the rear wheels. The steering foot lever 6 is secured by a Crank to a short vertical Rod which, in turn, is secured by another Crank to the Double Angle Strip carrying the front axle.

F25. Newton's Disc

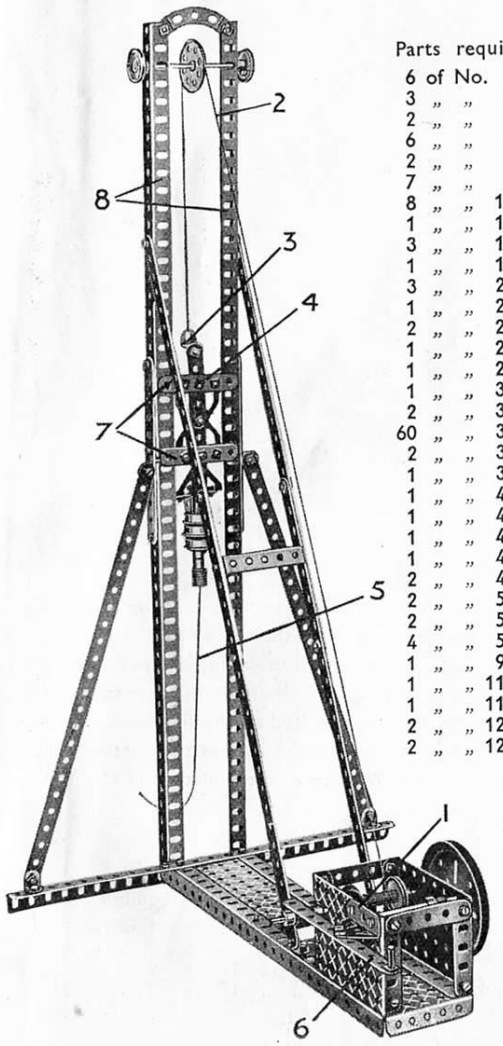
This model demonstrates that the colours of the spectrum, which are most simply produced by directing a ray of white light through a prism, can be re-combined to form white light. The cardboard disc is divided into equal sectors, and the seven colours of the spectrum—red, orange, yellow, green, blue, indigo, and violet—are painted on separate sectors. If the disc is rotated at a high speed by means of the hand wheel and the gears shown, the disc appears to be of a greyish-white colour.



Parts required	
2 of No. 15	10 of No. 37
1 „ „ 19b	1 „ „ 38
1 „ „ 24	2 „ „ 52
1 „ „ 26	2 „ „ 53
1 „ „ 27a	2 „ „ 59
1 of No. 115	

F26. Pile Driver

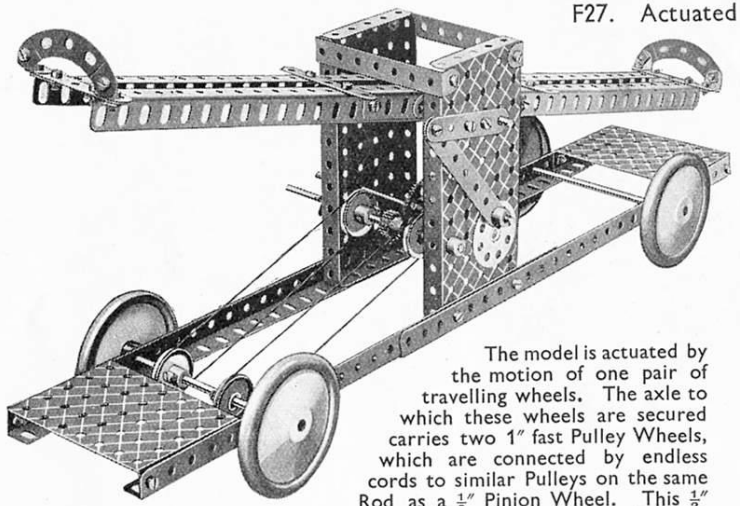
On moving the hand lever 6 to the right a $\frac{1}{2}$" Pinion on the hoisting shaft is brought into engagement with the 57-teeth Gear Wheel 1 on the driving shaft and the ram 4 is raised. The hoisting cord 2 is tied to an Angle Bracket 3, which lodges under another Angle Bracket bolted to the ram. The latter may be dropped whenever required by jerking the cord 5, thereby releasing the Brackets 3. The Strips 7 are duplicated, and slide between the Angle Girders 8.



Parts required

6	of No.	1
3	„ „	2
2	„ „	3
6	„ „	5
2	„ „	6a
7	„ „	8
8	„ „	12
1	„ „	15a
3	„ „	16
1	„ „	19b
3	„ „	20b
1	„ „	21
2	„ „	22
1	„ „	26
1	„ „	27a
1	„ „	32
2	„ „	35
60	„ „	37
2	„ „	37a
1	„ „	38
1	„ „	40
1	„ „	45
1	„ „	46
1	„ „	48a
2	„ „	48b
2	„ „	52
2	„ „	53
4	„ „	59
1	„ „	90a
1	„ „	111c
1	„ „	115
2	„ „	126
2	„ „	126a

F27. Actuated See-Saw



The model is actuated by the motion of one pair of travelling wheels. The axle to which these wheels are secured carries two 1" fast Pulley Wheels, which are connected by endless cords to similar Pulleys on the same Rod as a $\frac{1}{2}$" Pinion Wheel. This $\frac{1}{2}$" Pinion meshes with a 57-teeth Gear Wheel secured to the Rod of a Bush Wheel, and the latter is connected by means of a $3\frac{1}{2}$" Strip to an extended crank (a $2\frac{1}{2}$" Strip and a Crank bolted together) secured to the pivotal Rod of the see-saw.

Parts required

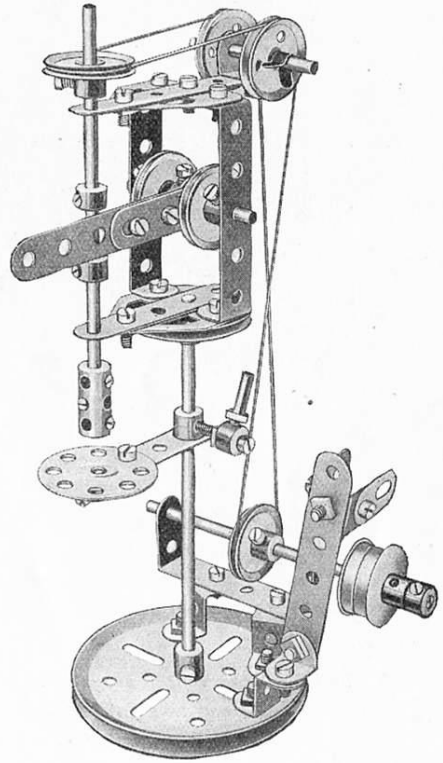
1	of No.	3
6	„ „	5
8	„ „	8
4	„ „	12
2	„ „	15
3	„ „	15a
4	„ „	22
1	„ „	24
1	„ „	26
1	„ „	27a
2	„ „	35
43	„ „	37
2	„ „	37a
1	„ „	40
2	„ „	48b
2	„ „	52
2	„ „	53
3	„ „	59
2	„ „	62
2	„ „	90a
1	„ „	111c
1	„ „	115
4	„ „	187

F28. Auto Swing Boat

Parts required

10	of No.	1	2	of No.	52
18	„ „	2	3	„ „	53
6	„ „	3	1	„ „	54a
6	„ „	5	2	„ „	59
8	„ „	8	2	„ „	62
6	„ „	12	2	„ „	90a
4	„ „	12a	1	„ „	115
1	„ „	13	2	„ „	126
1	„ „	19b	1	„ „	190
122	„ „	37	2	„ „	191
2	„ „	38	2	„ „	193
5	„ „	48a	2	„ „	195
2	„ „	48b	2	„ „	197

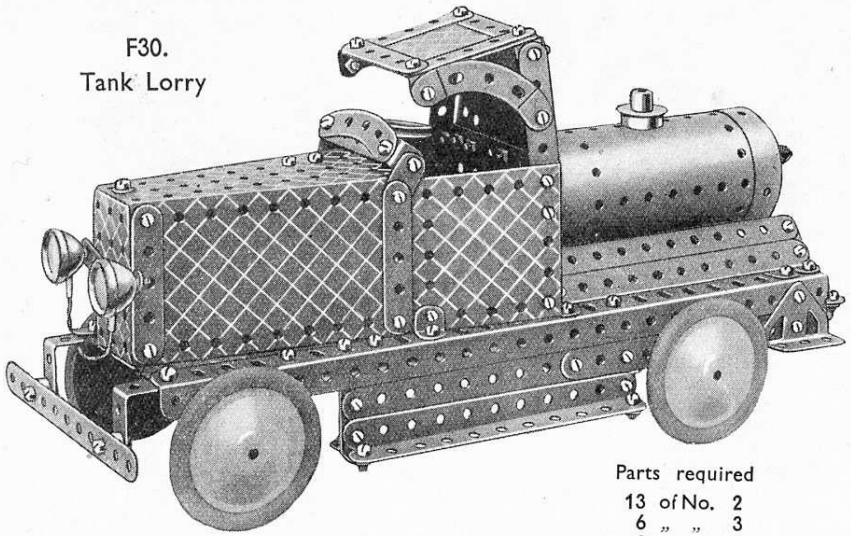
F29. Drilling Machine



Parts required

2	of No.	4	1	of No.	24
2	„ „	5	3	„ „	35
2	„ „	10	21	„ „	37
2	„ „	11	1	„ „	40
1	„ „	12	1	„ „	46
1	„ „	15	2	„ „	48a
2	„ „	15a	4	„ „	59
2	„ „	17	2	„ „	62
1	„ „	19b	1	„ „	63
2	„ „	20b	1	„ „	111
1	„ „	21	1	„ „	115
4	„ „	22	3	„ „	125
2	„ „	22a	2	„ „	126a

F30. Tank Lorry



The steering wheel, a $1\frac{1}{2}''$ Pulley Wheel, is secured to the upper end of the steering column, the bottom of which carries a Bush Wheel. This part is connected by two short cords to the front wheel bearings, a $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip.

The front Road Wheels are secured to a 5″ Rod that is journalled in the end holes of the $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip. The ends of the steering cord are tied to this Strip, which is pivoted by means of a Bolt and lock-nuts (S.M.1) to the central hole of a Double Bent Strip.

The head lamps are attached to the model by Flat Brackets and the wires from the pea-lamps are taken, via the bonnet, to a battery concealed in the bottom of the driver's cab.

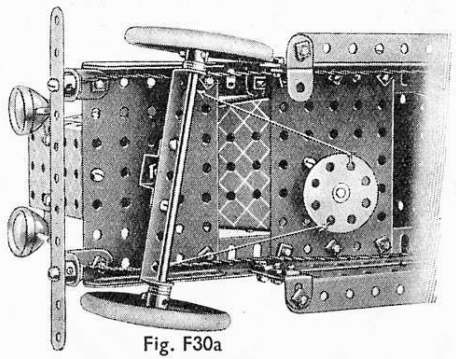


Fig. F30a

Parts required

13	of No.	2
6	„ „	3
2	„ „	4
12	„ „	5
2	„ „	6a
2	„ „	8
6	„ „	10
1	„ „	11
12	„ „	12
4	„ „	12a
4	„ „	12c
2	„ „	15a
1	„ „	16
1	„ „	20b
1	„ „	22
1	„ „	24
120	„ „	37
4	„ „	37a
10	„ „	38
1	„ „	40
1	„ „	43
1	„ „	45
2	„ „	48
2	„ „	48a
2	„ „	48b
1	„ „	51
1	„ „	52
3	„ „	53
2	„ „	54a
2	„ „	59
1	„ „	90
4	„ „	90a
3	„ „	111c
1	„ „	115
4	„ „	125
2	„ „	126
1	„ „	162
4	„ „	187
4	„ „	190
2	„ „	191

1 Lighting Set (not included in Outfit)

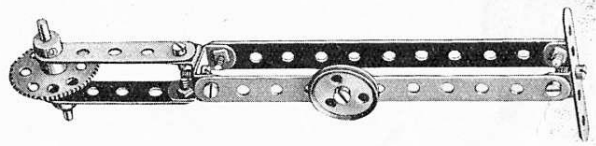
F31. Scales

Parts required

3	of No.	1
4	„ „	2
6	„ „	3
1	„ „	4
2	„ „	5
1	„ „	6a
8	„ „	8
4	„ „	11
6	„ „	12
2	„ „	12a
2	„ „	17
1	„ „	18a
1	„ „	22
2	„ „	35
53	„ „	37
1	„ „	44
2	„ „	52
2	„ „	53
2	„ „	59
2	„ „	62
4	„ „	90
1	„ „	125
2	„ „	126a

The only feature of this model which needs description is the standard, which is built up of two Angle Girders 1 secured to the base 2 by a $2\frac{1}{2}''$ Angle Girder and spaced apart at the top by a $2\frac{1}{2}''$ Strip obliquely disposed. The balance lever 3 is pivotally carried in Curved Strips 4 bolted to the top of two Angle Girders 5 sliding between the Girders 1. The Girders 4 are themselves bolted together and in order to guide them as they slide vertically two Flat Trunnions 6 and two $1\frac{1}{2}''$ Strips are bolted at the front and rear. The balance is raised by depressing the lever 7 pivoted at 8 and connected to the base of the vertically sliding Girders 5. The indicator 10 is bolted to a Crank, the boss of which is fitted on the pivot Rod 11. The connections at 12 are lock-nutted to allow free action.

F32. Pastry Designer



Parts required

2	of No.	2	1	of No.	22a
3	„ „	5	1	„ „	27a
3	„ „	11	9	„ „	37
1	„ „	17	2	„ „	59

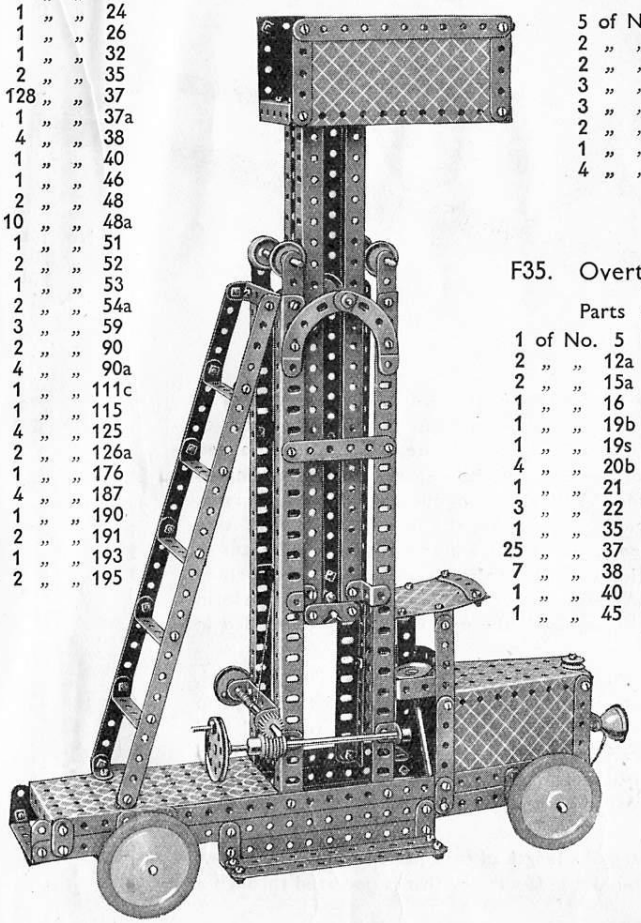
Parts required

6	of No.	1
8	„ „	2
3	„ „	3
2	„ „	4
12	„ „	5
2	„ „	6a
8	„ „	8
7	„ „	10
8	„ „	12
4	„ „	12a
1	„ „	15
1	„ „	15a
2	„ „	15b
4	„ „	16
1	„ „	17
4	„ „	20b
1	„ „	21
3	„ „	22
1	„ „	23
1	„ „	24
1	„ „	26
1	„ „	32
2	„ „	35
128	„ „	37
1	„ „	37a
4	„ „	38
1	„ „	40
1	„ „	46
2	„ „	48
10	„ „	48a
1	„ „	51
2	„ „	52
1	„ „	53
2	„ „	54a
3	„ „	59
2	„ „	90
4	„ „	90a
1	„ „	111c
1	„ „	115
4	„ „	125
2	„ „	126a
1	„ „	176
4	„ „	187
1	„ „	190
2	„ „	191
1	„ „	193
2	„ „	195

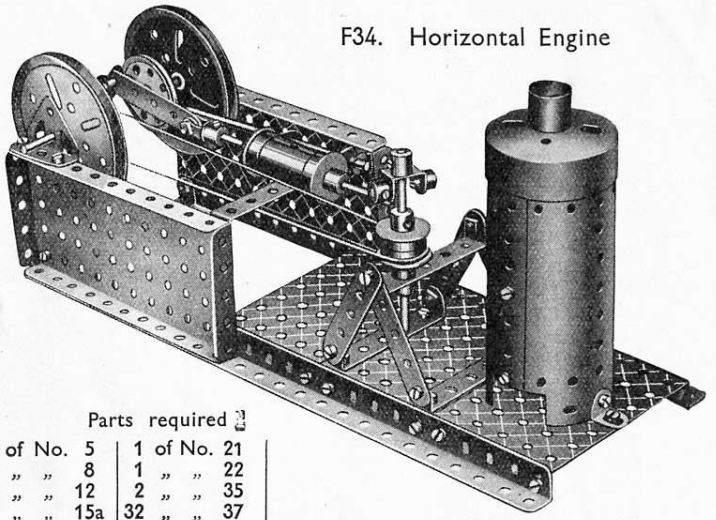
F33. Tower Wagon

When operated, the 1½″ Pulley and Threaded Pin forming a handle winds in the cord which passes over a 1″ fast Pulley Wheel and is tied to a Rod at the bottom of the moving portion of the tower. This part of the tower is thus raised or lowered as required, being guided by ¾″ Flanged Wheels and two pairs of Reversed Angle Brackets.

The steering cords are tied to a Bush Wheel and to the end of a 2½″ × ½″ Double Angle Strip bolted to a Double Bent Strip, which is pivoted to the lower Sector Plate. The front axle is journalled through the ends of the Double Angle Strip.



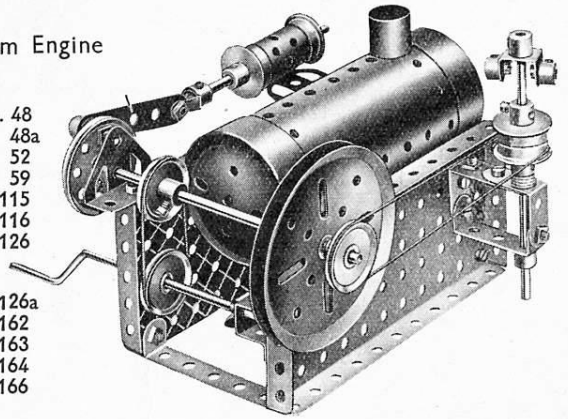
F34. Horizontal Engine



Parts required

5	of No.	5	1	of No.	21	2	of No.	52	1	of No.	116	1	of No.	163
2	„ „	8	1	„ „	22	3	„ „	53	1	„ „	125	1	„ „	164
2	„ „	12	2	„ „	35	3	„ „	59	2	„ „	126	1	„ „	166
3	„ „	15a	32	„ „	37	1	„ „	63	1	„ „	162			
3	„ „	18a	1	„ „	40									
2	„ „	19b	1	„ „	48									
1	„ „	19s	3	„ „	48a									
4	„ „	20b	2	„ „	48b									

F35. Overtype Steam Engine



Parts required

1	of No.	5	1	of No.	48
2	„ „	12a	4	„ „	48a
2	„ „	15a	2	„ „	52
1	„ „	16	4	„ „	59
1	„ „	19b	1	„ „	115
1	„ „	19s	1	„ „	116
4	„ „	20b	2	„ „	126
1	„ „	21			
3	„ „	22			
1	„ „	35	1	„ „	126a
25	„ „	37	1	„ „	162
7	„ „	38	1	„ „	163
1	„ „	40	1	„ „	164
1	„ „	45	1	„ „	166

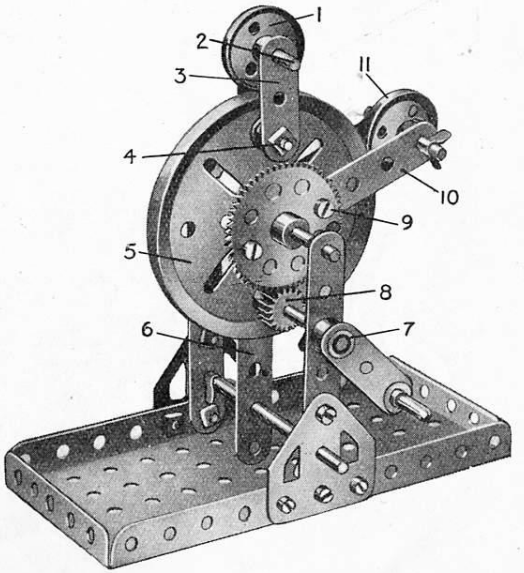
The 2½″ Strip forming the connecting rod, is pivoted in an End Bearing or a 3½″ Rod and attached to the 1½″ Pulley Wheel as shown by means of a Threaded Pin. The latter is fastened in one hole of the 1½″ Pulley Wheel, and two Washers are placed upon it between the Strip and the Wheel. The connecting rod is held in place by a Collar locked to the end of the Threaded Pin. The Boiler is attached to the framework by means of two 2½″ × ½″ Double Angle Strips attached by their centre holes to the side of the Boiler opposite the chimney. When the Boiler is placed in the position shown, the whole is secured by bolting the Double Angle Strips to the side Flanged Plates.

F36. Strip-Bending Machine

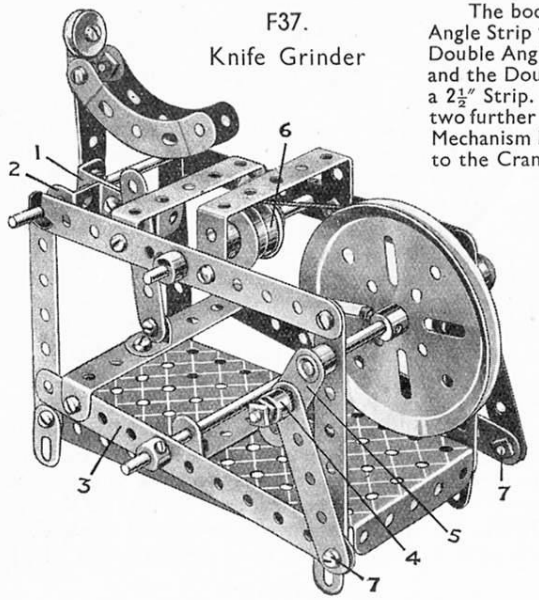
This model represents a device for bending bars or rods of metal to circular form, and may be put to practical purpose in shaping strips of tin or similar material. A loose Pulley 1 is spaced by a Collar and Washers in the centre of the short Rod 2 journalled in a 1½″ Strip 3. The latter is secured to the end of a ¾″ Bolt 4 and spaced away from the 3″ Pulley 5 by means of a number of Washers. The opposite end of the Rod is supported by a 5½″ Strip 6. The handle 7 is secured to a 3½″ Rod carrying a ½″ Pinion 8. This engages with a 57-teeth Gear Wheel 9 mounted on another 3½″ Rod which is free to revolve in the boss of the wheel 5. The Gear Wheel 9 carries a 3″ Strip 10 forming one of the bearings for a short Rod carrying a second 1″ loose Pulley 11. The latter is also spaced by means of a Collar and Washers so that it lies immediately above the groove of the Pulley Wheel 5. The material to be shaped is passed between the two loose Pulleys at the top of the wheel 5, and on rotation of the handle 7 the arm 10 is caused to move downward, so forcing the object to the same curvature as the circumference of the wheel

Parts required

1	of No.	2	2	of No.	18b	10	of No.	38
2	„ „	3	1	„ „	19b	1	„ „	52
1	„ „	4	2	„ „	22a	4	„ „	59
1	„ „	5	1	„ „	26	1	„ „	62
1	„ „	6a	1	„ „	27a	1	„ „	111
2	„ „	16	6	„ „	35	1	„ „	115
1	„ „	17	10	„ „	37	2	„ „	126a



F37. Knife Grinder

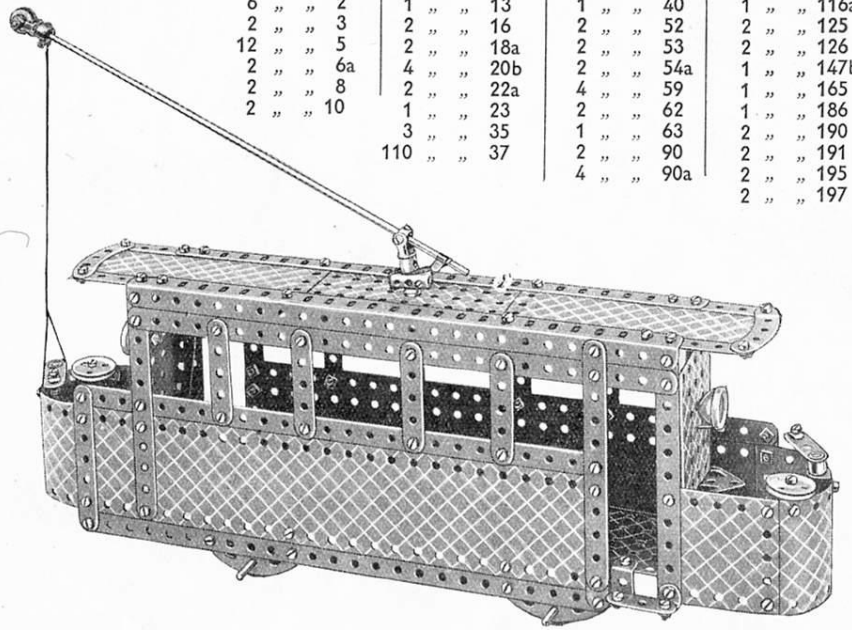


The body is a 2½" Strip, which is bolted at its lower end to a 1½" × ½" Double Angle Strip 1 and is held upright by a ½" Reversed Angle Bracket 2 secured to the Double Angle Strip. Both the latter parts are free to turn about a 3½" Axle Rod, and the Double Angle Strip is connected pivotally with the treadle 3 by means of a 2½" Strip. The treadle, in turn, is connected pivotally with the crankshaft by two further 2½" Strips, each of the Bolts 7 being secured by two Nuts as in Standard Mechanism No. 1. The Collar 4 is mounted loosely on a ¾" Bolt secured rigidly to the Crank 5, and forms a handle by means of which the model may be set in motion. The grinding wheel 6 is driven from the 3" Pulley Wheel by an endless belt.

Parts required

4	of	No.	2	9	of	No.	37a
4	„	„	3	1	„	„	38
4	„	„	5	1	„	„	40
4	„	„	10	1	„	„	46
1	„	„	11	1	„	„	48
1	„	„	12	2	„	„	48a
1	„	„	15a	1	„	„	48b
3	„	„	16	1	„	„	52
1	„	„	19b	4	„	„	59
2	„	„	20b	2	„	„	62
1	„	„	23	2	„	„	90a
3	„	„	35	1	„	„	111
27	„	„	37	1	„	„	125

F38. Electric Tramcar

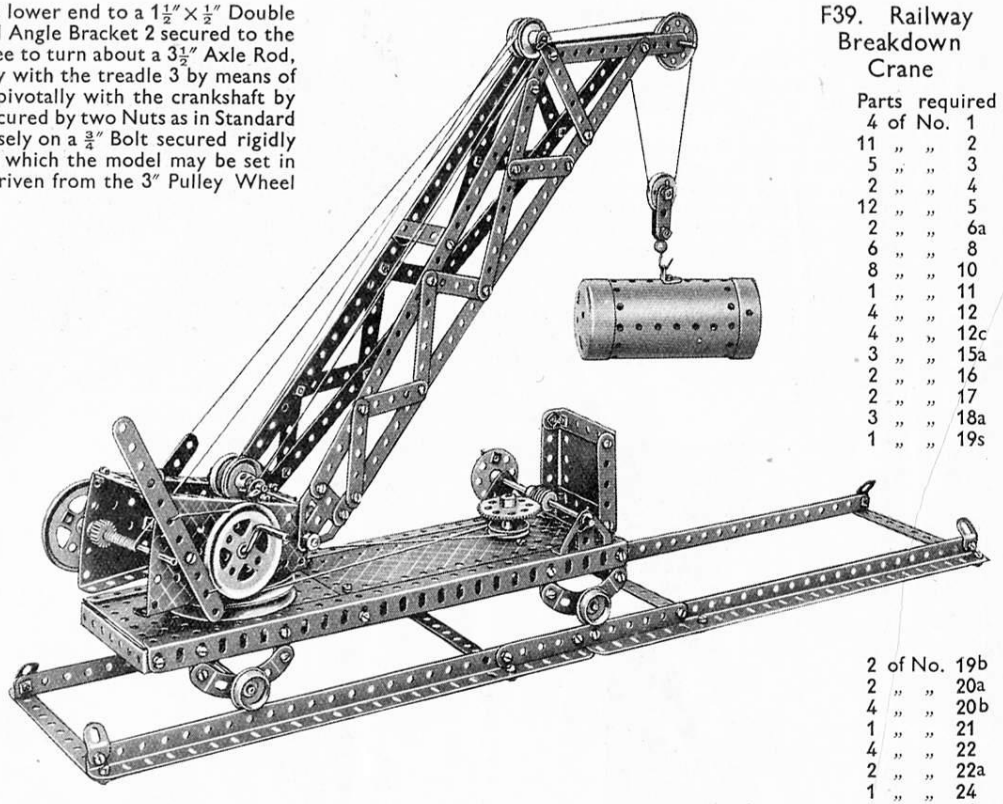


Parts required

6	of	No.	1	2	of	No.	11	5	of	No.	37a
6	„	„	2	10	„	„	12	5	„	„	38
2	„	„	3	1	„	„	13	1	„	„	40
12	„	„	5	2	„	„	16	2	„	„	52
2	„	„	6a	2	„	„	18a	2	„	„	53
2	„	„	8	4	„	„	20b	2	„	„	54a
2	„	„	10	2	„	„	22a	4	„	„	59
				1	„	„	23	2	„	„	62
				3	„	„	35	1	„	„	63
				110	„	„	37	2	„	„	90
								4	„	„	90a

1	of	No.	111
2	„	„	111c
1	„	„	116a
2	„	„	125
2	„	„	126
1	„	„	147b
1	„	„	165
1	„	„	186
2	„	„	190
2	„	„	191
2	„	„	195
2	„	„	197

F39. Railway Breakdown Crane



Parts required

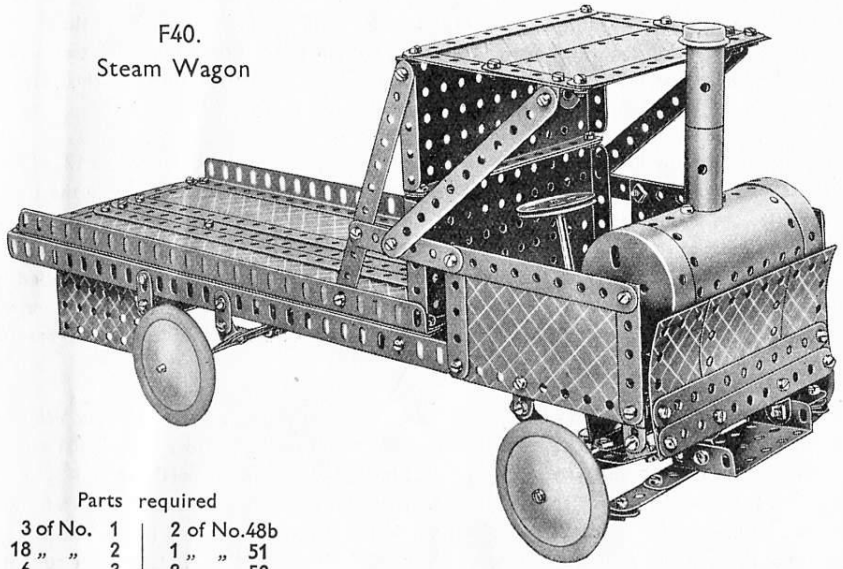
4	of	No.	1
11	„	„	2
5	„	„	3
2	„	„	4
12	„	„	5
2	„	„	6a
6	„	„	8
8	„	„	10
1	„	„	11
4	„	„	12
4	„	„	12c
3	„	„	15a
2	„	„	16
2	„	„	17
3	„	„	18a
1	„	„	19s
2	of	No.	19b
2	„	„	20a
4	„	„	20b
1	„	„	21
4	„	„	22
2	„	„	22a
1	„	„	24
2	„	„	26
1	„	„	27a
1	„	„	32
9	„	„	35
92	„	„	37
14	„	„	37a
22	„	„	38
1	„	„	40
1	„	„	45
1	„	„	48
3	„	„	48a
2	„	„	48b
3	„	„	53
2	„	„	54a
1	„	„	57c
4	„	„	59
4	„	„	90a
2	„	„	111
6	„	„	111c
2	„	„	115
2	„	„	126
2	„	„	126a
1	„	„	162
1	„	„	190
1	„	„	195

The base of the model consists of two 12½" Angle Girders secured together as shown by two 3½" × ½" Double Angle Strips. A solid base is formed by means of the 3½" × 2½" Flanged Plates and one 5½" × 2½" Strip Plate. Two of the Flanged Plates are arranged, at one end of the base, one hole apart, this space being to accommodate the boss of the lower 3" Pulley, forming the turntable of the crane. A second Pulley, held in place and rotating above the first Pulley, carries two Flanged Sector Plates, the upper edges of which are braced together by means of two 2½" Strips. Two ½" × ½" Angle Brackets are also secured on top of the crane housing and these support a Rod on which rotate two 1" fast Pulleys. These form the lower set of pulleys for the luffing cords the upper set being journalled in projections at the top of the jib.

The luffing cord is wound on a 3½" Crank Handle carrying a 2" Pulley Wheel. The groove of this Pulley carries a brake cord attached, as illustrated, to a 5½" Strip pivotally attached to the model. The hoisting cord is secured to a 3½" Rod carrying a ½" Pinion and 2" Pulley, a brake being fitted to this Pulley, similar to that already described. The brake lever, however, consists of a 3½" Strip instead of a 5½" Strip. The arrangement of the hoisting cord will be made clear on reference to the photograph.

Slewing is carried out by means of a length of cord passed round the upper Pulley of the turntable and also round a 1" fast Pulley that is operated through a worm reduction gearing.

F40.
Steam Wagon



Parts required

3 of No.	1	2 of No.	48b
18 „ „	2	1 „ „	51
6 „ „	3	2 „ „	52
2 „ „	4	3 „ „	53
12 „ „	5	2 „ „	54a
2 „ „	6a	4 „ „	59
6 „ „	8	2 „ „	62
8 „ „	10	1 „ „	63
4 „ „	11	2 „ „	111
14 „ „	12	1 „ „	111c
2 „ „	15	4 „ „	125
2 „ „	16	1 „ „	147b
2 „ „	18a	1 „ „	162
3 „ „	20b	2 „ „	163
1 „ „	21	1 „ „	164
1 „ „	24	4 „ „	187
102 „ „	37	3 „ „	190
3 „ „	37a	2 „ „	191
8 „ „	38	2 „ „	195
1 „ „	45	2 „ „	197

The steering column is journalled in bearings consisting of a $5\frac{1}{2}$″ Strip and two $2\frac{1}{2}$″ Strips (Fig. F40a) and carries a Bush Wheel, which is secured rigidly to it. A $\frac{3}{4}$″ Flanged Wheel supports the weight of the steering column. The stub axles of the front road wheels consist of $\frac{3}{4}$″ Bolts, on which the road wheels are spaced by Washers. These Bolts serve in the place of set screws to secure two collars to 1″ Rods. A pair of Cranks secured to these Rods are joined by two $5\frac{1}{2}$″ Strips overlapped eight holes. A $1\frac{1}{2}$″ Strip bolted to the face of the Bush Wheel at the bottom of the steering column is connected pivotally by a composite $4\frac{1}{2}$″ Strip (a $3\frac{1}{2}$″ Strip and a $2\frac{1}{2}$″ Strip overlapped three holes) to the end of the Crank. When the steering wheel is turned, the compound Strip moves the Cranks thereby deflecting the front road wheels.

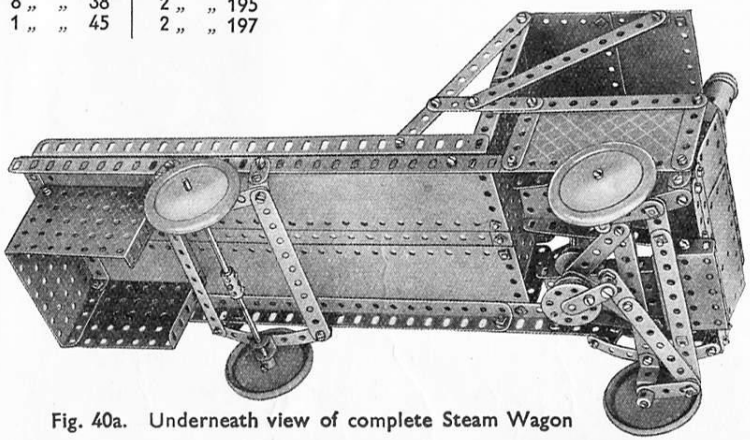
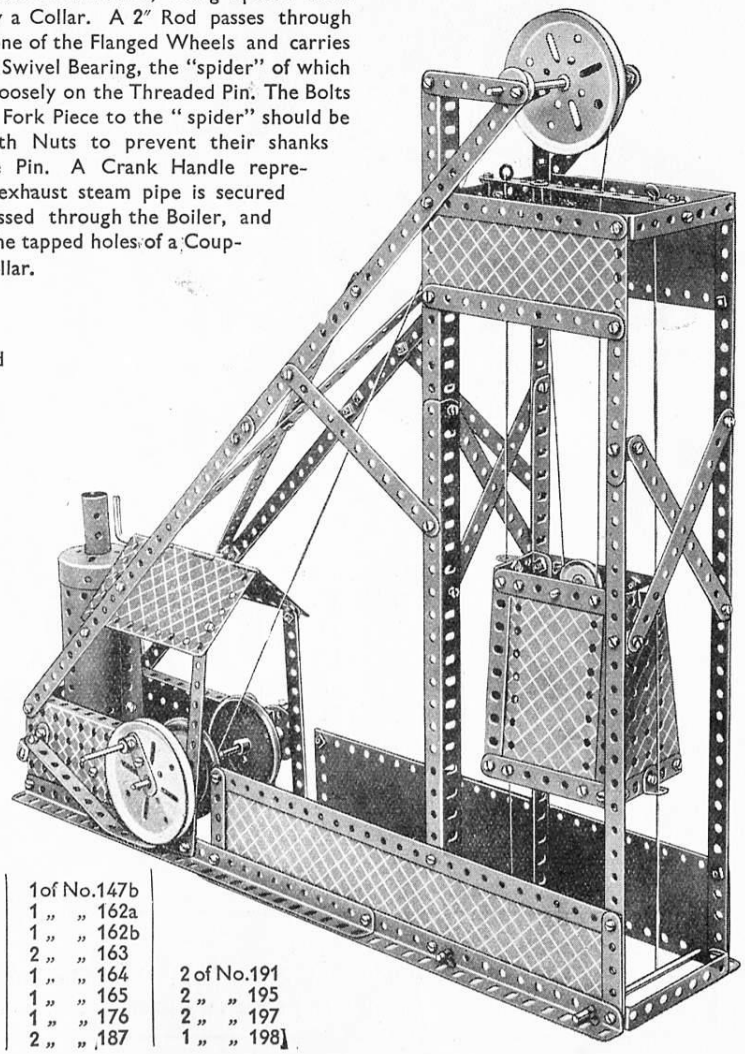


Fig. 40a. Underneath view of complete Steam Wagon

F41.
Pit-head Gear

The cage is raised and lowered by the cord which is wound between two Road Wheels on $4\frac{1}{2}$″ Axle Rod. The Rod also carries a 3″ Pulley which is provided with a Crank and Short Rod to form the operating handle, while a $5\frac{1}{2}$″ Strip secured by a Reversed Angle Bracket to the $5\frac{1}{2}$″ × $2\frac{1}{2}$″ Flanged Plate bears against the periphery of the Pulley and so serves as a brake. The Strip must be depressed slightly with the fingers whilst winding.

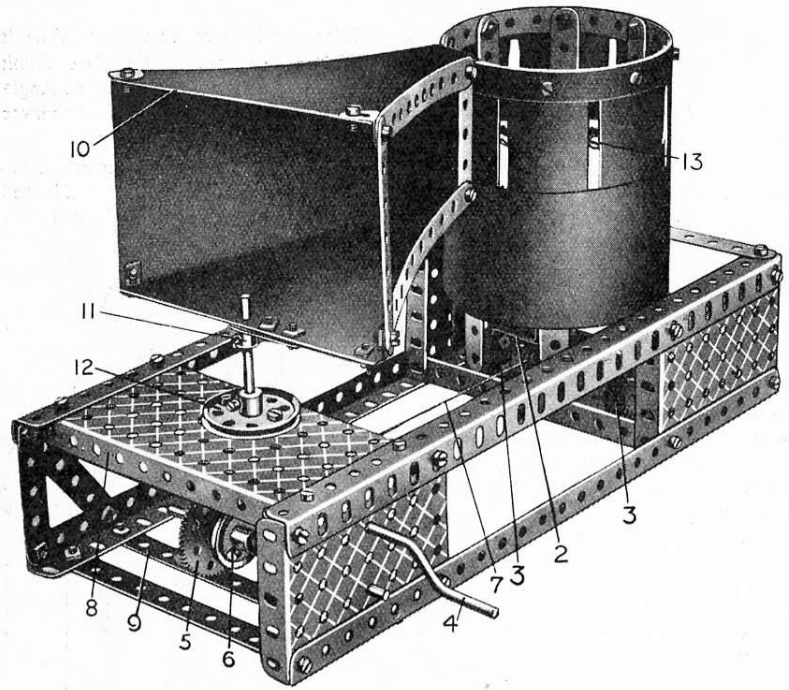
A Bush Wheel on the hoisting Rod carries a Threaded Pin that serves as the crank pin of a dummy engine, which is formed by a Sleeve Piece fitted at each end with a $\frac{3}{4}$″ Flanged Wheel. The Sleeve Piece is mounted on a Pivot Bolt that is passed through its centre hole and lock-nutted to the Plate, being spaced from the latter by a Collar. A 2″ Rod passes through the boss of one of the Flanged Wheels and carries at one end a Swivel Bearing, the "spider" of which is mounted loosely on the Threaded Pin. The Bolts securing the Fork Piece to the "spider" should be provided with Nuts to prevent their shanks gripping the Pin. A Crank Handle representing the exhaust steam pipe is secured by Bolts passed through the Boiler, and inserted in the tapped holes of a Coupling and a Collar.



Parts required

10 of No.	1	1 of No.	147b	2 of No.	191
16 „ „	2	1 „ „	162a	2 „ „	195
6 „ „	3	1 „ „	162b	2 „ „	197
2 „ „	4	2 „ „	163	1 „ „	198
4 „ „	5	1 „ „	164		
8 „ „	8	1 „ „	165		
14 „ „	12	1 „ „	176		
1 „ „	12a	2 „ „	187		
4 „ „	12c				
2 „ „	15				
2 „ „	15a				
2 „ „	17				
1 „ „	18a				
1 „ „	19s				
2 „ „	19b				
4 „ „	20b				
1 „ „	22				
1 „ „	24				
4 „ „	35				
114 „ „	37				
9 „ „	38				
1 „ „	40				
2 „ „	48b				
2 „ „	52				
3 „ „	53				
2 „ „	54a				
4 „ „	59				
1 „ „	62				
1 „ „	63				
2 „ „	111c				
1 „ „	115				
1 „ „	125				

F42. Kinetograph



Most Meccano boys probably are aware of the principles of the Kinetograph, but for the benefit of those who have not seen one in action, we may mention that it is a device which imparts an appearance of animation to a series of pictures, each differing slightly from the other and passed in rapid succession before the eyes. In this respect it resembles the remarkable principle upon which the modern cinematograph is based.

In constructing the Meccano model the following details will prove useful :—The drum consists of a 12½″ Strip bent to form a circle, with its ends overlapping one hole, and bolted to eight vertical 5½″ Strips forming the sides. Two pairs of opposite 5½″ Strips are connected by 3½″ Strips and Angle Brackets bolted in the third holes from their lower ends. The 3½″ Strips cross at right angles to one another and are bolted in the centre to a Bush Wheel, in the boss of which is secured a short Rod forming the pivot of the revolving drum. This Rod is journalled in a Double Bent Strip bolted to a 2½″×1″ Double Angle Strip 2. This, in turn, is secured to the base of the model by two 1″×1″ Angle Brackets 3. A further bearing for the short Rod consists of a Crank bolted to the base o the model.

The drum is rotated from the Crank Handle 4, on which is mounted a ½″ Pinion engaging a 57-teeth Gear Wheel 5 secured to a 3½″ Rod carrying a Pulley Wheel 6. The latter is connected by means of a cord 7 to a similar wheel nipped to the vertical spindle of the drum. Bearings are provided for the inner ends of the Crank Handle and 3½″ Rod by a Double Angle Strip bolted between the Plate 8 and 5½″ Strip 9. The sighting box 10 is built up from a framework of Strips and is secured by means of a Crank 11 to a short vertical Rod rigidly mounted in the boss of the 1½″ Pulley 12. The four sides of the framework 10 are covered with some black material ; stiff black paper suitable for this purpose may be obtained from any stationers. The drum is enclosed in the same way, but the covering paper should be cut in a strip measuring 12½″×4½″ and pierced with slots spaced 1½″ apart (from centre to centre) so that they fall exactly between the upright 5½″ Strips. The slots should measure 1½″×¼″.

The type of drawing suitable for use in this model is shown in Fig. F42a, and the dimensions indicated therein should be followed carefully. No doubt Meccano boys will be able to devise numerous amusing pictures of a similar kind for themselves. The strip of stout white paper carrying the sketches is inserted in the bottom of the drum as indicated at 13. The model is now ready for operation. Placing the frame 10 over the eyes, the line of vision is directed through the narrow end, where the Strips are held apart by means of Double Brackets, and through the slots in the drum. The latter should be rotated rapidly by operating the handle 4, and as it revolves, the little dog shown in Fig F42a will be seen jumping over the fence with a most realistic and amusing action.

Parts required

1 of No. 1	1 of No. 15a	12 of No. 38
17 „ „ 2	2 „ „ 16	1 „ „ 40
6 „ „ 3	1 „ „ 19s	1 „ „ 45
1 „ „ 4	1 „ „ 21	1 „ „ 46
3 „ „ 5	2 „ „ 22	1 „ „ 48a
4 „ „ 8	1 „ „ 24	2 „ „ 52
2 „ „ 11	1 „ „ 26	3 „ „ 53
12 „ „ 12	1 „ „ 27a	4 „ „ 59
2 „ „ 12a	60 „ „ 37	2 „ „ 62

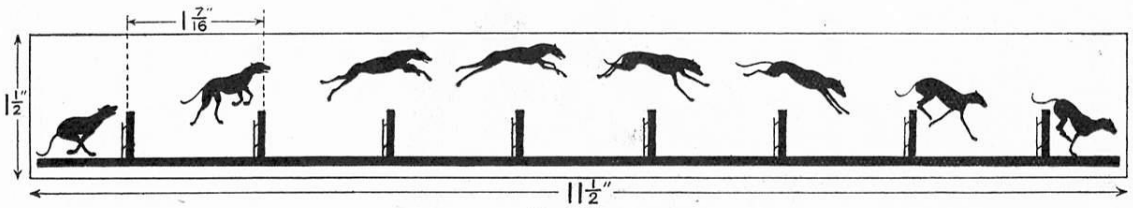
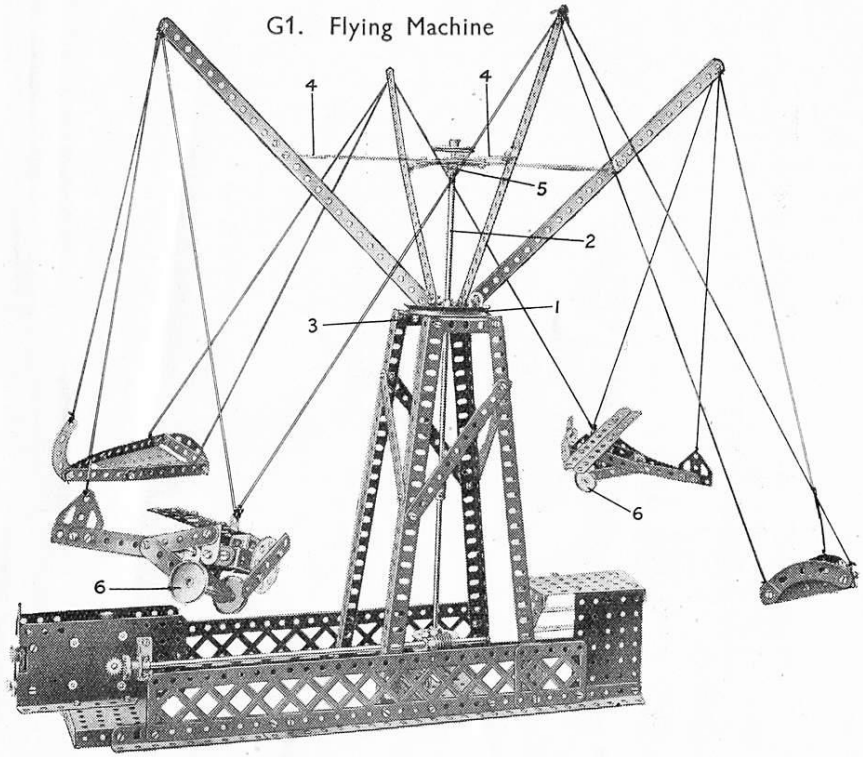


Fig. F42a

HOW TO CONTINUE

This completes our examples of models that may be made with MECCANO Outfit F (or E and Ea). The next models are a little more advanced, requiring extra parts to construct them. The necessary parts are all contained in an Fa Accessory Outfit, the price of which may be obtained from any Meccano dealer.

G1. Flying Machine



Parts required			Parts required		
6	of No.	1	1	of No.	27a
16	„ „	2	1	„ „	29
2	„ „	2a	1	„ „	32
11	„ „	5	122	„ „	37
1	„ „	6a	2	„ „	37a
6	„ „	8	2	„ „	40
3	„ „	9	1	„ „	46
6	„ „	10	2	„ „	48
3	„ „	11	6	„ „	48a
2	„ „	12	2	„ „	52
4	„ „	12a	3	„ „	53
2	„ „	13	2	„ „	54a
1	„ „	14	3	„ „	59
2	„ „	16	1	„ „	63
2	„ „	17	4	„ „	90a
1	„ „	19b	1	„ „	109
1	„ „	21	2	„ „	111c
4	„ „	22	2	„ „	126
2	„ „	24	2	„ „	126a
1	„ „	26	1	„ „	193
			1	„ „	197

No. E6. Electric Motor
(not included in outfit

The Braced Girders shown in the illustrations should be replaced by Strip Plates of corresponding lengths.

In Fig. G1 the model is shown equipped with a Meccano Electric Motor. Fig. G1a, which shows the base of the model only, indicates an alternative arrangement by which the model may be operated by hand if a Motor is not available. The revolving portion of the model consists of four $12\frac{1}{2}$" Strips bolted to the 3" Pulley Wheel 1 (Fig. G1) which is secured to the main vertical shaft 2 and rests directly on the $3\frac{1}{2}" \times 2\frac{1}{2}"$ Flanged Plate 3. The $12\frac{1}{2}$" Strips are supported by two further $12\frac{1}{2}$" Strips 4, crossed and bolted to a Face Plate 5 secured to the Rod 2.

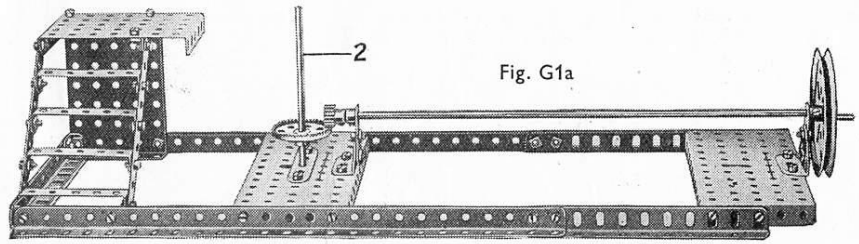


Fig. G1a

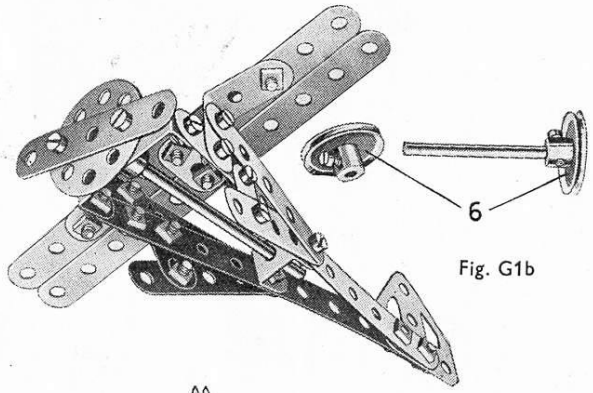
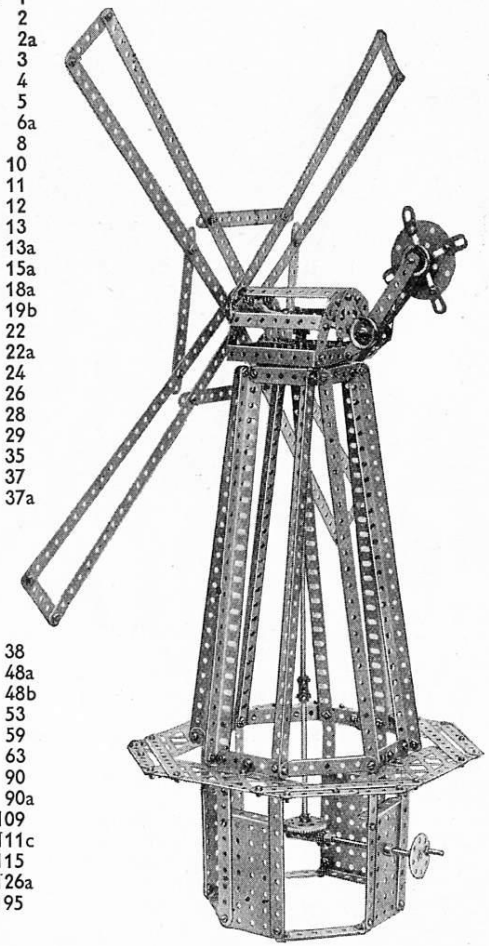


Fig. G1b

One of the aeroplanes attached to the model is shown in detail in Fig. G1b. The Wheels 6 are shown removed from their bearings.

G2. Windmill

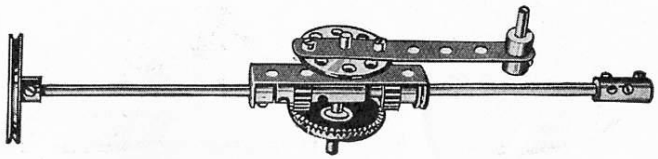
Parts required		
8	of No.	1
16	„ „	2
2	„ „	2a
6	„ „	3
4	„ „	4
16	„ „	5
2	„ „	6a
8	„ „	8
5	„ „	10
1	„ „	11
12	„ „	12
1	„ „	13
1	„ „	13a
2	„ „	15a
2	„ „	18a
2	„ „	19b
1	„ „	22
2	„ „	22a
2	„ „	24
2	„ „	26
1	„ „	28
1	„ „	29
2	„ „	35
126	„ „	37
6	„ „	37a
10	„ „	38
4	„ „	48a
6	„ „	48b
4	„ „	53
9	„ „	59
2	„ „	63
4	„ „	90
2	„ „	90a
1	„ „	109
6	„ „	111c
1	„ „	115
1	„ „	126a
4	„ „	195



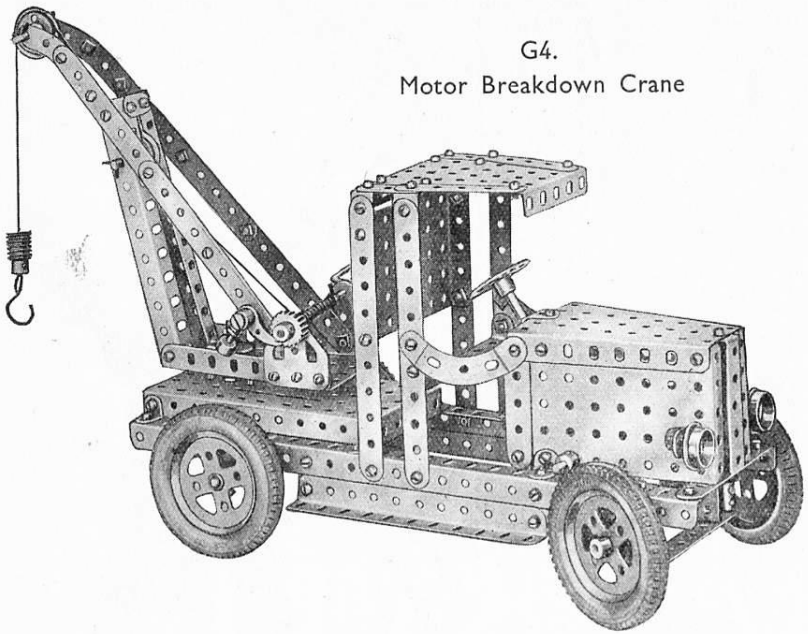
G3. Breast Drill

Parts required

1	of No.	3	1	of No.	21	2	of No.	26	1	of No.	48a
2	„ „	15	1	„ „	23	1	„ „	28	3	„ „	59
2	„ „	17	1	„ „	24	2	„ „	37	2	„ „	63
1	„ „	18a									



G4. Motor Breakdown Crane



Bearings for the steering column 1 (Fig. G4a) are formed by a Flat Bracket and Coupling 2. A 3½″ Rod passes through the centre transverse hole of the latter and carries a 1½″ Contrate Wheel which is spaced by means of three Washers from the Coupling. The teeth of the Contrate are engaged by a ½″ Pinion on the Rod 1. The Crank 3 carries a Flat Bracket bolted so that its round hole is over the elongated perforation of the Crank, and a Bolt passed through both is screwed into the tapped bore of a Collar on a 2″ Rod. This Rod is attached pivotally to the inner end of a stub axle by means of a swivel bearing formed from a Collar and Small Fork Piece.

The front road wheels rotate freely on the 1½″ Rods, and are held in position by Collars. The Couplings 4 are pivoted by means of ⅜″ Bolts to the extremities of two 4½″ Strips that are bolted together face to face to form the front axle. Two 1½″×½″ Double Angle Strips 5 secure the 4½″ Strips to the side Girders of the model.

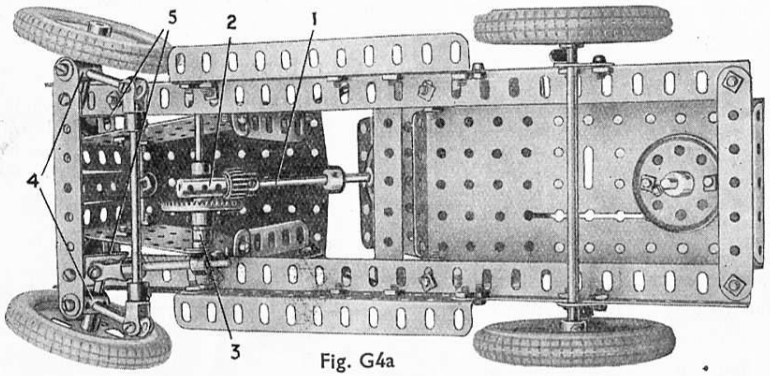
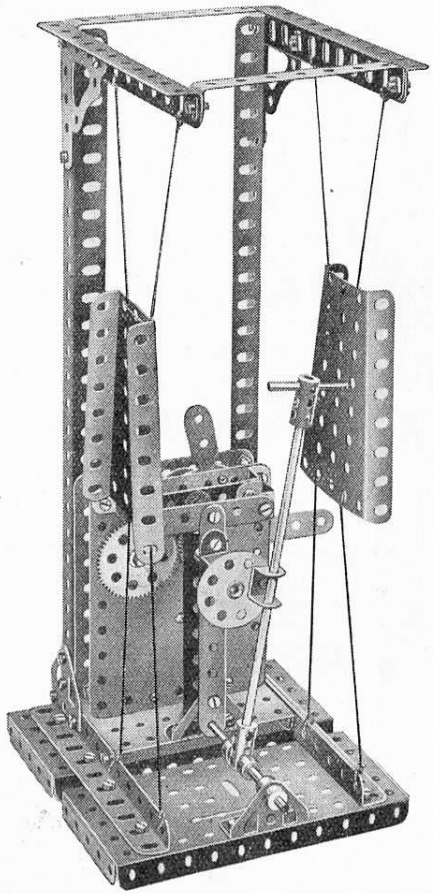


Fig. G4a

Parts required

8	of No.	2
2	„ „	2a
2	„ „	3
4	„ „	5
2	„ „	6a
2	„ „	8
4	„ „	9
7	„ „	10
10	„ „	12
1	„ „	15
3	„ „	16
3	„ „	17
4	„ „	18a
1	„ „	19s
4	„ „	20a
2	„ „	20b
1	„ „	21
1	„ „	22
2	„ „	22a
2	„ „	24
1	„ „	26
1	„ „	28
1	„ „	32
8	„ „	35
94	„ „	37
7	„ „	38
1	„ „	40
2	„ „	48
1	„ „	48a
3	„ „	48b
1	„ „	52
4	„ „	53
2	„ „	54a
1	„ „	57c
10	„ „	59
1	„ „	62
3	„ „	63
2	„ „	77
2	„ „	90
2	„ „	90a
4	„ „	111c
1	„ „	115
1	„ „	116a
2	„ „	126a
4	„ „	142a
1	„ „	147a
1	„ „	147b
1	„ „	148
2	„ „	165

G5. Automatic Gong



Parts required

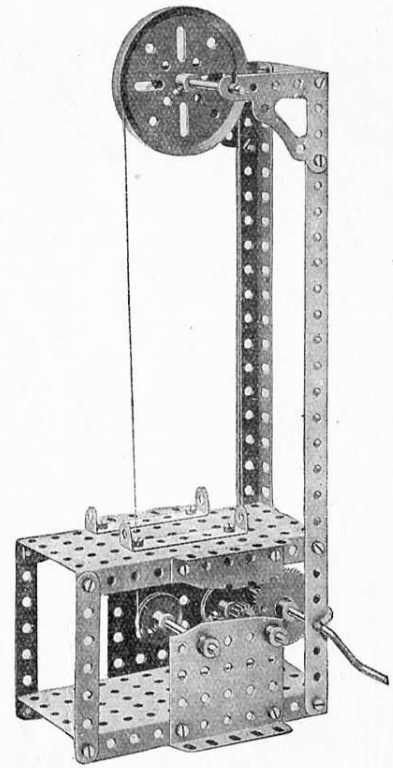
2	of No.	2a	2	of No.	38
2	„ „	5	1	„ „	40
2	„ „	8	1	„ „	45
4	„ „	9	2	„ „	48b
3	„ „	11	2	„ „	52
1	„ „	12	1	„ „	53
1	„ „	14	2	„ „	54a
1	„ „	16	4	„ „	59
1	„ „	17	2	„ „	63
1	„ „	18a	2	„ „	108
1	„ „	24	1	„ „	111c
1	„ „	26	2	„ „	125
1	„ „	27a	2	„ „	126
45	„ „	37	2	„ „	126a
2	„ „	37a			

No. 2. Clockwork Motor
(not included in Outfit.)

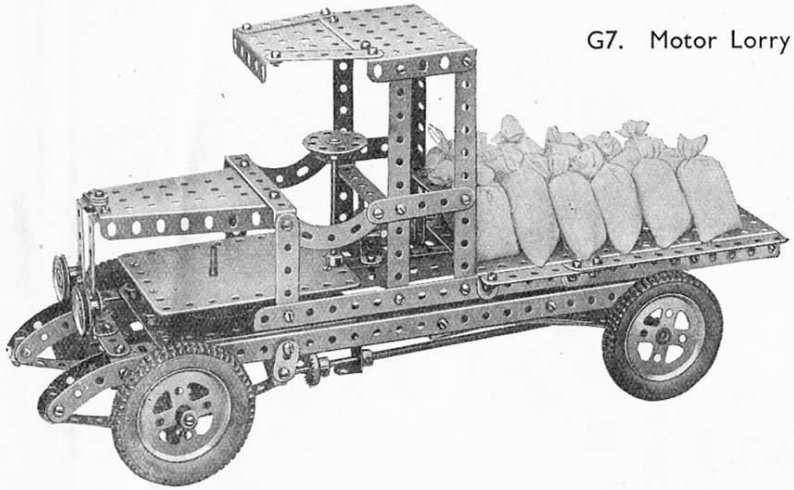
Parts required

2	of No.	3	4	of No.	35
1	„ „	5	26	„ „	37
2	„ „	8	1	„ „	40
3	„ „	16	2	„ „	48a
1	„ „	19	2	„ „	52
1	„ „	19b	2	„ „	53
2	„ „	22	4	„ „	59
1	„ „	26	2	„ „	108
1	„ „	27a			

G6. Band Saw



G7. Motor Lorry



Parts required

6 of No.	2		1 of No.	29	
2 „ „	2a		95 „ „	37	
5 „ „	3		14 „ „	37a	
2 „ „	4		15 „ „	38	
11 „ „	5		1 „ „	48	
1 „ „	6a		2 „ „	48a	
6 „ „	8		3 „ „	48b	
4 „ „	9		5 „ „	53	
4 „ „	10		1 „ „	54a	
4 „ „	11		10 „ „	59	
8 „ „	12		1 „ „	62	
1 „ „	13a		6 „ „	63	
1 „ „	15		4 „ „	90	
1 „ „	15a		2 „ „	90a	
1 „ „	16		2 „ „	111	
3 „ „	17		6 „ „	111c	
4 „ „	18a		1 „ „	115	
4 „ „	20a		1 „ „	116a	
2 „ „	22		1 „ „	125	
1 „ „	24		4 „ „	142a	
2 „ „	26		1 „ „	147b	
1 „ „	28		2 „ „	165	

No. 2 Clockwork Motor and Meccano Loaded Sacks (not included in Outfit).

The front wheels are mounted on $\frac{3}{4}$″ Bolts, which form the stub axles and are secured in Couplings 1 (Fig. G7a). Each of the latter carries in its centre transverse hole a $1\frac{1}{2}$″ Rod 2, which is passed through the end holes of two $4\frac{1}{2}$″ Strips laid one upon the other, and loosely clamped in place by Collars. The end transverse holes of the Couplings hold the Rods 3 and 4 which are connected pivotally together at their ends by Swivel Bearings and two short Rods joined by a Coupling. A 2″ Rod 5 is held in another Coupling on the Rod 4 and is connected by means of a Swivel Bearing and $3\frac{1}{2}$″ Rod to a Crank on the lower end of the steering column. A Pivot Bolt is passed through the end transverse hole of the Coupling on the $3\frac{1}{2}$″ Rod and is secured to the Crank by two Nuts.

The bonnet is attached pivotally to the body by Bolts 6 and lock-nuts so that t may be raised to allow the winding key of the Motor to be inserted. The shanks of the Bolts 10 enter the top holes of the $2\frac{1}{2}$″ Double Angle Strips in the front of the chassis, but they are not secured to the Strips.

The complete body shown in Fig. G7b can be detached from the chassis (Fig. G7a) by undoing the $\frac{3}{8}$″ Bolts 7 and 8, which are passed through holes in the Angle Girders of the chassis and spaced therefrom by Washers. The Bolts 7 are inserted in the hole marked 9 (Fig. G7a) and the corresponding hole in the other side Girder, whilst Bolts 8 are passed through the end holes but one of the two side Girders.

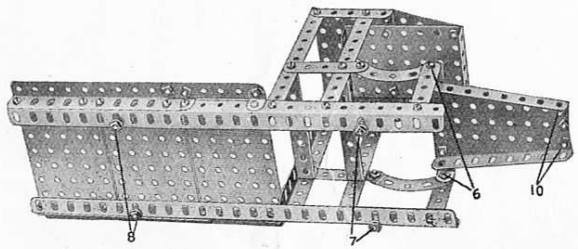


Fig. G7b

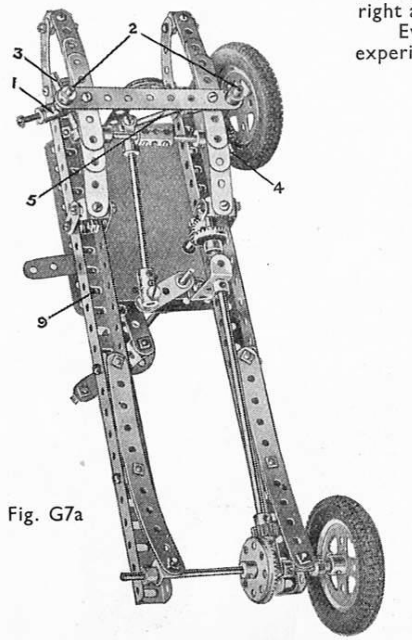
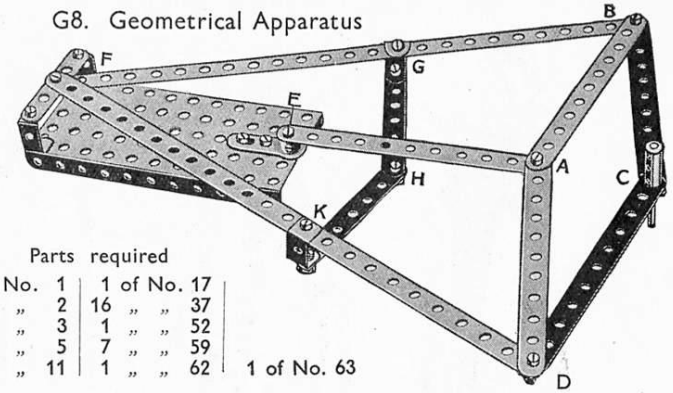


Fig. G7a

G8. Geometrical Apparatus



Parts required

2 of No.	1		1 of No.	17	
5 „ „	2		16 „ „	37	
2 „ „	3		1 „ „	52	
1 „ „	5		7 „ „	59	
4 „ „	11		1 „ „	62	

1 of No. 63

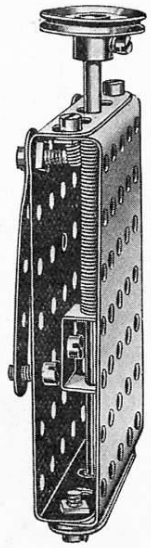
This most ingenious model for transforming a circular movement into a rectilinear movement was designed by M. Pierre-Th. Dufour, who used it in his Thesis (presented to the Faculty of Science in Paris) to obtain his degree of Doctor of the University of Paris. He required an instrument which would transform a circular movement into a movement rigorously rectilinear and he states in his published work that he was able to do this " with the aid of Meccano parts, which permit of making experiments so easily in mechanisms of the most varied types."

The point F is fixed, and is situated at a distance from the fixed point E, equal to AE, the two arms FB and FD being together equal to the four sides of the lozenge ABCD. The trajectory of the point C is then at right angles to EF. It will be found that whilst the point C is moving in a straight line at right angles to EF, the point A is describing a circle round the fixed point E.

Every Meccano Boy should make up this very interesting model and experiment with it.

G9. Conductor's Punch

This is just the thing for your younger brother! He only needs a strap with which to hang it over his shoulder to make him into a conductor. The $2\frac{1}{2}$″ Strip at the bottom is spaced by two Washers away from the body of the punch to allow the ticket to pass in to be punched. The punch Rod is passed completely through the Spring. The lower end of the latter presses against the Double Bracket and the upper end against a Collar secured to the Rod.



Parts required

3 of No.	5		2 of No.	38	
1 „ „	11		1 „ „	43	
1 „ „	15a		2 „ „	53	
1 „ „	22		1 „ „	59	
9 „ „	37				

G10. Alternating Swing

Parts required

3 of No.	1	4 of No.	12	10 of No.	48a	4 of No.	90a
8 „ „	2	2 „ „	14	2 „ „	48d	1 „ „	111c
2 „ „	4	2 „ „	24	2 „ „	54a	1 „ „	115
9 „ „	5	2 „ „	26	9 „ „	59	3 „ „	197
2 „ „	6a	72 „ „	37	2 „ „	62		
8 „ „	8	3 „ „	37a	4 „ „	90		

No. 2 Clockwork Motor
(not included in Outfit)

The Braced Girders shown in the illustrations should be replaced by Strip Plates of corresponding lengths.

G11. Distance Indicator

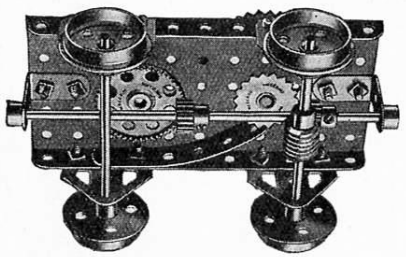


Fig. G11a.

Parts required

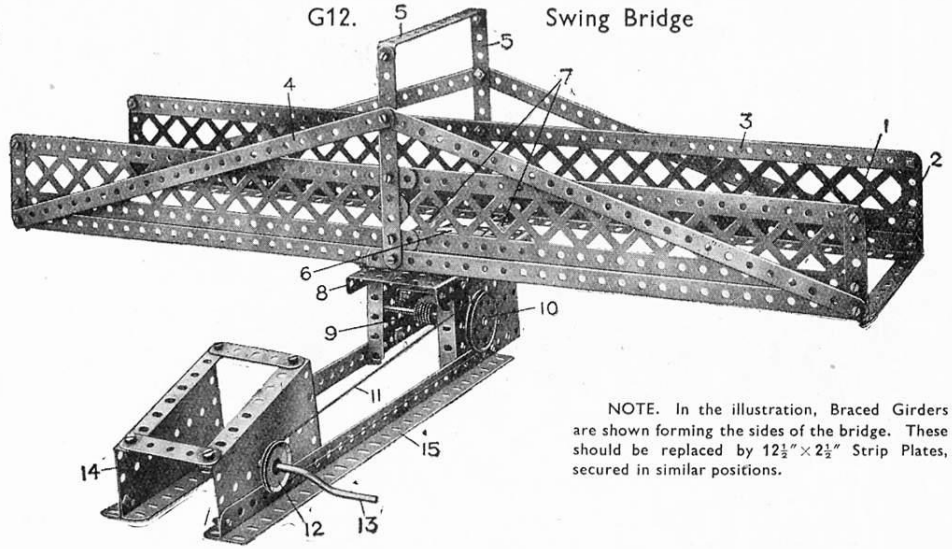
1 of No.	4	16 of No.	37
4 „ „	10	1 „ „	37a
2 „ „	12	3 „ „	38
1 „ „	15	1 „ „	52
2 „ „	16	3 „ „	59
2 „ „	17	2 „ „	62
4 „ „	20b	1 „ „	63
2 „ „	26	1 „ „	65
1 „ „	28	1 „ „	95
1 „ „	32	1 „ „	96

4 of No. 126a

G12. Swing Bridge

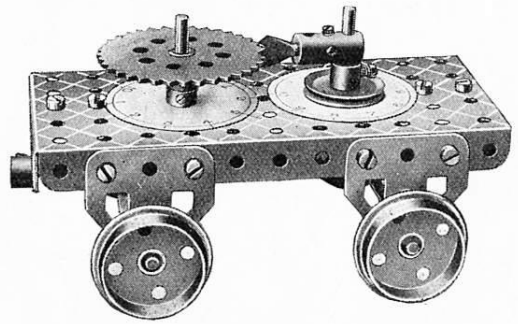
Parts required

8 of No.	1
6 „ „	2
6 „ „	5
6 „ „	8
1 „ „	16
1 „ „	17
1 „ „	19b
1 „ „	19s
1 „ „	21
1 „ „	22
1 „ „	27a
1 „ „	32
50 „ „	37
1 „ „	40
1 „ „	48a
1 „ „	48d
1 „ „	52
2 „ „	53
2 „ „	54a
2 „ „	59
4 „ „	197

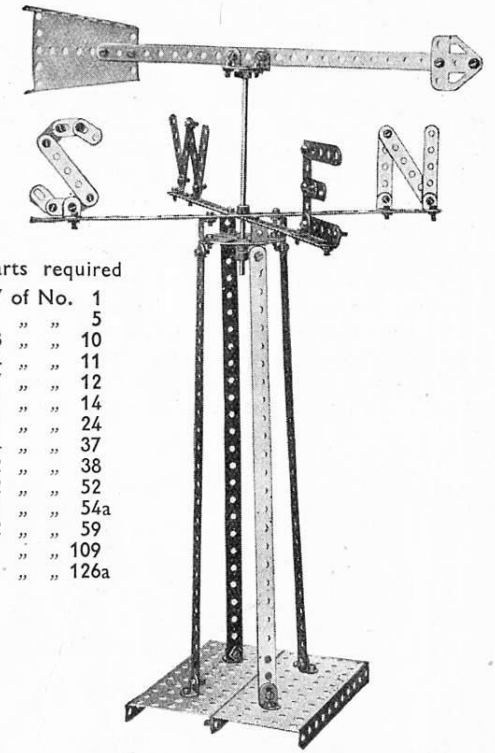


NOTE. In the illustration, Braced Girders are shown forming the sides of the bridge. These should be replaced by 12½″×2½″ Strip Plates, secured in similar positions.

The sides 1 of this model are secured to the upright Strips 2 and reinforced by the inner Strips 3. Other diagonal Strips 4 brace the side Girders to the top structure 5 forming a stay for the sides 1. The swing base of the bridge is composed of a 3″ Pulley Wheel 6 which is bolted to two cross 5½″ Strips 7 which in turn are secured to the main base side Girders. The bridge swings on the 5½″×2½″ Flanged Plate 8, on a short Rod on the lower end of which is secured a Gear Wheel engaged and driven by a Worm 9, on the spindle of which is the 1½″ Pulley 10 driven by the Cord 11 which is operated from the 1″ fast Pulley 12 on the Crank Handle 13. The Crank Handle is journalled in two Sector Plates 14 secured to the base Angle Girder 15.

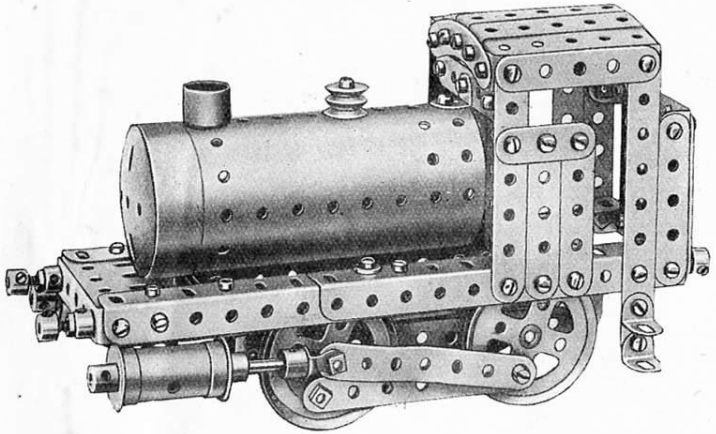


G13. Weather Vane



Parts required

7 of No.	1
11 „ „	5
8 „ „	10
4 „ „	11
17 „ „	12
1 „ „	14
1 „ „	24
54 „ „	37
2 „ „	38
2 „ „	52
1 „ „	54a
2 „ „	59
1 „ „	109
1 „ „	126a



G14. 0-4-0 Shunting Locomotive

Parts required

6	of No.	2	15	of No.	37a
2	„ „	2a	10	„ „	38
6	„ „	3	7	„ „	48a
18	„ „	5	6	„ „	59
2	„ „	6a	2	„ „	90
4	„ „	9	1	„ „	103f
6	„ „	10	2	„ „	111
10	„ „	12	5	„ „	111c
4	„ „	17	1	„ „	116a
4	„ „	20a	1	„ „	162
4	„ „	20b	2	„ „	163
2	„ „	23	1	„ „	164
85	„ „	37	1	„ „	166

The superstructure is shown in detail in Fig. G14a. Each of the two side members is built up from two $5\frac{1}{2}$″ Angle Girders overlapping five holes. The cab roof is composed of five $2\frac{1}{2}$″ × $\frac{1}{2}$″ Double Angle Strips bolted to two $2\frac{1}{2}$″ Curved Strips and is attached to the frame of the cab by Angle Brackets. The front of the cab is composed of three $2\frac{1}{2}$″ Strips connected together so as to form three sides of a square and bolted to the Boiler by an Angle Bracket. The cylinders 2 are bolted to the side members by means of two Flat Brackets 3 which are bent slightly outward.

Each side of the frame that carries the wheels is composed of two $5\frac{1}{2}$″ Strips overlapping seven holes and one $5\frac{1}{2}$″ Strip attached by Flat Brackets 4 as shown in Fig. G14b.

The coupling Rods 7 are attached to the front pair of Wheels by Bolts and lock-nuts and to the back pair by $\frac{3}{8}$″ Bolts and lock-nuts. The connecting Rods 8, which are bent slightly as shown, are attached at one end to the Bolts 9 and at the other are connected to End Bearings, which carry the $1\frac{1}{2}$″ Rods forming the piston rods.

To assemble the model, the Bolts 5 are passed through the centre holes of the $2\frac{1}{2}$″ Strips 6, and through the Boiler, and are then secured by their Nuts (the Washers shown being used to space the Strips 6 from the $1\frac{1}{2}$″ Double Angle Strips).

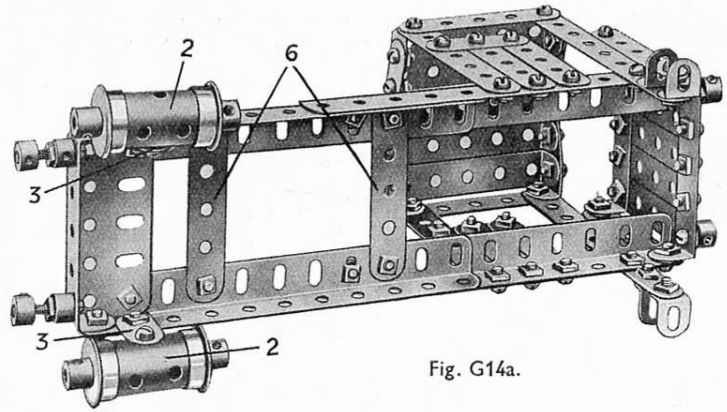


Fig. G14a.

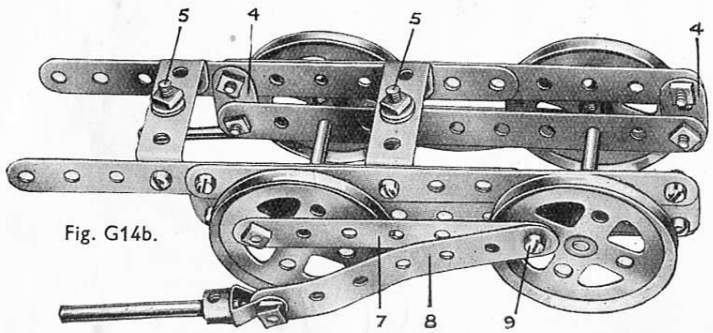
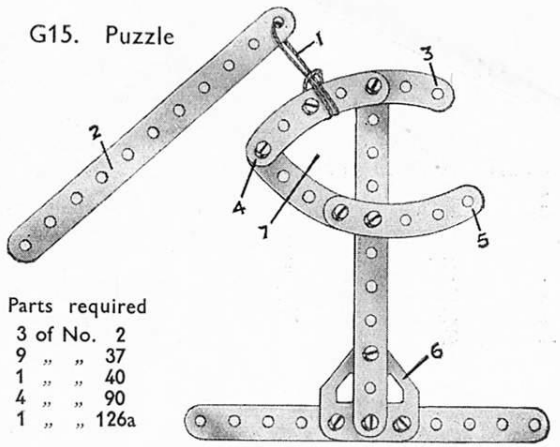


Fig. G14b.

Parts required

3	of No.	2	2	of No.	48b
4	„ „	3	1	„ „	52
2	„ „	5	2	„ „	53
4	„ „	8	2	„ „	54a
1	„ „	15	6	„ „	59
2	„ „	15a	4	of No.	111c
2	„ „	16	1	„ „	115
1	„ „	17	1	„ „	125
4	„ „	20b	2	„ „	126
4	„ „	22	2	of No.	126a
1	„ „	24	2	„ „	195
2	„ „	26			
1	„ „	27a			
2	„ „	29			
45	„ „	37			
4	„ „	37a			
3	„ „	38			
1	„ „	40			
1	„ „	46			
2	„ „	48a			

G15. Puzzle



Parts required

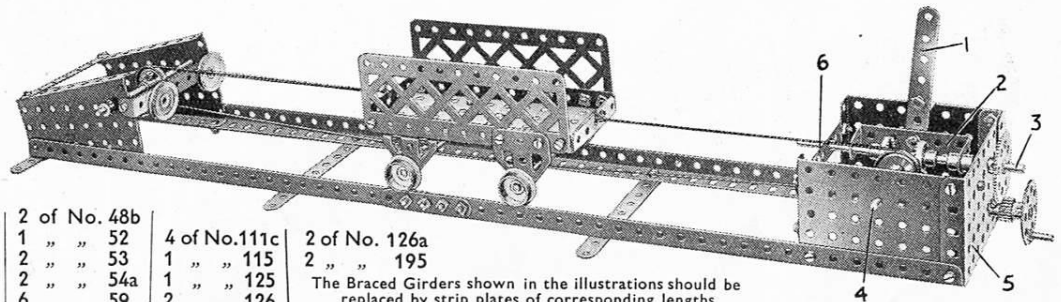
3	of No.	2
9	„ „	37
1	„ „	40
4	„ „	90
1	„ „	126a

The problem, which is to remove the Strip 2 from the frame, is by no means an easy one to solve. Cutting the string or undoing the knot is not allowed !

The loop of string 1, attached to the end of the $5\frac{1}{2}$″ Strip 2, should reach half way along the Strip 2 (when removed from the frame). To assemble the puzzle first pass the loop over the points 3, 4 and 5 and then slip it down to the Trunnion 6. Next pass the $5\frac{1}{2}$″ Strip 2 through the space 7 and again take the loop over 3, 4 and 5. The loop 1 and Strip 2 are now attached to the frame as shown in the illustration.

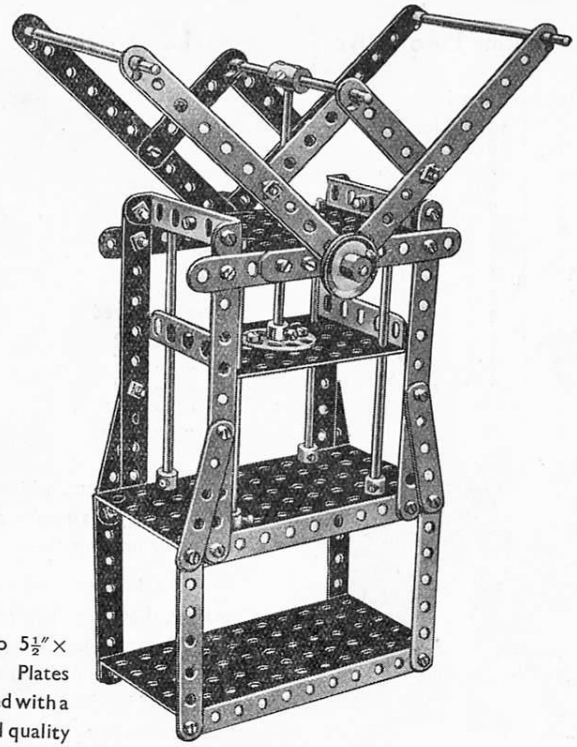
G16. Cable Railway

The reversing lever 1 is pivoted near its centre to a Reversed Angle Bracket and at its lower end to a $2\frac{1}{2}$″ × 1″ Double Angle Strip 2. This Strip is kept in place on the Rod 3 by two Collars. The two $\frac{3}{4}$″ Contrate Wheels are fastened on this Rod in such a position that one or other can be brought into gear with a $\frac{1}{2}$″ Pinion secured to the Rod 4, by moving the reversing lever. This Rod 4 is journalled in one of the side plates of the gear box and in a $3\frac{1}{2}$″ × $\frac{1}{2}$″ Double Angle Strip bolted between Plate 5 and the Strip 6.



The Braced Girders shown in the illustrations should be replaced by strip plates of corresponding lengths.

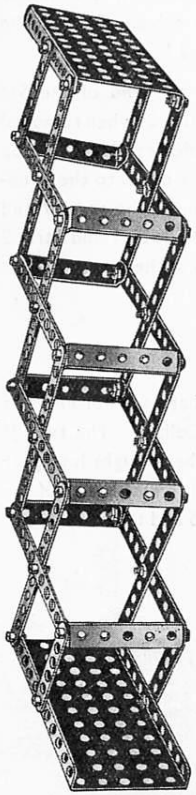
G17. Bale Press



Parts required

10	of No.	2	14	of No.	37a
4	„ „	3	2	„ „	38
8	„ „	5	2	„ „	48a
4	„ „	15	2	„ „	52
1	„ „	15a	2	„ „	53
2	„ „	17	4	„ „	59
1	„ „	24	1	„ „	63
8	„ „	35	2	„ „	111
44	„ „	37			

G18. Periscope

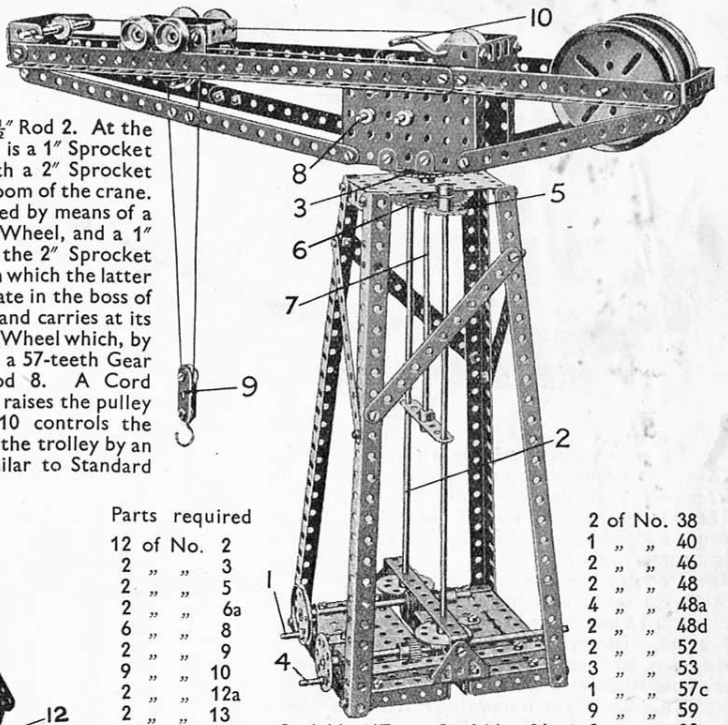


The two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates are each fitted with a piece of good quality mirror giving as little distortion as possible. The two Plates are held apart by a series of $5\frac{1}{2}''$ Strips and $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips, all connecting Bolts being lock-nutted in order to allow the periscope to fold.

Parts required

16	of No.	2
4	„ „	4
32	„ „	37
8	„ „	48a
2	„ „	52

G19. Girder Crane

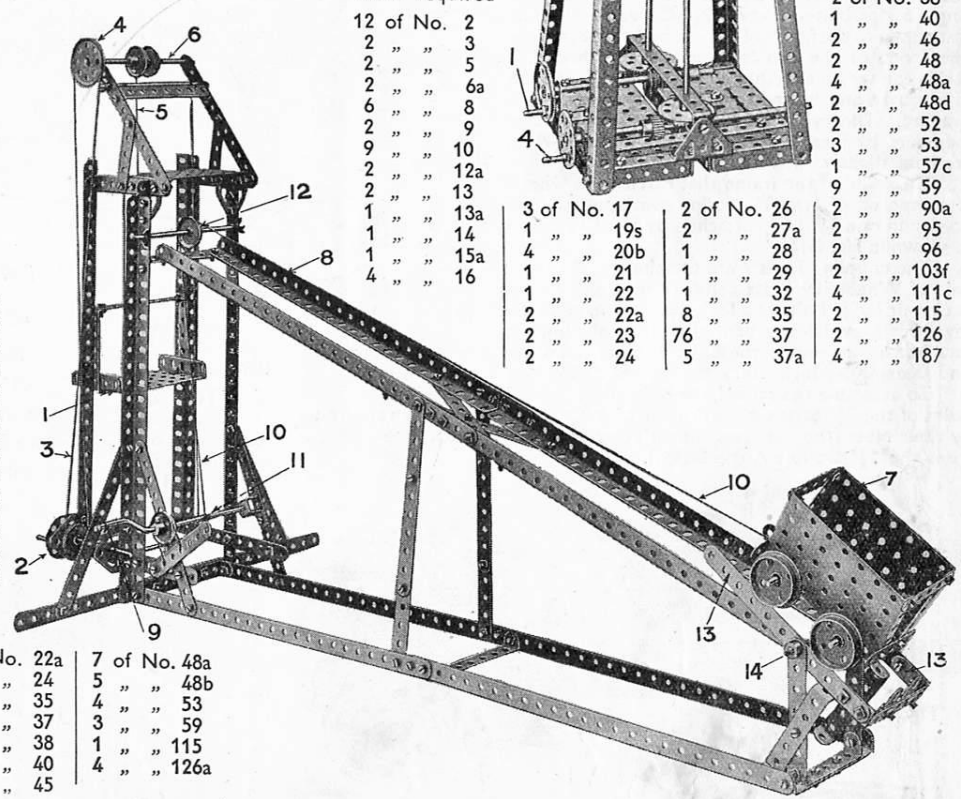


The boom is rotated by means of the handle 1, on the axle of which is a Worm engaging with a 57-teeth Gear Wheel secured to an $11\frac{1}{2}''$ Rod 2. At the upper end of the Rod 2 is a 1″ Sprocket Wheel that meshes with a 2″ Sprocket Wheel 3 bolted to the boom of the crane. The handle 4 is connected by means of a $\frac{1}{2}''$ Pinion, $1\frac{1}{2}''$ Contrate Wheel, and a 1″ Sprocket Wheel 5 to the 2″ Sprocket Wheel 6. The Rod 7, on which the latter is secured, is free to rotate in the boss of the Sprocket Wheel 3, and carries at its upper end a $\frac{3}{4}''$ Contrate Wheel which, by means of a $\frac{1}{2}''$ Pinion and a 57-teeth Gear Wheel, rotates the Rod 8. A Cord wound on the latter Rod raises the pulley block 9. The handle 10 controls the traversing movement of the trolley by an endless rope drive similar to Standard Mechanism No. 168.

Parts required

12	of No.	2	3	of No.	17	2	of No.	26	2	of No.	38
2	„ „	3	1	„ „	19s	2	„ „	27a	1	„ „	40
2	„ „	5	4	„ „	20b	1	„ „	28	2	„ „	46
2	„ „	6a	1	„ „	21	1	„ „	29	2	„ „	48
6	„ „	8	1	„ „	22	1	„ „	32	4	„ „	48a
2	„ „	9	2	„ „	22a	8	„ „	35	2	„ „	48d
9	„ „	10	2	„ „	23	76	„ „	37	2	„ „	52
2	„ „	12a	2	„ „	24	5	„ „	37a	3	„ „	53
2	„ „	13							1	„ „	57c
1	„ „	13a							9	„ „	59
1	„ „	14							2	„ „	90a
1	„ „	15a							2	„ „	95
4	„ „	16							2	„ „	96
									2	„ „	103f
									4	„ „	111c
									2	„ „	115
									2	„ „	126
									4	„ „	187

G20. Inclined Delivery Chute

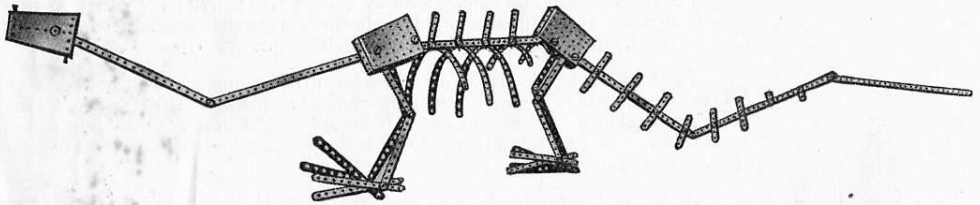


The cage 1 is raised from the hand wheel 2 by means of an endless Cord 3 which passes over the upper $1\frac{1}{2}''$ Pulley 4. A Cord 5 winding on Rod 6 between two 1″ fast Pulleys raises or lowers the cage. The truck 7 is raised or lowered along the inclined rails 8 by a Crank Handle 9, a Cord 10 being wound on the Rod 11, passing over a Pulley 12, and connected to the truck 7. When the truck reaches the end of the inclined rails 8 it rests upon two $5\frac{1}{2}''$ Strips 13 pivoted at 14, the weight of the truck depressing these pivoted Strips and tipping the load.

Parts required

5	of No.	1	2	of No.	12a	1	of No.	22a	7	of No.	48a
16	„ „	2	4	„ „	15a	1	„ „	24	5	„ „	48b
4	„ „	3	4	„ „	16	7	„ „	35	4	„ „	53
2	„ „	4	1	„ „	19	99	„ „	37	3	„ „	59
10	„ „	5	4	„ „	20b	1	„ „	38	1	„ „	115
8	„ „	8	1	„ „	21	1	„ „	40	4	„ „	126a
2	„ „	10	4	„ „	22	1	„ „	45			

G21. Diplodocus



This representation of a prehistoric animal is a most extraordinary effort sent in by a young French boy to compete in one of the big Meccano Model-building Competitions. We could scarcely class it as an engineering model, but any boy with a brain clever enough and an imagination lively enough to conceive and construct such an animal as this from Meccano parts deserved a good prize, so we awarded him one. Screw the Nuts and Bolts up tightly because the Diplodocus looks most dejected when he droops.

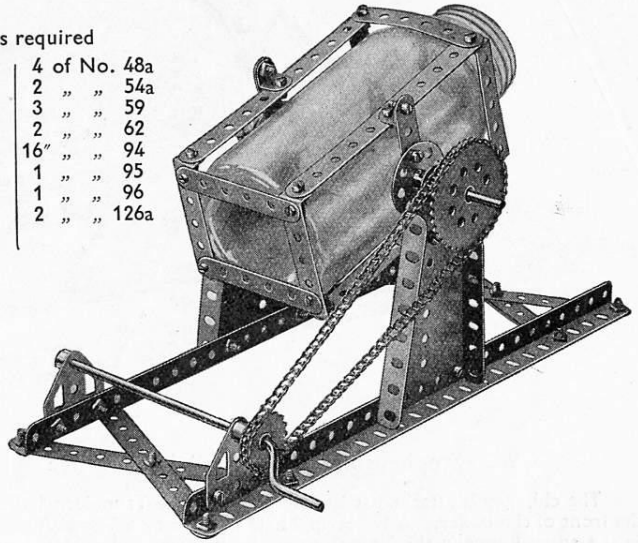
Parts required

1 of No.	1	1 of No.	8	4 of No.	17	2 of No.	54a
7 „ „	2	4 „ „	10	2 „ „	22	8 „ „	59
4 „ „	3	1 „ „	16	40 „ „	37		
				4 „ „	53		

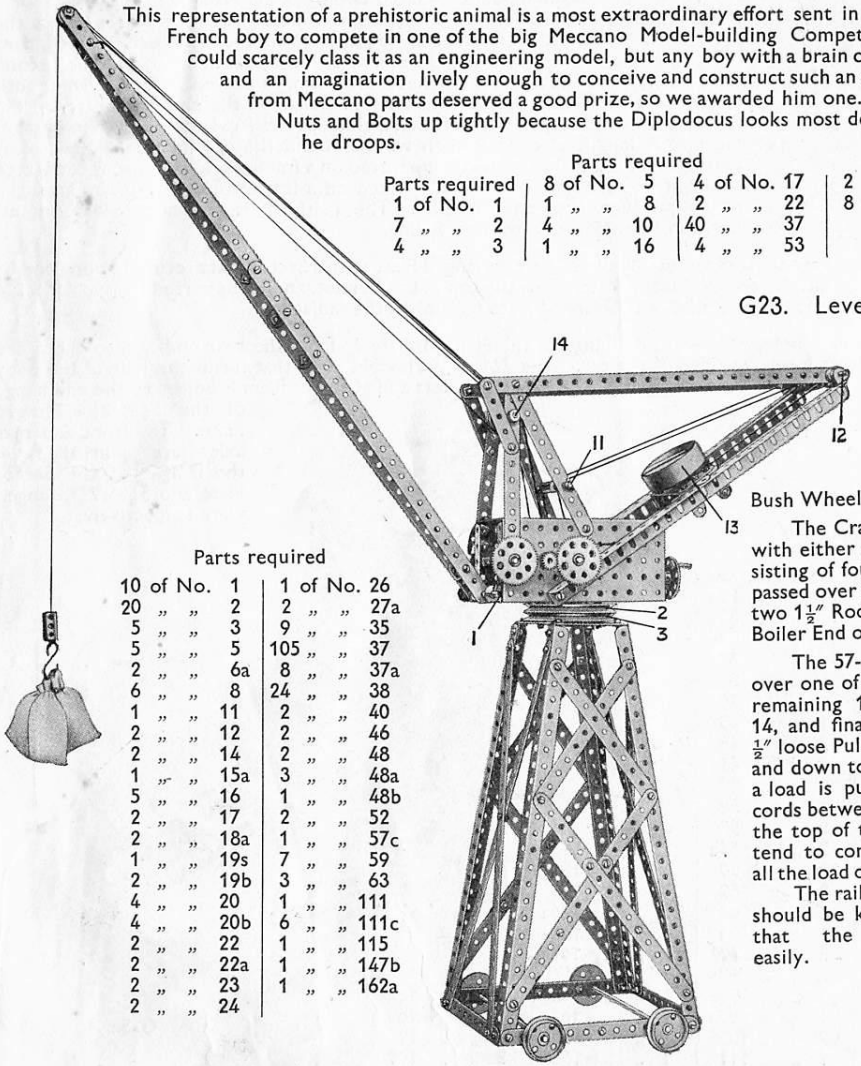
G22. Butter Churn

Parts required

8 of No.	2	4 of No.	48a
2 „ „	3	2 „ „	54a
4 „ „	4	3 „ „	59
2 „ „	8	2 „ „	62
4 „ „	12	16″ „ „	94
2 „ „	17	1 „ „	95
1 „ „	19	1 „ „	96
2 „ „	24	2 „ „	126a
42 „ „	37		



G23. Level Luffing Jib Crane



Parts required

10 of No.	1	1 of No.	26
20 „ „	2	2 „ „	27a
5 „ „	3	9 „ „	35
5 „ „	5	105 „ „	37
2 „ „	6a	8 „ „	37a
6 „ „	8	24 „ „	38
1 „ „	11	2 „ „	40
2 „ „	12	2 „ „	46
2 „ „	14	2 „ „	48
1 „ „	15a	3 „ „	48a
5 „ „	16	1 „ „	48b
2 „ „	17	2 „ „	52
2 „ „	18a	1 „ „	57c
1 „ „	19s	7 „ „	59
2 „ „	19b	3 „ „	63
4 „ „	20	1 „ „	111
4 „ „	20b	6 „ „	111c
2 „ „	22	1 „ „	115
2 „ „	22a	1 „ „	147b
2 „ „	23	1 „ „	162a
2 „ „	24		

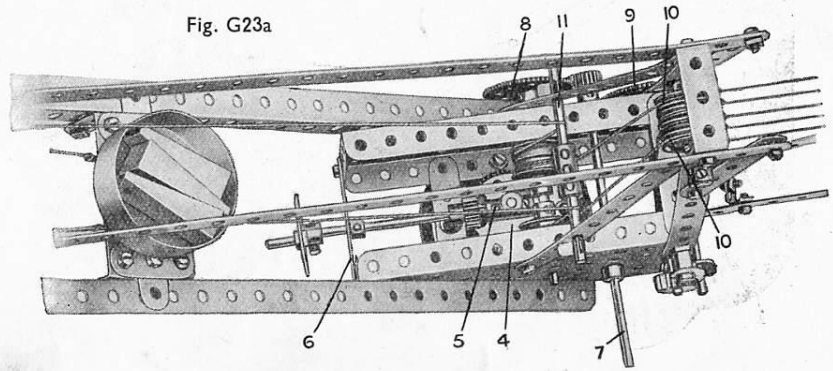
The side plates of the gear box ($5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates) are connected together at each end by $2\frac{1}{2}''$ Strips, the front also being fitted with a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 1, which forms a bearing for the jib pivot. A 3″ Pulley 2 bolted to the bottom of the gear box slides on the rim of a second 3″ Pulley 3, which is fixed to the travelling base, and a 2″ Rod is secured in the boss of Pulley 3 and passed through the boss of Pulley 2. A $1\frac{1}{2}''$ Contrate 4 (Fig. G23a) is next secured to the Rod, together with a Coupling 5, the latter being spaced from the Contrate by Washers and held in place by a Collar. A $3\frac{1}{2}''$ Rod, on which is fixed a $\frac{1}{2}$in. Pinion engaging with the Contrate, is journalled in the Coupling 5 and in the $2\frac{1}{2}''$ Strip 6. A handle consisting of a Bush Wheel and a Threaded Pin attached to this Rod manipulates the slewing movement.

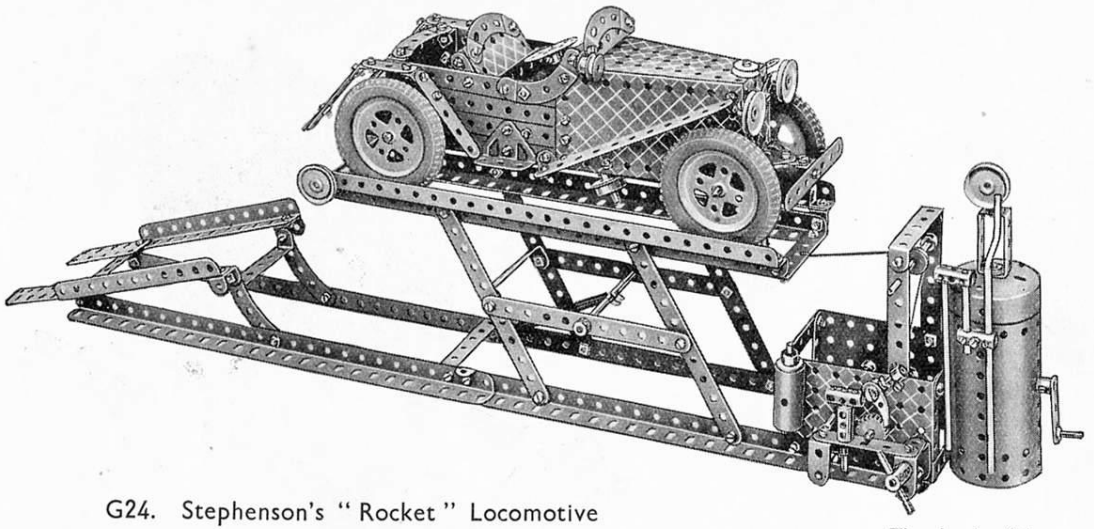
The Crank Handle 7 carrying a $\frac{1}{2}''$ Pinion slides in the side plates of the gear box, so that the Pinion may be engaged with either of the two 57-teeth Gears 8 and 9. The Gear 8 is attached to a $3\frac{1}{2}''$ Rod on which are fixed two drums consisting of four small Flanged Wheels. These form the luffing barrels. Two lengths of cord are attached to the jib head, passed over the 1″ Pulleys 10, and are then wound four times round the luffing barrels. From here they are carried over the two $1\frac{1}{2}''$ Rods 11 and the $4\frac{1}{2}''$ Rod 12, and finally are secured to the moving carriage 13. When the model is working, the Boiler End on the carriage should be weighted until it exactly counterbalances the jib.

The 57-teeth Gear 9 is fixed to the $3\frac{1}{2}''$ Rod forming the hoisting barrel. A length of cord attached to this is passed over one of the remaining 1″ loose Pulleys on the Rod 14, round one of the $\frac{1}{2}''$ loose Pulleys at the jib head, back to the remaining 1″ loose Pulley at 14, and finally over the other $\frac{1}{2}''$ loose Pulley at the jib head and down to the hook. When a load is put on the hook the cords between the jib head and the top of the superstructure tend to contract, thus taking all the load off the luffing cords.

The rails of the carriage 13 should be kept well oiled, so that the carriage slides easily.

Fig. G23a





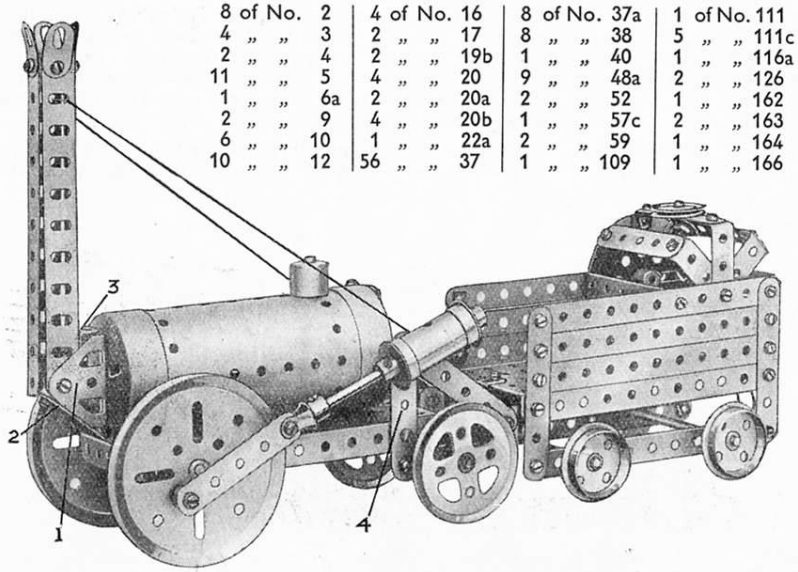
G24. Stephenson's "Rocket" Locomotive

The chimney is attached at its lower end to two Trunnions 1 that are bolted to the front of the boiler. A 1½" Strip 2 held in place by a ½" × ½" Angle Bracket closes in the space between the Trunnions at the bottom, and a ½" × ½" Angle Bracket 3 performs a similar function at the top.

The trailing wheels are secured on an axle that is journalled in 2½" Strips attached to the bottom extremities of the 2½" Strips 4. The rearmost ends of the horizontal Strips are secured by Flat Brackets. The upper ends of the Strips 4 serve as mountings for the cylinders, which are secured rigidly thereon by ⅜" Bolts, on each of which are four Washers between the cylinder and the Strip.

Parts required

8	of No.	2	4	of No.	16	8	of No.	37a	1	of No.	111
4	„ „	3	2	„ „	17	8	„ „	38	5	„ „	111c
2	„ „	4	2	„ „	19b	1	„ „	40	1	„ „	116a
11	„ „	5	4	„ „	20	9	„ „	48a	2	„ „	126
1	„ „	6a	2	„ „	20a	2	„ „	52	1	„ „	162
2	„ „	9	4	„ „	20b	1	„ „	57c	2	„ „	163
6	„ „	10	1	„ „	22a	2	„ „	59	1	„ „	164
10	„ „	12	56	„ „	37	1	„ „	109	1	„ „	166



G25. Car Lifting Apparatus

The model should be commenced by bolting two pairs of 12½" Angle Girders together as shown. The compound Angle Girders are then spaced across the ends and middle by means of 2½" × ½" Double Angle Strips.

The two sloping Angle Girders that form the incline are then bolted to one of the Double Angle Strips and the upper end of each Angle Girder is fitted with a Double Bracket to one end of which is bolted a 2½" Curved Strip. The Double Brackets are spaced by a 2½" × ½" Double Angle Strip and the Curved Strips are bolted to the base girders.

At one end of the model are bolted two 3½" × 2½" Flanged Plates, which form the side plates of the operating mechanism. These Plates are spaced across the top by two 2½" Strips. A Crank Handle journalled in the Plates drives a secondary shaft through the medium of a ½" Pinion and a 57-teeth Gear and the second shaft is fitted with a Pawl and Ratchet mechanism, to prevent it from turning anti-clockwise under the weight of the car. A Collar on the end of a Threaded Pin screwed into the tapped bore of the Pawl keeps the Pawl and Ratchet in engagement. A length of cord is then wound round the secondary shaft and after passing over a ½in. loose Pulley, supported on a framework of Strips, is connected to the lifting platform. This is supported on a framework of Strips so arranged as to produce a parallel motion. The platform is returned to its original position by means of a tension Spring.

The chassis of the car consists essentially of a 5½" × 2½" Flanged Plate with a Sector Plate secured to one end by means of two 2½" Strips. A second Sector Plate forms the top of the bonnet, and is supported by two 4½" × 2½" Flexible Plates and at the front by a 2½" × 1½" Flanged Plate that forms the radiator.

A Flat Trunnion is bolted to each side flange of the Flanged Plate ½" from the rear end and to them are bolted the Strips that form the sides of the car. The 2½" × 2½" Flexible Plate that forms the rear of the body is secured at the top by a 2½" Strip and two ½" × ½" Angle Brackets and at the bottom is bolted to the end flange of the 5½" × 2½" Flanged Plate. The front and rear axles are journalled in the flanges of the Sector Plate and 5½" × 2½" Flanged Plate respectively.

Parts required

16	of No.	2	1	of No.	26	6	of No.	111c	1	of No.	164
2	„ „	3	1	„ „	27a	2	„ „	115	1	„ „	165
12	„ „	5	5	„ „	35	1	„ „	125	2	„ „	190
2	„ „	6a	134	„ „	37	3	„ „	126	2	„ „	191
8	„ „	8	16	„ „	37a	2	„ „	126a			
2	„ „	9	3	„ „	38	4	„ „	142a			
7	„ „	10	1	„ „	40	1	„ „	147a			
2	„ „	11	1	„ „	43	1	„ „	147b			
21	„ „	12	2	„ „	48	1	„ „	148			
4	„ „	12a	9	„ „	48a	1	„ „	162a			
4	„ „	12c	1	„ „	51	1	„ „	162b			
1	„ „	15a	1	„ „	52	1	„ „	163			
1	„ „	15b	2	„ „	53						
4	„ „	16	2	„ „	54a						
3	„ „	17	10	„ „	59						
3	„ „	18a	2	„ „	62						
1	„ „	19	6	„ „	63						
1	„ „	19s	1	„ „	65						
4	„ „	20a	2	„ „	77						
1	„ „	20b	3	„ „	90						
4	„ „	22	4	„ „	90a						
3	„ „	23	1	„ „	96a						
1	„ „	23a	2	„ „	103f						
1	„ „	24	1	„ „	111						

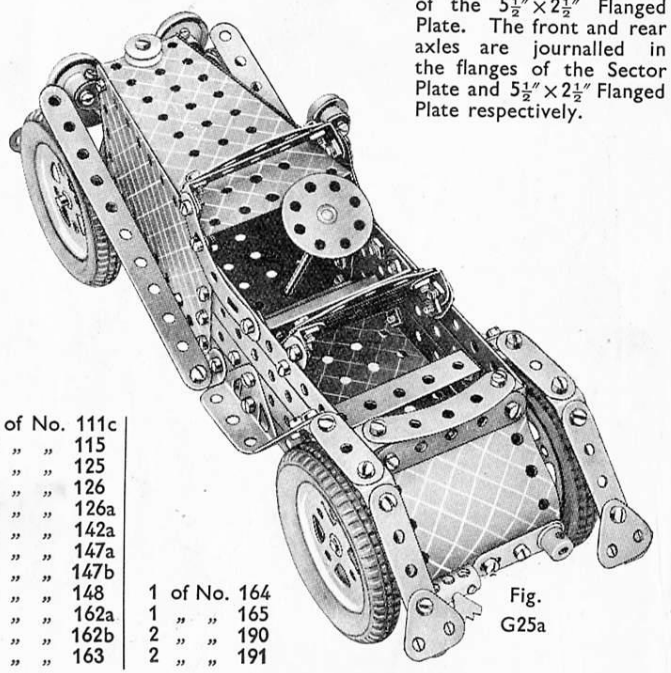
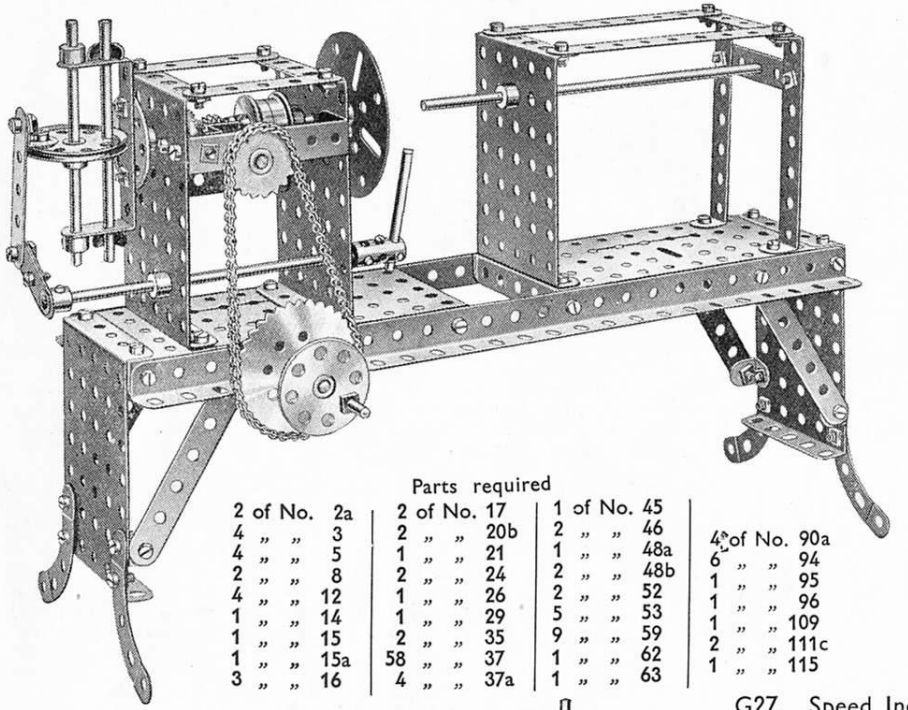


Fig. G25a

G26. Elliptical Lathe

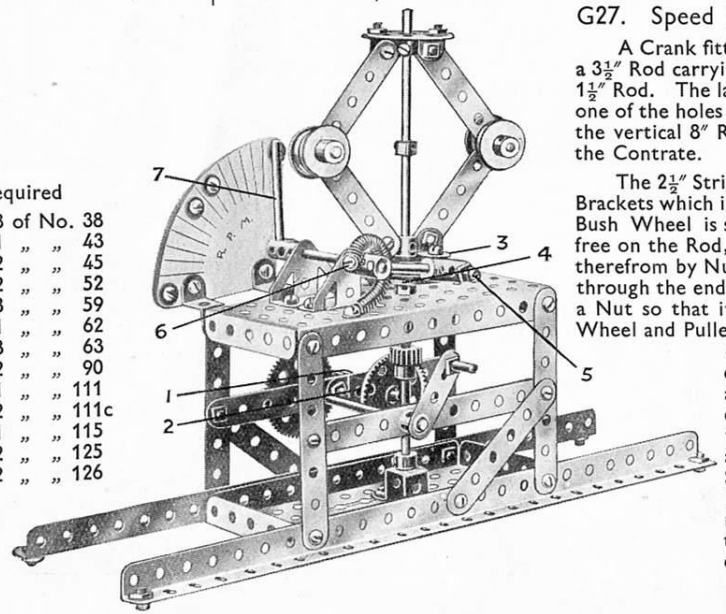


Parts required

2	of No.	2a	2	of No.	17	1	of No.	45	
4	„ „	3	2	„ „	20b	2	„ „	46	
4	„ „	5	1	„ „	21	1	„ „	48a	
2	„ „	8	2	„ „	24	2	„ „	48b	
4	„ „	12	1	„ „	26	2	„ „	52	
1	„ „	14	1	„ „	29	5	„ „	53	
1	„ „	15	2	„ „	35	9	„ „	59	
1	„ „	15a	58	„ „	37	1	„ „	62	
3	„ „	16	4	„ „	37a	1	„ „	63	

4	of No.	90a	
6	„ „	94	
1	„ „	95	
1	„ „	96	
1	„ „	109	
2	„ „	111c	
1	„ „	115	

G27. Speed Indicator



Parts required

2	of No.	2	8	of No.	38
4	„ „	3	1	„ „	43
2	„ „	4	2	„ „	45
6	„ „	5	2	„ „	52
2	„ „	8	3	„ „	59
4	„ „	12	1	„ „	62
1	„ „	13a	3	„ „	63
1	„ „	16	2	„ „	90
2	„ „	17	1	„ „	111
4	„ „	18a	2	„ „	111c
4	„ „	20b	1	„ „	115
1	„ „	21	2	„ „	125
2	„ „	24	2	„ „	126
2	„ „	26			
1	„ „	27a			
1	„ „	28			
39	„ „	37			
8	„ „	37a			

A Crank fitted with a Threaded Pin to form a handle is secured on a $3\frac{1}{2}$″ Rod carrying a 57-teeth Gear that meshes with a $\frac{1}{2}$″ Pinion 1 on a $1\frac{1}{2}$″ Rod. The latter Rod carries a Contrate Wheel and is journalled in one of the holes of a $5\frac{1}{2}$″ Strip and a Double Bent Strip 2. A Pinion on the vertical 8″ Rod which carries the governor is in engagement with the Contrate.

The $2\frac{1}{2}$″ Strips forming the governor arms are lock-nutted to Angle Brackets which in turn are secured rigidly to Bush Wheels. The upper Bush Wheel is secured to the Rod, while the lower wheel 3, which is free on the Rod, is connected to a $1\frac{1}{2}$″ Pulley 4 by $\frac{3}{4}$″ Bolts, but spaced therefrom by Nuts on the shanks of the Bolts. The $\frac{3}{4}$″ Bolt 5 is passed through the end tapped hole of the Coupling and locked in position by a Nut so that its shank protrudes into the space between the Bush Wheel and Pulley. As the weights of the governor fly outward under centrifugal force the Bush Wheel and Pulley unit 3 rises, carrying with it the Bolt 5 and its Coupling and so actuating the pointer (a 2″ Rod 7). The extent of the movement of the latter over the graduated scale indicates the speed at which the vertical shaft rotates. A Spring secured to the $5\frac{1}{2}$″ × $2\frac{1}{2}$″ Flanged Plate is fixed by the Bolt 6 in such a manner that the pointer tends to return to its original position as the motion decreases.

G28. Warehouse

The Cord 1 that raises and lowers the elevator passes from the top of the car 11 over the $\frac{1}{2}$″ loose Pulley Wheel 4 and the $1\frac{1}{2}$″ Pulley 5, and is wound between two 1″ fast Pulley Wheels on a 3″ Axle Rod 2, which is driven from the Electric Motor via a Worm Wheel, a 57-toothed Gear Wheel, a $\frac{3}{4}$″ Contrate Wheel, and a $\frac{1}{2}$″ Pinion. The elevator car is counterbalanced by a weight 3, consisting of a Fork Piece, fourteen $2\frac{1}{2}$″ Strips, and a Collar, which is connected to the car by a Cord 10 passing over a 1″ fast Pulley Wheel (behind the Wheel 5) and the $\frac{1}{2}$″ loose Pulley Wheel 6.

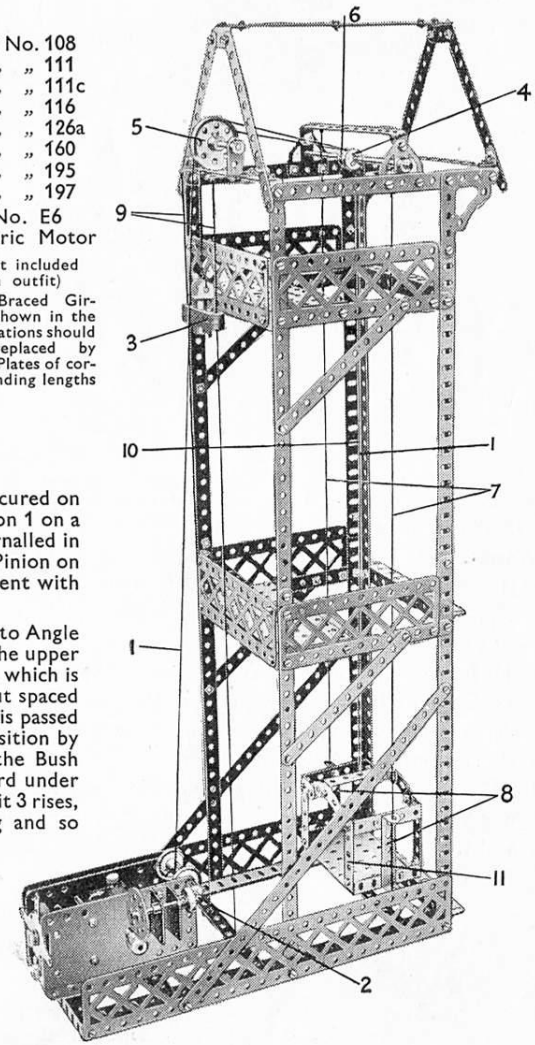
The elevator car is guided by a pair of vertical Cords 7, which pass through holes in the $2\frac{1}{2}$″ × $\frac{1}{2}$″ Double Angle Strips 8 as shown, and the weight 3 is similarly guided by the cords 9.

Parts required

6	of No.	1	1	of No.	27a	2	of No.	108	
19	„ „	2	1	„ „	29	2	„ „	111	
18	„ „	5	1	„ „	32	4	„ „	111c	
2	„ „	6a	2	„ „	35	1	„ „	116	
6	„ „	8	126	„ „	37	2	„ „	126a	
4	„ „	9	6	„ „	37a	1	„ „	160	
4	„ „	10	1	„ „	38	6	„ „	195	
16	„ „	12	1	„ „	40	2	„ „	197	
1	„ „	14	1	„ „	46				
2	„ „	16	5	„ „	48a				
2	„ „	17	1	„ „	48d				
1	„ „	21	2	„ „	52				
3	„ „	22	1	„ „	53				
2	„ „	23	6	„ „	59				
1	„ „	26	2	„ „	90a				

No. E6 Electric Motor (not included in outfit)

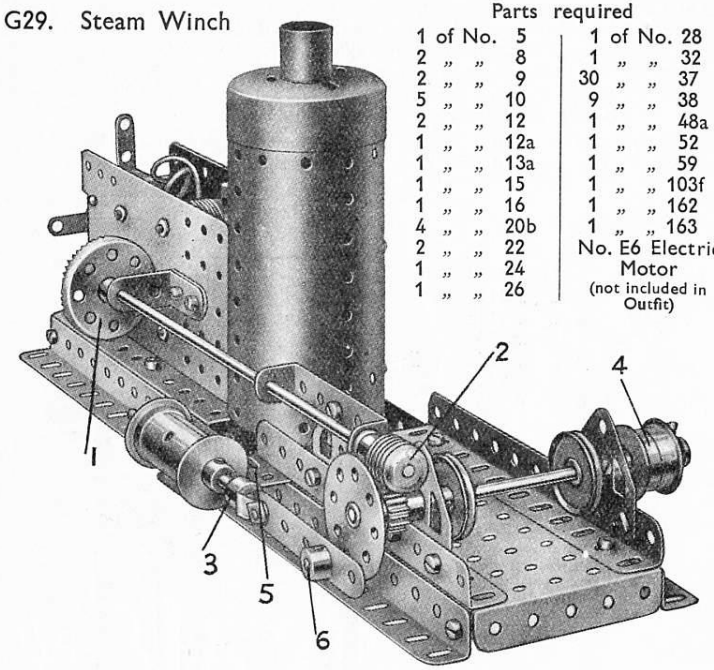
The Braced Girders shown in the illustrations should be replaced by Strip Plates of corresponding lengths



G29. Steam Winch

Parts required

1	of No. 5	1	of No. 28
2	„ „ 8	1	„ „ 32
2	„ „ 9	30	„ „ 37
5	„ „ 10	9	„ „ 38
2	„ „ 12	1	„ „ 48a
1	„ „ 12a	1	„ „ 52
1	„ „ 13a	1	„ „ 59
1	„ „ 15	1	„ „ 103f
1	„ „ 16	1	„ „ 162
4	„ „ 20b	1	„ „ 163
2	„ „ 22	No. E6 Electric Motor (not included in Outfit)	
1	„ „ 24		
1	„ „ 26		



A $\frac{1}{2}$" Pinion secured to the armature of the Electric Motor turns a $1\frac{1}{2}$" Contrate Wheel 1 mounted on an 8" Axle Rod, to the opposite end of which is secured a Worm Wheel 2. The drum 4 of the winch consists of two $\frac{3}{4}$" Flanged Wheels and is secured to the end of a 5" Rod, which carries a $\frac{1}{2}$" Pinion that is driven by the Worm 2. The cylinder is composed of a Sleeve Piece, secured by two Nuts and Bolts to the end of a $2\frac{1}{2}$" Flat Girder 5, and two $\frac{3}{4}$" Flanged Wheels. The piston rod is attached pivotally to the connecting rod by means of an End Bearing 3, and the crank pin 6 is formed by a Threaded Pin secured to the Bush Wheel. The Boiler is secured in place by two Angle Brackets bolted to its base and to the $5\frac{1}{2}$" $\times 2\frac{1}{2}$" Flanged Plates forming part of the engine bed. It will be noted that the 1"×1" Angle Bracket supporting one end of the 8" Rod is spaced away from the Motor by a Flat Bracket, in order to obtain proper clearance for the Contrate Wheel 1.

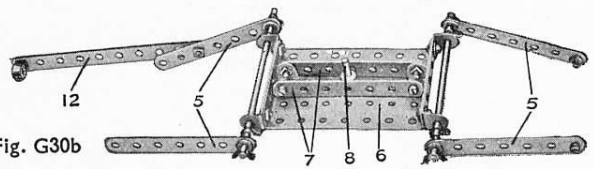
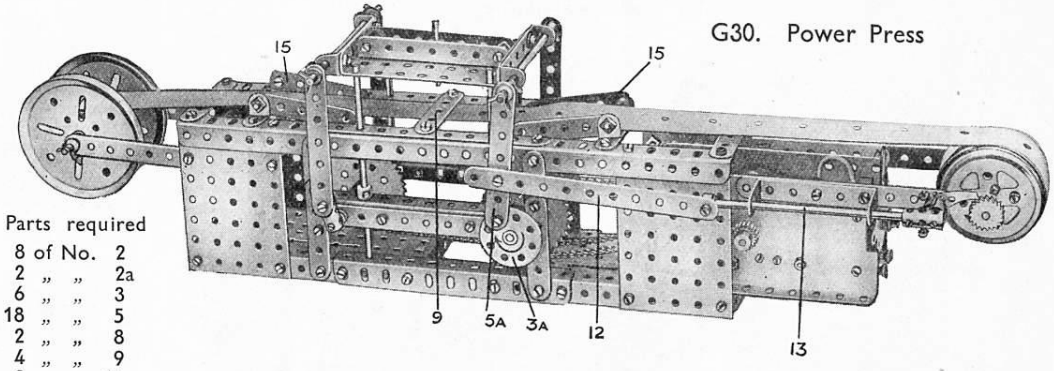


Fig. G30b

G30. Power Press



Parts required

8	of No. 2	1	„ „ 103f
2	„ „ 2a	1	„ „ 111
6	„ „ 3	1	„ „ 111a
18	„ „ 5	1	„ „ 111b
2	„ „ 8	1	„ „ 111c
4	„ „ 9	1	„ „ 147a
2	„ „ 11	1	„ „ 147b
1	„ „ 15	1	„ „ 148
5	„ „ 15a	2	„ „ 162a
5	„ „ 16	No. E6 Electric Motor (not included in Outfit)	
2	„ „ 17		
1	„ „ 18a		
2	„ „ 19b		
2	„ „ 20a		
2	„ „ 24		
1	„ „ 26		
2	„ „ 27a		
13	„ „ 35		
102	„ „ 37		
19	„ „ 38		
1	„ „ 43		
1	„ „ 46		
2	„ „ 48		
2	„ „ 48a		
2	„ „ 52		
5	„ „ 53		
10	„ „ 59		
1	„ „ 62		
3	„ „ 63		
30"	„ „ 94		
2	„ „ 95		
2	„ „ 96		
2	„ „ 111c		

The model shown in the illustration represents a type of automatic press used in factories for stamping out small metal parts. Although the model does not stamp out steel parts, it will cut neat round holes at equal distances in a strip of paper with great rapidity. Figs. G30a and G30b should be studied in conjunction with the description.

The drive from the Electric Motor is transmitted via the $\frac{1}{2}$" Pinion on the armature shaft to a 57-teeth Gear on the Rod 1a, and from another $\frac{1}{2}$" Pinion on this Rod to a second 57-teeth Gear on the Rod 1. Two 1" Sprocket Wheels on the latter Rod are connected by Sprocket Chain to 2" Sprocket Wheels on the "crankshafts" 2. One crankshaft is formed from a $3\frac{1}{2}$" Rod and two Bush Wheels 3, 3a, and the other from a $3\frac{1}{2}$" Rod carrying two Couplings 4 placed at exactly similar angles. Four Strips 5, which form connecting links between the "die platten" 6 and the crankshafts, are lock-nutted to the Bush Wheels and attached pivotally to the Couplings by $\frac{3}{8}$" Bolts. They are pivoted to the die platten by means of two $4\frac{1}{2}$" Rods and retained in place by Spring Clips.

The $3\frac{1}{2}$"$\times 2\frac{1}{2}$" Flanged Plate forming the die platten is strengthened with two $3\frac{1}{2}$" Strips 7 bolted to the Plate by Double Brackets. The die 8, a $1\frac{1}{2}$" Rod, is secured rigidly by means of a Crank. Two $2\frac{1}{2}$" Strips 9 bolted to the frame of the model and spaced apart by Washers form the "sink" through which passes the paper strip. Guides 15 are provided to keep the material in correct alignment.

The feed drum is composed of two Boiler Ends attached to the Rod 10 by means of two 2" Pulleys. At one end of this Rod is affixed a 1" Pulley on which works a spring-controlled brake, and on the other end is attached a Ratchet Wheel that engages with a Pawl 11, which is retained in constant engagement by means of a piece of Spring Cord or elastic. The Pawl is attached to a $4\frac{1}{2}$" Rod 13 by means of a Coupling and the Rod is pivotally connected by a $5\frac{1}{2}$" Strip 12 to the Strip 5a.

The arrow on the Bush Wheel 3a shows the direction of travel, this being very important as the feed drum must only turn when the die platten is at the top of its stroke. The paper to be stamped is first wound on to the drum 14, then passed through the guides 15 and through the guide 9 and its end is stuck to the feed drum at the other end of the model.

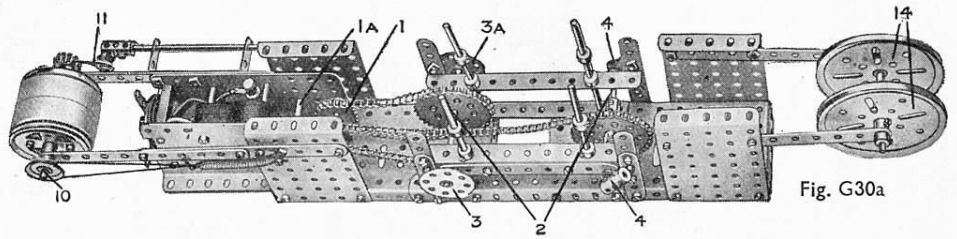


Fig. G30a

G31. Elevated Jib Crane

Parts required

4	of No.	1	1	of No.	19
10	„ „	2	1	„ „	19b
1	„ „	3	1	„ „	19s
8	„ „	5	4	„ „	20
4	„ „	8	2	„ „	20b
4	„ „	11	1	„ „	21
14	„ „	12	1	„ „	22
3	„ „	12a	2	„ „	22a
1	„ „	13	2	„ „	26
5	„ „	16	1	„ „	27a
1	„ „	18a	1	„ „	28

1	of No.	29
4	„ „	35
85	„ „	37
1	„ „	40
1	„ „	46
3	„ „	48a
2	„ „	52
5	„ „	53
1	„ „	57c
6	„ „	59
1	„ „	63

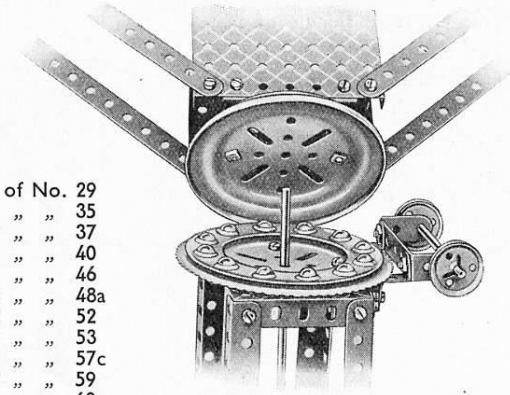


Fig. G31b

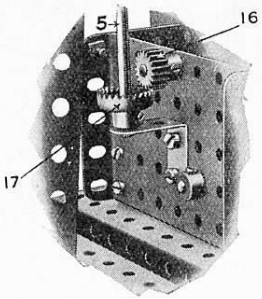
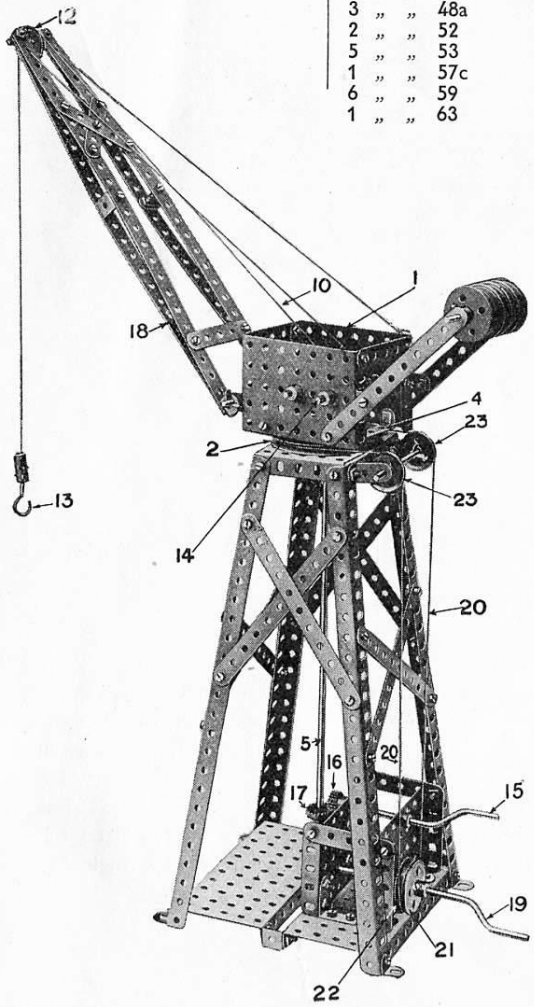


Fig. G31a



The gear-box 1 is secured to a 3″ Pulley Wheel 2 (the boss 3 of which is upward) by means of two 2½″ × ½″ Double Angle Strips 4. The 11½″ Rod 5 passes up through the boss 3, a Collar 6 being placed on top of the boss. The Contrate Wheel 7 is then secured to the top of the Rod 5. A ½″ Pinion 8 engages the Contrate Wheel 7 and also a 57-teeth Gear 9 on the Rod 14 on which latter the hoisting cord 10 is wound, passing over the 1″ Pulley 12 to the Hook 13. The Rod 5 is actuated from the Crank Handle 15 by the Pinion 16 engaging a ¾″ Contrate Wheel 17 and operates the cord 10, through the Gear Wheels 7, 8, and 9, to raise or lower the load. The jib 18 is swivelled from the Crank Handle 19, a continuous cord 20 being wound twice round the ¾″ Flanged Wheels 21. The cord 20 passes over 1″ guide Pulleys 23 and round the 3″ Pulley Wheel 2. By turning the handle 19 the jib is swivelled.

Alternative Construction. In order to make the jib swivel more freely, a Ball Bearing Unit (No. 168) may be fitted as shown in Fig. G31b, The Toothed Race is bolted to the top of the base and the Flanged Race is secured beneath a 3″ Pulley Wheel bolted to the superstructure. The Ball Casing is placed in position before fitting the two Races together.

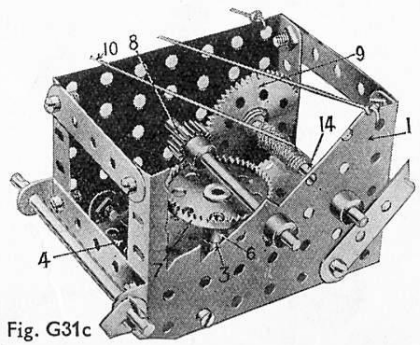


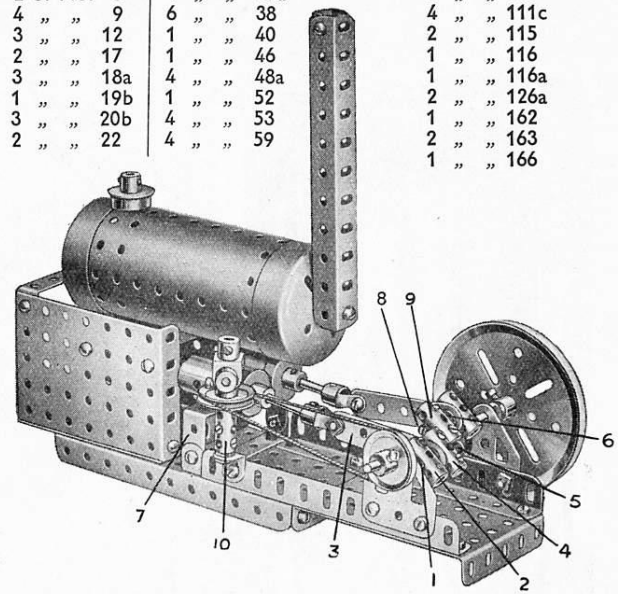
Fig. G31c

G32. Undertype Steam Engine

Parts required

2	of No.	5	40	of No.	37
4	„ „	9	4	„ „	37a
3	„ „	12	6	„ „	38
2	„ „	17	1	„ „	40
3	„ „	18a	1	„ „	46
1	„ „	19b	4	„ „	48a
3	„ „	20b	1	„ „	52
2	„ „	22	4	„ „	53
			4	„ „	59

5	of No.	63
2	„ „	111
4	„ „	111c
2	„ „	115
1	„ „	116
1	„ „	116a
2	„ „	126a
1	„ „	162
2	„ „	163
1	„ „	166



The crankshaft is built up of four Couplings joined together by ¾″ Bolts. A ¾″ Bolt 1 is passed through the centre threaded hole of the Coupling 2 and screwed up as tightly as possible. The connecting Rod 3 is now slipped on and spaced by two Washers, one on each side of the Strip, after which the Coupling 4 is screwed on to the Bolt 1 so that the connecting Rod revolves easily in the intervening space. A ⅜″ Bolt 5 is next screwed into the Coupling 4 until it strikes the end of Bolt 1. The second crank is assembled in the same way—that is, a ¾″ Bolt is passed through the centre threaded holes of two Couplings—but two Washers are placed at 6 and a ⅜″ Bolt 8 is inserted in the Coupling 9 in the same way as the Bolt 5 in Coupling 4. A ¾″ Bolt is now passed through the inner transverse hole of Coupling 9 and through the corresponding hole in Coupling 4, and is gripped securely by the Grub Screws of both Couplings. The whole crankshaft is held rigid by the ⅜″ Bolts, for the head of Bolt 5 engages with the hole in the end of Coupling 9 whilst the head of Bolt 8 engages the end of Coupling 4.

Two 2″ Rods are used for the ends of the crankshaft, one carrying a 3″ Pulley to represent a flywheel and the other a 1″ Pulley round which a length of cord is passed which takes the drive to a 1″ Pulley on the centrifugal governor. The latter is built up from a Large Fork Piece with Collars attached by means of ⅜″ Bolts, to represent the governor weights. The Fork Piece and 1″ Pulley are attached to a 1½″ Rod that turns in the top of the Coupling 9, which is secured on a Threaded Pin and attached to the base by an Angle Bracket.

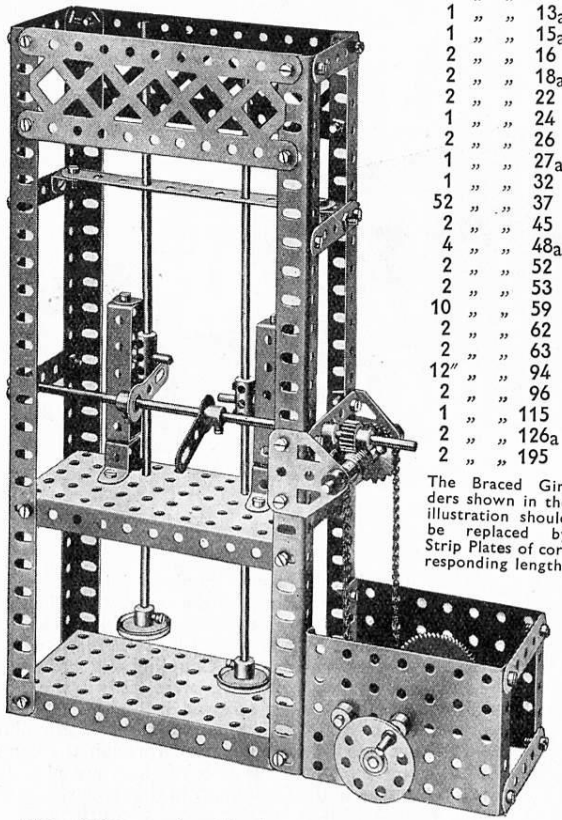
The cylinders are composed of two Sleeve Pieces, each fitted with one ¾″ Flanged Wheel, and are bolted to a 2½″ × 1″ Double Angle Strip 7.

G33. Trip Hammer

Parts required

1	of No.	2
8	„ „	5
4	„ „	8
2	„ „	12
2	„ „	13
1	„ „	13a
1	„ „	15a
2	„ „	16
2	„ „	18a
2	„ „	22
1	„ „	24
2	„ „	26
1	„ „	27a
1	„ „	32
52	„ „	37
2	„ „	45
4	„ „	48a
2	„ „	52
2	„ „	53
10	„ „	59
2	„ „	62
2	„ „	63
12″	„ „	94
2	„ „	96
1	„ „	115
2	„ „	126a
2	„ „	195

The Braced Girders shown in the illustration should be replaced by Strip Plates of corresponding length.



The shafts carrying the hammers are prevented from rotating in their bearings by means of $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips bolted in pairs to form guides, in which slide Collars on short Rods secured to the Couplings in the centre of the hammer shafts. As the Rod carrying the Cranks slowly rotates, the hammers rise and fall alternately.

The drive from the handwheel is taken through a 57-teeth Gear and $\frac{1}{2}''$ Pinion to a 1″ Sprocket Wheel that drives by means of Chain a second similar Sprocket. The Rod of this wheel carries a Worm driving a $\frac{1}{2}''$ Pinion on the Rod fitted with the Cranks.

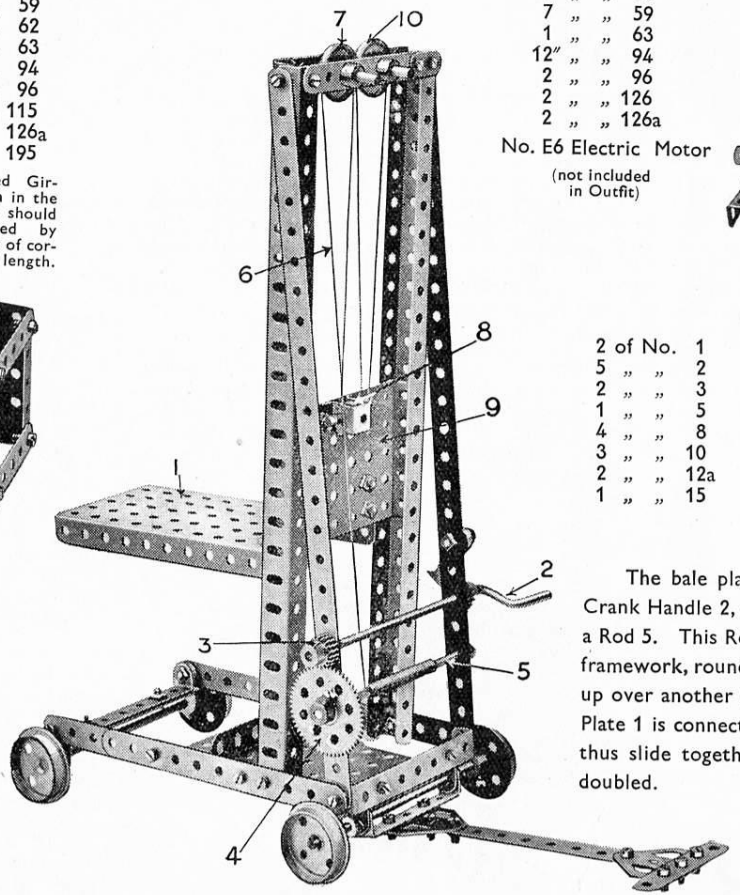
G34. Swing Saw

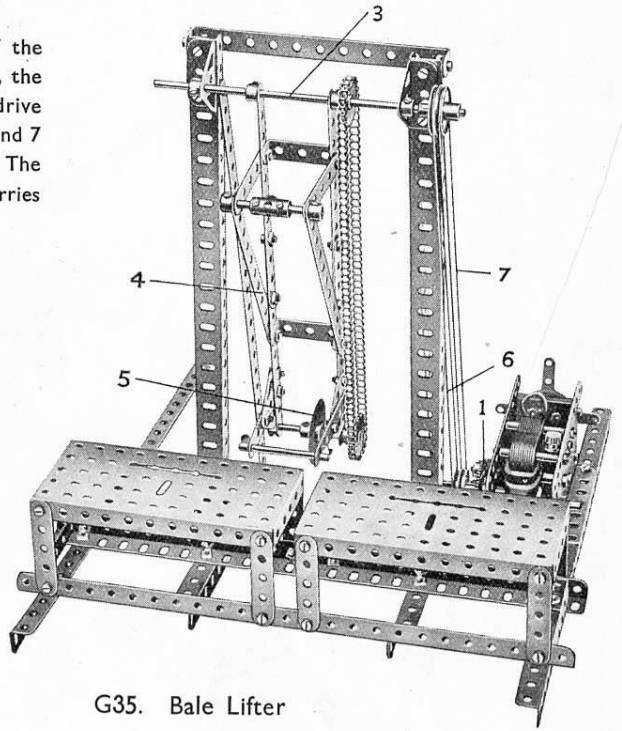
A $\frac{1}{2}''$ Pinion secured to the armature spindle of the Electric Motor engages with a 57-teeth Gear Wheel 1, the shaft of which carries two 1″ Pulleys that transmit the drive by belts to the operating Rod 3. Two driving belts 6 and 7 are used side by side to obtain a more positive grip. The framework 4, is free to swing about the Rod 3, and carries a 57-teeth Gear 5, representing the circular saw.

Parts required

2	of No. 1	1	of No. 16	57	of No. 37
6	„ „ 2	3	„ „ 17	1	„ „ 40
12	„ „ 5	4	„ „ 22	2	„ „ 48
8	„ „ 8	1	„ „ 26	2	„ „ 48a
2	„ „ 9	2	„ „ 27a	1	„ „ 48d
1	„ „ 14	2	„ „ 35	2	„ „ 52
				2	„ „ 53
				7	„ „ 59
				1	„ „ 63
				12″	„ „ 94
				2	„ „ 96
				2	„ „ 126
				2	„ „ 126a

No. E6 Electric Motor
(not included in Outfit)





G35. Bale Lifter

Parts required

2	of No. 1	2	of No. 15a	2	of No. 35
5	„ „ 2	2	„ „ 17	46	„ „ 37
2	„ „ 3	1	„ „ 18a	1	„ „ 37a
1	„ „ 5	1	„ „ 19	19	„ „ 38
4	„ „ 8	4	„ „ 20b	1	„ „ 40
3	„ „ 10	2	„ „ 22	1	„ „ 45
2	„ „ 12a	1	„ „ 26	2	„ „ 48a
1	„ „ 15	1	„ „ 27a	3	„ „ 48b

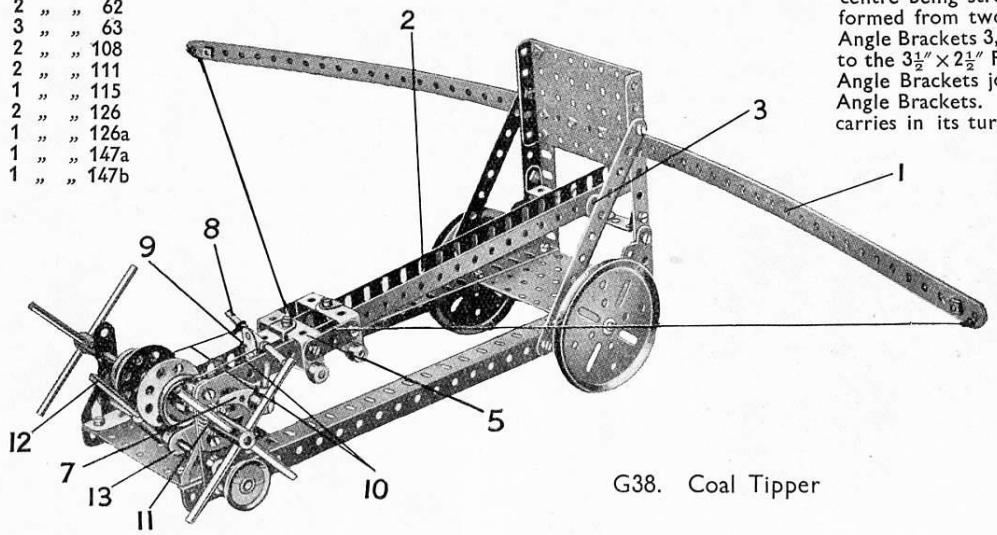
1	of No.	52
3	„ „	53
7	„ „	59
1	„ „	111
2	„ „	126a
1	„ „	147a
1	„ „	147b
1	„ „	148

The bale platform 1, consisting of a $2\frac{1}{2}'' \times 5\frac{1}{2}''$ Flanged Plate, is raised by a Crank Handle 2, operating a Pinion 3 which engages with a 57-teeth Wheel 4 on a Rod 5. This Rod carries the Cord 6, passing over a Pulley 7, in the head of the framework, round a $\frac{3}{4}''$ Bolt 8 pivoted in a Double Bent Strip bolted to the Plate 9, up over another Pulley 10, and made fast to the Plate 9. The $2\frac{1}{2}'' \times 5\frac{1}{2}''$ Flanged Plate 1 is connected to the Plate 9 by 1″ Angle Brackets, and the Plates 1 and 9 thus slide together in the vertical framework formed by $12\frac{1}{2}''$ Angle Girders doubled.

Parts required

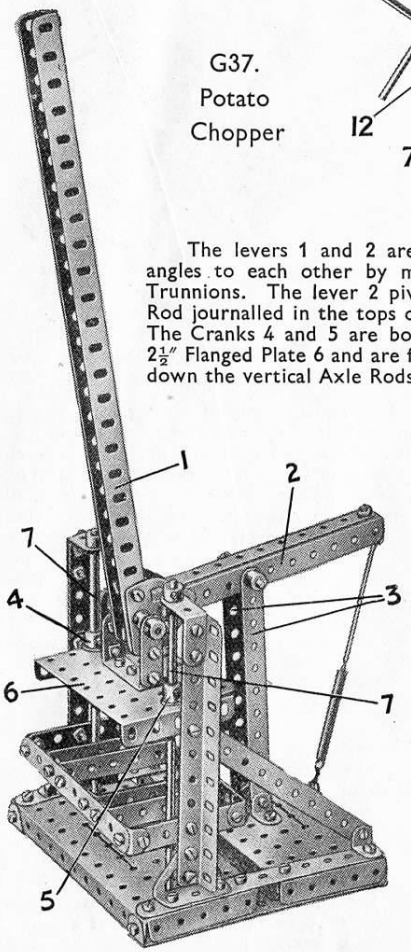
6 of No.	1	4 of No.	17	3 of No.	53
7 „ „	5	2 „ „	19b	4 „ „	59
2 „ „	6a	4 „ „	22	2 „ „	62
4 „ „	8	2 „ „	24	3 „ „	63
2 „ „	9	1 „ „	26	2 „ „	108
1 „ „	10	53 „ „	37	2 „ „	111
1 „ „	11	2 „ „	37a	1 „ „	115
4 „ „	12	5 „ „	38	2 „ „	126
4 „ „	12a	1 „ „	40	1 „ „	126a
1 „ „	15	1 „ „	45	1 „ „	147a
3 „ „	15a	1 „ „	48	1 „ „	147b
4 „ „	16	1 „ „	48b		

G36. Mechanical Cross Bow



This model represents a large military weapon of the type used before the invention of gunpowder. It is built on the principle of the crossbow Each side of the bow 1 is composed of three 12½″ Strips bolted together, the centre being strengthened by three 2½″ Strips. The trough 2, which is formed from two 12½″ Angle Girders, is held loosely between a pair of Angle Brackets 3, and its rear end is secured to a Double Bent Strip bolted to the 3½″ × 2½″ Flanged Plate. The carriage 5 is composed of four 1″ × 1″ Angle Brackets joined by a pair of 1½″ Strips and guided by two ½″ × ½″ Angle Brackets. A Double Bracket is bolted to one of the latter, and carries in its turn a Flat Bracket 9. When the handles are turned in an anti-clockwise direction, the Cords 10 draw the carriage back, and are prevented from unwinding by the Pawl 7 engaging a ½″ Pinion Wheel 11. When the lever 12 is depressed, the ends of a pair of 2½″ Strips bolted to Cranks 13 lift the 2″ Rod 8 off the Flat Bracket 9. This releases the carriage, and the projectile (a marble) is shot out of the trough 2 with considerable force.

G37. Potato Chopper

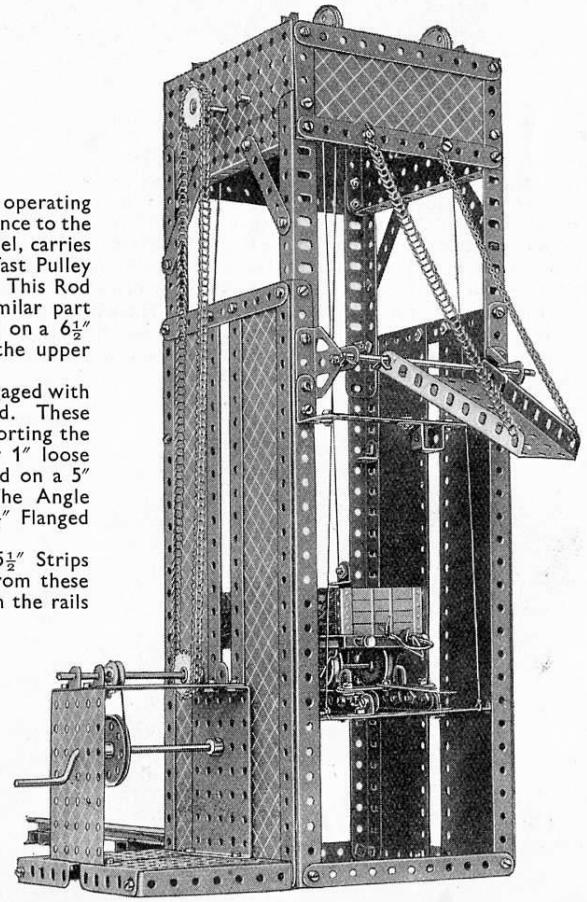


The levers 1 and 2 are secured at right angles to each other by means of two Flat Trunnions. The lever 2 pivots about a short Rod journalled in the tops of the 5½″ Strips 3. The Cranks 4 and 5 are bolted to the 3½″ × 2½″ Flanged Plate 6 and are free to ride up and down the vertical Axle Rods 7.

Parts required

8 of No.	2
3 „ „	5
2 „ „	6a
2 „ „	8
4 „ „	9
10 „ „	12
4 „ „	12a
2 „ „	14
1 „ „	17
1 „ „	18a
73 „ „	37
4 „ „	37a
4 „ „	38
1 „ „	40
1 „ „	43
4 „ „	48a
2 „ „	48d
2 „ „	52
1 „ „	53
1 „ „	57c
10 „ „	59
2 „ „	62
2 „ „	111c
2 „ „	126
2 „ „	126a

G38. Coal Tipper



The only part of this model requiring description is the operating mechanism, the construction being made quite clear on reference to the illustration. A Crank Handle, shown at the base of the model, carries a 1½″ Pulley that is connected by a Driving Band to a ½″ fast Pulley mounted on a Rod journalled at each end in Double Brackets. This Rod also carries a 1″ Sprocket Wheel that is linked up with a similar part at the top of the tower. The latter Sprocket is carried on a 6½″ Rod journalled in the two 5½″ × 2½″ Flanged Plates forming the upper section of the model.

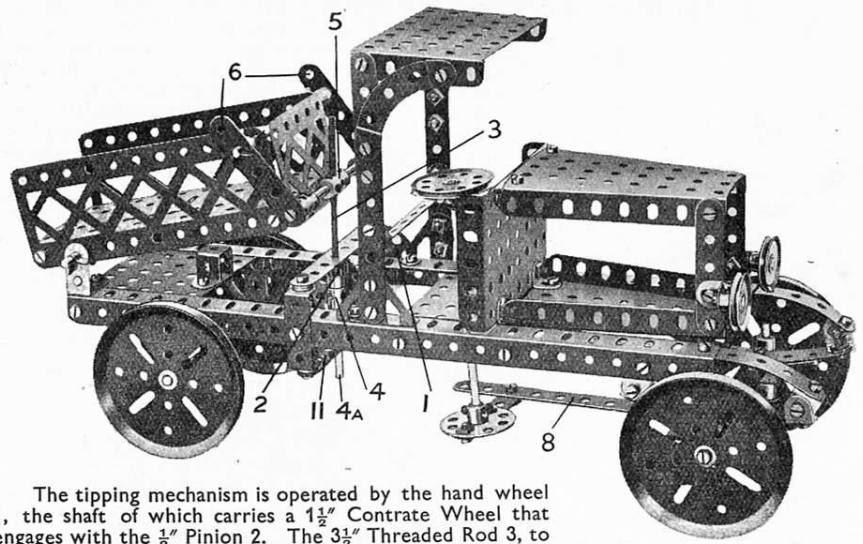
Between the Plates, the Rod carries a ½″ Pinion that is engaged with two 57-teeth Gear Wheels each of which is carred on 6½″ Rod. These two Rods form the winding drums to which the cords, supporting the truck platform, are secured. Two of the cords pass over 1″ loose Pulleys, and two over 1″ fast Pulleys each pair being carried on a 5″ Rod mounted at each end in ½″ × ½″ Angle Brackets. The Angle Brackets are bolted to the top flanges of the two 5½″ × 2½″ Flanged Plates forming the upper section of the tower.

The rails, on which the truck is carried, consist of 5½″ Strips pivotally attached to the moving platform. A projection from these rails, a 2½″ Strip, strikes a Double Bent Strip as shown when the rails are raised, this causing the truck to tip.

Parts required

8 of No.	1	4 of No.	12a	2 of No.	27a	8 of No.	59
18 „ „	2	3 „ „	14	10 „ „	35	1 length No.	94
4 „ „	3	3 „ „	15	112 „ „	37	2 of No.	96
4 „ „	4	1 „ „	16	3 „ „	37a	1 „ „	111c
8 „ „	5	1 „ „	19s	1 „ „	40	1 „ „	115
4 „ „	8	1 „ „	21	1 „ „	45	2 „ „	126
4 „ „	9	2 „ „	22	2 „ „	48b	1 „ „	186
4 „ „	10	2 „ „	22a	2 „ „	52	2 „ „	195
2 „ „	11	1 „ „	23a	4 „ „	53	4 „ „	197
17 „ „	12	1 „ „	26	1 „ „	54a		

G39.
Tipping Motor Wagon



The tipping mechanism is operated by the hand wheel 1, the shaft of which carries a $1\frac{1}{2}$" Contrate Wheel that engages with the $\frac{1}{2}$" Pinion 2. The $3\frac{1}{2}$" Threaded Rod 3, to which the Pinion 2 is secured, is journalled in one end of a Coupling 4 and passes through the central threaded bore of a second Coupling 5, which is mounted between the ends of two short Rods that are free to turn on Bolts passed through $2\frac{1}{2}$" Strips 6. These Strips 6 are attached pivotally to the body of the lorry. The short Rod 4a passes through the $3\frac{1}{2}$" Strip 11 and is secured in the lower end of the Coupling 4, the centre transverse hole of which forms a bearing for the Rod of the hand wheel 1.

The steering gear is shown in Fig. G39a. The $2\frac{1}{2}$" Strip 7 is pivoted to the Strip 8, but is secured rigidly at right-angles to the Crank 9. The Crank 9a is made to move simultaneously with the Crank 9 by means of the track-rod 10. The front road wheels are mounted on $\frac{3}{4}$" Bolts secured in Collars 12.

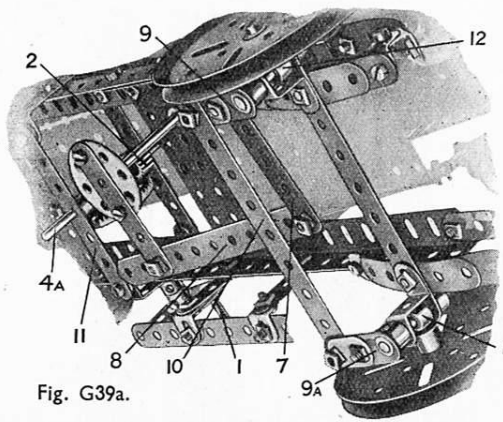


Fig. G39a.

Parts required

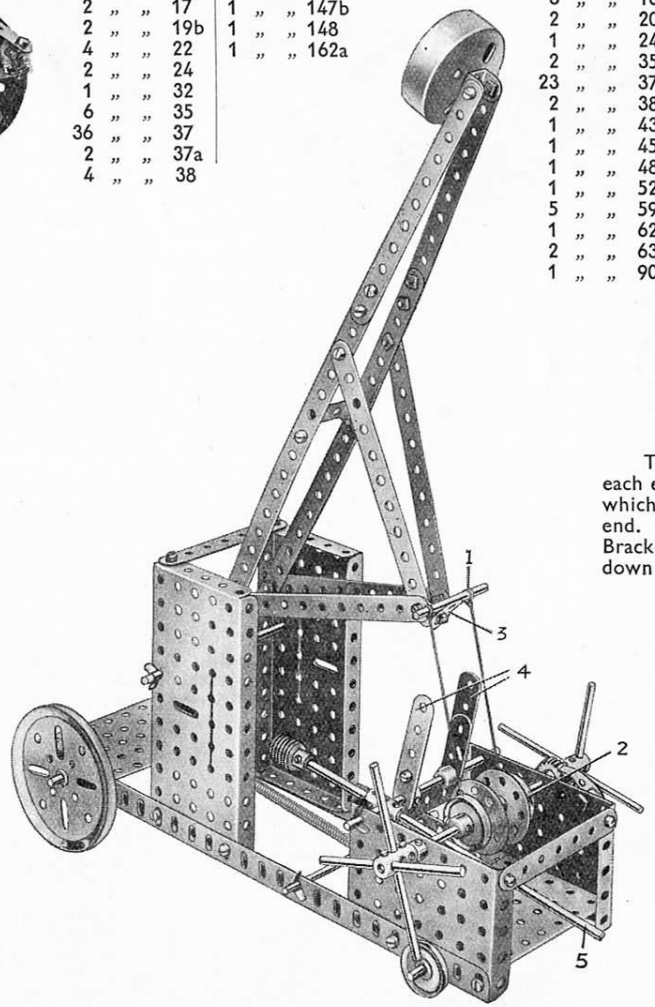
2	of No.	2	2	of No.	45
2	„ „	2a	2	„ „	48
6	„ „	3	1	„ „	48b
12	„ „	5	1	„ „	52
2	„ „	6a	2	„ „	53
2	„ „	8	2	„ „	54a
5	„ „	10	10	„ „	59
15	„ „	12	2	„ „	62
2	„ „	12a	4	„ „	63
4	„ „	15a	1	„ „	80a
2	„ „	17	2	„ „	90a
4	„ „	18a	4	„ „	111c
1	„ „	21	1	„ „	115
2	„ „	22	2	„ „	125
2	„ „	24	2	„ „	126
1	„ „	26	2	„ „	126a
1	„ „	28	4	„ „	187
8	„ „	35	1	„ „	193
89	„ „	37	2	„ „	195
4	„ „	37a			
14	„ „	38			

The Braced Girders shown in the illustrations should be replaced by Strip Plates of corresponding lengths.

G40. Catapult

Parts required

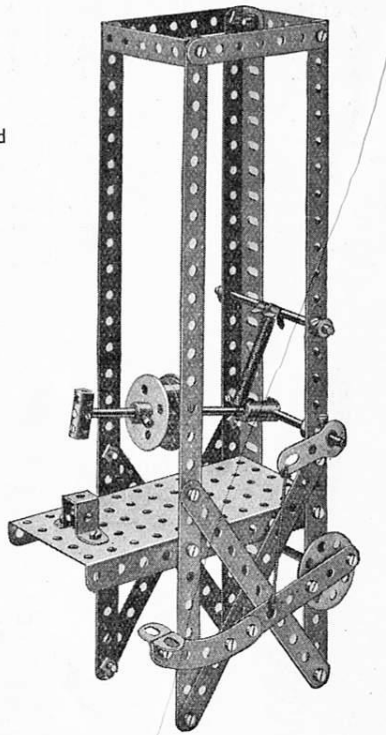
2	of No.	1	1	of No.	40
6	„ „	2	1	„ „	43
4	„ „	3	1	„ „	48
2	„ „	5	2	„ „	52
2	„ „	8	4	„ „	53
1	„ „	10	1	„ „	57c
3	„ „	11	3	„ „	59
3	„ „	15	2	„ „	62
4	„ „	15a	3	„ „	63
4	„ „	16	1	„ „	147a
2	„ „	17	1	„ „	147b
2	„ „	19b	1	„ „	148
4	„ „	22	1	„ „	162a
2	„ „	24			
1	„ „	32			
6	„ „	35			
36	„ „	37			
2	„ „	37a			
4	„ „	38			



G41. Treadle Hammer

Parts required

2	of No.	1
4	„ „	2
3	„ „	3
1	„ „	5
2	„ „	8
2	„ „	12
1	„ „	15a
3	„ „	16
2	„ „	20b
1	„ „	24
2	„ „	35
23	„ „	37
2	„ „	38
1	„ „	43
1	„ „	45
1	„ „	48a
1	„ „	52
5	„ „	59
1	„ „	62
2	„ „	63
1	„ „	90

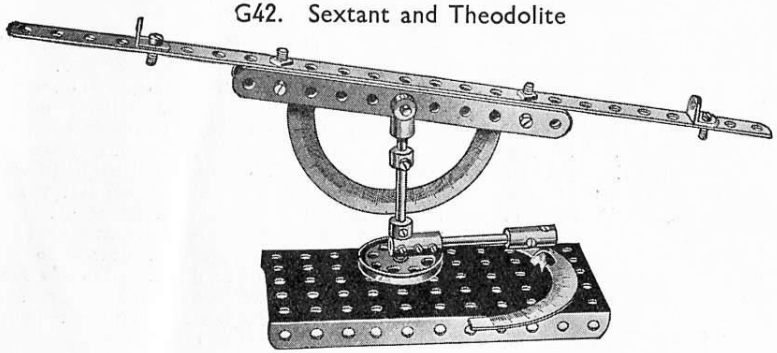


G40—continued.

Two equal lengths of cord are attached to each end of the $1\frac{1}{2}$" Rod 1 and to the winch 2, which is operated by the hand levers at each end. The Rod 1 is placed over the end of a Flat Bracket 3 and the winch turned so as to pull down the arm of the catapult against the tension of the Spring. The release gear consists of $2\frac{1}{2}$" Strips 4 bolted to two Cranks that are secured to a Rod operated by the lever 5. When the model is ready for firing, the Rod 1 is in front of the Strips 4, so that when the end of the lever 5 is pressed down the Strips 4 push the Rod off its Flat Bracket and release the arm.

The missiles are placed in the Boiler End attached to the catapult arm, which is then hauled back against the tension of the Spring. On depressing the lever 5 the arm is released and springs back until it strikes a Strip bolted across the tops of the $5\frac{1}{2}$" × $2\frac{1}{2}$" Flanged Plates. The missiles are thus flung out at their objective.

G42. Sextant and Theodolite



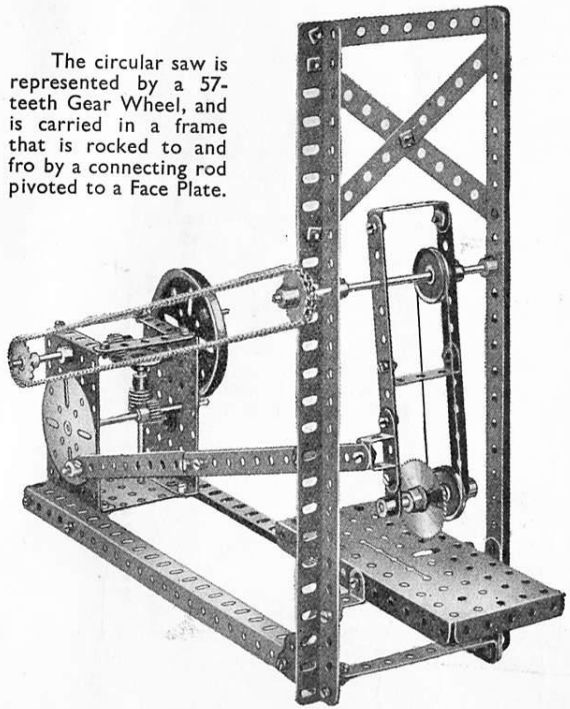
Parts required

1 of No. 1	1 of No. 17	1 of No. 52
2 „ „ 2	2 „ „ 18a	4 „ „ 59
2 „ „ 11	1 „ „ 21	3 „ „ 63
2 „ „ 12	1 „ „ 22	1 „ „ 65
1 „ „ 16	8 „ „ 37	

Cardboard for Quadrants
(not included in Outfit)

G43. Automatic Saw

The circular saw is represented by a 57-teeth Gear Wheel, and is carried in a frame that is rocked to and fro by a connecting rod pivoted to a Face Plate.



Parts required

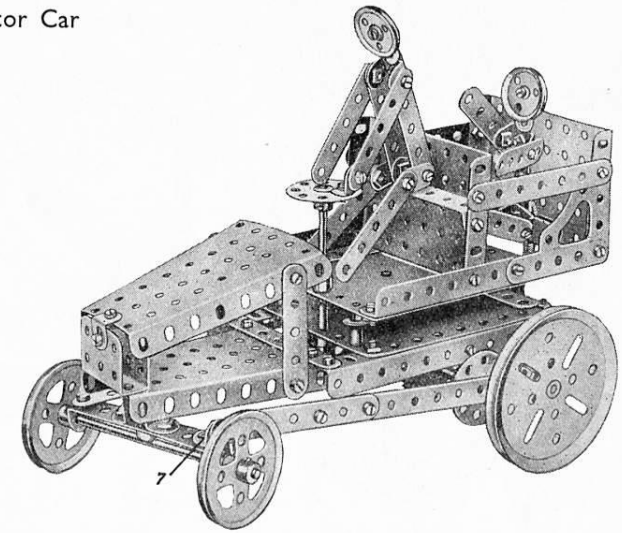
7 of No.	2
1 „ „	3
3 „ „	5
4 „ „	8
1 „ „	15
1 „ „	15a
2 „ „	16
1 „ „	17
1 „ „	19b
2 „ „	22
2 „ „	26
1 „ „	27a
1 „ „	28
1 „ „	32
41 „ „	37
3 „ „	37a
2 „ „	38
1 „ „	45
2 „ „	48
1 „ „	48a
1 „ „	52
3 „ „	53
9 „ „	59
24″ „ „	94
2 „ „	108
1 „ „	109
1 „ „	111c
2 „ „	115
2 „ „	125

G44. Ancient Motor Car

Parts required

2 of No. 2a	1 of No. 28
3 „ „ 3	57 „ „ 37
13 „ „ 5	14 „ „ 37a
2 „ „ 6a	8 „ „ 38
4 „ „ 9	1 „ „ 43
4 „ „ 10	1 „ „ 45
4 „ „ 11	2 „ „ 48b
3 „ „ 12	2 „ „ 53
1 „ „ 15	2 „ „ 54a
2 „ „ 15a	10 „ „ 59
1 „ „ 16	1 „ „ 62
1 „ „ 17	2 „ „ 63
2 „ „ 19b	2 „ „ 103f
2 „ „ 20a	2 „ „ 108
2 „ „ 22a	5 „ „ 111c
2 „ „ 24	2 „ „ 115
2 „ „ 26	1 „ „ 160
1 „ „ 27a	

No. 2 Clockwork Motor
(not included in Outfit)



This model performs very amusing antics, all its movements being derived from a Clockwork Motor in the chassis. When the Motor is set in motion the model wobbles violently along the floor, while the driver seems to be endeavouring to keep it in a straight line and the passenger (who seems to have fallen on to the floor !) appears in constant danger of being thrown completely out of the car !

A ½″ Pinion on the Motor shaft engages with the 1½″ Contrate Wheel 1 attached to the back axle 2. The latter is journalled in two 2½″ Flat Girders bolted to two 5½″ Angle Girders to which the Clockwork Motor is attached. Two Couplings 3 are fixed to each extremity of the Rod 2, and the road wheels are attached to their centre threaded holes by Threaded Pins. The Couplings are set at an angle of 180 degrees to one another and so cause the car to wobble in a most peculiar manner when it is running.

A 57-teeth Gear 4 is fixed to a 4½″ Rod 5 that carries at one end a Bush Wheel. This is connected to the front wheels by a link built up of 3½″ and 4½″ Strips and attached by an Angle Bracket 7 to the 2½″ Double Angle Strip 8 that forms a bearing for the front axle. This results in the front road wheels being turned alternately from side to side. The 1½″ Rod forming the pivot for the steering should be kept fairly loose to allow for the rolling of the chassis.

A 4½″ Strip 6 is lock-nutted to the Double Angle Strip 8 at one end and at the other to a Crank 9 which is fixed to a 3½″ Rod. This is journalled in the holes of the Clockwork Motor and at its top a Bush Wheel is secured. The driver is attached pivotally to the Bush Wheel by an Angle Bracket and 2½″ Strip, so that when the Motor is in motion he steers quite realistically. The passenger at the back is attached to the frame by a Spring clamped between two 1½″ Strips.

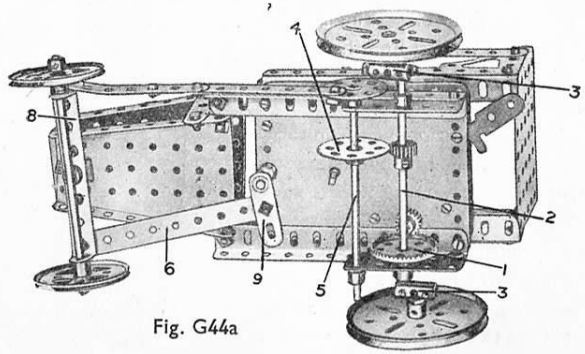


Fig. G44a

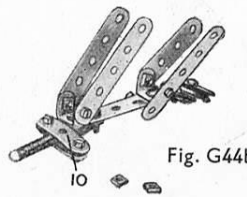
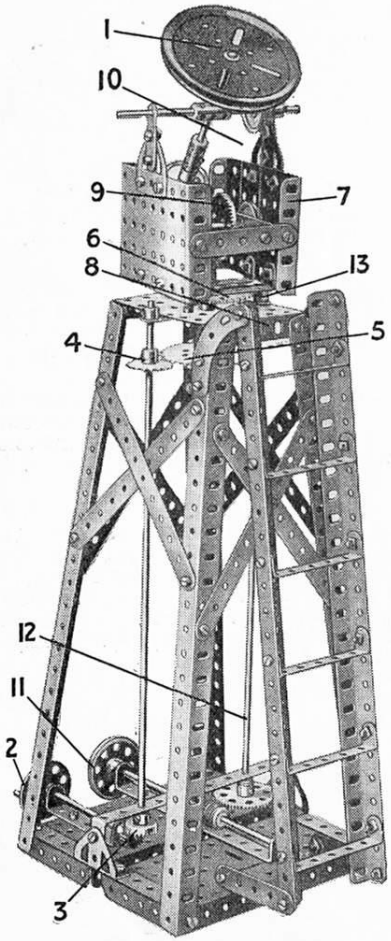


Fig. G44b

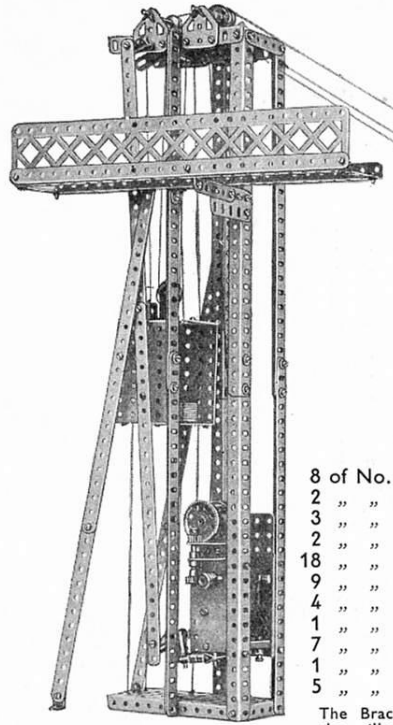
G45. Searchlight

Parts required

10	of No.	2	3	of No.	22	2	of No.	48d
1	„ „	3	2	„ „	24	2	„ „	52
4	„ „	5	2	„ „	26	3	„ „	53
2	„ „	6a	1	„ „	27a	4	„ „	59
6	„ „	8	1	„ „	28	2	„ „	63
2	„ „	12	1	„ „	29	2	„ „	95
2	„ „	13	1	„ „	32	2	„ „	96
1	„ „	14	86	„ „	37	2	„ „	115
3	„ „	16	7	„ „	38	2	„ „	126
2	„ „	17	1	„ „	45	2	„ „	126a
1	„ „	19b	9	„ „	48a			
1	„ „	21	1	„ „	48b			

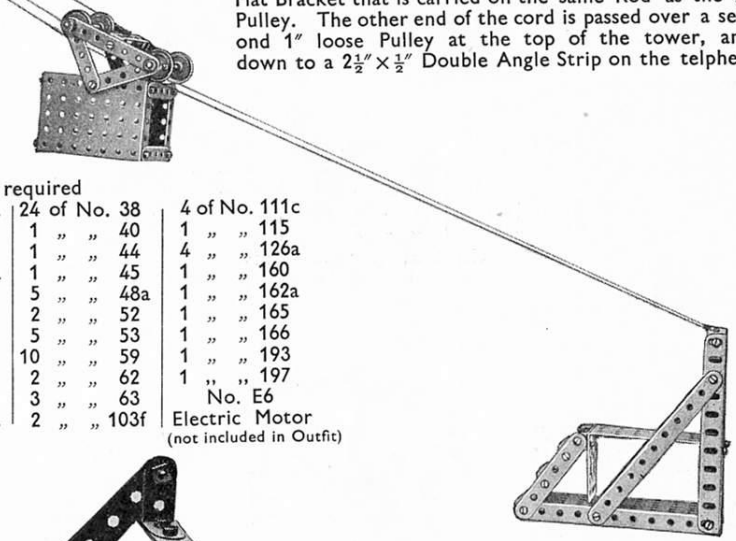


The elevation of the searchlight 1 is controlled by the hand wheel 2, the motion of which is transmitted by means of a ½″ Pinion and ¾″ Contrate Wheel 3 and 1″ Sprocket Wheel 4 to a 2″ Sprocket Wheel 5. The latter is secured to a vertical Rod that is free to revolve in the boss of a second 2″ Sprocket Wheel 6 bolted to two 2½ × ½″ Double Angle Strips, which in turn, are secured in the base of the rotating frame 7. This vertical Rod is journalled in a Double Bent Strip that is bolted beneath the Plate 8 to form an additional support, and it carries at its upper end a ½″ Pinion that engages with the 1½″ Contrate Wheel 9.



G46. Telpher Span

A Worm Wheel on the armature spindle of the Electric Motor engages with a ½″ Pinion that is secured, together with a second ½″ Pinion, on a vertical 2″ Rod. This Rod is journalled in a Channel Bearing secured to the Motor side plate. The second ½″ Pinion engages with a 1½″ Contrate Wheel carried on the hoisting drum, the latter being formed by a 2½″ Rod journalled in the end holes of the Motor side plates. The lift and telpher hoisting rope, which is continuous, is wound round the hoisting drum three turns, and is then connected to the lift and telpher in the following manner. One end of the cord is passed over 1″ and ½″ loose Pulleys at the top of the tower, then over a 1″ fast Pulley attached to the cage, and is finally attached to a Flat Bracket that is carried on the same Rod as the ½″ Pulley. The other end of the cord is passed over a second 1″ loose Pulley at the top of the tower, and down to a 2½″ × ½″ Double Angle Strip on the telpher.



Parts required

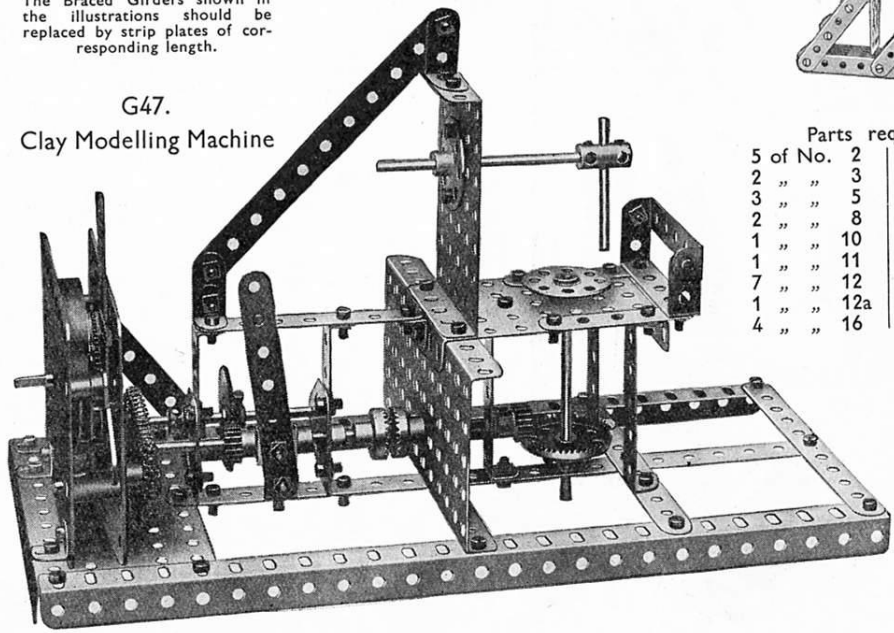
8	of No.	1	2	of No.	18a	24	of No.	38
2	„ „	2	2	„ „	20	1	„ „	40
3	„ „	3	4	„ „	22	1	„ „	44
2	„ „	4	3	„ „	22a	1	„ „	45
18	„ „	5	1	„ „	23	5	„ „	48a
9	„ „	8	2	„ „	26	2	„ „	52
4	„ „	9	1	„ „	28	5	„ „	53
1	„ „	11	1	„ „	32	10	„ „	59
7	„ „	12	4	„ „	35	2	„ „	62
1	„ „	15a	126	„ „	37	3	„ „	63
5	„ „	16	6	„ „	37a	2	„ „	103f

4	of No.	111c
1	„ „	115
4	„ „	126a
1	„ „	160
1	„ „	162a
1	„ „	165
1	„ „	166
1	„ „	193
1	„ „	197

No. E6 Electric Motor (not included in Outfit)

The Braced Girders shown in the illustrations should be replaced by strip plates of corresponding length.

G47. Clay Modelling Machine

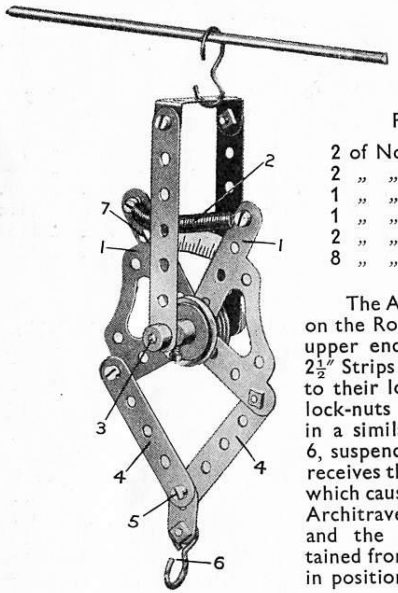


Parts required

5	of No.	2	2	of No.	117	1	of No.	63
2	„ „	3	2	„ „	24	6	„ „	94
3	„ „	5	2	„ „	26	2	„ „	96
2	„ „	8	1	„ „	27a	2	„ „	126a
1	„ „	10	1	„ „	28			
1	„ „	11	2	„ „	29			
7	„ „	12	50	„ „	37			
1	„ „	12a	2	„ „	37a			
4	„ „	16	2	„ „	38			
			1	„ „	46			
			6	„ „	48a			
			2	„ „	52			
			2	„ „	53			
			4	„ „	59			

No. 2 Clockwork Motor (not included in Outfit)

G48. Spring Balance



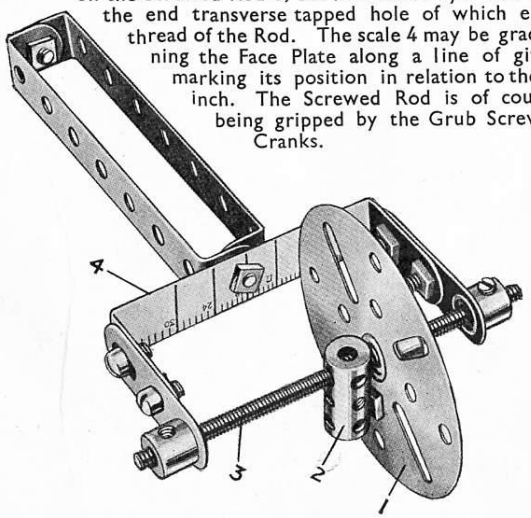
Parts required

2 of No.	3	3 of No.	37a
2 „ „	5	1 „ „	43
1 „ „	10	1 „ „	48
1 „ „	17	1 „ „	57c
2 „ „	22	2 „ „	59
8 „ „	37	2 „ „	108

The Architraves 1 are pivoted on the Rod 3 and secured at their upper ends to a Spring 2. Two $2\frac{1}{2}$" Strips 4 are attached pivotally to their lower ends by Bolts and lock-nuts and connected together in a similar manner. The Hook 6, suspended from a Flat Bracket, receives the article to be weighed, which causes the upper ends of the Architraves to move outward, and the weight may be ascertained from the scale that is bolted in position at 7.

G49. Opisometer

This instrument can be put to practical use for measuring curved lines, the perimeter of bodies, map routes, etc. The Face Plate 1 is free on the Screwed Rod 3, but is attached by a Bolt to a Coupling 2, the end transverse tapped hole of which engages with the thread of the Rod. The scale 4 may be graduated by running the Face Plate along a line of given length and marking its position in relation to the scale for every inch. The Screwed Rod is of course immovable, being gripped by the Grub Screws of the two Cranks.



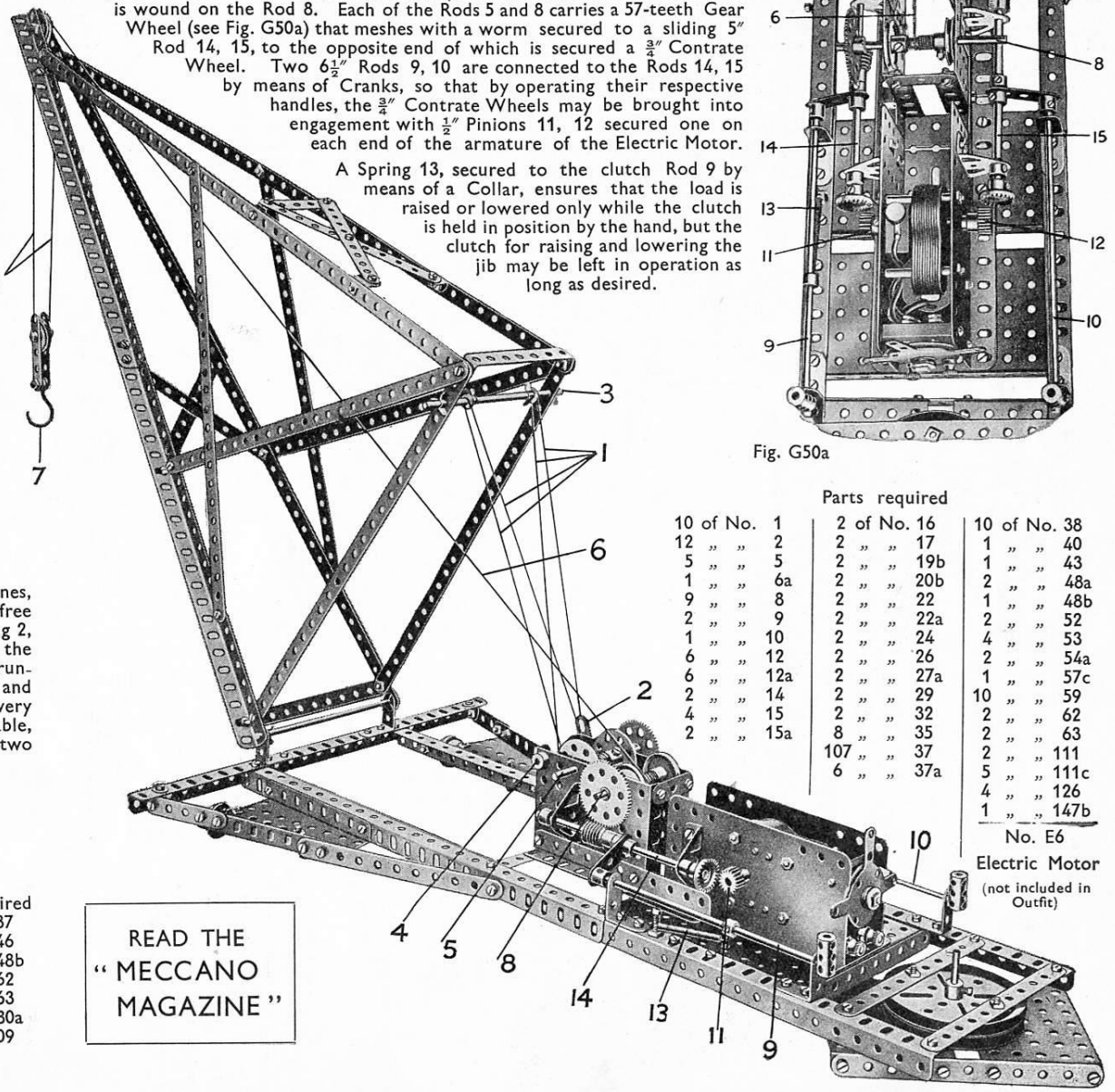
Parts required

7 of No.	37		
1 „ „	46		
2 „ „	48b		
2 „ „	62		
1 „ „	63		
1 „ „	80a		
1 „ „	109		

G50. Rotating Crane

The jib of the crane is raised or lowered by means of the cord 1 the end of which is tied to a Flat Bracket 2 mounted on the Rod 4 in the gear box. The cord is led over the Rod 3, round Rod 4, again over Rod 3, and then is wound on the Rod 5. One end of the cord 6, which raises the Hook 7, is tied to the jib of the crane and the other end is wound on the Rod 8. Each of the Rods 5 and 8 carries a 57-teeth Gear Wheel (see Fig. G50a) that meshes with a worm secured to a sliding 5" Rod 14, 15, to the opposite end of which is secured a $\frac{3}{4}$" Contrate Wheel. Two $6\frac{1}{2}$" Rods 9, 10 are connected to the Rods 14, 15 by means of Cranks, so that by operating their respective handles, the $\frac{3}{4}$" Contrate Wheels may be brought into engagement with $\frac{1}{2}$" Pinions 11, 12 secured one on each end of the armature of the Electric Motor.

A Spring 13, secured to the clutch Rod 9 by means of a Collar, ensures that the load is raised or lowered only while the clutch is held in position by the hand, but the clutch for raising and lowering the jib may be left in operation as long as desired.



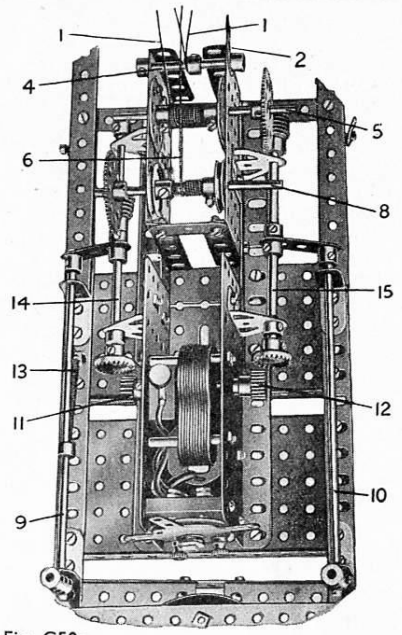


Fig. G50a

Parts required

10 of No.	1	2 of No.	16	10 of No.	38
12 „ „	2	2 „ „	17	1 „ „	40
5 „ „	5	2 „ „	19b	1 „ „	43
1 „ „	6a	2 „ „	20b	2 „ „	48a
9 „ „	8	2 „ „	22	1 „ „	48b
2 „ „	9	2 „ „	22a	2 „ „	52
1 „ „	10	2 „ „	24	4 „ „	53
6 „ „	12	2 „ „	26	2 „ „	54a
6 „ „	12a	2 „ „	27a	1 „ „	57c
2 „ „	14	2 „ „	29	10 „ „	59
4 „ „	15	2 „ „	32	2 „ „	62
2 „ „	15a	8 „ „	35	2 „ „	63
		107 „ „	37	2 „ „	111
		6 „ „	37a	5 „ „	111c
				4 „ „	126
				1 „ „	147b

No. E6 Electric Motor (not included in Outfit)

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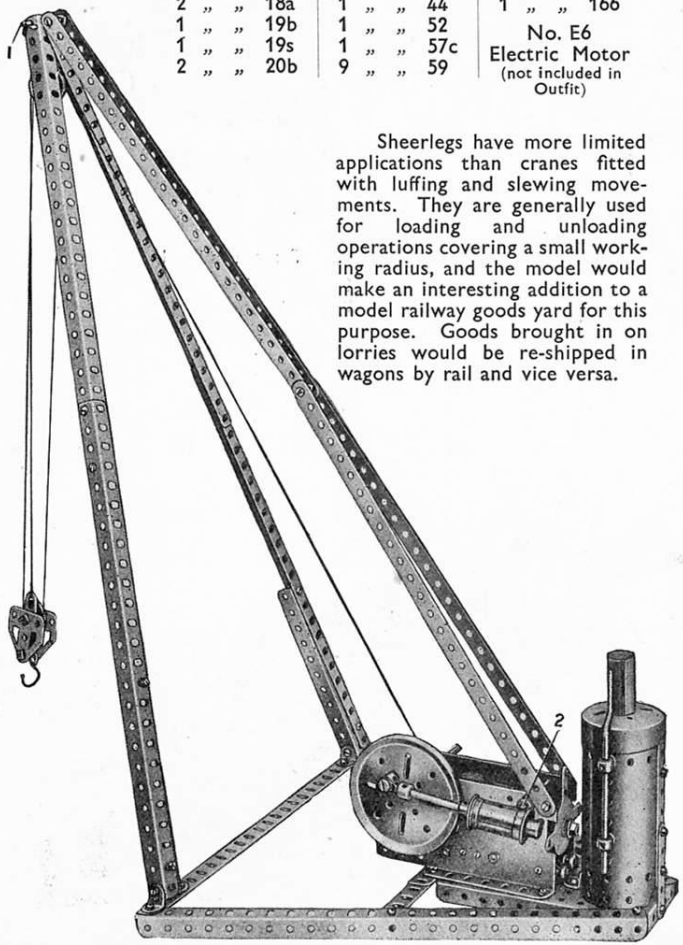
G51. Sheerlegs

The fixed pulley block at the top of the sheerlegs consists of a Cranked Bent Strip carrying two 1″ loose Pulleys. The Cranked Bent Strip has a Small Fork Piece secured to it by a ⅜″ Bolt, which passes through the hole in the bottom of the Cranked Bent Strip, and is held in place by a 1½″ Rod 1. The Sleeve Piece forming the cylinder is free to turn about the Rod 2, on which it is held in place by two Collars secured one on the inside and the other on the outside of the Sleeve Piece.

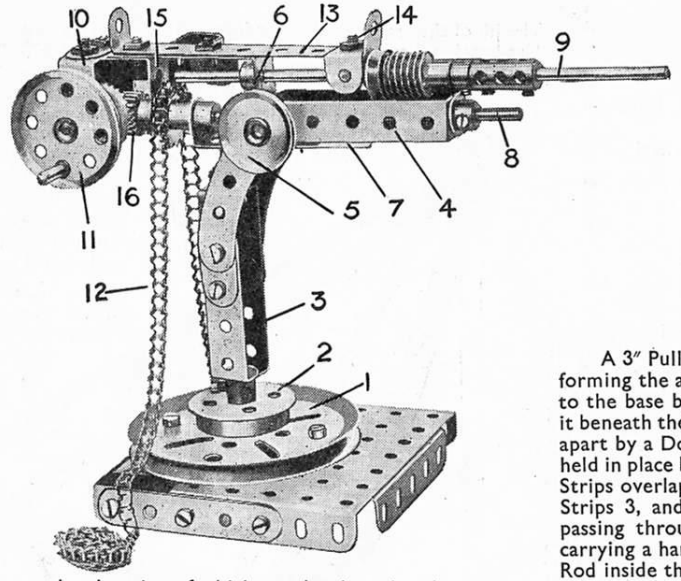
Parts required

4	of No.	1	3	of No.	22a	2	of No. 111
1	„ „	5	1	„ „	26	1	„ „ 111c
7	„ „	8	2	„ „	27a	1	„ „ 116a
4	„ „	9	4	„ „	35	2	„ „ 126a
1	„ „	10	36	„ „	37	1	„ „ 147b
5	„ „	12	6	„ „	37a	1	„ „ 162
1	„ „	16	9	„ „	38	2	„ „ 163
1	„ „	17	1	„ „	40	1	„ „ 164
2	„ „	18a	1	„ „	44	1	„ „ 166
1	„ „	19b	1	„ „	52		
1	„ „	19s	1	„ „	57c		
2	„ „	20b	9	„ „	59		

No. E6 Electric Motor (not included in Outfit)



Sheerlegs have more limited applications than cranes fitted with luffing and slewing movements. They are generally used for loading and unloading operations covering a small working radius, and the model would make an interesting addition to a model railway goods yard for this purpose. Goods brought in on lorries would be re-shipped in wagons by rail and vice versa.



G52. Naval Quick-Firing Gun

Parts required

2	of No.	5	1	of No.	21	5	of No. 48a
1	„ „	10	2	„ „	22	2	„ „ 48b
2	„ „	11	1	„ „	23	2	„ „ 53
1	„ „	12	1	„ „	26	8	„ „ 59
3	„ „	12a	1	„ „	29	1	„ „ 63
1	„ „	14	1	„ „	32	4	„ „ 90
1	„ „	15a	2	„ „	35	40″	„ „ 94
3	„ „	17	24	„ „	37	1	„ „ 96a
1	„ „	18a	2	„ „	38	2	„ „ 111c
1	„ „	19b	1	„ „	45	1	„ „ 115
1	„ „	20b	1	„ „	46	1	„ „ 125

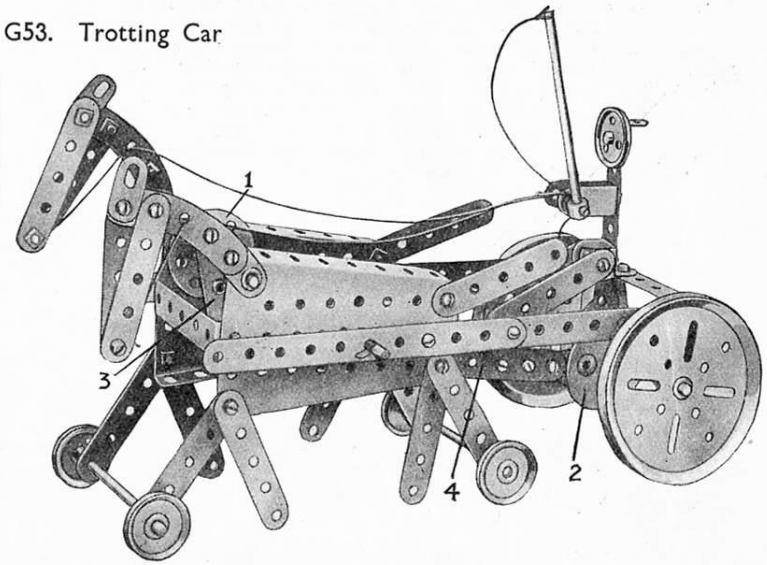
A 3″ Pulley Wheel 1 provides a bearing for the vertical 4½″ Rod forming the axis about which the gun pivots. The Rod is secured to the base by a Flanged Wheel 2 and a 1″ Pulley Wheel attached to it beneath the larger Wheel 1. Two Double Angle Strips 3, spaced apart by a Double Bracket, are mounted upon this vertical Rod and held in place by a Collar secured to its upper end. Two 2½″ Curved Strips overlapped 4 holes are bolted to each of the Double Angle Strips 3, and their upper holes form bearings for a short Rod passing through the ends of further Double Angle Strips 4, and carrying a hand wheel 5. Two Spring Clips are mounted on this Rod inside the Strips 4 to secure it to the pivoting portion of the gun, the elevation of which may be altered on turning the Wheel 5. The Strips 4 are bolted to the end of a Double Angle Strip 6, and the same Bolt secures an Angle Bracket which in turn is bolted to the Double Angle strip 7. The Rod 8 passes through the end holes of the Strips 4 and 7 and is held in place by two Collars. On the top of the Strip 6 is bolted a 3½″ Double Angle Strip 13, the upturned ends of which form the sighting apertures. The Bolt 14 secures a Double Bracket and an Angle Bracket, the latter together with one of the holes in the Strip 6 forming bearings for the barrel 9. A 1″×1″ Angle Bracket 15, bolted beneath the Strip 6, and the end of the Strip 7 provide bearings for the short Rod carrying a ¾″ Sprocket Wheel and ½″ Pinion 16. Two 1″×1″ Angle Brackets 10 form bearings for a 2″ Rod carrying the hand Wheel 11. This Rod is fitted with a ¾″ Contrate Wheel which engages with the Pinion 16. On rotation of the Wheel 11, the small Sprocket Wheel actuates the Sprocket Chain 12 which represents the cartridge belt.

G53. Trotting Car

The only portion of this model requiring description is the mechanism operating the horses' heads. Each of the latter is secured by a Crank to one end of a 3½″ Rod. To this Rod is also secured a Bush Wheel 1 carrying a 2½″ Strip 3, which is given a rocking motion by means of an Eccentric 2 on the road wheel axle. The Eccentric 2 and the 2½″ Strip 3 are connected together by the link 4.

Parts required

6	of No.	2	1	of No.	37a
17	„ „	5	2	„ „	38
2	„ „	10	1	„ „	40
1	„ „	11	1	„ „	44
2	„ „	15a	3	„ „	48a
4	„ „	16	1	„ „	48b
2	„ „	19b	2	„ „	54a
4	„ „	22	1	„ „	59
1	„ „	22a	2	„ „	62
1	„ „	24	2	„ „	90
4	„ „	35	2	„ „	126a
42	„ „	37	1	„ „	130



G54. Gantry Crane

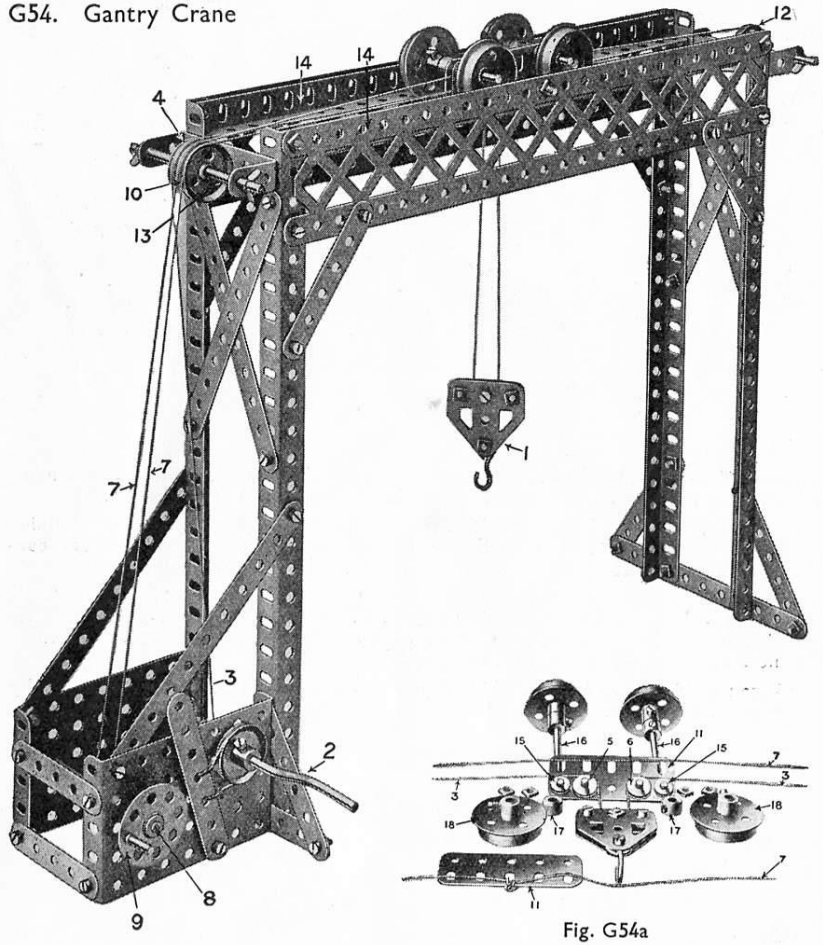


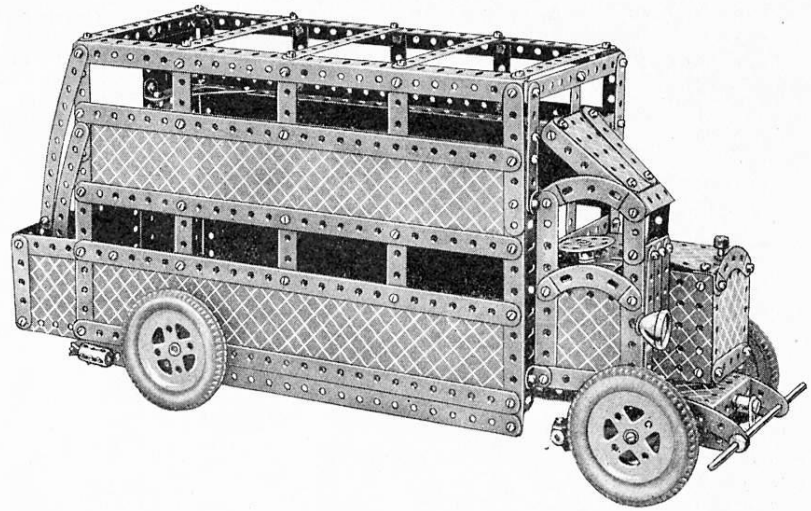
Fig. G54a

Parts required	
2	of No. 1
8	„ „ 2
6	„ „ 3
6	„ „ 4
2	„ „ 5
6	„ „ 8
3	„ „ 16
2	„ „ 17
1	„ „ 19
4	„ „ 20b
3	„ „ 22
2	„ „ 22a
3	„ „ 23
1	„ „ 24
6	„ „ 35
59	„ „ 37
1	„ „ 37a
12	„ „ 38
1	„ „ 40
2	„ „ 46
2	„ „ 53
1	„ „ 57c
4	„ „ 59
2	„ „ 103f
1	„ „ 115
2	„ „ 126a
2	„ „ 197

The Braced Girders shown in the illustrations should be replaced by Strip Plates of corresponding length.

The pulley block 1 is capable of being hoisted to raise the load, or traversed. In order to raise the load the Crank Handle 2 is operated, which winds the Cord 3 passing over the rear Pulley Wheel 4 round the ½″ Pulley 5 (Fig. G54a) and a Pulley in the block, thence round another ½″ Pulley 6 and is made fast at the end of the gantry. For traversing, a continuous Cord 7 is wound several turns on the 3½″ Rod 8 to which is secured a hand wheel 9. The cord passes over the Pulley Wheel 10 and is secured to one of the side Plates 11, and continues round the Pulley 12 returning to and passing over the nearest Pulley Wheel 13 back to the Rod 8. Consequently by turning the hand wheel 8 in one or other direction, the carriage is traversed to and fro along the top Angle Girders 14, which form the travelling rails. The construction of the travelling carriage is shown in Fig. G54a, four Washers 15 being placed on each of the outer Bolts passed through the two plates 11 ; and ½″ Pulley Wheels 5, 6, on the inner Bolts. The outer plates being then bolted together, the Rods 16 of the Flanged Wheels are passed through both plates in the end elongated holes, and Collars 17 secured on the exterior, after which the remaining Flanged Wheels 18 are secured on the ends of the Rods 16.

G55. Motor Bus



The front wheels are journalled freely on ¾″ Bolts secured in Couplings that pivot on 1½″ Axle Rods journalled in Cranks bolted to the front axle (see Fig. G55a). The track rod is connected by Swivel Bearings to the ends of Rods, which are secured in the centre transverse holes of the Couplings. Connection is made in the manner shown, with a Flat Bracket bolted to a Bush Wheel on the bottom end of the steering column.

Parts required			
10 of No. 1	20 of No. 12	10 of No. 37a	1 of No. 65	4 of No. 142a
21 „ „ 2	1 „ „ 12c	11 „ „ 38	2 „ „ 69	1 „ „ 147a
2 „ „ 2a	2 „ „ 14	2 „ „ 48	1 „ „ 77	1 „ „ 147b
6 „ „ 3	1 „ „ 15b	3 „ „ 48a	4 „ „ 90	2 „ „ 165
6 „ „ 4	4 „ „ 16	2 „ „ 48d	4 „ „ 90a	4 „ „ 190
16 „ „ 5	1 „ „ 17	1 „ „ 51	2 „ „ 103f	1 „ „ 191
2 „ „ 6a	3 „ „ 18a	2 „ „ 52	1 „ „ 108	1 „ „ 193
6 „ „ 8	4 „ „ 20a	2 „ „ 53	3 „ „ 111	2 „ „ 195
4 „ „ 9	1 „ „ 23	2 „ „ 54a	7 „ „ 111c	4 „ „ 197
7 „ „ 10	2 „ „ 24	8 „ „ 59	1 „ „ 115	
2 „ „ 11	3 „ „ 35	2 „ „ 62	1 „ „ 116a	
	164 „ „ 37	5 „ „ 63	1 „ „ 126	

1 Lighting Set (not included in Outfit)

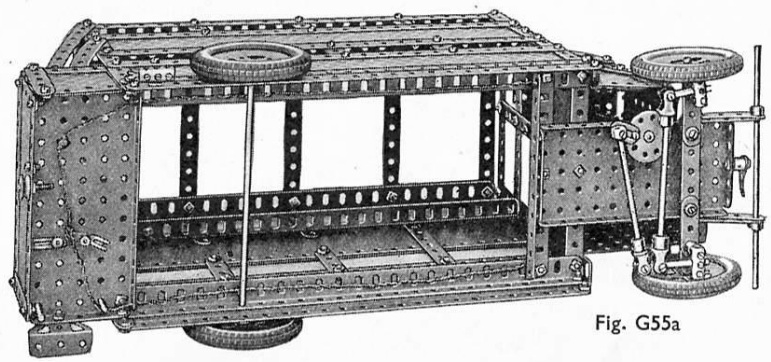


Fig. G55a

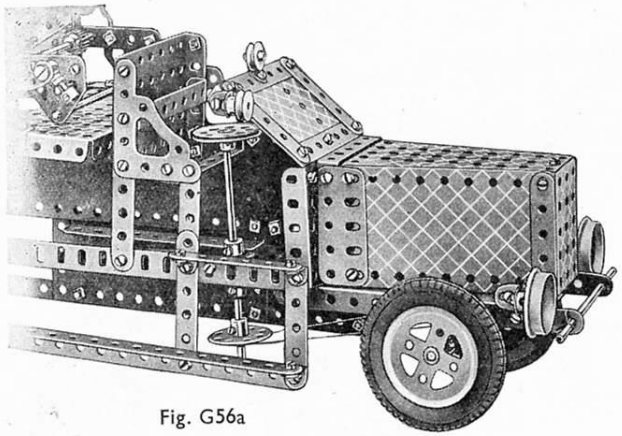
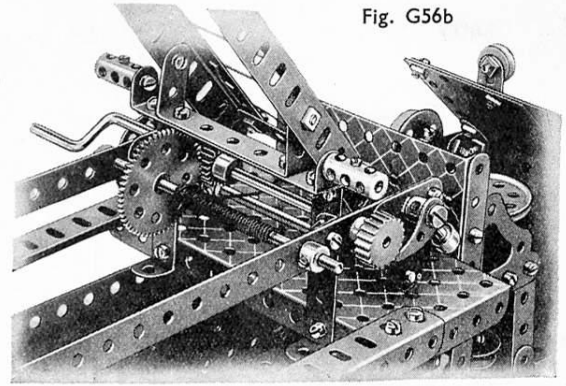


Fig. G56a

G56. Fire Engine

The riding platform, on which the fire-engine crew ride, is represented in the model by two $12\frac{1}{2}$" Angle Girders secured together by means of a $5\frac{1}{2}$" × $2\frac{1}{2}$" Flanged Plate at the front and by a $5\frac{1}{2}$" Angle Girder at the rear. A $5\frac{1}{2}$" Strip is bolted adjacent to the $5\frac{1}{2}$" Angle Girder and this carries two $2\frac{1}{2}$" × $\frac{1}{2}$" Double Angle Strips bolted together at their upper ends by a $3\frac{1}{2}$" × $\frac{1}{2}$" Double Angle Strip. The $2\frac{1}{2}$" Double Angle Strips carry the rear ends of two $12\frac{1}{2}$" Strips the other ends of which are connected by $\frac{1}{2}$" × $\frac{1}{2}$" Angle Brackets to a second pair of $2\frac{1}{2}$" × $\frac{1}{2}$" Double Angle Strips. The extreme ends of the $12\frac{1}{2}$" Strips are fitted with Flat Trunnions carrying the axle controlling the extending of the ladder. The handle for this axle consists of a Bush Wheel and a Threaded Pin.

Fig. G56b

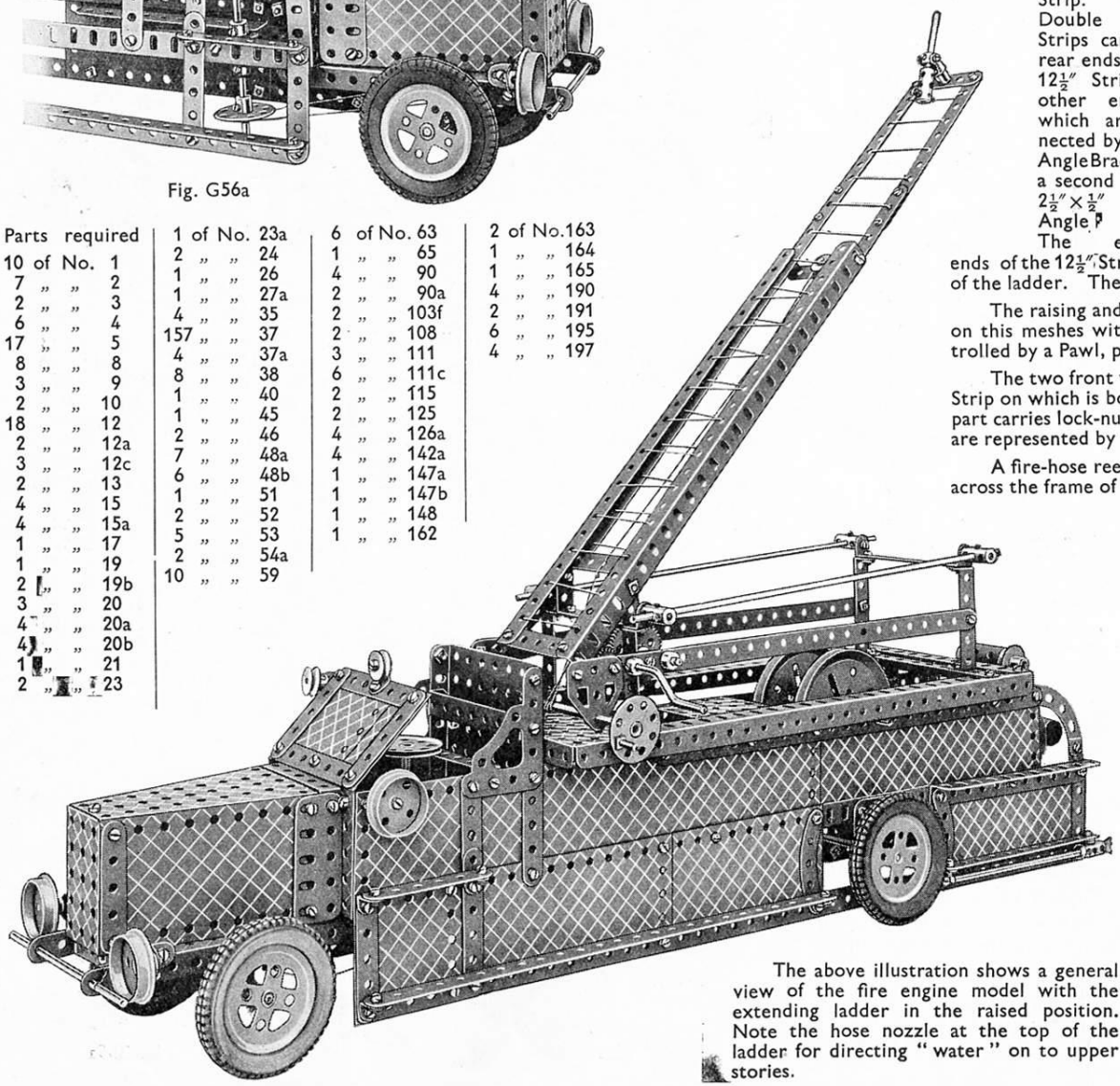


The raising and lowering of the ladder is carried out from a 5" Crank Handle. A $\frac{1}{2}$" Pinion on this meshes with a 57 teeth Gear driving the hoisting barrel, and a Ratchet Wheel, controlled by a Pawl, prevents the ladder from falling after it has been elevated.

The two front vertical $2\frac{1}{2}$" × $\frac{1}{2}$" Double Angle Strips are fitted with a $3\frac{1}{2}$" × $\frac{1}{2}$" Double Angle Strip on which is bolted a $2\frac{1}{2}$" × 1" Double Angle Strip. The end holes of the lugs of this latter part carries lock-nutted Bolts on which the ladder pivots. Hardrails for the use of the firemen are represented by $11\frac{1}{2}$" Rods held in place by Couplings.

A fire-hose reel is built up from two 3" Pulleys secured on a $4\frac{1}{2}$" Rod running transversally across the frame of the model.

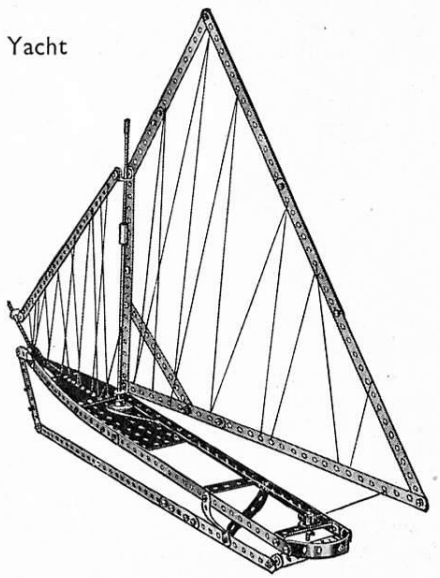
Parts required		
10	of No.	1
7	" "	2
2	" "	3
6	" "	4
17	" "	5
8	" "	8
3	" "	9
2	" "	10
18	" "	12
2	" "	12a
3	" "	12c
2	" "	13
4	" "	15
4	" "	15a
1	" "	17
1	" "	19
2	" "	19b
3	" "	20
4	" "	20a
4	" "	20b
1	" "	21
2	" "	23
1	of No.	23a
2	" "	24
1	" "	26
1	" "	27a
4	" "	35
157	" "	37
4	" "	37a
8	" "	38
1	" "	40
1	" "	45
2	" "	46
7	" "	48a
6	" "	48b
1	" "	51
2	" "	52
5	" "	53
2	" "	54a
10	" "	59
6	of No.	63
1	" "	65
4	" "	90
2	" "	90a
2	" "	103f
2	" "	108
3	" "	111
6	" "	111c
2	" "	115
2	" "	125
4	" "	126a
4	" "	142a
1	" "	147a
1	" "	147b
1	" "	148
1	" "	162
2	of No.	163
1	" "	164
1	" "	165
4	" "	190
2	" "	191
6	" "	195
4	" "	197



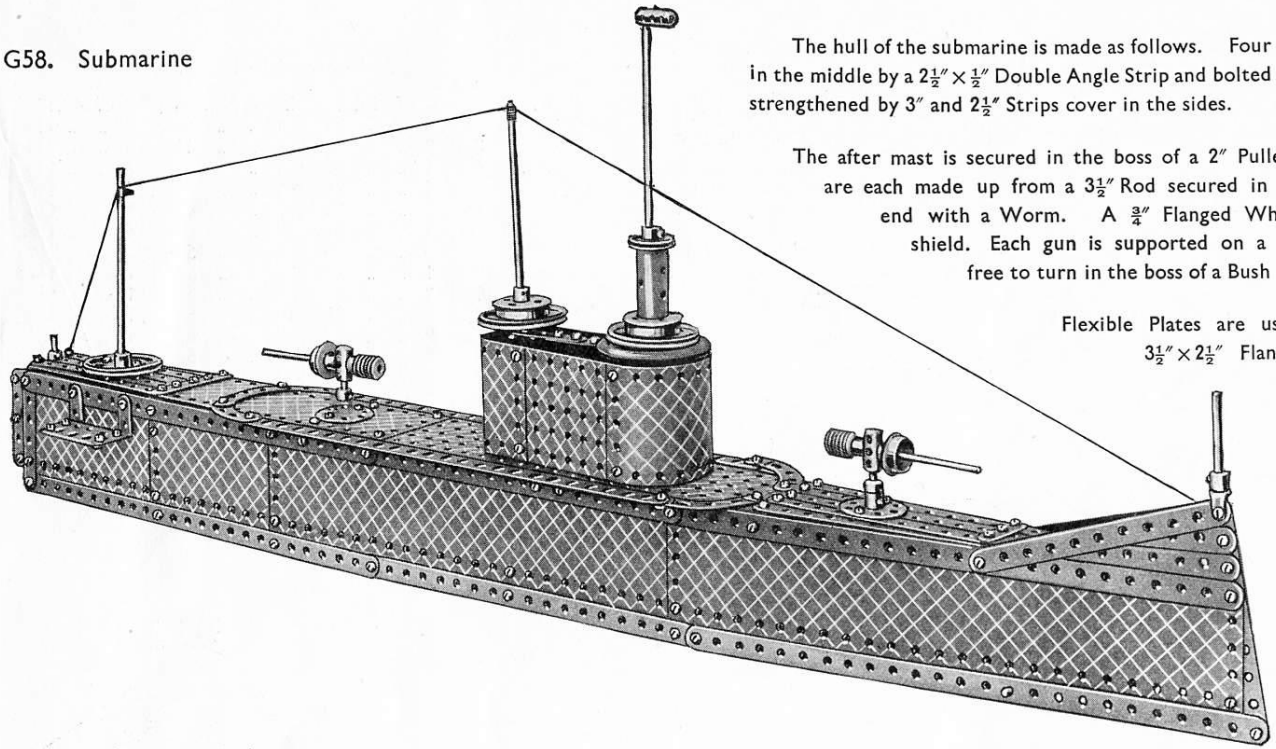
The above illustration shows a general view of the fire engine model with the extending ladder in the raised position. Note the hose nozzle at the top of the ladder for directing "water" on to upper stories.

G57. Yacht

Parts required		
9	of No.	1
7	" "	2
4	" "	3
2	" "	4
2	" "	5
1	" "	10
5	" "	12
1	" "	13a
2	" "	15
2	" "	18a
1	" "	22
51	" "	37
1	" "	40
1	" "	44
2	" "	48a
1	" "	52
1	" "	54a
1	" "	63



G58. Submarine



The hull of the submarine is made as follows. Four compound Strips each made from three $12\frac{1}{2}$" Strips are spaced in the middle by a $2\frac{1}{2}$" × $\frac{1}{2}$" Double Angle Strip and bolted at one end to a $4\frac{1}{2}$" Strip. Strip Plates bolted to the Strips and strengthened by 3" and $2\frac{1}{2}$" Strips cover in the sides.

The after mast is secured in the boss of a 2" Pulley Wheel that is bolted to the Strips of the deck. The guns are each made up from a $3\frac{1}{2}$" Rod secured in the central transverse bore of a Coupling and fitted at one end with a Worm. A $\frac{3}{4}$" Flanged Wheel on the other side of the Coupling represents the shield. Each gun is supported on a $1\frac{1}{2}$" Rod that passes into one end of the Coupling and is free to turn in the boss of a Bush Wheel bolted to the deck.

Flexible Plates are used for the ends of the conning tower and are bolted to $3\frac{1}{2}$" × $2\frac{1}{2}$" Flanged Plates forming the sides. Two $2\frac{1}{2}$" × $\frac{1}{2}$" Double Angle Strips (shown in Fig. G58a) support the axle of the helm from which a cord passes round two 1" loose Pulleys, below the deck, and is connected to the rudder.

Parts required

10	of No.	1	2	of No.	32
12	„ „	2	5	„ „	35
1	„ „	2a	117	„ „	37
4	„ „	3	3	„ „	37a
6	„ „	4	1	„ „	40
8	„ „	5	2	„ „	48
2	„ „	6a	4	„ „	48a
2	„ „	8	2	„ „	52
2	„ „	10	2	„ „	53
11	„ „	12	13	„ „	59
4	„ „	12a	2	„ „	62
1	„ „	13	3	„ „	63
1	„ „	13a	1	„ „	90
1	„ „	14	4	„ „	90a
1	„ „	15b	2	„ „	103f
5	„ „	16	2	„ „	111c
4	„ „	17	2	„ „	126a
2	„ „	18a	1	„ „	163
2	„ „	20	1	„ „	164
3	„ „	20a	1	„ „	166
2	„ „	20b	1	„ „	176
1	„ „	21	1	„ „	187
4	„ „	22	2	„ „	191
2	„ „	22a	1	„ „	193
2	„ „	23	5	„ „	195
2	„ „	24	4	„ „	197

The periscope consists of an $11\frac{1}{2}$" Axle Rod that is secured to the deck by a Crank and carries a Road Wheel that fits over the Flexible Plates to form a top to the conning tower. A 2" Pulley and $1\frac{1}{8}$" Flanged Wheel are fitted on the Rod and a Sleeve Piece mounted on a Chimney Adaptor is placed above these and surmounted a 1" Pulley. A Coupling is carried at the top of the periscope. An 8" Rod forms the mast and passes through a $2\frac{1}{2}$" Strip, fixed to the Double Angle Strips shown in Fig. G58a, and through the deck. This Rod carries a 2" Pulley and a Flanged Wheel, and cord is attached to the bows and to the tops of both masts before being secured to the stern.

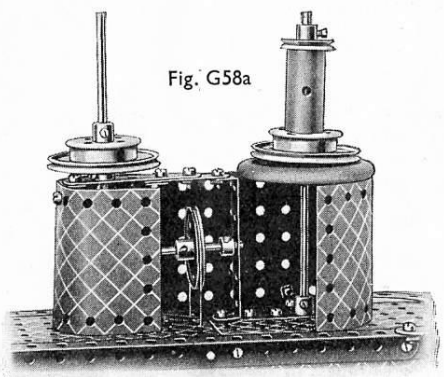


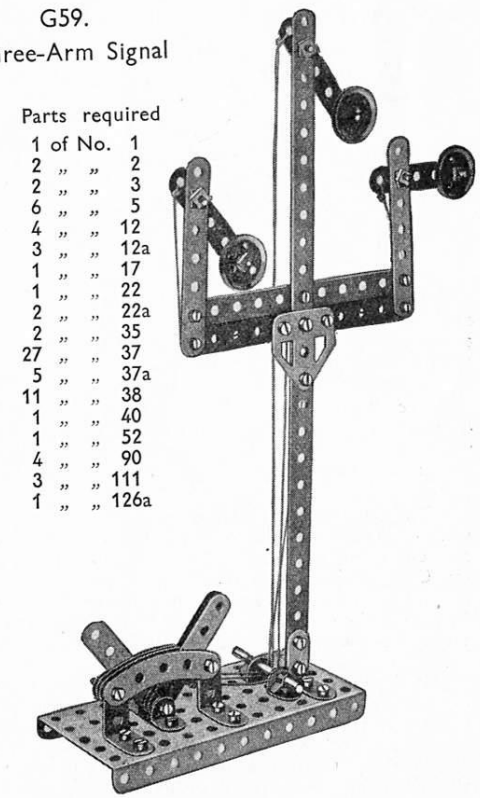
Fig. G58a

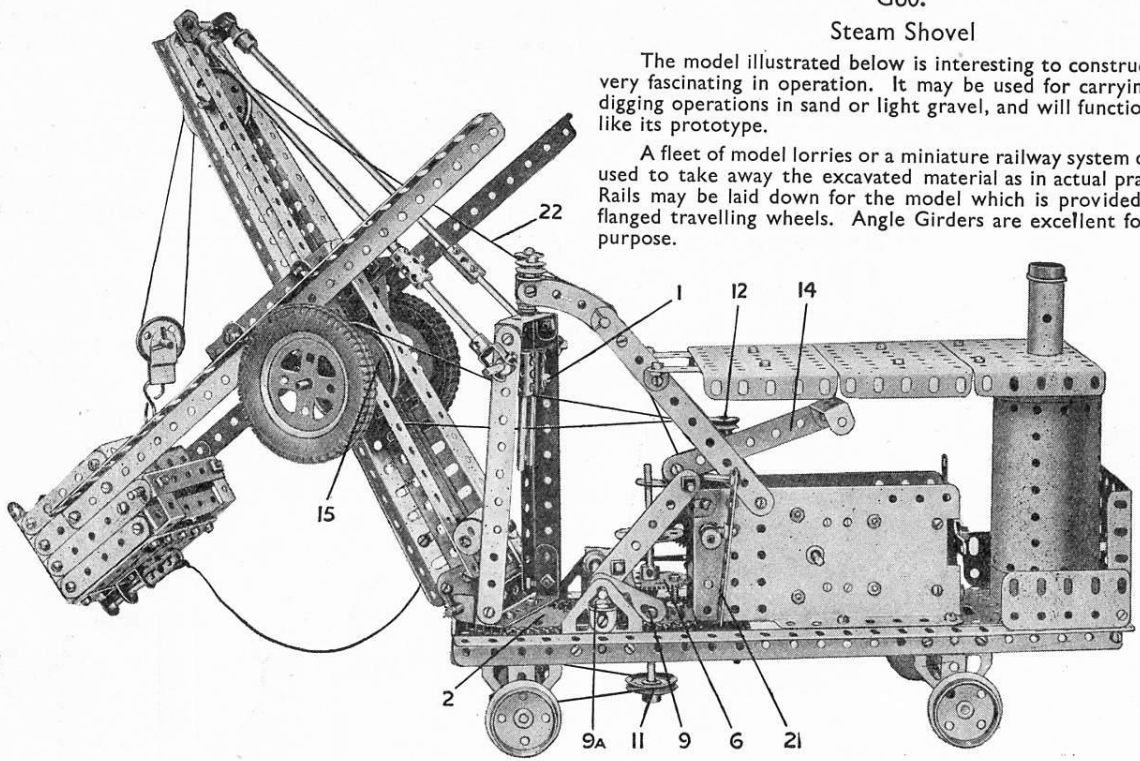
The model travels on two 1" fast Pulleys mounted on a Rod journalled amidships, and on two 1" loose Pulleys mounted one at the bows and the other at the stern. These Pulleys are free to slide along their Rods.

G59. Three-Arm Signal

Parts required

1	of No.	1
2	„ „	2
2	„ „	3
6	„ „	5
4	„ „	12
3	„ „	12a
1	„ „	17
1	„ „	22
2	„ „	22a
2	„ „	35
27	„ „	37
5	„ „	37a
11	„ „	38
1	„ „	40
1	„ „	52
4	„ „	90
3	„ „	111
1	„ „	126a





G60.

Steam Shovel

The model illustrated below is interesting to construct and very fascinating in operation. It may be used for carrying out digging operations in sand or light gravel, and will function just like its prototype.

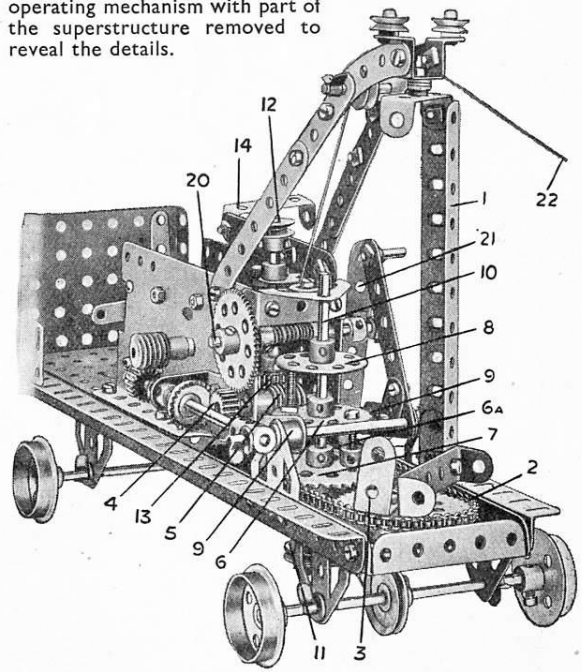
A fleet of model lorries or a miniature railway system can be used to take away the excavated material as in actual practice. Rails may be laid down for the model which is provided with flanged travelling wheels. Angle Girders are excellent for this purpose.

Parts required

6	of No.	2	4	of No.	18a	21	of No.	38	2	of No.	103f
2	„ „	2a	4	„ „	20	1	„ „	40	2	„ „	111
6	„ „	3	3	„ „	20a	1	„ „	44	3	„ „	111c
4	„ „	4	1	„ „	20b	1	„ „	45	2	„ „	115
18	„ „	5	1	„ „	21	1	„ „	46	1	„ „	116a
2	„ „	6a	2	„ „	22	2	„ „	48	3	„ „	126
8	„ „	8	1	„ „	22a	10	„ „	48a	4	„ „	126a
2	„ „	9	3	„ „	23	2	„ „	52	2	„ „	142a
3	„ „	10	1	„ „	23a	4	„ „	53	1	„ „	147b
1	„ „	11	2	„ „	24	1	„ „	57c	1	„ „	162
12	„ „	12	2	„ „	26	10	„ „	59	1	„ „	163
4	„ „	12a	2	„ „	27a	2	„ „	62	1	„ „	164
3	„ „	14	1	„ „	29	6	„ „	63	2	„ „	165
1	„ „	15	2	„ „	32	2	„ „	77	1	„ „	166
5	„ „	15a	10	„ „	35	3	„ „	90			
5	„ „	16	125	„ „	37	11″	„ „	94			
5	„ „	17	7	„ „	37a	2	„ „	95			

No. E6
Electric Motor
(not included in Outfit)

Fig. G60c (below) shows the operating mechanism with part of the superstructure removed to reveal the details.



The base of this model consists essentially of two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates connected together by $12\frac{1}{2}''$ Angle Girders, and the vertical member 1 is secured firmly to a 2″ Sprocket Wheel 2 that is free to turn about a Pivot Bolt attached to one of the base plates. It should be noted that the $2\frac{1}{2}'' \times 1''$ Double Angle Strip 3 (Fig. G60c) is spaced from the Sprocket 2 by the thickness of two Washers.

The gear box provides four movements--hoisting and lowering, racking, slewing, and travelling, all of which are driven by the Electric Motor. On the armature spindle of the Motor is a Worm meshing with a $\frac{1}{2}''$ Pinion on a horizontal Rod on which is secured also a $\frac{3}{4}''$ Contrate. The latter is in constant mesh with a $\frac{1}{2}''$ Pinion 4 on a short Rod that is journalled in the Motor side plates and carries a Worm 5.

The slewing and travelling motions are actuated through a novel form of clutch shown in Figs. G60 and G60c. A 57-teeth Gear 6 meshes with the Worm 5. It is loose on its Rod 10 and may be raised or lowered by means of two Cranks 9, which are secured to a Rod and have in their end holes Bolts the shanks of which engage with the underside of the Gear. When the Gear moves downwards, one of two $\frac{3}{4}''$ Bolts 6a secured to it, engages with one of the holes in a 2″ Sprocket 7, which is loose on the Rod 10 and is connected to the Sprocket 2 by a length of Sprocket Chain. By this means the model is slewed. By raising the Gear 6 the second $\frac{3}{4}''$ Bolt engages with a Bush Wheel 8, which is fastened to the Rod 10. A 1″ fast Pulley 11 on the lower end of this shaft is connected by a short belt of cord to a similar Pulley on the front axle.

It should be borne in mind that the Gear 6 must be always in mesh with the Worm 5, unless it is required to throw it out of gear entirely, when it is only necessary to slide it up the Rod to its fullest extent. To prevent the Gear coming out of mesh with the Worm when in the slewing position a Collar is fixed on the lower $\frac{3}{4}''$ Bolt, and in order to maintain the operating lever in position after movement, a Spring Clip 9a is mounted on the end of the Rod carrying the Cranks 9, and prevented from rotation by its ends engaging with a $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Bracket bolted to the Flat Trunnion. Hence the required stiffness in the movement of the lever is obtained.

The drive for the racking movement is taken off a ½″ fast Pulley 12 secured to the top end of a Rod that carries a ½″ Pinion 13, which may be brought into mesh with the Worm 5 by sliding the Rod downward with the aid of the lever 14. A belt of cord connects the Pulley 12 with a 2″ Pulley 15 secured on a Rod that is journalled in the sides of the jib and which carries two other 2″ Pulleys shod with Dunlop Tyres. The frame 16 (Fig. G60b) also is mounted on this Rod in the holes 17 and the Girders of the bucket arm engage between the ½″×½″ Angle Brackets 18 and the tyre-shod Pulleys. The Brackets 18 should press the bucket arm only lightly into contact with the Tyres, and the driving belt should be taken several times round the Pulleys 12 and 15.

In Fig. G60a the Digger Bucket (Part No. 169) is shown mounted on the bucket arm in place of the built-up bucket. It is bolted to a 2½″×1″ Double Angle Strip to which an Angle Bracket is fixed for attaching the Hook of the pulley block. The advantage of using Part No. 169 is that it can be used for handling fine material such as sand that would escape through the perforations in the built-up bucket. Fig. G60b shows the method of constructing a bucket from standard parts.

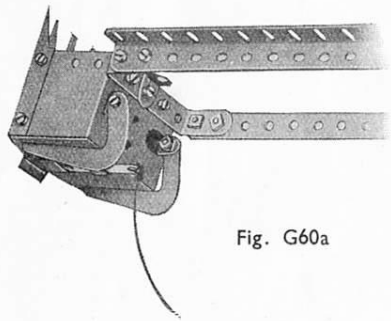


Fig. G60a

The catch for the bucket consists of a 1½″ Rod free to slide in a Double Bracket that is bolted rigidly to the underneath of the bucket. One end of the Rod is fitted with a Coupling, to which the release cord is attached, and the other end fits into the lower hole of a 3″ Strip 19.

The hoisting barrel consists of a 3½″ Rod 20 that is free to slide in the Motor side plates and is controlled by the lever 21, so that the 57-teeth Gear on its extremity may be thrown into or out of engagement with the ½″ Pinion 4. When out of gear the projecting shank of a Bolt on the Motor side plate engages with one of the holes of the 57-teeth Gear and thus prevents the unwinding of the barrel. The grub-screw in the boss of the Pinion 4 should be filed, if necessary, so that it does not foul the teeth of the 57-teeth Gear.

The pair of ½″ loose Pulleys mounted at the top of the vertical member form guides round which the hoisting cord 22 passes when the jib is slewed round. The Boiler is retained in position by a 6½″ Rod, which passes completely through it, and through the base plate, and is secured by a Bush Wheel on its lower end, and at its upper extremity by a ¾″ Flanged Wheel that forms the chimney cap.

Much fun may be had with this model, not only during its construction but afterwards when it is set to work. Also, it may easily be converted into a crane by detaching the bucket arm and unhooking the bucket from the pulley block.

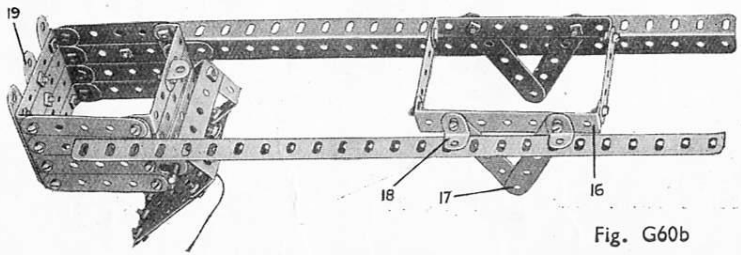
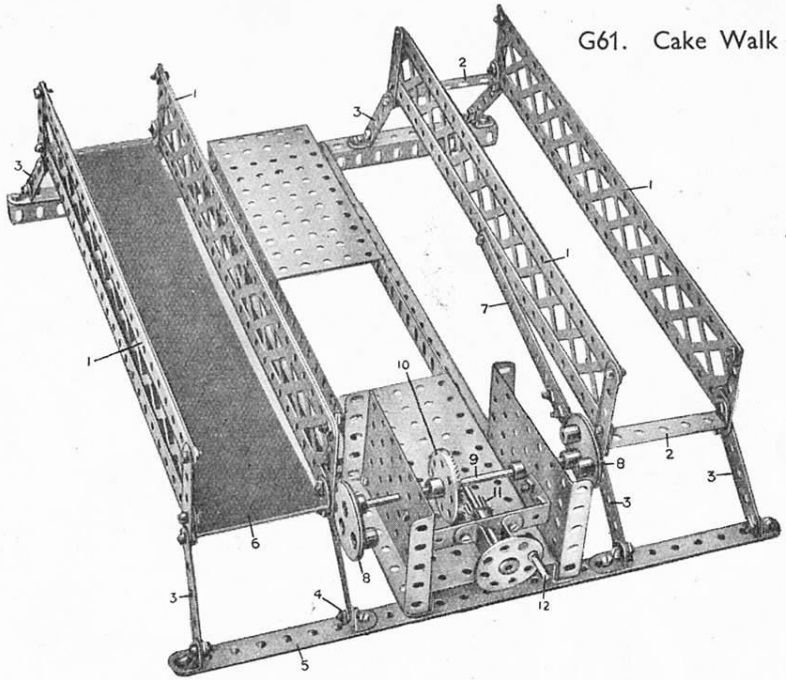


Fig. G60b

G61. Cake Walk



Parts required

8	of	No.	1
2	„	„	2
16	„	„	5
6	„	„	8
8	„	„	12
1	„	„	15
1	„	„	17
1	„	„	24
1	„	„	26
1	„	„	28
66	„	„	37
1	„	„	38
1	„	„	45
1	„	„	46
4	„	„	48a
2	„	„	52
2	„	„	53
2	„	„	59
1	„	„	115
2	„	„	130
4	„	„	197

The Braced Girders shown in the illustrations should be replaced by Strip Plates of corresponding length.

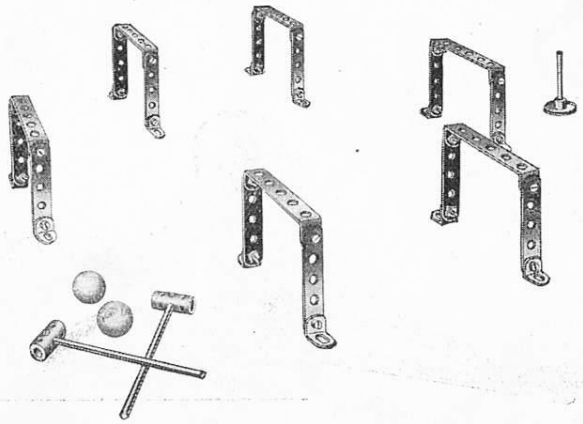
Strip Plates replace the Braced Girders 1 and are connected by the end Strips 2 and pivotally bolted and lock-nutted to the Strips 3 forming rocking links. These latter are bolted and lock-nutted at 4 to the Angle Girders 5. Strips 6 of cardboard are secured to the end Strips 2. The platforms are rocked by means of Strips 7, one of which is connected to each rocking platform and to Eccentrics 8 fixed on the Rod 9 on which is secured a Contrate Wheel 10 driven by a Pinion 11 from the handle 12. As the handle 12 is turned the platforms are rocked to and fro on the Strips 3. The Eccentrics 8 should be so arranged that the platforms rock in opposite directions.

G62. Table Croquet

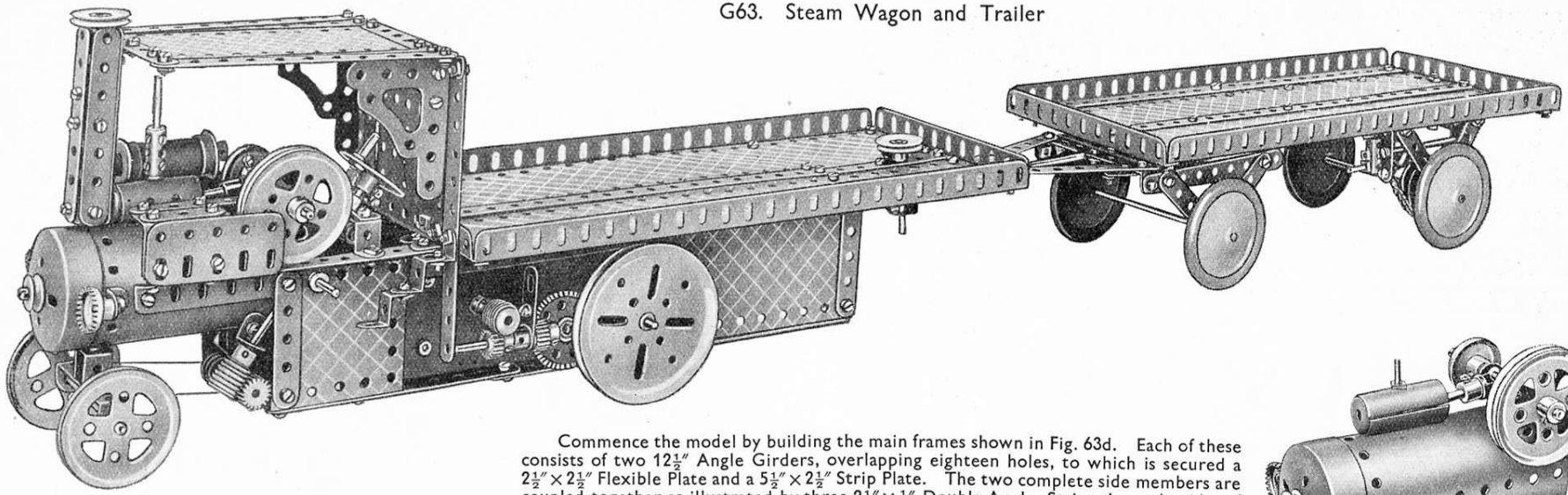
A most diverting game. Coloured marbles may be used for the balls. Full instructions for playing croquet may be obtained from any sports or games dealer.

Parts required

12	of	No.	5
12	„	„	12
2	„	„	16
2	„	„	17
2	„	„	22
24	„	„	37
6	„	„	48a
2	„	„	63



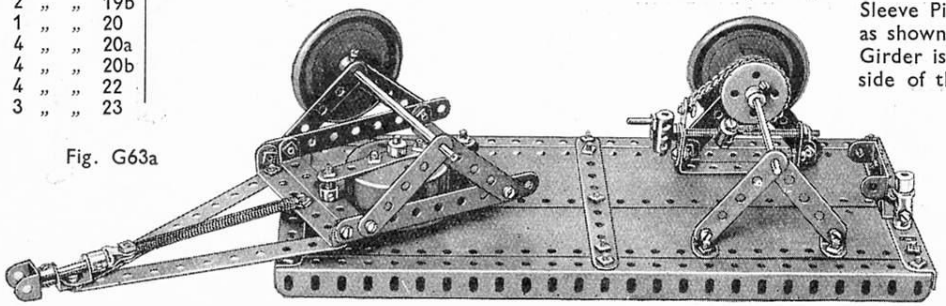
G63. Steam Wagon and Trailer



Parts required

4 of No.	1	1 of No.	23a	10 of No.	59	1 of No.	160
10 „ „	2	2 „ „	24	2 „ „	62	1 „ „	162
2 „ „	2a	2 „ „	26	4 „ „	63	2 „ „	163
6 „ „	3	1 „ „	28	1 „ „	80a	1 „ „	164
1 „ „	4	2 „ „	29	12″ „ „	94	1 „ „	165
17 „ „	5	2 „ „	32	1 „ „	95	1 „ „	166
2 „ „	6a	8 „ „	35	1 „ „	96a	4 „ „	187
8 „ „	8	162 „ „	37	2 „ „	103f	2 „ „	190
4 „ „	9	10 „ „	37a	2 „ „	108	3 „ „	195
4 „ „	10	24 „ „	38	1 „ „	109	4 „ „	197
5 „ „	11	1 „ „	40	3 „ „	111	No. E6 Electric Motor	
23 „ „	12	1 „ „	43	8 „ „	111c		
6 „ „	12a	1 „ „	45	2 „ „	115		
1 „ „	12c	1 „ „	46	1 „ „	116		
2 „ „	15	2 „ „	48	1 „ „	116a		
3 „ „	15a	6 „ „	48a	4 „ „	125		
4 „ „	16	5 „ „	48b	3 „ „	126		
4 „ „	17	1 „ „	53	4 „ „	126a		
3 „ „	18a						
2 „ „	19b						
1 „ „	20						
4 „ „	20a						
4 „ „	20b						
4 „ „	22						
3 „ „	23						

Fig. G63a



Commence the model by building the main frames shown in Fig. 63d. Each of these consists of two 12½″ Angle Girders, overlapping eighteen holes, to which is secured a 2½″ × 2½″ Flexible Plate and a 5½″ × 2½″ Strip Plate. The two complete side members are coupled together as illustrated by three 2½″ × ½″ Double Angle Strips the undersides of which form supports for two 12½″ Strips. These Strips carry the Electric Motor. The front ends of the Strip Plates, already mentioned, are attached to the 12½″ Strips by Angle Brackets and strengthened by vertical 2½″ Strips that support the rear axle carrying 3″ Pulleys for road wheels. The axle is prevented from moving laterally by means of two ¾″ Flanged Wheels and carries a 2″ Sprocket Wheel. This Sprocket is connected by a short length of Sprocket Chain, to a ¾″ Sprocket Wheel secured on a short Rod journalled in the side plates of the Motor and driven from the armature shaft through a gear train, Fig. G63c, consisting of a Worm, two ½″ Pinions and a 1½″ Contrate Wheel.

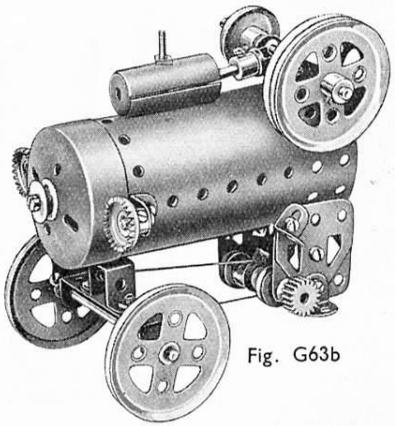


Fig. G63b

The firebox, Fig. G63b, in which the steering rod is journalled, is built up from four Flat Trunnions and the inner end of the Boiler is secured to this by a 1½″ × ½″ Double Angle Strip. The Boiler is also held in place by a Rod passed through its end centre horizontal holes and also through the main frames as shown. The Boiler, near its fore-end, is secured to the main frames by ¾″ Bolts as shown in the general view of the model.

The visible side of the engine consists of a vertically disposed 2½″ Flat Girder to which is bolted a horizontal 1½″ Strip and 2½″ Strip, both of which are held to the Flat Girder by two 1″ × 1″ Angle Brackets. The opposite side of the engine is arranged similarly with the exception that two 2½″ Strips are used. The inner Strip of this pair carries a Sleeve Piece fitted with two ¾″ Flanged Wheels as shown. Immediately to the rear of the Flat Girder is fitted a Channel Bearing forming one side of the cab.

The cylinder is represented by a Sleeve Piece carried at its forward end on a Chimney Adaptor that is bolted to the base of the chimney. The chimney is built up from four 3½″ Strips bolted round four

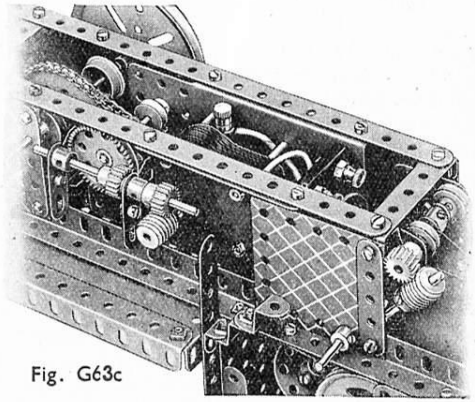


Fig. G63c

Double Brackets. A Collar is fitted inside by two Bolts, three holes from the top, and this supports a short Rod bearing at its upper end a 1″ Fast Pulley.

The crank-shaft is represented by a 3½″ Rod mounted in a Double Bracket that is bolted to the top of the boiler, Washers being used for spacing purposes. The connecting rod merely rests in the cylinder and is connected to the crank-shaft by a Small Fork Piece. The flywheel consists of two 2″ Pulleys and the opposite end of the crank-shaft is fitted with a 1″ fast Pulley.

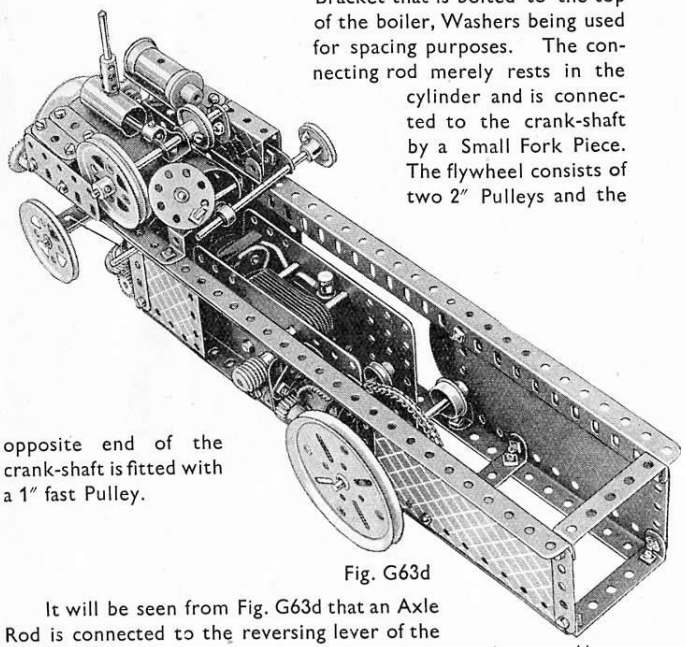


Fig. G63d

It will be seen from Fig. G63d that an Axle Rod is connected to the reversing lever of the Electric Motor by means of a Bolt that is screwed into the tapped bore of a Collar on the Rod. The Rod is free to slide in a Flat Bracket bolted to the frame side and carries a 1″ Pulley on its outer end. This arrangement facilitates control of the Motor when the model is assembled.

The lower end of the steering column carries a worm engaging a ½″ Pinion that is carried on a 2″ Rod journalled in the Flat Trunnions of the fire box. A Coupling is fixed between two ½″ loose Pulleys on the Rod as shown in Fig. G63b, and cord wound several times round the Coupling is attached to the 2½″ × ½″ Double Angle Strip carrying the front axle. As the Coupling is turned, the cord is wound in at one end and paid out at the other, thus steering the axle.

An underneath view of the trailer is shown in Fig. G63a. The frame carrying the front wheels is free to swivel about a 1½″ Axle Rod carried in a Face Plate that is bolted to the underside of the platform body. The Rod passes through a Boiler End the rim of which rests on the Face Plate. The brake drum on the rear axle is formed by a 1⅛″ Flanged Wheel and Bush Wheel, and a length of Chain passed round the drum can be tightened by operating a handwheel on a Screwed Rod.

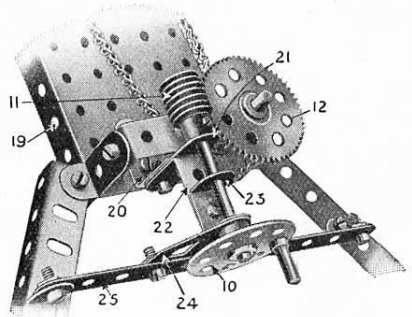


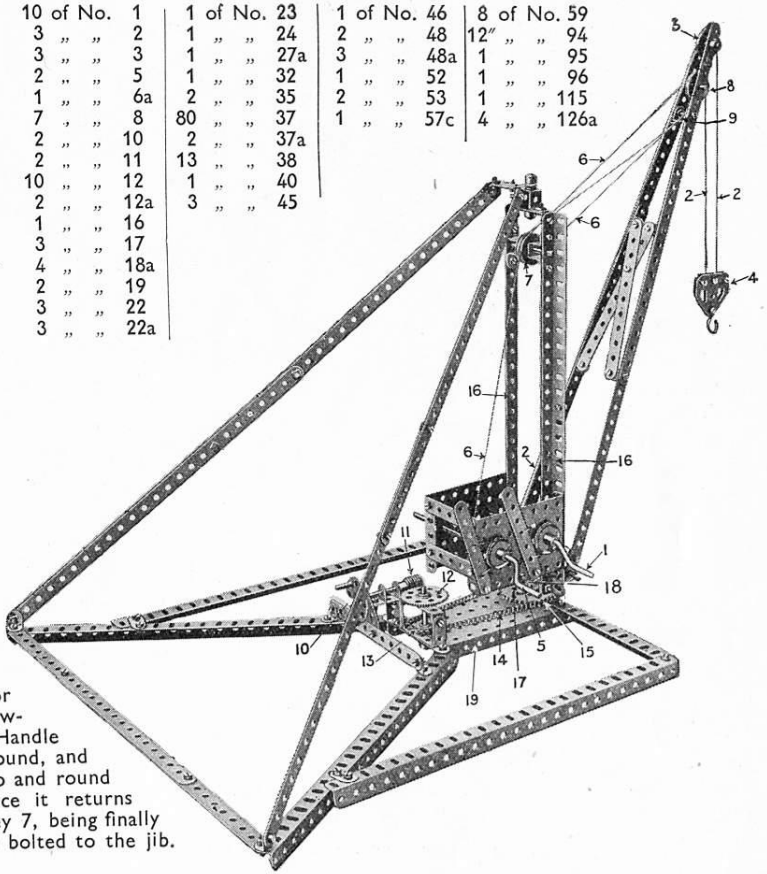
Fig. G64a

G64. Swivelling and Luffing Jib Crane

Parts required

10 of No.	1	1 of No.	23	1 of No.	46	8 of No.	59
3 „ „	2	1 „ „	24	2 „ „	48	12″ „ „	94
3 „ „	3	1 „ „	27a	3 „ „	48a	1 „ „ „	95
2 „ „	5	1 „ „	32	1 „ „	52	1 „ „ „	96
1 „ „	6a	2 „ „	35	2 „ „	53	1 „ „ „	115
7 „ „	8	80 „ „	37	1 „ „	57c	4 „ „ „	126a
2 „ „	10	2 „ „	37a				
2 „ „	11	13 „ „	38				
10 „ „	12	1 „ „	40				
2 „ „	12a	3 „ „	45				
1 „ „	16						
3 „ „	17						
4 „ „	18a						
2 „ „	19						
3 „ „	22						
3 „ „	22a						

In this model three separate actions are provided, for raising the load, raising the jib, and swivelling the jib. The load is raised by means of a Crank Handle 1 on which the Cord 2 is wound and passed over the 1″ Pulley 3, thence round the ½″ Pulley in the block 4 (spacing Washers being used to give clearance to the ½″ Pulley), the end of the Cord 2 being made fast to the top of the jib. By turning the Handle 1 the load is raised or lowered. The jib itself is raised or lowered by the operation of the Crank Handle 5 on the rod of which a cord is wound, and passed over one of two Pulleys 7, to and round another 1″ Pulley 8 in the jib, whence it returns to and passes round the other Pulley 7, being finally made fast to the Double Bracket 9 bolted to the jib.



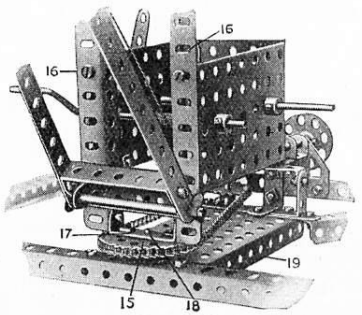
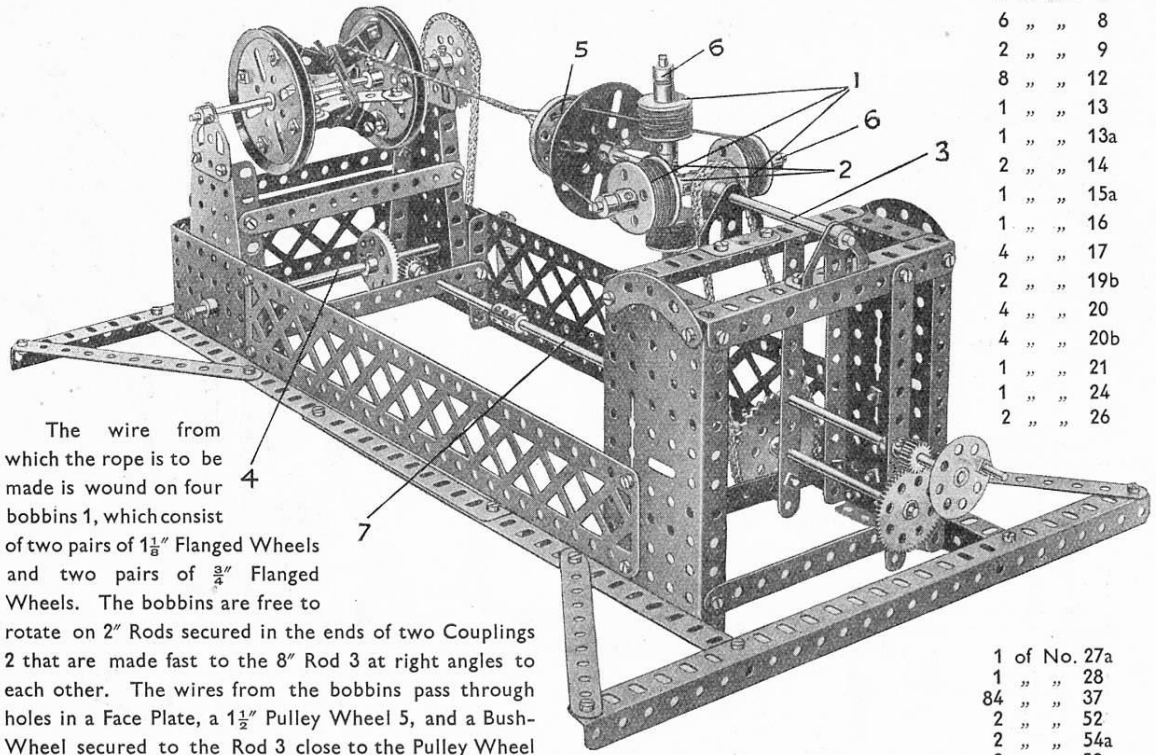


Fig. G64b

As the Handle 5 is turned the Cord 6 is wound in or paid out and the angle of the jib varied. The jib is swivelled by the hand wheel 10, a Worm 11 engaging a 57-toothed Gear 12 on the rod of which a 1″ Sprocket Wheel 13 is mounted. A Sprocket Chain 14 passes round this Wheel 13 and round a 2″ Sprocket Wheel 15 secured to the standard 16 of the crane. The bearing for the Rod of the Worm 11 is made by bolting a 1″ × 1″ Angle Bracket 20 (Fig. G64a) to the 5½″ × 2½″ Flanged Plate 19, and to the Angle Bracket 20 is secured a 1½″ Strip 21 and another 1″ × 1″ Bracket 22. To the Bracket 22 is bolted a Double Bracket 23. A Flat Trunnion 24 is bolted to the 5½″ Strip 25 and forms with the Bracket 23 the front bearing for the Rod. The standard is built up of two 12½″ Girders 16 which are connected at the base by a 1½″ Double Angle Strip 17 (Fig. G63b) which is bolted to the 2″ Sprocket Wheel 15. The 1″ Rod 18 is secured in the boss of the Sprocket Wheel 15 and fitted with a Collar below the 5½ × 2½″ Flanged Plate 19.

At the upper end the two sides of the standard are held together by a second 1½″ × ½″ Double Angle Strip that carries a Double Bent Strip. A 1½″ Rod, journalled in the Double Angle Strip and Double Bent Strip forms the top pivot of the standard, the Rod being linked up to the rear bracing members by means of a Flat Trunnion.

G65. Wire Rope Making Machine



The wire from which the rope is to be made is wound on four bobbins 1, which consist of two pairs of $1\frac{1}{8}$″ Flanged Wheels and two pairs of $\frac{3}{4}$″ Flanged Wheels. The bobbins are free to rotate on 2″ Rods secured in the ends of two Couplings 2 that are made fast to the 8″ Rod 3 at right angles to each other. The wires from the bobbins pass through holes in a Face Plate, a $1\frac{1}{2}$″ Pulley Wheel 5, and a Bush-Wheel secured to the Rod 3 close to the Pulley Wheel 5, and are tied together on a drum at the opposite end of the machine. The drum is mounted on a $6\frac{1}{2}$″ Rod that is connected by Sprocket Chain to a 1″ Sprocket Wheel on the Rod 4, which is revolved slowly from the hand wheel through the gearing shown.

The Rod 3, together with the bobbins, Face Plate, Pulley Wheel 5, and the Bush Wheel, are rotated from the main driving shaft 7 by means of 2″ and 1″ Sprocket Wheels. The wires are thus twisted together between the Pulley Wheel 5 and the drum, and are wound on the latter in the form of a cable. In order to prevent the wire from unwinding too rapidly, Washers are placed on the 2″ Rods between the Couplings and the bosses of the Flanged Wheels 1, and the Collars 6 are pressed hard against the wheels before being secured to the 2″ Rods.

A considerable amount of tension is essential for the production of good wire rope, and for this reason the $1\frac{1}{2}$″ Pulley Wheel 5 and the Bush Wheel behind it are secured close together on the Rod 3 in such a manner that the friction generated by the wires in passing through the holes in the wheels keeps the cable taut while it is being twisted.

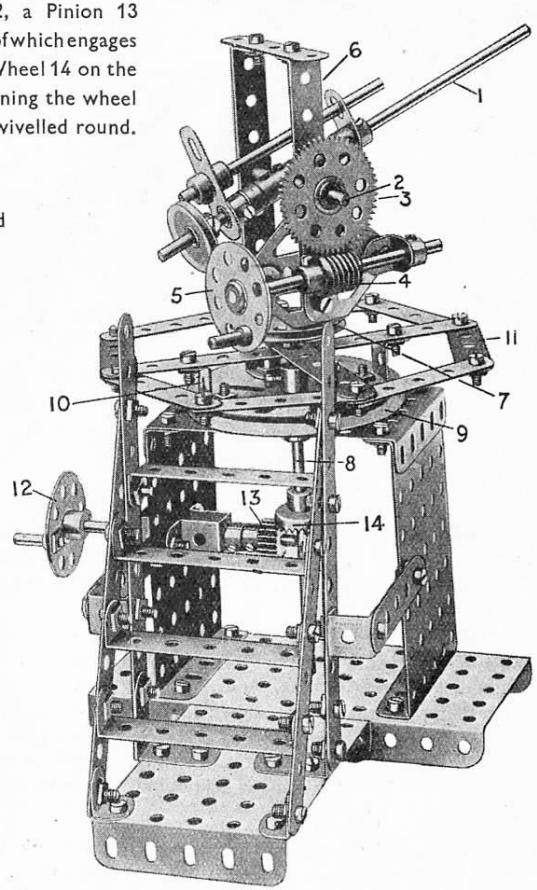
Parts required

11	of No.	2
6	„ „	8
2	„ „	9
8	„ „	12
1	„ „	13
1	„ „	13a
2	„ „	14
1	„ „	15a
1	„ „	16
4	„ „	17
2	„ „	19b
4	„ „	20
4	„ „	20b
1	„ „	21
1	„ „	24
2	„ „	26
1	of No.	27a
1	„ „	28
84	„ „	37
2	„ „	52
2	„ „	54a
8	„ „	59
3	„ „	63
2	„ „	90
4	„ „	90a
15″	„ „	94
2	„ „	95
2	„ „	96
1	„ „	109
1	„ „	115
2	„ „	126
2	„ „	126a
1	„ „	195
2	„ „	197

The Braced Girders shown in the illustrations should be replaced by Strip Plates of corresponding lengths.

G66. Anti-Aircraft Gun

The gun represented by the Rod 1 is pivoted upon a transverse Rod 2 which passes through a Coupling on the Rod 1. A 57-teeth gear 3 on the pivot Rod 2 is engaged by a Worm 4 operated from the hand wheel 5. By turning this wheel 5 the gun is lifted or lowered. The two vertical Strips forming the framework for the pivot Rod 2 are bolted to a $1\frac{1}{2}$″ Pulley 7 which is secured on a vertical Rod 8. A 3″ Pulley Wheel 9 is also bolted to a Rod 8 and from the Pulley Wheel is carried by reversed Angle Brackets 10 a framework 11. The Rod 8 with the framework is rotated from the hand wheel 12, a Pinion 13 on the spindle of which engages a $\frac{3}{4}$″ Contrate Wheel 14 on the Rod 8. By turning the wheel 12 the gun is swivelled round.



Parts required

6	of No.	2
11	„ „	5
1	„ „	10
2	„ „	11
4	„ „	12
2	„ „	12a
1	„ „	15
1	„ „	15a
4	„ „	16
1	„ „	17
1	„ „	19b
1	„ „	21
2	„ „	22
2	„ „	24
1	„ „	26
1	„ „	27a
1	„ „	29
1	„ „	32
64	„ „	37
12	„ „	38
2	„ „	45
4	„ „	48a
2	„ „	48b
1	„ „	52
4	„ „	53
8	„ „	59
1	„ „	62
2	„ „	63
2	„ „	115
4	„ „	125
2	„ „	126a

HOW TO CONTINUE

This completes our examples of models that may be made with MECCANO Outfit G (or F and Fa). The next models are a little more advanced, requiring extra parts to construct them. The necessary parts are all contained in a Ga Accessory Outfit, the price of which may be obtained from any Meccano dealer.

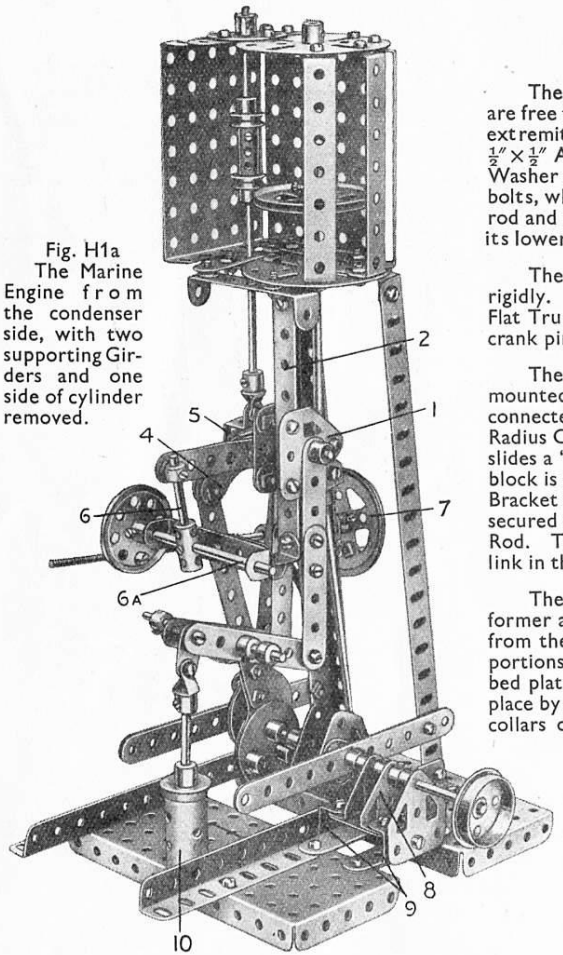


Fig. H1a The Marine Engine from the condenser side, with two supporting Girders and one side of cylinder removed.

H1. Vertical Marine Engine

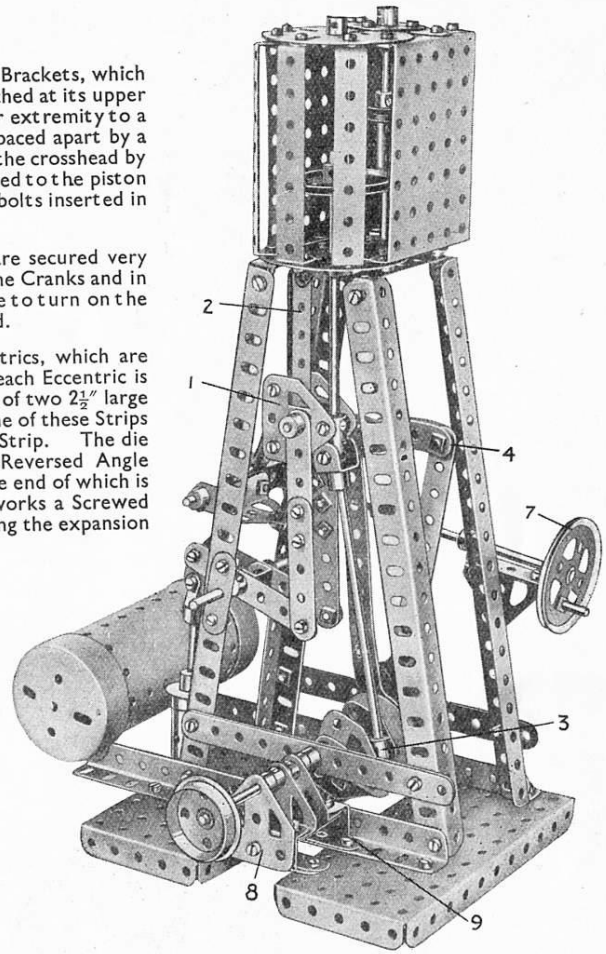
The crosshead 1 consists of two Flat Trunnions secured together by two Double Brackets, which are free to slide between 4½" Strips 2 forming the crosshead guide. The latter is attached at its upper extremity to a ½" × ½" Angle Bracket on the bottom cylinder cover, and at its lower extremity to a ½" × ½" Angle Bracket that is mounted on a Trunnion. The Strips of the guide are spaced apart by a Washer on each of the retaining bolts. A Coupling is secured rigidly to the apex of the crosshead by bolts, which are inserted in its upper transverse tapped bore. This Coupling is secured to the piston rod and is attached pivotally to the connecting rod by a Fork Piece that rides on two bolts inserted in its lower transverse tapped bore.

The crankshaft is built up from two Rods on the inner ends of which Cranks are secured very rigidly. The crank pin is a ¾" Bolt, which is fixed rigidly by nuts in the end holes of the Cranks and in Flat Trunnions that form the balance weights. The " big end " (a Coupling 3) is free to turn on the crank pin between the Cranks, and is attached to the lower end of the connecting rod.

The model is fitted with Stephenson's valve gear. This comprises two Eccentrics, which are mounted upon the crankshaft in such a manner that their throws are opposite, and each Eccentric is connected by a 4½" Strip, to one end of an " expansion link " 4. The latter consists of two 2½" large Radius Curved Strips, bolted together at each end by a ⅜" Bolt and three nuts. On one of these Strips slides a " die block " 5 and the other is connected pivotally to a crank arm 6 by a 2½" Strip. The die block is an Eye Piece, which is attached to the lower end of the valve spindle by a ½" Reversed Angle Bracket and an End Bearing. The crank 6 is mounted on the " weigh shaft " 6a, to one end of which is secured a 1½" Pulley carrying a " spider " (taken from a Swivel Bearing) in which works a Screwed Rod. The latter is rotated by turning the Wheel 7, so actuating the crank 6 and moving the expansion link in the die block.

The " thrust block " 8 consists of two Trunnions and one Flat Trunnion. The two former are bolted down to four Double Brackets 9, Washers spacing each Trunnion from the Double Brackets, whilst 1½" Strips keep the Trunnions apart. The lower portions of the Double Brackets are clamped between pairs of 2½" Strips bolted to the bed plate to keep the thrust block in position, whilst the Flat Trunnion is secured in place by a ½" × ½" Angle Bracket. Collars fixed to the crankshaft represent the thrust collars of the actual device.

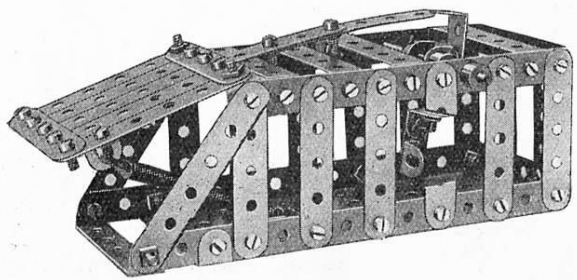
The circulating pump is represented by a Sleeve Piece 10 fitted with a ¾" Flanged Wheel, through which the pump plunger passes. The pump is retained in position by being pushed on to a Chimney Adaptor that is bolted to the base plate, and it is worked off the crosshead through a lever and links. The Boiler secured next to the pump represents the condenser.



Parts required

4 of No. 2	4 of No. 16	24 of No. 38
4 „ „ 2a	1 „ „ 16a	1 „ „ 48
1 „ „ 3	1 „ „ 17	3 „ „ 48a
2 „ „ 4	2 „ „ 18a	3 „ „ 48b
10 „ „ 5	1 „ „ 20	1 „ „ 50a
4 „ „ 6a	2 „ „ 20a	2 „ „ 52
4 „ „ 8a	1 „ „ 20b	3 „ „ 53
2 „ „ 8b	1 „ „ 21	15 „ „ 59
1 „ „ 10	1 „ „ 23	2 „ „ 62
7 „ „ 11	1 „ „ 23a	4 „ „ 63
5 „ „ 12	2 „ „ 24	1 „ „ 80a
1 „ „ 14	86 „ „ 37	2 „ „ 90
2 „ „ 15	18 „ „ 37a	2 „ „ 109

2 of No. 111
6 „ „ 111c
1 „ „ 115
1 „ „ 116
1 „ „ 125
4 „ „ 126
5 „ „ 126a
1 „ „ 162
1 „ „ 163
1 „ „ 164
1 „ „ 165
1 „ „ 166

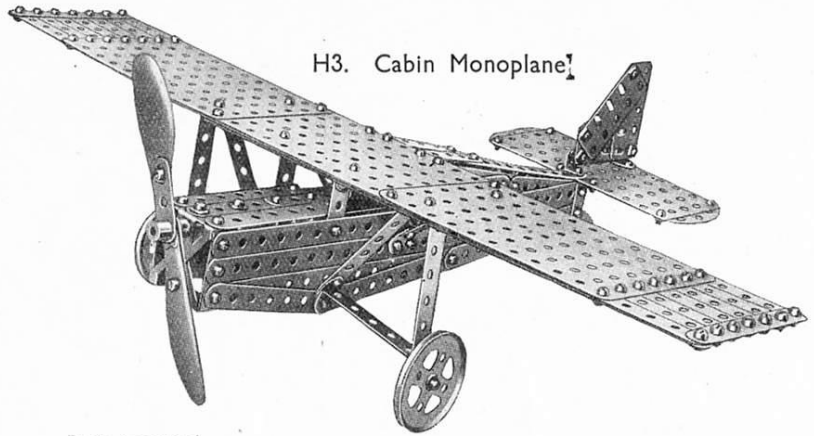


H2. Mouse Trap

Parts required

3 of No. 2	1 of No. 16
8 „ „ 4	59 „ „ 37
18 „ „ 5	5 „ „ 38
1 „ „ 10	1 „ „ 43
1 „ „ 11	1 „ „ 48
4 „ „ 12	9 „ „ 48a
	1 „ „ 52
	4 „ „ 59

H3. Cabin Monoplane



Parts required

6	of No	1
2	„ „	1b
6	„ „	2
4	„ „	2a
12	„ „	3
6	„ „	4
17	„ „	5
2	„ „	6
5	„ „	6a
6	„ „	10
2	„ „	11
11	„ „	12
2	„ „	12a
1	„ „	16a
2	„ „	20a
106	„ „	37
6	„ „	37a
8	„ „	38
2	„ „	41
1	„ „	48
2	„ „	48a
3	„ „	52a
1	of No.	59
2	„ „	62
1	„ „	70
2	„ „	90a
3	„ „	103f
2	„ „	111
2	„ „	111c
2	„ „	126

Fig. H3a is an underneath view of the model with one side removed to show the construction of the fuselage and method of securing the wings to the undercarriage.

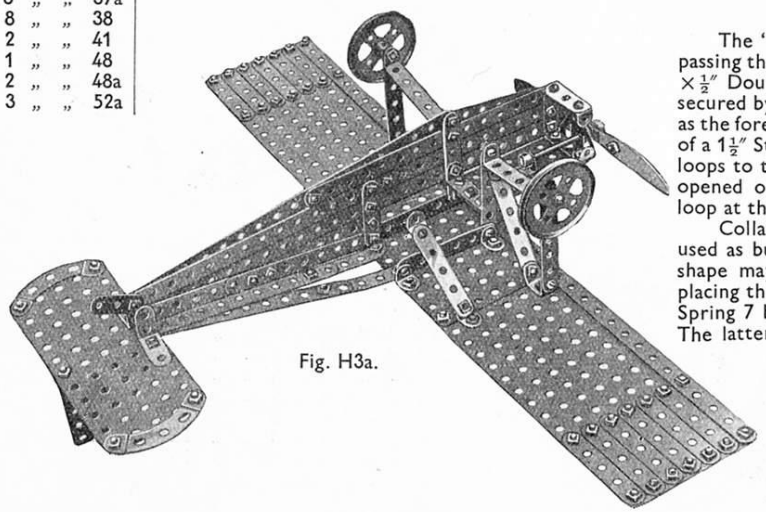


Fig. H3a.

Parts required

7	of No	1
10	„ „	2
8	„ „	3
2	„ „	4
10	„ „	5
10	„ „	8
2	„ „	10
9	„ „	12
2	„ „	14
2	„ „	15
4	„ „	15a
2	„ „	16
4	„ „	20
2	„ „	22
88	„ „	37
2	„ „	44
1	„ „	46
5	„ „	48a
1	„ „	50a
2	of No.	52
2	„ „	53
2	„ „	54a
2	„ „	57c
8	„ „	59
1	„ „	102

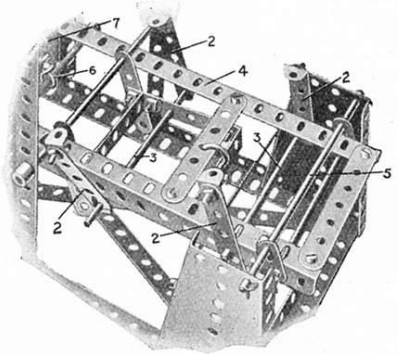
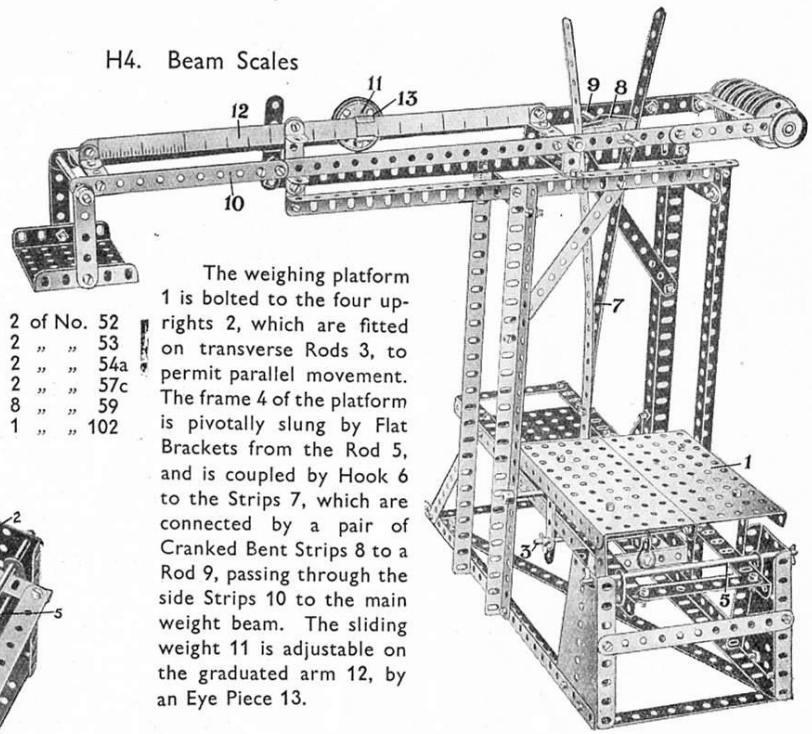


Fig. H4a

H4. Beam Scales



The weighing platform 1 is bolted to the four uprights 2, which are fitted on transverse Rods 3, to permit parallel movement. The frame 4 of the platform is pivotally slung by Flat Brackets from the Rod 5, and is coupled by Hook 6 to the Strips 7, which are connected by a pair of Cranked Bent Strips 8 to a Rod 9, passing through the side Strips 10 to the main weight beam. The sliding weight 11 is adjustable on the graduated arm 12, by an Eye Piece 13.

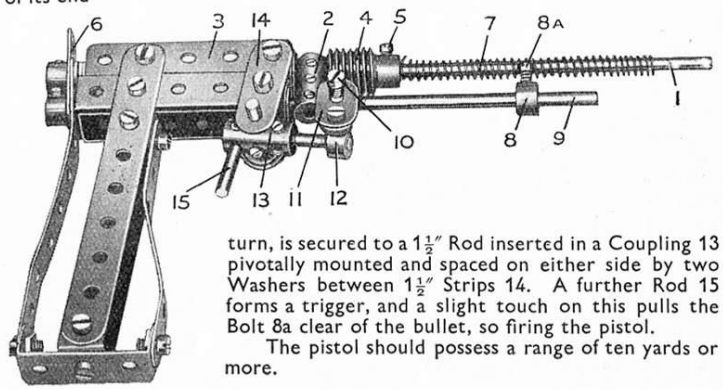
H5. Spring Pistol

Parts required

3	of No	2a
1	„ „	3
3	„ „	6a
1	„ „	10
2	„ „	11
1	„ „	13a
1	of No	14
3	„ „	18a
1	„ „	32
20	„ „	37
9	„ „	38
1	of No.	43
1	„ „	48
4	„ „	48a
5	„ „	59
2	„ „	63

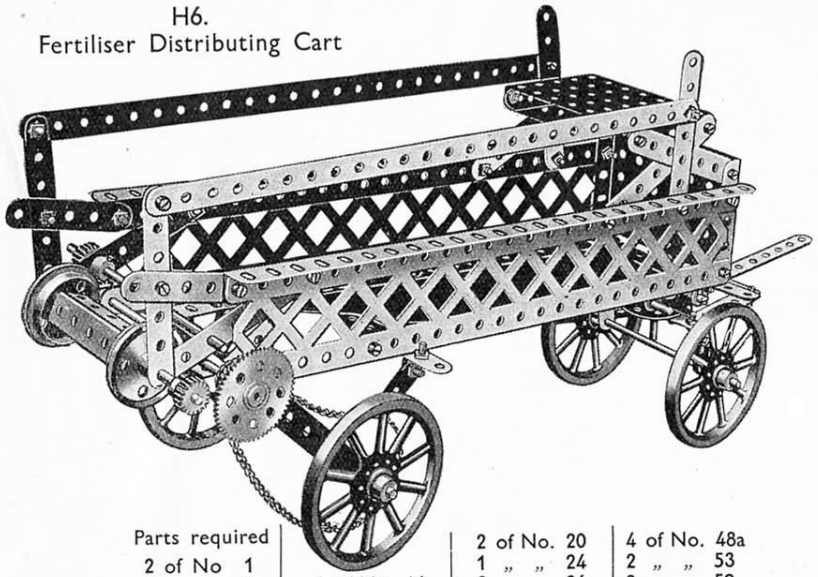
The " barrel " of the pistol consists of an 8" Axle Rod 1 passing through a Coupling 2 and through the ends of two $2\frac{1}{2}$" × $\frac{1}{2}$" Double Angle Strips 3. It carries a Worm 4, which is secured by a Bolt 5 in place of its grub-screw. This Bolt serves as the foresight, the backsight being formed by the upper hole of a $1\frac{1}{2}$" Strip 6. A Meccano Spring secured by one of its end loops to the Bolt 5, is mounted on the barrel and opened out to form a compression spring. The loop at the other end should be cut away.

Collars, with Set Screws extracted, may be used as bullets, or small pieces of wood of similar shape may be employed. The gun is loaded by placing the bullet upon the barrel, and pushing the Spring 7 back until the bullet passes the Collar 8. The latter is rigidly secured by means of a 5/32" Bolt 8a to a $6\frac{1}{2}$" Rod 9, which is free to turn slightly in its bearings. The Bolt 8a is pushed in front of the bullet, so preventing the Spring 7 from expelling it from the barrel. Another Collar and Bolt 10 is secured to the Rod 9 and coupled by means of a Flat Bracket 11 to a Bolt mounted in a Collar 12. This in turn, is secured to a $1\frac{1}{2}$" Rod inserted in a Coupling 13 pivotally mounted and spaced on either side by two Washers between $1\frac{1}{2}$" Strips 14. A further Rod 15 forms a trigger, and a slight touch on this pulls the Bolt 8a clear of the bullet, so firing the pistol.



The pistol should possess a range of ten yards or more.

H6. Fertiliser Distributing Cart



Parts required							
2 of No	1	1 of No.	14	2 of No.	20	4 of No.	48a
3 „ „	2	3 „ „	15	1 „ „	24	2 „ „	53
10 „ „	3	2 „ „	15a	3 „ „	26	8 „ „	59
9 „ „	5	2 „ „	17	1 „ „	27a	9" „ „	94
4 „ „	8	4 „ „	19a	4 „ „	35	1 „ „	95
6 „ „	12			57 „ „	37	1 „ „	96
				1 „ „	46	2 „ „	197

The Braced Girders shown in the illustration should be replaced by Strip Plates of corresponding length.

H7. Field Gun and Carriage

Parts required		3 of No.	11	1 of No.	20	3 of No.	48a	1 of No.	115
4 of No	2	14 „ „	12	1 „ „	21	2 „ „	48b	2 „ „	125
2 „ „	3	2 „ „	15	1 „ „	22	2 „ „	53	2 „ „	126a
2 „ „	4	1 „ „	15a	1 „ „	24	3 „ „	59		
6 „ „	5	1 „ „	16	1 „ „	32	1 „ „	62		
2 „ „	6a	1 „ „	18a	62 „ „	37	1 „ „	63		
3 „ „	10	4 „ „	19a	2 „ „	38	2 „ „	90		

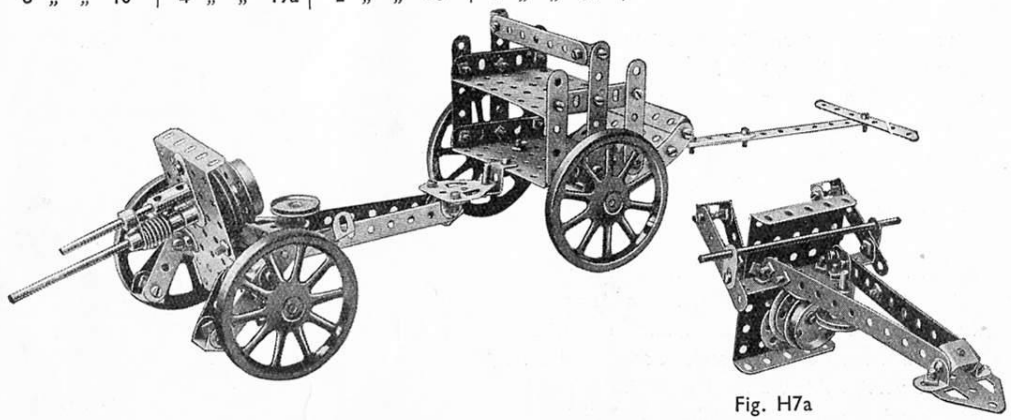
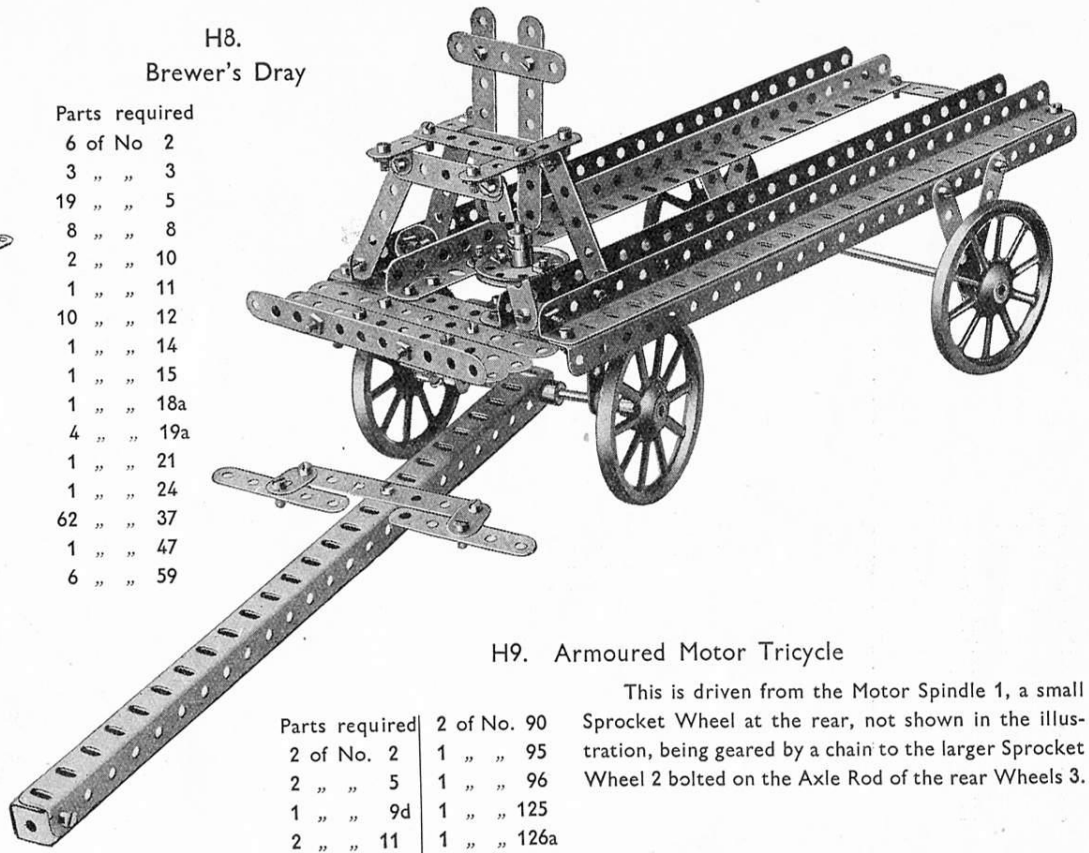


Fig. H7a

H8. Brewer's Dray

Parts required	
6 of No	2
3 „ „	3
19 „ „	5
8 „ „	8
2 „ „	10
1 „ „	11
10 „ „	12
1 „ „	14
1 „ „	15
1 „ „	18a
4 „ „	19a
1 „ „	21
1 „ „	24
62 „ „	37
1 „ „	47
6 „ „	59

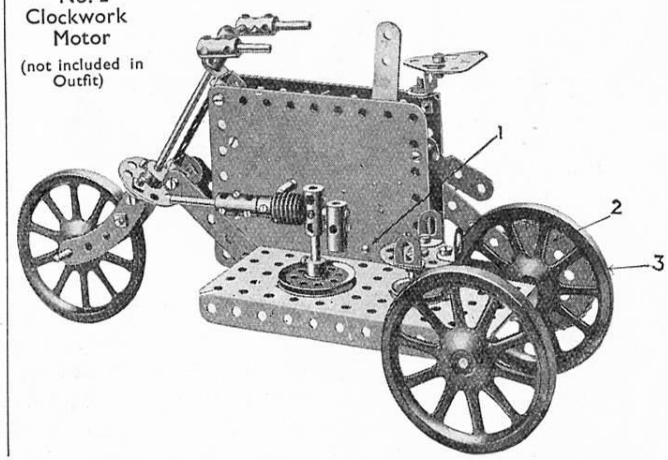


H9. Armoured Motor Tricycle

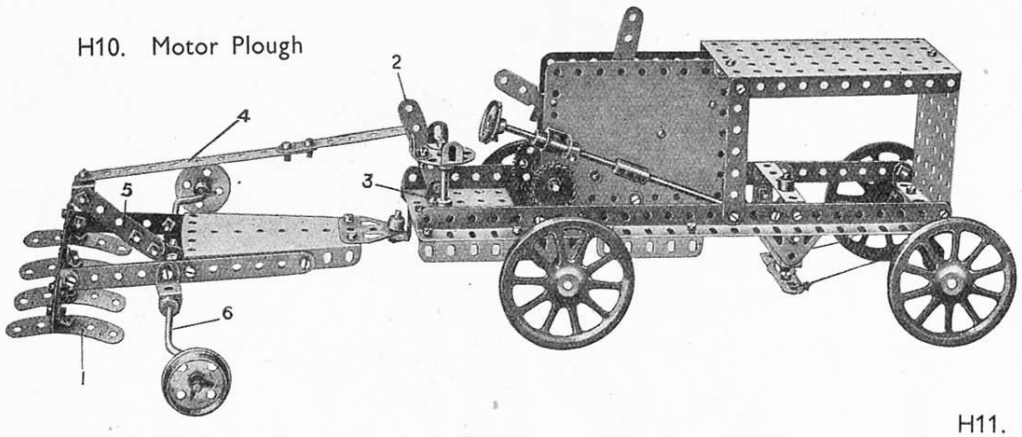
This is driven from the Motor Spindle 1, a small Sprocket Wheel at the rear, not shown in the illustration, being geared by a chain to the larger Sprocket Wheel 2 bolted on the Axle Rod of the rear Wheels 3.

Parts required		2 of No.	90
2 of No.	2	1 „ „	95
2 „ „	5	1 „ „	96
1 „ „	9d	1 „ „	125
2 „ „	11	1 „ „	126a
4 „ „	12		
2 „ „	12a		
1 „ „	15a		
2 „ „	16		
2 „ „	17		
4 „ „	18a		
3 „ „	19a		
1 „ „	21		
3 „ „	22		
2 „ „	24		
1 „ „	32		
22 „ „	37		
10 „ „	38		
1 „ „	48a		
1 „ „	52		
1 „ „	59		
6 „ „	63		

No. 2 Clockwork Motor (not included in Outfit)



H10. Motor Plough



The ploughshares 1 are raised or lowered by the handle 2 pivoted to an Angle Bracket on the far side of the seat pillar, and connected by Strips 4 to a Crank 5 secured on the bent axle 6 of the wheels formed by Crank Handles. The plough is driven by a Meccano Clockwork Motor.

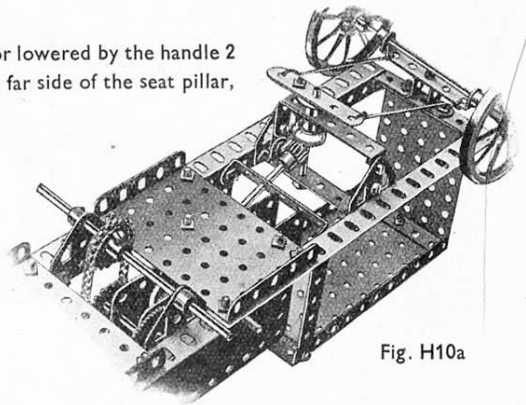
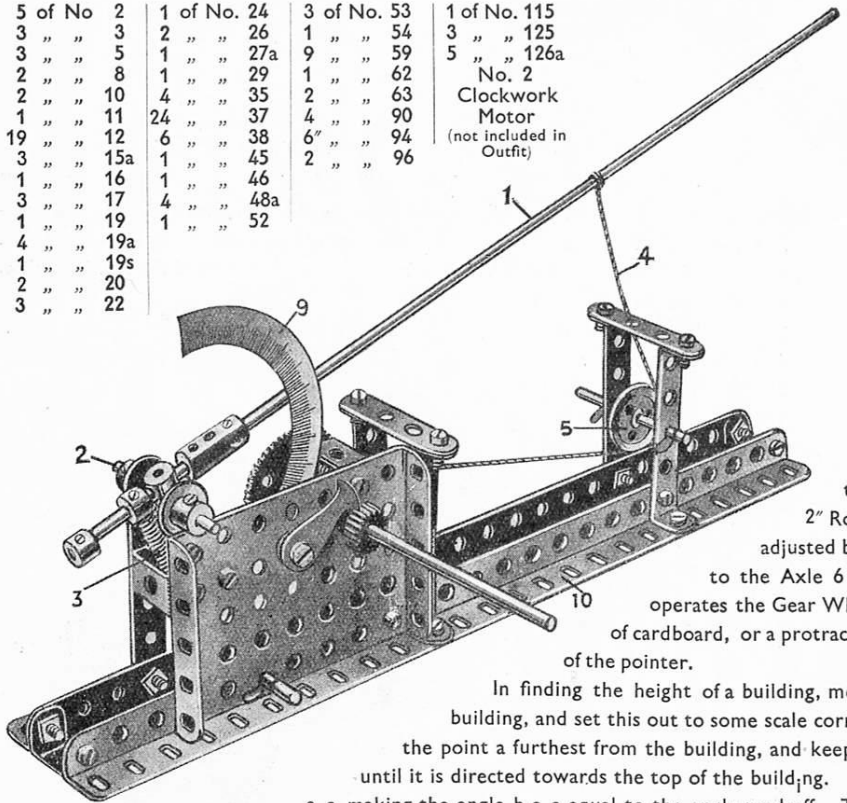


Fig. H10a

Parts required

5 of No	2	1 of No.	24	3 of No.	53	1 of No.	115
3 „ „	3	2 „ „	26	1 „ „	54	3 „ „	125
3 „ „	5	1 „ „	27a	9 „ „	59	5 „ „	126a
2 „ „	8	1 „ „	29	1 „ „	62	No. 2 Clockwork Motor (not included in Outfit)	
2 „ „	10	4 „ „	35	2 „ „	63		
1 „ „	11	24 „ „	37	4 „ „	90		
19 „ „	12	6 „ „	38	6″ „ „	94		
3 „ „	15a	1 „ „	45	2 „ „	96		
1 „ „	16	1 „ „	46				
3 „ „	17	4 „ „	48a				
1 „ „	19	1 „ „	52				
4 „ „	19a						
1 „ „	19s						
2 „ „	20						
3 „ „	22						

H11. Sighting Apparatus



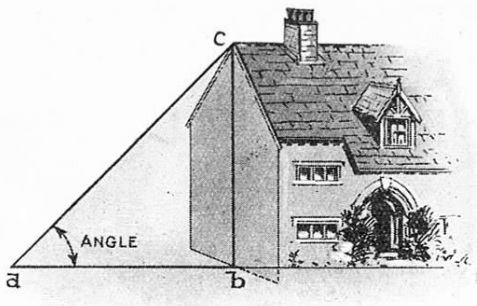


Fig. H11a

Parts required

1 of No.	5	24 of No.	37		
2 „ „	6	1 „ „	40		
2 „ „	8	1 „ „	43		
4 „ „	11	5 „ „	48a		
1 „ „	13	1 „ „	53		
4 „ „	17	3 „ „	59		
1 „ „	19	2 „ „	62		
1 „ „	22	2 „ „	63		
1 „ „	26	1 „ „	147a		
1 „ „	27a	1 „ „	147b		
2 „ „	35	1 „ „	148		

This model is for determining the heights o buildings, towers, etc. The pointer, 11½″ Rod 1, is pivoted on the 2″ Rod 2 and controlled by a Spring 3, the pointer 1 being adjusted by the cord 4 which passes round a guide Pulley 5 and on to the Axle 6 upon which it is wound by the Crank Handle 7 which operates the Gear Wheel and Pinion 8. A graduated scale of degrees 9 made of cardboard, or a protractor, is mounted in order to read off the angle of inclination of the pointer.

In finding the height of a building, measure out a number of feet or yards from the foot of the building, and set this out to some scale corresponding to the line a b (Fig. H11a). Then standing at the point a furthest from the building, and keeping the Angle Girders 10 horizontal, move the pointer 1 until it is directed towards the top of the building. Then read off the angle on the scale 9, and draw a line a c, making the angle b a c equal to the angle read off. Then draw a vertical line b c from the point b, and with the same scale used for setting off the distance a b measure the height b c, which will be the height of the building.

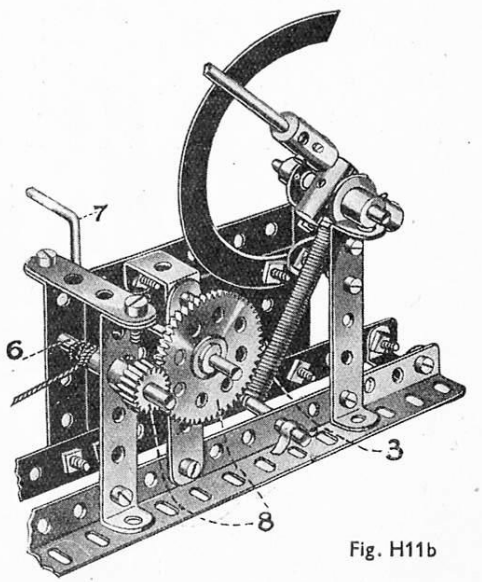
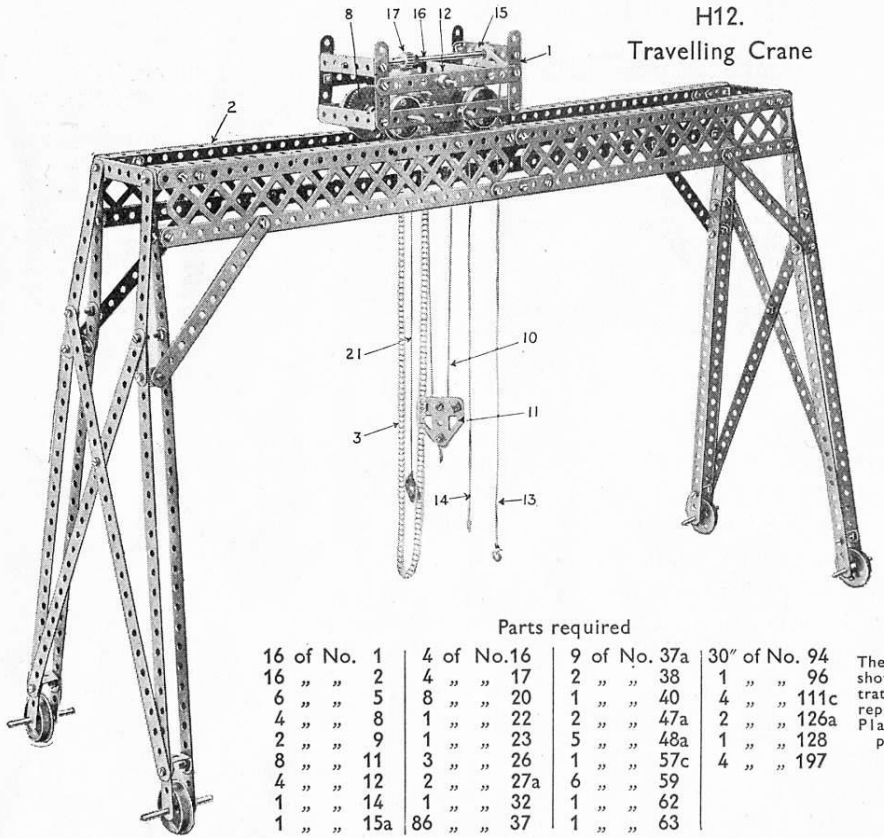


Fig. H11b

H12. Travelling Crane



Parts required

16 of No.	1	4 of No.	16	9 of No.	37a	30″ of No.	94
16 „ „	2	4 „ „	17	2 „ „	38	1 „ „	96
6 „ „	5	8 „ „	20	1 „ „	40	4 „ „	111c
4 „ „	8	1 „ „	22	2 „ „	47a	2 „ „	126a
2 „ „	9	1 „ „	23	5 „ „	48a	1 „ „	128
8 „ „	11	3 „ „	26	1 „ „	57c	4 „ „	197
4 „ „	12	2 „ „	27a	6 „ „	59		
1 „ „	14	1 „ „	32	1 „ „	62		
1 „ „	15a	86 „ „	37	1 „ „	63		

The Braced Girders shown in the illustration should be replaced by Strip Plates of corresponding length.

The carriage 1 is caused to travel on the rails 2 in either direction by the Sprocket Chain 3, which passes over a 1″ Sprocket Wheel 4 on the spindle 4a on which are two Pinions 5 and 6 for engagement respectively with 57-teeth Gears 7 and 8. The Gear Wheel 7 is secured on an Axle Rod 9, upon which is coiled the winding Cord 10 passing round a ½″ Pulley in the block 11, and being made fast to the Strip 12. The other Gear Wheel 8 is secured on the axle 9a of the travelling wheels. The Pinions 5 and 6 are caused to engage respectively with the Gear Wheels 7 and 8 by sliding the Pinion Axle 4a in the carriage frame 1. This is effected by means of two Cords 13 and 14 connected to a Boss Bell Crank 15 on a Rod 16, a Pinion 17 which engages a Worm 18 in the manner of a rack. This Worm is secured to a Rod 19, which is connected by means of the Crank 20 to the Rod 4a. The latter revolves freely in the Crank 20, being held in position by a Collar on each side of the Crank. Consequently, by pulling on one or other of the Cords 13, 14, the Bell Crank is moved and the Pinions caused to engage with one or other of the Gear Wheels 7 or 8. When engaging the Gear Wheel 7 the load may be raised or lowered by pulling the Sprocket Chain 3, but when the Pinion 6 engages the Gear Wheel 8, the carriage travels on the rails. The Cord 21 passes round a Pulley 22 on the winning Axle and acts as a brake.

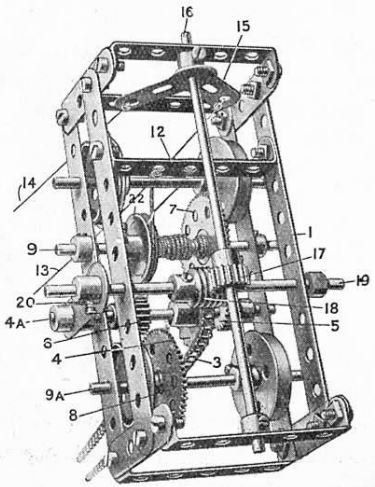
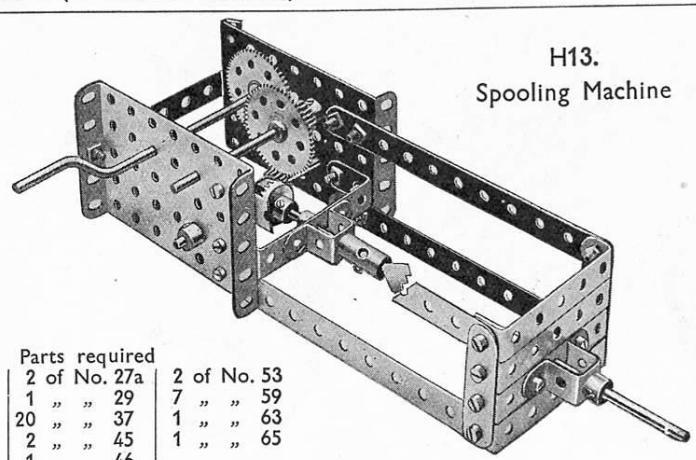


Fig. H12a

H13. Spooling Machine



Parts required

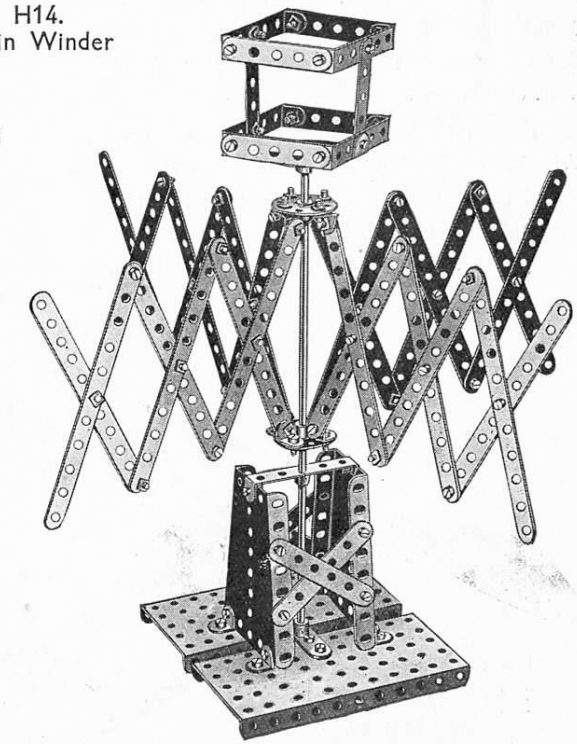
4 of No.	2	2 of No.	27a	2 of No.	53
1 „ „	3	1 „ „	29	7 „ „	59
3 „ „	16	20 „ „	37	1 „ „	63
1 „ „	17	2 „ „	45	1 „ „	65
1 „ „	19	1 „ „	46		
2 „ „	26	4 „ „	48a		

A bobbin is fitted to the stationary Rod and is then held against the Centre Fork by a Collar. The gear train consists of two 57-teeth Gear Wheels and two ½″ Pinions, one of which engages a ¾″ Contrate Wheel on the spooling shaft.

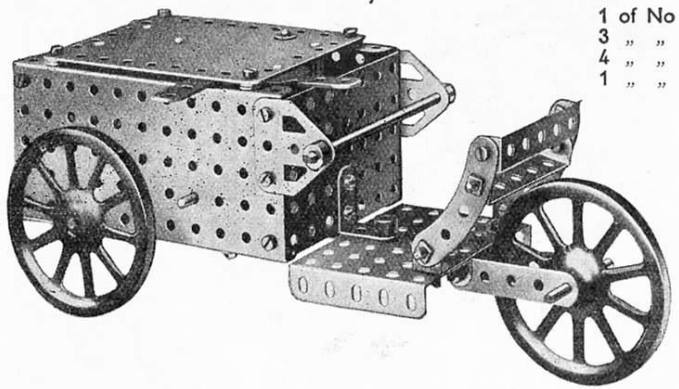
H14. Skein Winder

Parts required

24 of No.	2	2 „ „	52
4 „ „	4	2 „ „	54a
7 „ „	5	2 „ „	59
8 „ „	12		
1 „ „	13		
1 „ „	21		
2 „ „	24		
86 „ „	37		
5 „ „	48a		



H15. Delivery Van



Parts required

1 of No 3	1 of No. 15
3 „ „ 5	2 „ „ 15a
4 „ „ 12	1 „ „ 17
1 „ „ 12a	3 „ „ 19a
	1 „ „ 26
	1 „ „ 28
	31 „ „ 37
	9 „ „ 38
	2 „ „ 48a
	2 „ „ 52
	3 „ „ 53
	7 „ „ 59
	2 „ „ 90
	9″ „ „ 94
	2 „ „ 96
	1 „ „ 115
	2 „ „ 126a

No. 2 Clockwork Motor (not included in outfit)

A ½″ Pinion on the Motor driving shaft (see Fig. H15a) engages with a 1½″ Contrate Wheel that is secured to a 3½″ Rod journalled in the side plates of the model. This Rod carries a 1″ Sprocket Wheel that is connected by Sprocket Chain to a further 1″ Sprocket on the axle of the front road wheels.

The model is steered by pivoting the rear Wheel to the box body. A 1″×1″ Angle Bracket bolted to the latter is pivotally attached to the 3½″×2½″ Flanged Plate, below the seat, by a Threaded Pin and Collar. A 4½″ Axle Rod forms the handlebar.

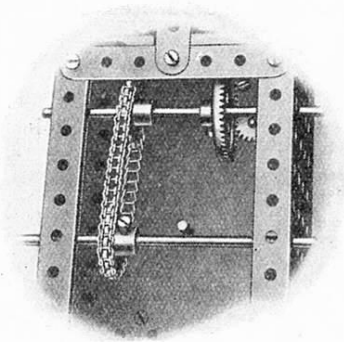
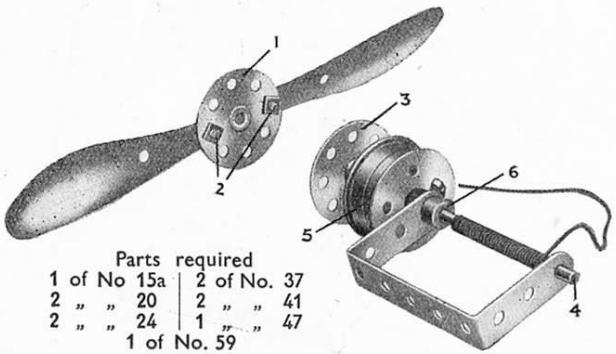


Fig. H15a

H16. Helicopter Toy



Parts required

1 of No 15a	2 of No. 37
2 „ „ 20	2 „ „ 41
2 „ „ 24	1 „ „ 47
1 of No. 59	

The Bush Wheel 3 and the two Flanged Wheels 5, which act as a flywheel, are all secured to the 4½″ Rod 4, and the latter is journalled in a 2½″×1½″ Double Angle Strip, in which it is retained by a Collar 6. The Double Angle Strip forms a convenient handle with which to hold the toy.

A piece of cord about 24″ long is wound on the Rod 4. The propeller 1 should be placed so that the shanks of the Bolts 2 lodge freely in the holes of the Bush Wheel 3. If now the free end of the cord wound on the Rod 4 is given a smart pull, the propeller will immediately leap off into the air.

H17. Measuring Machine

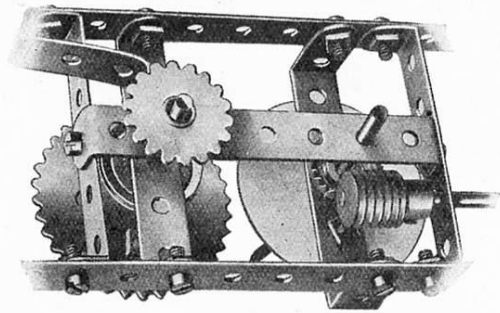


Fig. H17a

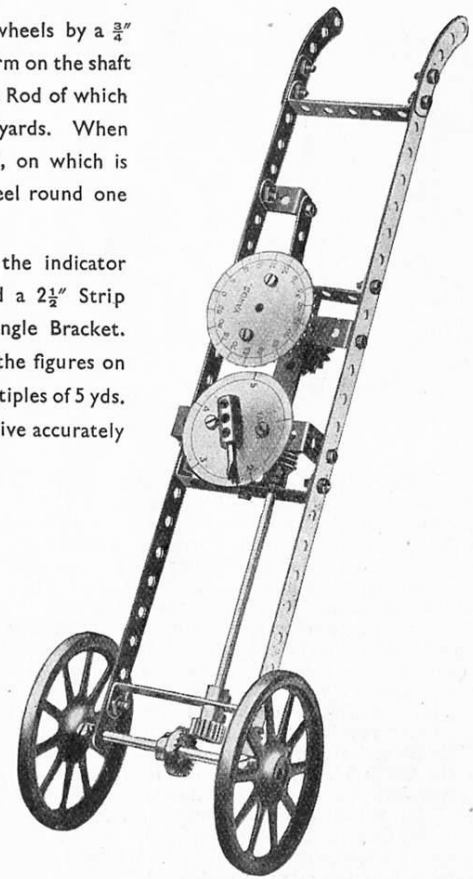
Parts required

2 of No. 1	22 of No. 37
1 „ „ 5	1 „ „ 46
1 „ „ 15	5 „ „ 48a
1 „ „ 16	1 „ „ 48b
2 „ „ 17	1 „ „ 59
2 „ „ 19a	1 „ „ 63
1 „ „ 22	1 „ „ 65
1 „ „ 26	2 „ „ 90
2 „ „ 29	1 „ „ 95
1 „ „ 32	1 „ „ 96
1 of No. 125	

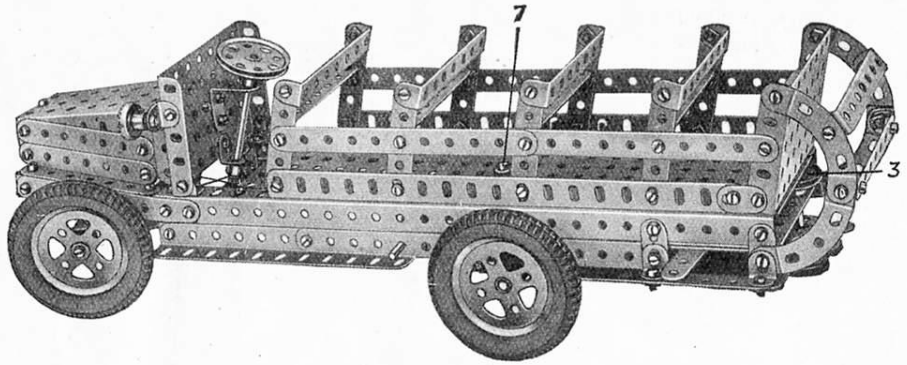
The drive is transmitted from the road wheels by a ¾″ Contrate Wheel engaging a ½″ Pinion. A Worm on the shaft of the latter engages another ½″ Pinion, on the Rod of which is fixed a pointer which indicates up to five yards. When this pointer touches the 2″ Sprocket Wheel, on which is fixed a second indicating dial, it turns the Wheel round one tooth, representing five yards.

A Ratchet is fixed at the other end of the indicator Rod. It consists of a 1″ Sprocket Wheel and a 2½″ Strip that is bolted to the frame by a ½″ Reversed Angle Bracket.

When reading off the distance traversed, the figures on the upper dial are first noted, these being in multiples of 5 yds. The reading of the lower dial is then added to give accurately the number of yards and feet.



H18.
Char-à-Banc

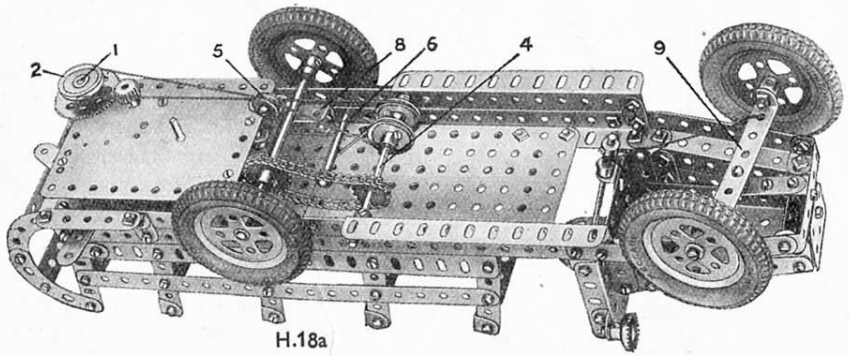


Parts required

1 of No.	1	2 of No.	12a	2 of No.	29	4 of No.	90a
1 „ „	1b	1 „ „	15	112 „ „	37	7″ „ „	94
4 „ „	2	1 „ „	15a	11 „ „	37a	1 „ „	96
2 „ „	2a	1 „ „	16	4 „ „	38	1 „ „	96a
12 „ „	3	1 „ „	16a	1 „ „	40	3 „ „	111
1 „ „	5	1 „ „	17	1 „ „	48a	3 „ „	111c
5 „ „	6a	4 „ „	20a	6 „ „	48b	4 „ „	142a
2 „ „	8	1 „ „	21	2 „ „	52a	1 „ „	160
2 „ „	8a	4 „ „	22	2 „ „	53	No. 2 Clockwork Motor (not included in Outfit)	
4 „ „	9	1 „ „	23	1 „ „	54a		
12 „ „	10	1 „ „	26	9 „ „	59		
21 „ „	12	1 „ „	27a	2 „ „	77		

The Clockwork Motor is secured to the sides of the model by means of two $5\frac{1}{2}$″ Angle Girders 8 (Fig. H18a) and the $\frac{1}{2}$″ Pinion on the Motor driving shaft engages with a 57-teeth Gear on the Rod 1. Two 1″ Pulleys 2 and 3 are secured to each extremity of this Rod and are connected by cord to the Pulleys on the Rod 4. The jockey pulley 5, over which one side of the cord passes, is mounted on the Motor side plate by a Flat Bracket and an Angle Bracket. The Rod 6, which guides the cord to and from the Pulley 3, is journalled at one end in the side of the model and at the other in a Collar secured to the floor by a Bolt 7.

Steering is accomplished by means of a cord passed about four times round the lower end of the steering column and connected to each end of the $3\frac{1}{2}$″ × $\frac{1}{2}$″ Double Angle Strip 9. This latter is pivoted at its centre hole to a $1\frac{1}{2}$″ Strip secured to the fore part of the bonnet by a 1″ × 1″ Angle Bracket.

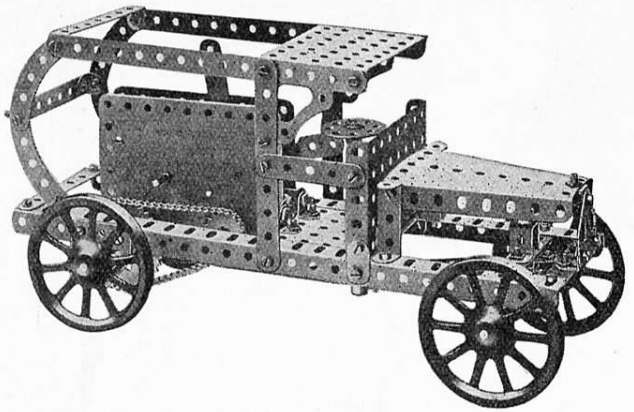


H.18a

H19.
Motor Car

Parts required

3 of No.	2	3 of No.	53
4 „ „	3	1 „ „	54a
5 „ „	5	3 „ „	59
2 „ „	8	1 „ „	62
2 „ „	10	4 „ „	90
11 „ „	12	12″ „ „	94
2 „ „	15a	1 „ „	95
1 „ „	16	1 „ „	96
1 „ „	17	1 „ „	108
4 „ „	19a	1 „ „	125
2 „ „	24	3 „ „	126a
63 „ „	37	No. 2 Clockwork Motor (not included in Outfit)	
2 „ „	38		
2 „ „	45		
2 „ „	48		
2 „ „	48b		



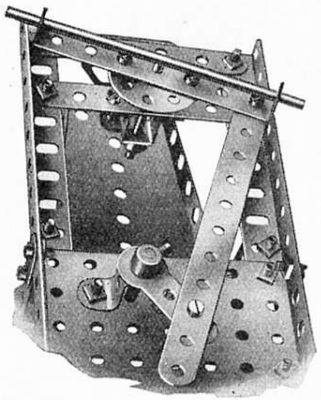


Fig. H19a

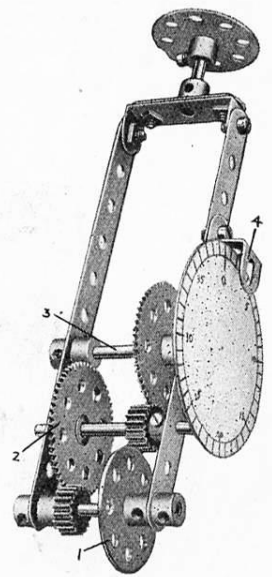
The steering wheel is mounted on a short Rod that is journalled in a $3\frac{1}{2}$″ × $2\frac{1}{2}$″ Flanged Plate and in a Double Bent Strip secured to the Plate (see Fig. H19a). The lower end of the Rod carries a Crank that is connected to the swivelling front axle by a $5\frac{1}{2}$″ Strip, which is pivoted at both ends by Bolts and Nuts (S.M.1).

A 1″ Sprocket on the driving shaft of the Clockwork Motor is connected by a length of chain to a 2″ Sprocket Wheel on the rear Axle bearings for which are formed by Flat Trunnions bolted to the Angle Girders of the chassis.

H20.
Map Measuring Instrument.

Parts required

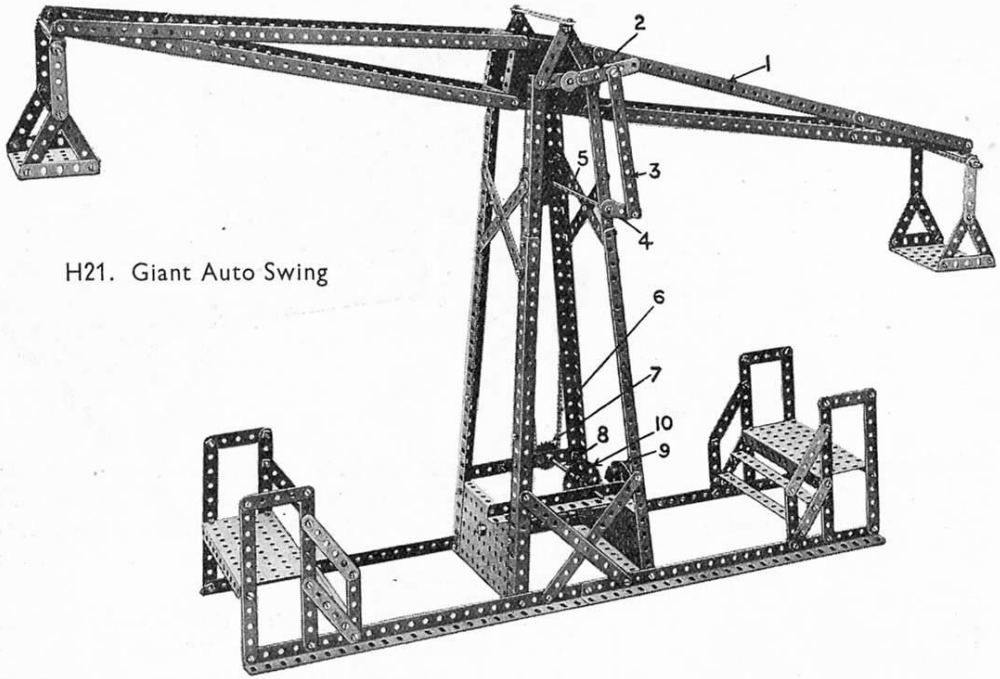
2 of No.	2	2 of No.	26	4 of No.	59
3 „ „	17	2 „ „	27a	1 „ „	62b
1 „ „	18a	5 „ „	37	1 „ „	109
2 „ „	24	1 „ „	48	1 „ „	125



By rolling this model along any desired route in a map, it is possible to obtain a very close approximation of the actual distance. The dial consists of a Face Plate on which is struck a circular disc of white cardboard, and is divided into forty equal parts representing inches, which, when compared with the scale of the map, will give the mileage. Thus, if the dial gives a reading of 10, and the scale of the map is $\frac{1}{2}$″ to the mile, the actual distance will be 20 miles.

The Bush Wheel 1 forms the " travelling wheel," and its motion is transmitted through a gear train to the dial shaft 3. Readings are taken through the hole in the Reversed Angle Bracket 4.

H21. Giant Auto Swing

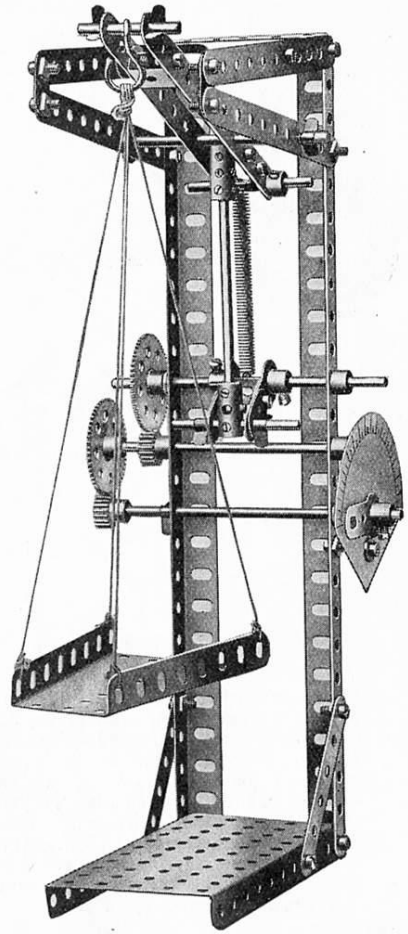


The beam 1 is rocked by means of a Crank 2 secured on the end of a Rod which forms the beam pivot and which is gripped in a Bush Wheel secured to the beam. The Crank 2 is connected by a Strip 3 to another Crank 4 on a Rod 5. On the end of this is a 2″ Sprocket Wheel driven by a Chain 6 from a 1″ Sprocket Wheel 7 on a Rod 8. This Rod is driven by means of a Worm on the Rod of the 3″ Pulley 9 which Worm engages and drives the Gear Wheel 10 on the Rod 8. As the Crank 4 continuously rotates, the link 3 causes the upper Crank 2 to oscillate and also the beam 1.

Parts required

8	of No.	1
26	„ „	2
2	„ „	3
8	„ „	4
31	„ „	5
12	„ „	8
1	„ „	9
18	„ „	12
2	„ „	14
4	„ „	15
1	„ „	19b
1	„ „	24
1	„ „	27a
1	„ „	32
165	„ „	37
2	„ „	38
2	„ „	48a
2	„ „	48b
4	„ „	48d
4	„ „	52
4	„ „	53
9	„ „	59
2	„ „	62
28	„ „	94
1	„ „	95
1	„ „	96
1	„ „	147b

H22. Spring Scales

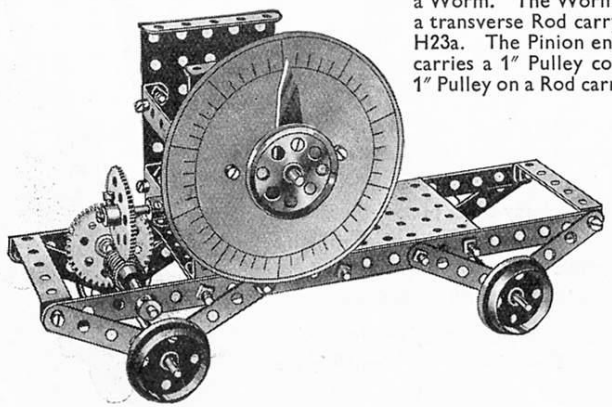


Parts required

6	of No.	2
2	„ „	4
2	„ „	8
2	„ „	10
3	„ „	11
2	„ „	15
1	„ „	15a
2	„ „	16
2	„ „	17
1	„ „	18a
2	„ „	26
2	„ „	27a
23	„ „	37
1	„ „	40
1	„ „	43
2	„ „	48a
1	„ „	52
1	„ „	54a
1	„ „	57c
2	„ „	59
2	„ „	62
2	„ „	63
1	„ „	111

The scale beam consists of two 5½″ Strips spaced apart by Double Brackets. A vertical Rod is connected pivotally to the beam by means of a ¾″ Bolt, and to a short Rod passed through the ends of two Cranks. The latter are secured to an axle which carries a 57-teeth Gear Wheel, the motion of which is led through the gear train shown to a pointer moving over a graduated scale. A Meccano Spring, attached to the Rod carrying the Cranks, is connected to the end of the beam which acts as a spring balance.

H23. Distance Indicator



The Axle of one pair of travelling Wheels carries a ½″ Pinion that engages a 57-teeth Gear Wheel on a Rod carrying a Worm. The Worm meshes with another 57-teeth Gear on a transverse Rod carrying a ½″ Pinion that can be seen in Fig. H23a. The Pinion engages a 1½″ Contrate, the Rod of which carries a 1″ Pulley connected by a Driving Band to another 1″ Pulley on a Rod carrying the pointer.

Parts required

4	of No.	2
4	„ „	3
8	„ „	5
10	„ „	12
2	„ „	15
2	„ „	15a
1	„ „	16
1	„ „	17
4	„ „	20
1	„ „	21
2	„ „	22
1	of No.	24
2	„ „	26
2	„ „	27a
1	„ „	28
1	„ „	32
38	„ „	37
2	„ „	48a
1	„ „	52
2	„ „	53
6	„ „	59
1	„ „	186

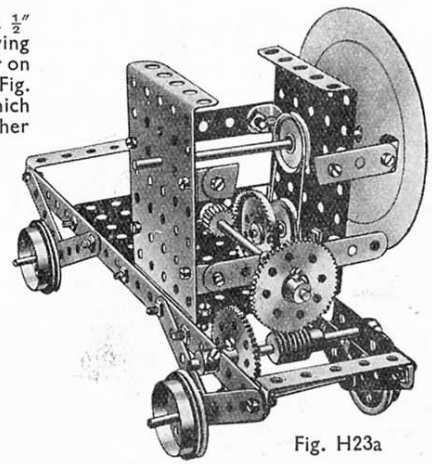
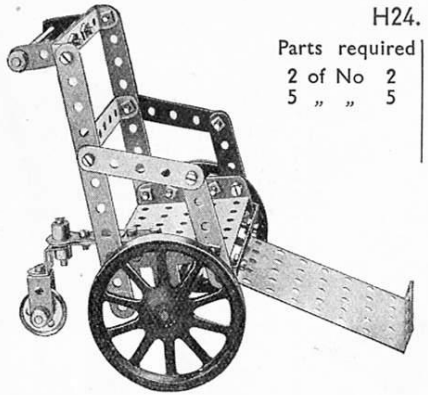


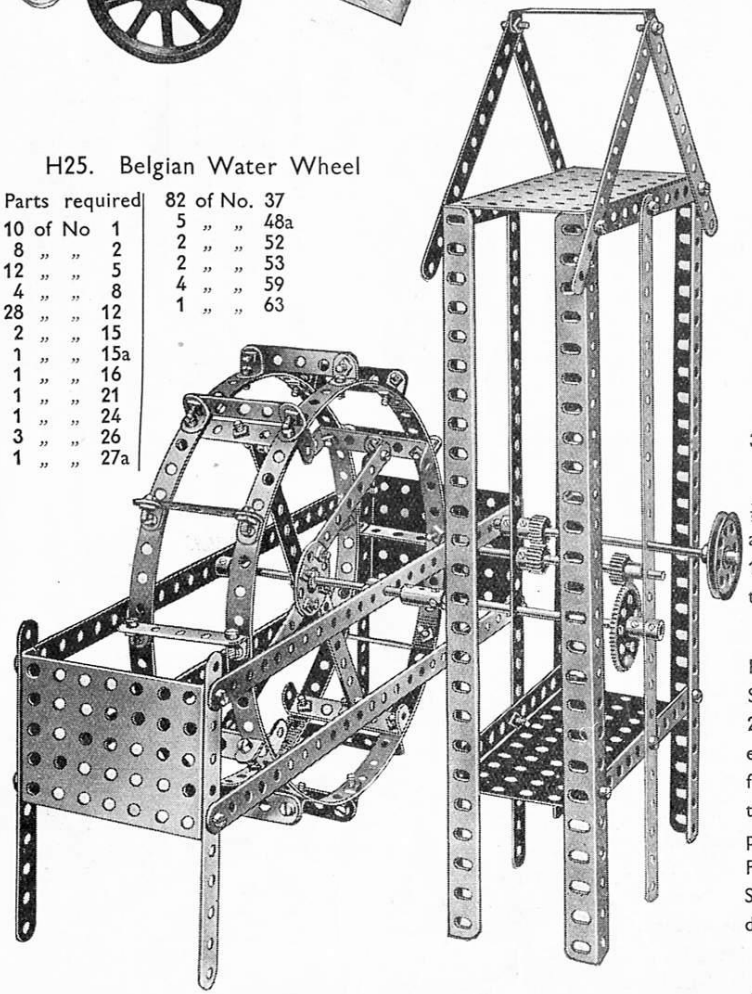
Fig. H23a

H24. Invalid Chair



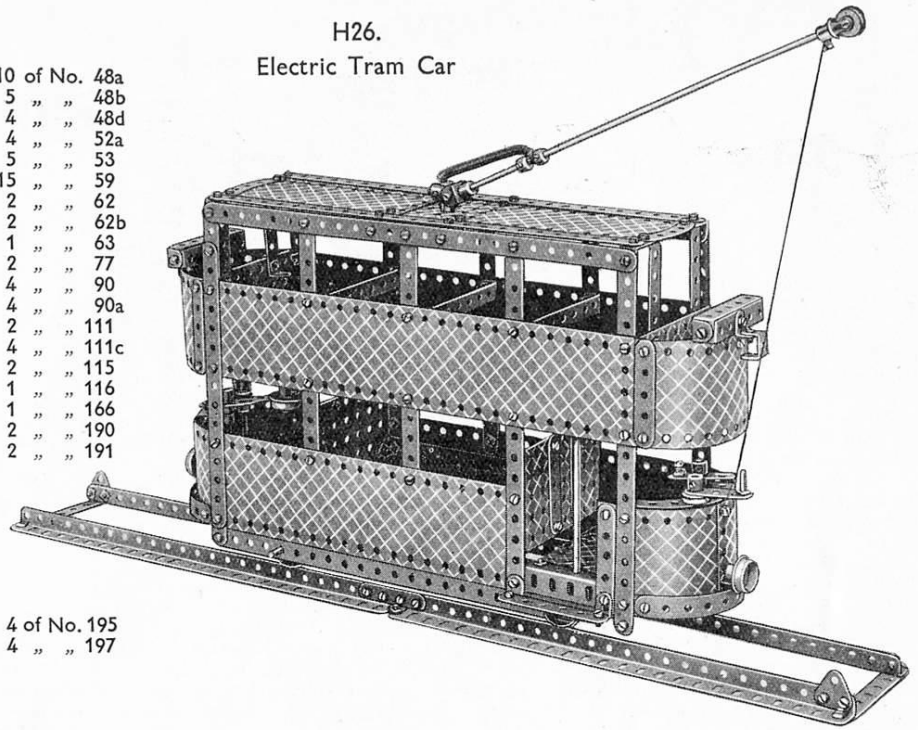
Parts required			1 of No. 10			25 of No. 37		
2 of No		2	1 „ „		15a	5 „ „		38
5 „ „		5	1 „ „		16	1 „ „		46
			2 „ „		18a	3 „ „		48b
			2 „ „		19a	2 „ „		53
			1 „ „		22a	5 „ „		59
						1 „ „		62
						1 „ „		102
						1 „ „		125
						2 „ „		126a

H25. Belgian Water Wheel



Parts required			82 of No. 37		
10 of No		1	5 „ „		48a
8 „ „		2	2 „ „		52
12 „ „		5	2 „ „		53
4 „ „		8	4 „ „		59
28 „ „		12	1 „ „		63
2 „ „		15			
1 „ „		15a			
1 „ „		16			
1 „ „		21			
1 „ „		24			
3 „ „		26			
1 „ „		27a			

H26. Electric Tram Car



Parts required			10 of No. 48a		
6 of No		1	5 „ „		48b
2 „ „		1b	4 „ „		48d
5 „ „		2	4 „ „		52a
2 „ „		2a	5 „ „		53
10 „ „		3	15 „ „		59
4 „ „		4	2 „ „		62
24 „ „		5	2 „ „		62b
2 „ „		6	1 „ „		63
6 „ „		6a	2 „ „		77
8 „ „		8	4 „ „		90
2 „ „		9	4 „ „		90a
12 „ „		10	2 „ „		111
2 „ „		11	4 „ „		111c
22 „ „		12	2 „ „		115
2 „ „		12a	1 „ „		116
1 „ „		13	1 „ „		166
3 „ „		15a	2 „ „		190
4 „ „		17	2 „ „		191
4 „ „		20			
4 „ „		20b			
3 „ „		23			
4 „ „		35			
196 „ „		37			
6 „ „		37a			
4 „ „		38			
1 „ „		40	4 of No. 195		
1 „ „		43	4 „ „		197

The chassis of the tramcar is made from two $12\frac{1}{2}$" Angle Girders spaced apart at $\frac{1}{2}$" and 4" from each end by means of $3\frac{1}{2}$" Strips, and a $5\frac{1}{2}$" × $3\frac{1}{2}$" Flat Plate is used for the floor.

Strips are bolted vertically to the chassis, as shown in Fig. H26a, and the lower ends of the corner Strips, which project $\frac{1}{2}$" below the chassis, are connected by $12\frac{1}{2}$" Strips which form the bearings for the axles. These are $4\frac{1}{2}$" in length and are held in place by means of Collars. The ends of the chassis are fitted with semi-circles of $2\frac{1}{2}$" Curved Strips. The $12\frac{1}{2}$" × $2\frac{1}{2}$" Strip Plate that forms each side of the lower deck is extended by a $4\frac{1}{2}$" × $2\frac{1}{2}$" Flexible Plate, curved and bolted to the corner upright of the bodywork.

A $12\frac{1}{2}$" Angle Girder and a $12\frac{1}{2}$" × $2\frac{1}{2}$" Strip Plate are next bolted across the tops of the vertical Strips and form one side of the upper deck, a $5\frac{1}{2}$" × $2\frac{1}{2}$" Strip Plate being curved and secured to each end of the model by means of Flat Brackets. The floor is made from three $5\frac{1}{2}$" × $3\frac{1}{2}$" Flat Plates, and the roof, which is supported by $2\frac{1}{2}$" Strips is composed of two $5\frac{1}{2}$" × $2\frac{1}{2}$" Strip Plates and a $3\frac{1}{2}$" × $2\frac{1}{2}$" Flanged Plate. Three pairs of $3\frac{1}{2}$" × $\frac{1}{2}$" Double Angle Strips are bolted between the sides of the upper deck to form seats.

The construction of other fittings on the car can be seen quite clearly in the illustration.

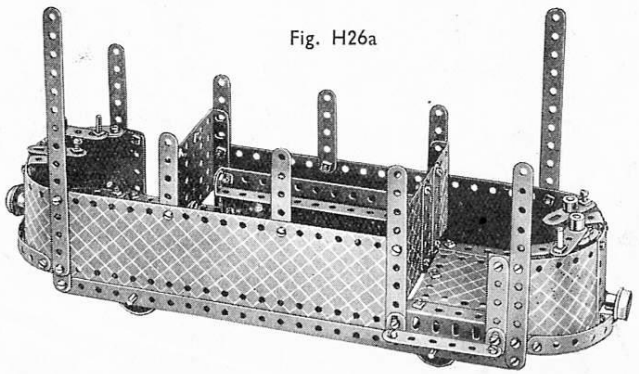
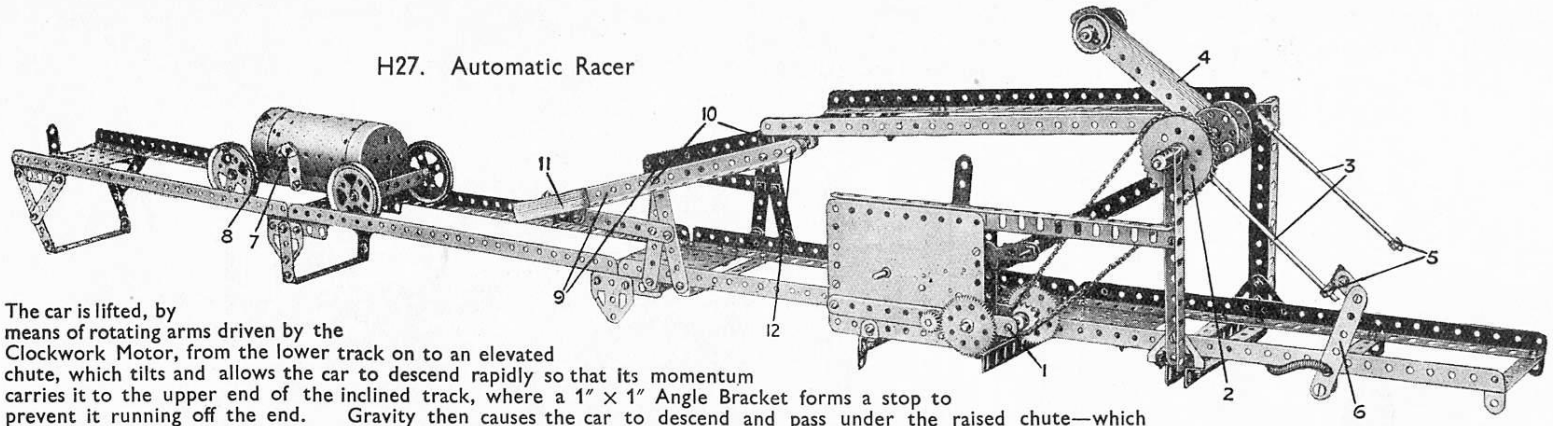


Fig. H26a

H27. Automatic Racer



The car is lifted, by means of rotating arms driven by the Clockwork Motor, from the lower track on to an elevated chute, which tilts and allows the car to descend rapidly so that its momentum carries it to the upper end of the inclined track, where a 1″ × 1″ Angle Bracket forms a stop to prevent it running off the end. Gravity then causes the car to descend and pass under the raised chute—which has been automatically lifted by means of balance weights—to the lower extremity of the track, where it releases a catch, thus allowing the cycle of operations to be carried out until the spring of the Motor is run down.

For the construction of the main track 12½″ Girders are secured by means of Bolts passed through their elongated holes and through 3½″ × 2½″ Flanged Plates. The Bolt heads should be spaced from the upturned flanges of the girders to allow sufficient room for the 2″ Pulleys of the car to pass unimpeded. Two 5½″ Girders are bolted vertically to Trunnions which, in turn, are secured to 5½″ transverse Girders near the lower end of the track. The vertical Girders are braced by 9½″ Girders.

A ½″ Pinion on the Motor driving spindle meshes with a 57-teeth Gear, the Rod of which carries a ½″ Pinion meshing with a further Gear on a 1½″ Rod 1. This Rod carries a ¾″ Sprocket Wheel transmitting the drive through Chain to the Sprocket on a 6½″ Rod journalled in the vertical Angle Girders. The 6½″ Rod also carries two Couplings carrying the Rods 3, two Double Brackets to which the Girders of the elevated chute are secured, and two Bush Wheels clamped on either side of the balance weight 4. The Rods 3 carry near their outer ends Collars, in the tapped holes of which Bolts 5 are screwed and arranged to face inward.

A 3″ Strip 6 is held loosely to a Pivot Bolt and carries a Flat Bracket to which two Angle Brackets are fixed so that they catch the Bolt 5 and prevent the Rods 3 revolving. The mechanism should be very carefully adjusted so that the Angle Brackets 7 and 8 of the car release the catch and then come into position directly above the Bolts 5, which, being freed, are raised by means of the Motor. The lower edges of the Brackets 7 should be slightly higher than those of the Brackets 8. The Bolts 5 carry the car up and deposit it on the upper girders, which are normally held in a horizontal position by the Girders 9. The latter are pivoted by lock-nutted Bolts at 10 and are provided with balance weights 11 consisting of 2½″ Strips. A Rod 12 held in Cranks at the ends of the Girders carries Collars which are so arranged to keep the side members of the chute in alignment with the lower track.

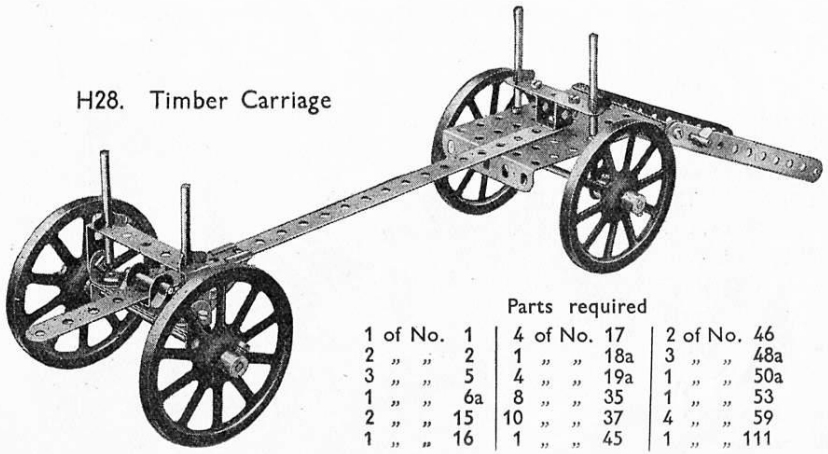
Before setting the model in operation all parts on rotating shafts should be fixed securely. The Sprocket 2, the Couplings carrying the Rods 3 and the Bush Wheels which hold the weight 4, should each be provided with two grub screws, since they must be absolutely immovable on the horizontal 6½″ Rod.

Parts required

26	of No.	2	7	„ „	3	3	„ „ 4
32	„ „	5	2	„ „	6	2	„ „ 6a
10	„ „	8	4	„ „	8a	2	„ „ 8b
4	„ „	9	3	„ „	10	2	„ „ 11
13	„ „	12	1	„ „	12a	1	„ „ 13a
1	„ „	14	2	„ „	15	2	„ „ 16
2	„ „	17	2	„ „	18a	4	„ „ 20a
2	„ „	22	2	„ „	24	2	„ „ 26
2	„ „	27a	120	of No.	37	8	„ „ 37a
24	„ „	38	1	„ „	43	4	„ „ 48b
2	„ „	48d	1	„ „	52	1	„ „ 52a
3	„ „	53	14	„ „	59	2	„ „ 62
4	„ „	63	16″	„ „	94	1	„ „ 95
1	„ „	96a	2	„ „	111	4	„ „ 111c
1	„ „	115	2	„ „	126	4	„ „ 126a
1	„ „	147b	1	„ „	162		

No.2 Clockwork Motor (not included in Outfit)

H28. Timber Carriage



Parts required

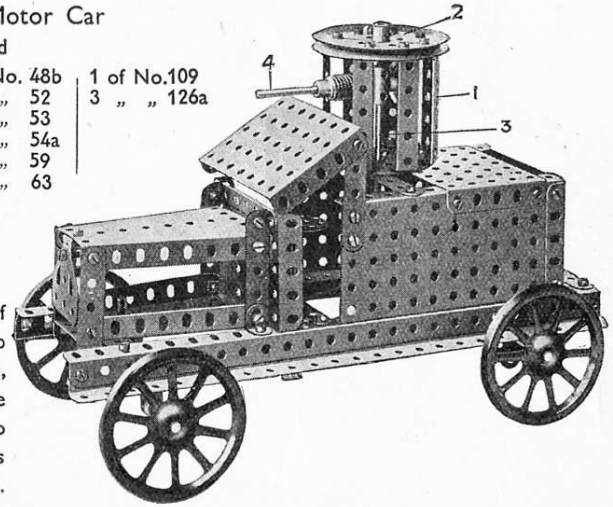
1	of No.	1	4	of No.	17	2	of No. 46
2	„ „	2	1	„ „	18a	3	„ „ 48a
3	„ „	5	4	„ „	19a	1	„ „ 50a
1	„ „	6a	8	„ „	35	1	„ „ 53
2	„ „	15	10	„ „	37	4	„ „ 59
1	„ „	16	1	„ „	45	1	„ „ 111

H29. Armoured Motor Car

Parts required

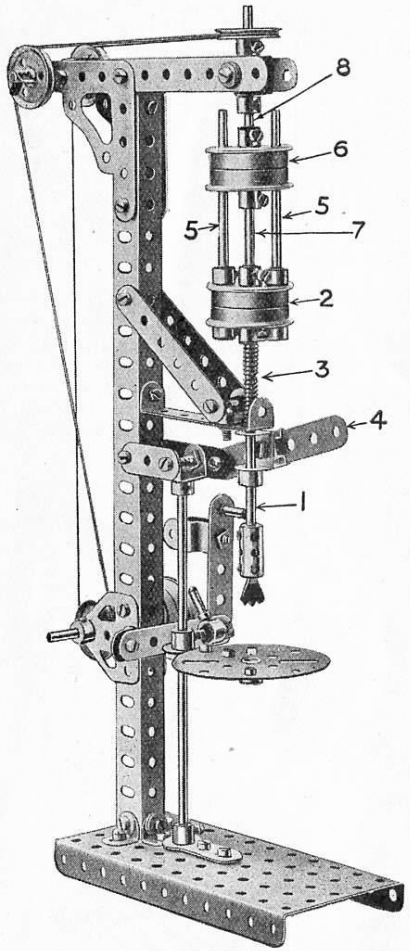
5	of No.	3	4	of No.	19a	1	of No. 48b
6	„ „	5	1	„ „	19b	2	„ „ 52
4	„ „	8	2	„ „	22	4	„ „ 53
5	„ „	12	2	„ „	24	2	„ „ 54a
1	„ „	12a	1	„ „	32	8	„ „ 59
2	„ „	14	77	„ „	37	1	„ „ 63
1	„ „	15	2	„ „	38		
2	„ „	16	2	„ „	45		
2	„ „	18a	7	„ „	48a		

1 of No.109
3 „ „ 126a



The turret, made up of a number of Double Angle Strips 1 bolted at the top to a 3″ Pulley 2 and below to a Face Plate, is bolted on a Rod 3 passing up the centre which forms the pivot of the turret so that it may freely turn. The gun 4 is bolted in a Coupling on this pivot Rod.

H30. Vertical Drill

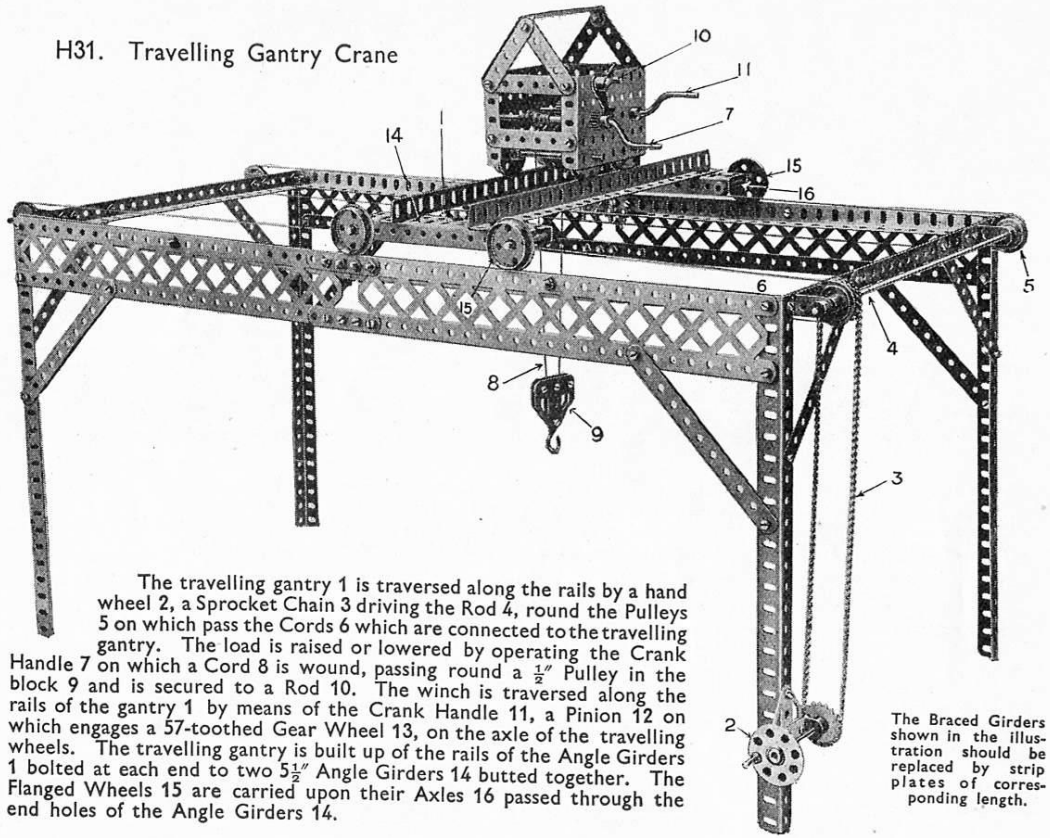


Parts required

2	of No.	2
3	„ „	4
2	„ „	5
1	„ „	6
1	„ „	6a
2	„ „	8
5	„ „	11
6	„ „	12
1	„ „	14
1	„ „	15a
4	„ „	16
1	„ „	17
6	„ „	20
2	„ „	21
2	„ „	22a
4	„ „	35
39	„ „	37
6	„ „	38
1	„ „	40
1	„ „	43
1	„ „	44
1	„ „	48a
1	„ „	50a
10	„ „	59
2	„ „	62
1	„ „	65
2	„ „	108
1	„ „	109
1	„ „	111
2	„ „	115
2	„ „	126a

The drill Rod 1 is connected to the boss of the lower Flanged Wheel of the pair 2, butted face to face, a Spring 3 round the Rod raising the drill after it has been depressed by the Strip 4. Two Rods 5, retained in the Wheels 2 by Collars, slide in the upper Flanged Wheels 6. The central Rod 7 is bolted in the upper Wheels and slides in the centre boss of the upper Wheel 2. The Wheels 6 are bolted to the driving spindle 8 and consequently the drill is driven by the Rods 5 and may be depressed by the handle 4 against the Spring.

H31. Travelling Gantry Crane



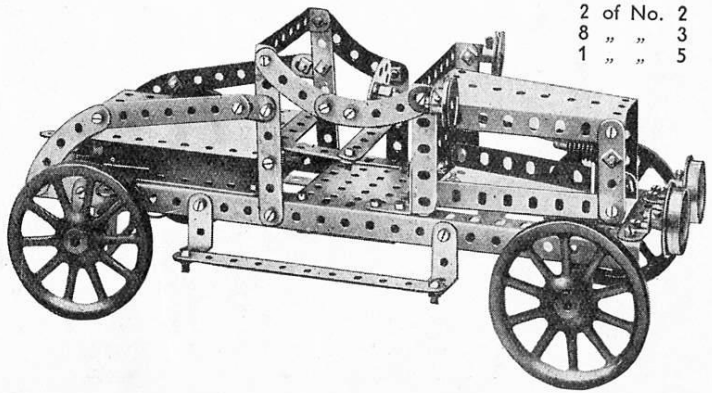
Parts required

4	of No.	1
8	„ „	2
4	„ „	4
10	„ „	5
12	„ „	8
4	„ „	9
2	„ „	11
4	„ „	12a
2	„ „	13
3	„ „	16
5	„ „	17
1	„ „	19
1	„ „	19s
8	„ „	20
4	„ „	22
1	„ „	23
1	„ „	24
1	„ „	26
1	„ „	27a
2	„ „	35
96	„ „	37
6	„ „	38
1	„ „	40
1	„ „	48
1	„ „	48b
2	„ „	53
1	„ „	57c
8	„ „	59
24″	„ „	94
2	„ „	96
2	„ „	115
3	„ „	126a
1	„ „	147a
1	„ „	147b
1	„ „	148
4	„ „	197

The travelling gantry 1 is traversed along the rails by a hand wheel 2, a Sprocket Chain 3 driving the Rod 4, round the Pulleys 5 on which pass the Cords 6 which are connected to the travelling gantry. The load is raised or lowered by operating the Crank Handle 7 on which a Cord 8 is wound, passing round a ½″ Pulley in the block 9 and is secured to a Rod 10. The winch is traversed along the rails of the gantry 1 by means of the Crank Handle 11, a Pinion 12 on which engages a 57-toothed Gear Wheel 13, on the axle of the travelling wheels. The travelling gantry is built up of the rails of the Angle Girders 1 bolted at each end to two 5½″ Angle Girders 14 butted together. The Flanged Wheels 15 are carried upon their Axles 16 passed through the end holes of the Angle Girders 14.

The Braced Girders shown in the illustration should be replaced by strip plates of corresponding length.

H32. Motor Car



Parts required

2	of No.	2
8	„ „	3
1	„ „	5
4	of No.	6
2	„ „	8
2	„ „	10
8	„ „	12
6	„ „	12a
1	„ „	14
2	„ „	15
1	„ „	16
4	„ „	19a
2	„ „	20
2	„ „	22
2	„ „	24
2	„ „	26
1	„ „	28
1	„ „	32
75	„ „	37
4	„ „	38

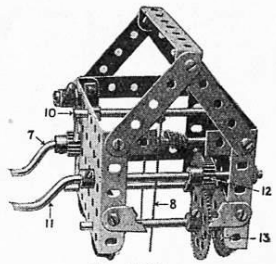
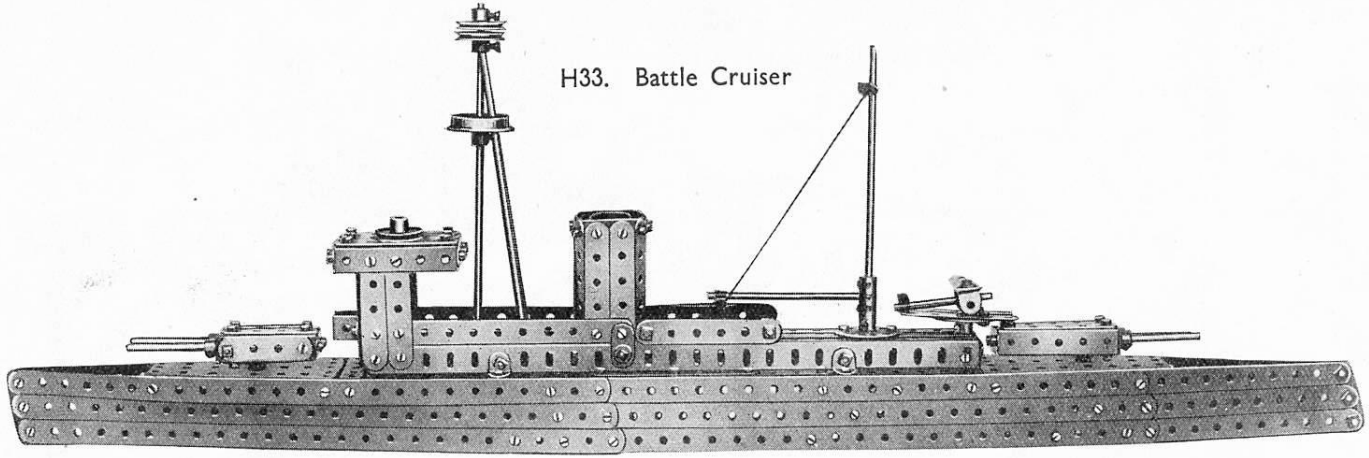


Fig. H31a

3	of No.	48b
2	„ „	53
2	„ „	54a
7	„ „	59
2	„ „	89

2 of No.126a
No. 2 Clockwork Motor
(not included in outfit)

H33. Battle Cruiser



The hull consists of three rows of 12½" and 5½" Strips, the upper row being bolted to the flanges of the Sector Plates and 5½" × 2½" Flanged Plates which form the deck. The superstructure is built up on two 12½" Angle Girders, which are spaced apart by 1½" Strips and a longitudinal 12½" Strip and secured by Angle Brackets to the Flanged Plates. 2½" Strips are bolted vertically to support 2½" × ½" Double Angle Strips, to which further Strips are secured to form the navigating bridge.

The tripod mast is placed directly behind the bridge. The mast proper, which consists of one 6½" Axle Rod, is secured to the deck by a 1½" Pulley Wheel and carries a Flanged Wheel and two 1" Pulleys. Two further 6½" Rods are passed through holes in the Flanged Wheel and their lower ends are inserted in holes in the upper deck and secured by Spring Clips. The funnel consists of ten 2½" Strips bolted in a vertical position and held together by Flat Brackets slightly bent. It is secured to the ship by Angle Brackets.

The aeroplane launching platform consists of 2½" Strips bolted to a Bush Wheel, while the miniature aeroplane is built up from a 2" Rod carrying a Collar, in the tapped hole of which a bolt is securely fixed. A Double Bracket and a 1½" Strip are held on the shank of the bolt. The tailplane is represented by a Spring Clip.

Figs. H33a and H33b show the gun turrets. The guns, which are formed from Rods, are held in position by Collars. The completed turrets pivot about ⅜" Bolts secured to the 1" Triangular Plates and loosely attached to the Sector Plates by locknuts.

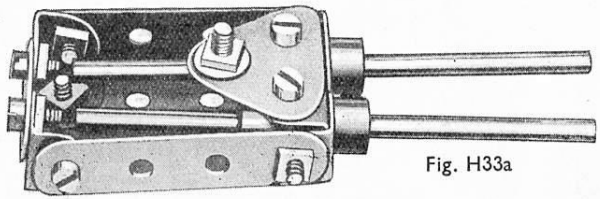


Fig. H33a

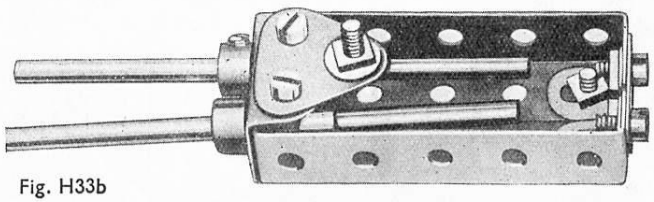


Fig. H33b

Parts required

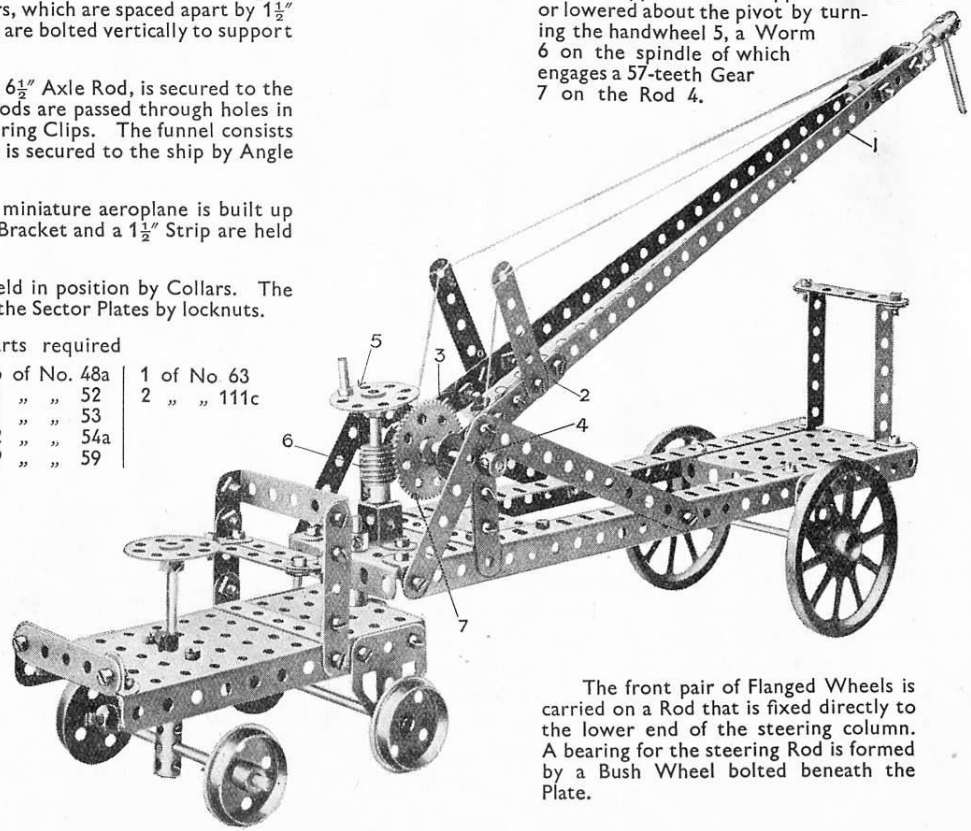
13 of No.	1	6 of No.	48a	1 of No.	63
8 „ „	2	1 „ „	52	2 „ „	111c
2 „ „	3	1 „ „	53		
35 „ „	5	2 „ „	54a		
4 „ „	6	9 „ „	59		
5 „ „	6a				
2 „ „	8				
11 „ „	10				
1 „ „	11				
27 „ „	12				
3 „ „	14				
5 „ „	16				
1 „ „	18a				
1 „ „	20				
1 „ „	21				
3 „ „	22				
2 „ „	24				
3 „ „	35				
146 „ „	37				
4 „ „	38				
1 „ „	45				
2 „ „	48				

H34. Fire Watertower

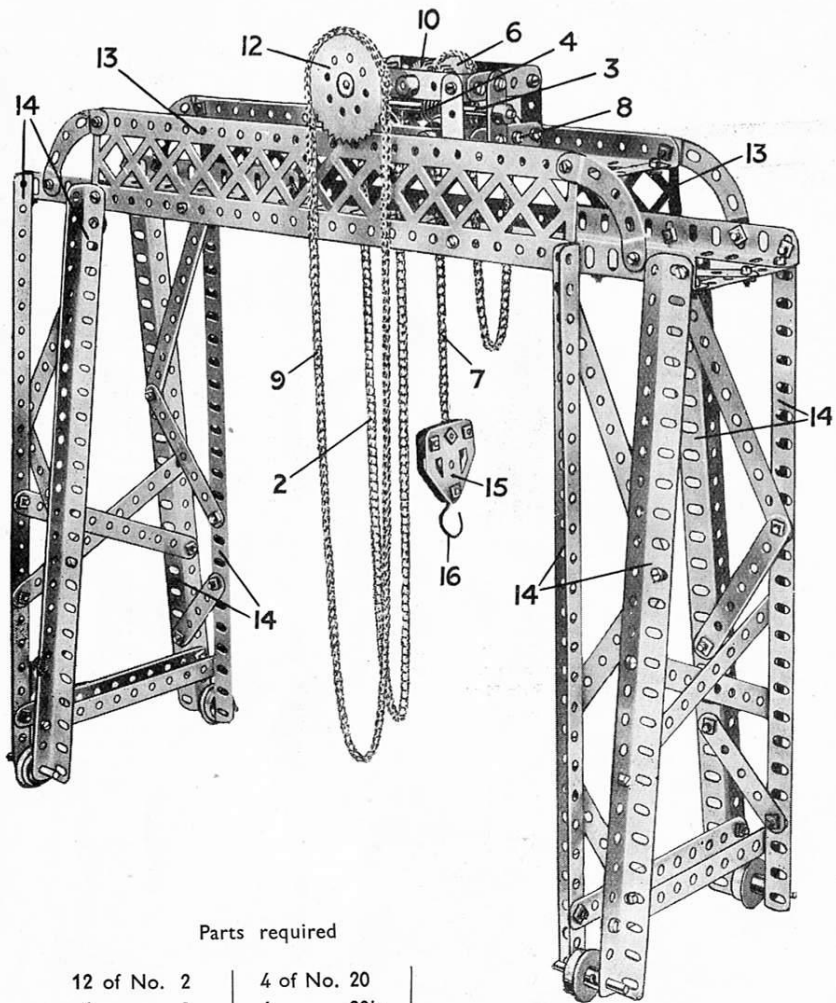
Parts required

2 of No.	2	2 of No.	19a	5 of No.	48a
2 „ „	4	4 „ „	20	1 „ „	52
11 „ „	5	1 „ „	22	2 „ „	53
4 „ „	8	2 „ „	24	9 „ „	59
3 „ „	10	1 „ „	27a	2 „ „	62
2 „ „	11	1 „ „	32	3 „ „	63
2 „ „	12	3 „ „	35	1 „ „	115
3 „ „	15a	65 „ „	37	4 „ „	126a
4 „ „	16	2 „ „	45		
2 „ „	17	1 „ „	46		

This is an apparatus for raising a waterhose and directing the nozzle towards high buildings. The hose is led along the support 1, formed of two 12½" Angle Girders, secured by Strips 2 and Cranks 3 to the Rod 4, forming a pivot for the support. The support is raised or lowered about the pivot by turning the handwheel 5, a Worm 6 on the spindle of which engages a 57-teeth Gear 7 on the Rod 4.



The front pair of Flanged Wheels is carried on a Rod that is fixed directly to the lower end of the steering column. A bearing for the steering Rod is formed by a Bush Wheel bolted beneath the Plate.



H35. Hand Operated Gantry Crane

The gantry consists of two 12½″ Angle Girders extended at each end by means of 5½″ Girders. Strip Plates 13 support further 12½″ Angle Girders that form the track along which travels the crane trolley.

The end towers comprise 12½″ Angle Girders 14 braced by Strips. 1½″ Axle Rods are journalled in the lower ends of the Girders, and carry ¾″ Flanged Wheels that form the travelling wheels.

The construction of the trolley or traveller is shown clearly in Fig. H35a. Two pairs of 3½″ × ½″ Double Angle Strips are spaced apart by means of 2″ Strips and, 1½″ Strips are bolted between each pair. Two 2½″ Rods journalled in the Double Angle Strips carry the ¾″ Flanged Wheels 1 and 1a. The Rod of the Wheels 1a also carries a 57-teeth Gear that meshes with the ½″ Pinion 10.

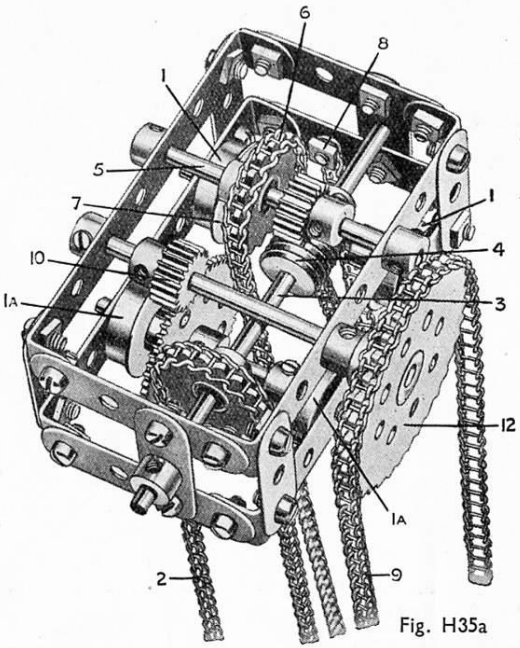


Fig. H35a

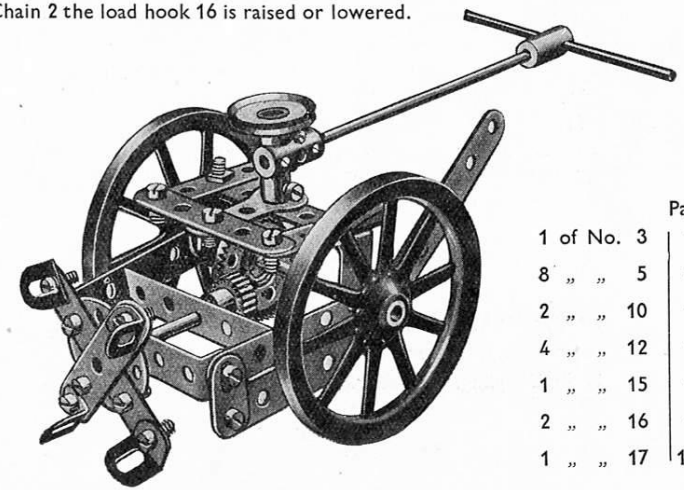
By hauling on the chain 9, which is passed over the Sprocket Wheel 12, the ½″ Pinion 10 and the 57-teeth Gear Wheel is made to rotate, thus driving the Flanged Wheels 1a and causing the trolley to travel along the gantry.

The hoisting mechanism is operated by the chain 2 that passes over a 1″ Sprocket, on the Rod of which is a Worm 4. This engages the teeth of a ½″ Pinion on the Rod 5 that also carries a 1″ Sprocket Wheel 6. A length of Sprocket Chain 7 is placed over this Wheel, one end of it being secured between two Flat Trunnions 15 (Fig. H35) ; the other end is secured to the frame at 8. By operating the Chain 2 the load hook 16 is raised or lowered.

Parts required

12 of No. 2	4 of No. 20	
4 „ „ 3	4 „ „ 20b	
6 „ „ 4	2 „ „ 26	
4 „ „ 5	1 „ „ 27a	
4 „ „ 6	1 „ „ 32	
6 „ „ 6a	87 „ „ 37	
12 „ „ 8	8 „ „ 37a	60″ of No. 94
4 „ „ 9	2 „ „ 38	1 „ „ 95
1 „ „ 15a	4 „ „ 48b	2 „ „ 96
1 „ „ 16	1 „ „ 57c	4 „ „ 111c
3 „ „ 16a	6 „ „ 59	2 „ „ 126a
4 „ „ 18a	4 „ „ 90a	2 „ „ 197

The Braced Girders shown in the illustration should be replaced by Strip Plates of corresponding length.

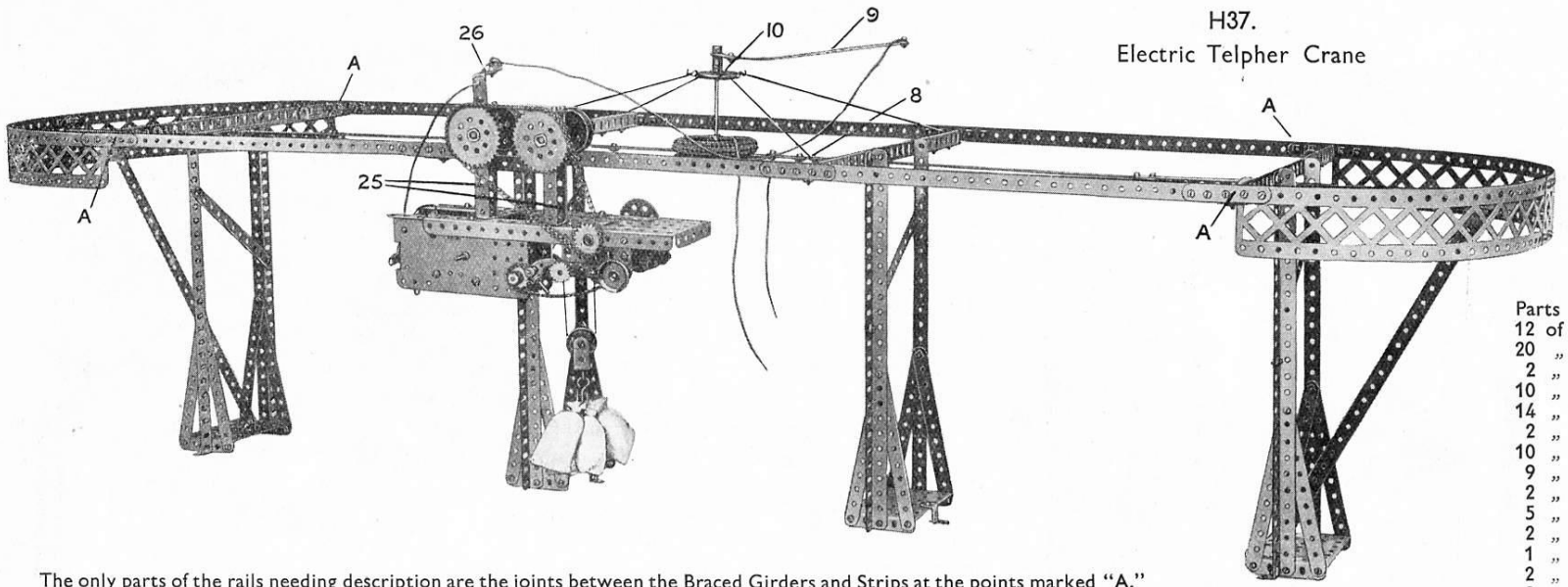


H36. Potato Reaper

Parts required

1 of No. 3	1 of No. 18a	1 of No. 46
8 „ „ 5	2 „ „ 19b	2 „ „ 48a
2 „ „ 10	1 „ „ 22	1 „ „ 59
4 „ „ 12	1 „ „ 24	1 „ „ 62
1 „ „ 15	1 „ „ 26	2 „ „ 63
2 „ „ 16	1 „ „ 28	
1 „ „ 17	19 „ „ 37	

H37.
Electric Telpher Crane



The only parts of the rails needing description are the joints between the Braced Girders and Strips at the points marked "A." A 2½" Strip 1, Fig. H37a, is bolted to the outside of the 12½" Strip 2, the latter also carrying a Flat Bracket 3 on its inner side. This Flat Bracket overlaps the end of a Double Angle Strip 4 and both are again overlapped by a second Flat Bracket 5, a Washer on the Bolt 6 spacing the Bracket 5 from the 2½" Strip 1. The Braced Girder 7 is secured by the Bolt 6 and also by a second Bolt spaced also by a Washer. The complete joint is bolted to the overhanging Girder of the end support by means of the Double Angle Strip 4.

The current conductor is insulated by means of 2" Dunlop Tyres mounted on 2" Pulleys and clamped to the central 12½" Strip 8 by means of two ¾" Bolts. These are inserted in the holes of the 2" Pulleys on each side on the Strip 8 and great care should be taken to prevent them touching the Strip. A 3½" Rod nipped in the boss of the upper Pulley has attached to it a Bush Wheel, 10, with a Crank swinging loosely immediately above it, but held in place by a Collar. A 12½" Strip 9, is bolted to this Crank and bent upwards slightly so as to clear the electric telpher. The complete conductor is held vertical by four cords attached to the Bush Wheel 10 and tied to the two central standards.

The two 5½" Angle Girders 11 of the telpher (Fig. H37b) are attached at one end to the flanges of the Electric Motor and at the other to the 5½×2½" Flanged Plate 12. To each side of the Plate 12, two 2½" Flat Girders are bolted to form the sides of the gear box. The drive from the armature shaft of the Motor to the ¾" Sprocket 13 will be seen clearly from the illustration. From this Sprocket the drive is transmitted by means of Sprocket Chain to a 1" Sprocket on the lay shaft 14 of the gear box. This Rod is moved into any desired position by means of a 3½" Screwed Rod 15 through the medium of the Coupling 16 and Threaded Pin 17. The latter is provided with two Nuts so that the Collar 18 may be fixed rigidly to it but still allow the Rod 14, carrying two fixed collars, to rotate freely. The smooth portion of the Threaded Pin is inserted in the Coupling, but not gripped therein.

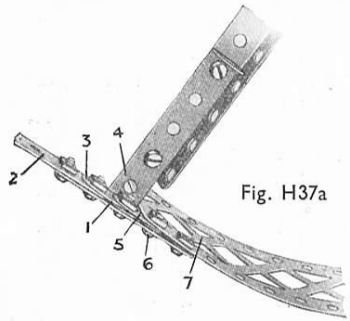


Fig. H37a

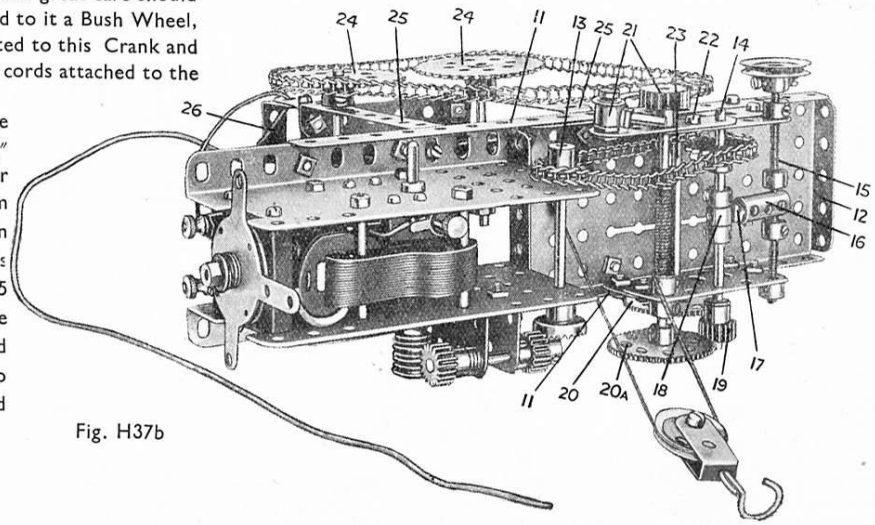


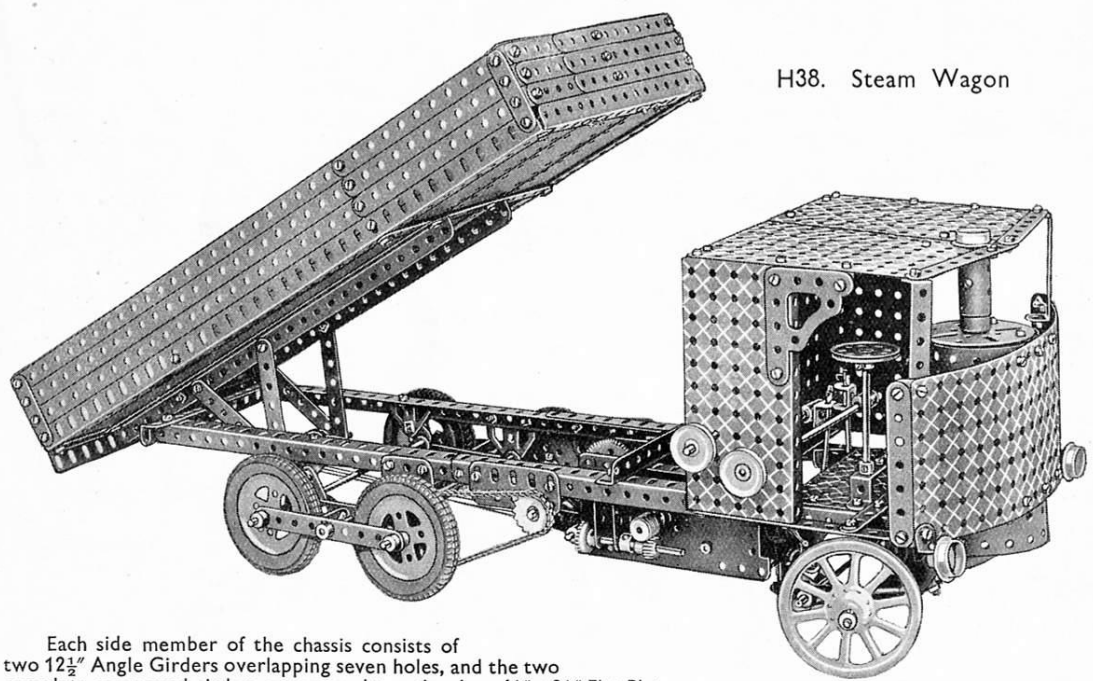
Fig. H37b

The Braced Girders shown in the illustration should be replaced by Strip Plates of corresponding length.

Parts required

12	of No.	1
20	„ „	2
2	„ „	4
10	„ „	5
14	„ „	8
2	„ „	9
10	„ „	10
9	„ „	12
2	„ „	12a
5	„ „	16
2	„ „	16a
1	„ „	17
2	„ „	20
2	„ „	20a
1	„ „	21
1	„ „	22
1	„ „	22a
2	„ „	24
2	„ „	26
2	„ „	27a
1	„ „	29
1	of No.	32
164	„ „	37
3	„ „	37a
16	„ „	38
1	„ „	40
8	„ „	48a
4	„ „	48b
1	„ „	52
4	„ „	53
1	„ „	57c
14	„ „	59
1	„ „	62
1	„ „	63
1	„ „	80a
26"	„ „	94
2	„ „	95
2	„ „	96
1	„ „	96a
1	„ „	102
4	„ „	103f
3	„ „	111
1	„ „	111c
2	„ „	115
4	„ „	125
2	„ „	142a
1	„ „	147
1	„ „	148
1	„ „	160
4	„ „	197

No. E6 Electric Motor
(Not included in Outfit)



H38. Steam Wagon

Each side member of the chassis consists of two 12½″ Angle Girders overlapping seven holes, and the two complete compound girders are secured together by a 4½″ × 2½″ Flat Plate at the fore end and by a 5½″ Angle Girder at the rear. The 4½″ × 2½″ Flat Plate forms the floor of the cab, and it carries a Double Bent Strip, as shown, supporting the steering column. The Rod forming the steering column is held in place by an Eye Piece above the Double Bent Strip and by a ¾″ Flanged Wheel beneath the plate, and carries a Double Arm Crank at its lowest end. This Crank is fitted with a Small Fork Piece carrying a 3½″ Rod, the other end of which is fitted with a Swivel Bearing. A 1½″ Rod is carried in the "spider" of the Swivel Bearing and also in one of the end plain bore holes of a Coupling, attached by a ¾″ Bolt to the front axle that is constructed from four 5½″ Strips as shown in Fig. H38a. The end of the 1½″ Rod, already mentioned, carries a second Swivel Bearing that is connected as indicated to the opposite wheel.

The front axle is carried on two leaf springs built up from 1½″, 2½″ and 3½″ Strips. The fore end of each spring is connected by an Angle Bracket to a Flat Trunnion, the necessary pivot point being formed from a 5″ Rod, the one Rod serving for both springs. The rear end of each spring also carries a ½″ × ½″ Angle Bracket. This is coupled up by a lock-nutted Bolt to a Flat Bracket that is attached by a Rod to a Trunnion bolted to the frame of the wagon.

The E6 Electric Motor forming the driving unit is secured to the main frames at one end by a 7½″ Angle Girder and at the other end by a 5½″ Angle Girder. The general arrangement of the gears is shown in Fig. H38b. A Worm on the armature shaft drives a ½″ Pinion carried on a short Rod journalled in a Channel Bearing. The other end of the Rod is fitted with a ¾″ Contrate Gear and this meshes with a second ½″ Pinion. This latter Pinion is mounted on a sliding Rod, one section of which lying between the side plates of the Motor carries a ½″ Pinion. A similar Pinion is also secured on the outer unoccupied portion of the sliding Rod. These two last-mentioned Pinions are controlled from a handle in the cab and may be engaged or disengaged as desired with 57-teeth Gears in order to bring the travelling or tipping movements into operation.

The 57-teeth Gear of the tipping movement is carried on a 2″ Rod that forms the hoisting barrel for the tipping cord. This cord is secured in place on the Rod and is then led over a system of pulleys as shown. The movable set of pulleys is attached to the tipping body by means of four 3½″ Strips and the body pivots about a 3½″ Rod journalled in a 2½″ × ½″ Double Angle Strip.

For ease in manipulation the reversing handle of the Motor is extended by means of a 3½″ Crank Handle, Fig. H38a, the necessary connection being made by means of a Coupling. The two levers protruding into the cab carry extensions that bring these two controls to a point of accessibility outside the cab.

Parts required

6	of No.	1
2	„ „	1b
18	„ „	2
4	„ „	2a
12	„ „	3
8	„ „	5
4	„ „	6
5	„ „	6a
10	„ „	8
2	„ „	8b
3	„ „	9
1	„ „	9d
5	„ „	10
2	„ „	11
22	„ „	12
4	„ „	12a
4	„ „	12c
1	„ „	13a
3	„ „	14
5	„ „	15
2	„ „	15a
4	„ „	16
4	„ „	16a
5	„ „	17
4	„ „	18a
1	„ „	19
1	„ „	19s
2	„ „	19a
4	„ „	20a
4	„ „	20b
1	„ „	21
4	„ „	22
3	„ „	22a
2	„ „	23
1	„ „	23a
3	of No.	26
2	„ „	27a
1	„ „	29
1	„ „	32
18	„ „	35
172	„ „	37
6	„ „	37a
22	„ „	38
1	„ „	40
1	„ „	45
4	„ „	48a
1	„ „	48b
1	„ „	50a
4	„ „	52
4	„ „	52a
19	of No.	53a
2	„ „	59
1	„ „	62b
6	„ „	63
1	„ „	70
2	„ „	94
2	„ „	95
2	„ „	96
2	„ „	103f
2	„ „	108
1	„ „	109
2	„ „	111
6	„ „	111c
1	„ „	116a
4	„ „	126
4	of No.	126a
4	„ „	142a
1	„ „	160
1	„ „	162b
1	„ „	163
1	„ „	164
2	„ „	165
1	„ „	166
1	„ „	186
3	„ „	195
3	„ „	197
No. E6 Electric Motor (not included in Outfit)		

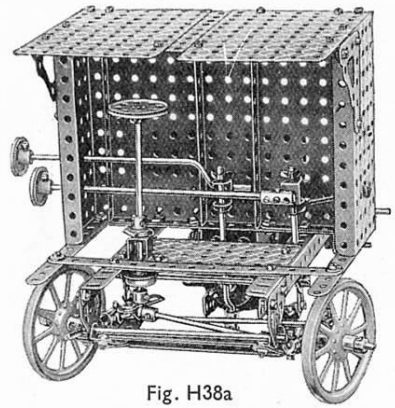


Fig. H38a

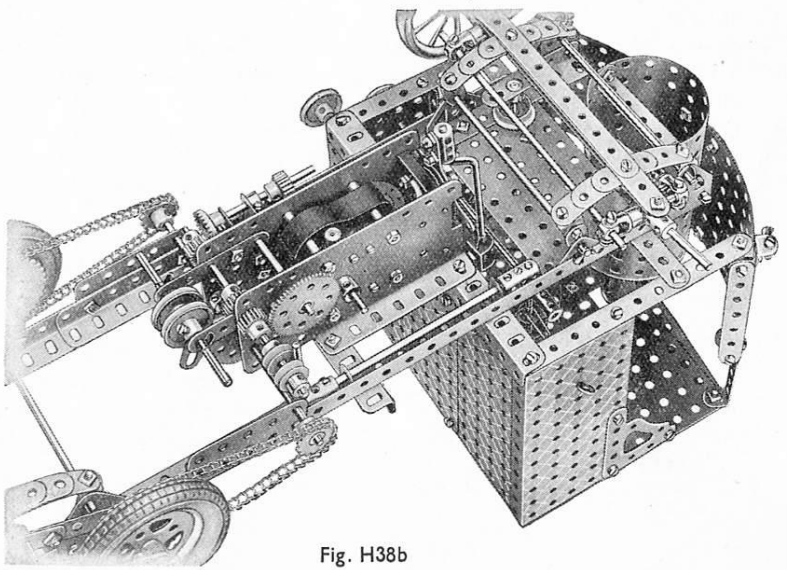
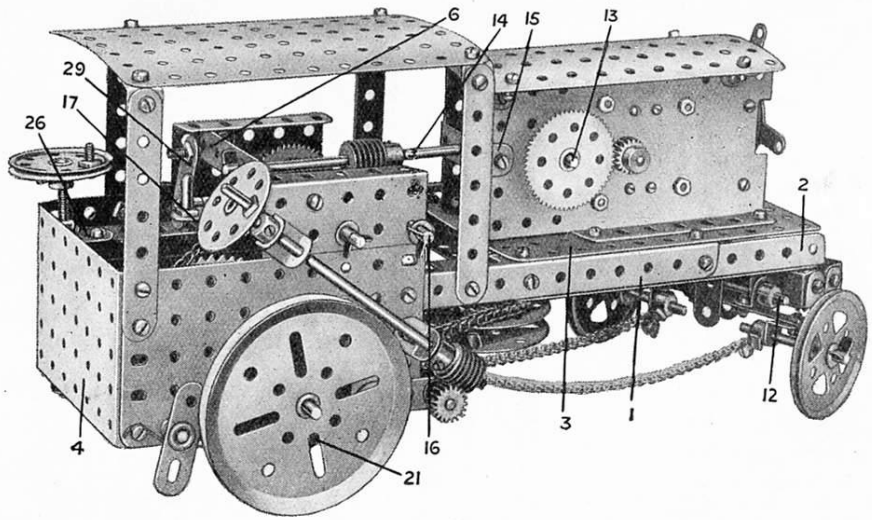


Fig. H38b

H39. Cable Ploughing Engine



Two 12½″ Angle Girders 1, forming the main frames, are extended at the front by the 5½″ Girders 2, the complete frames being joined together at the front by the 5½″ × 3½″ Flat Plates 3, 3a and at the rear by a 3½″ × 2½″ Flanged Plate 4. Each side of the gear box and controlling platform is built up from a 3½″ × 2½″ Flanged Plate and a 4½″ × 2½″ Flat Plate. These are held rigid by the 3½″ Strip 5 (shown partly cut away in Fig. H39a) and the 3½″ × ½″ Double Angle Strip 6.

The front axle pivot 7 (a Pivot Bolt) has a Bush Wheel secured to it which carries two 1″ × 1″ Angle Brackets 8 and two ½″ × ½″ Angle Brackets 9. The tool tray, which is built up of four 2½″ × ½″ Double Angle Strips and one 2½″ Flat Girder, is secured to one of the Angle Brackets 8 by means of a ½″ × ½″ Angle Bracket. The front axle proper, a 3½″ × ½″ Double Angle Strip, carries four ½″ × ½″ Angle Brackets 10 and 11, the latter forming bearings for the front wheel stub axles. A 2½″ Rod 12 passed through the Angle Brackets 9 and 10 forms a suitable connection for the three-point suspension system. The worm and pinion steering is similar to Standard Mechanism No. 159.

A ½″ Pinion on the Motor armature shaft engages with a 57-teeth Gear on the Rod 13, which carries a ¾″ Contrate engaging with a ½″ Pinion on the Rod 14. This Rod, journalled in a 1½″ × ½″ Double Angle Strip 15 and in the 3½″ × ½″ Double Angle Strip 6, carries a Worm that meshes with a ½″ Pinion on the layshaft 16. The latter is slidable in its bearings and is controlled by the lever 17 (a 3½″ Strip that is pivoted at its second hole from the handle end to a ½″ × ½″ Angle Bracket, which, in turn, is secured to the Double Angle Strip 6, in the second hole from one end). A Bolt is secured to the lever 17 so that its shank lies between two Collars secured to the layshaft. Operation of the lever causes the ½″ Pinion on the layshaft to engage with either of the two gears 18 and 19 at the same time remaining in mesh with the Worm on the Rod 14.

The 57-teeth Gear 18 is secured to a 4½″ Rod 20 on which is fixed a ¾″ Sprocket Wheel connected by Sprocket Chain to a 2″ Sprocket Wheel on the rear axle. The 1½″ Contrate 19 is secured to a 2½″ Rod that is journalled in the 3½″ Strips 5 and 5a and has attached to it a 1″ Sprocket Wheel that is connected by Sprocket Chain to a 2″ Sprocket Wheel on the cable drum shaft 28.

Brake drums, 2″ Pulleys 21, are fitted to the rear axle and round these are passed cords that are attached at one end to the side plates of the model and at the other to Double Arm Cranks 22. The latter are secured to each end of a 4½″ Rod 23 that carries a Bush Wheel 24 connected pivotally by a 1½″ Strip to the Coupling 25, which has a 3½″ Screwed Rod passing through its end transverse threaded bore. The Screwed Rod is journalled in the Girder 1 and Flat Bracket 26 and in the Angle Bracket 27, which is spaced by four Washers to keep the Rod in correct alignment. A suitable handle is attached consisting of a 1½″ Pulley fitted with a ⅜″ Bolt.

The Crank 29, secured to the shaft 30, manipulates the reversing handle of the Electric Motor through the Coupling and 1½″ Strip 31. The latter is lock-nutted to the reversing handle and attached loosely to the Coupling by a ⅜″ Bolt. The shaft 30 consists of one 6½″ and one 1½″ Rod joined by a Coupling and is journalled in two Angle Brackets secured to the main frame.

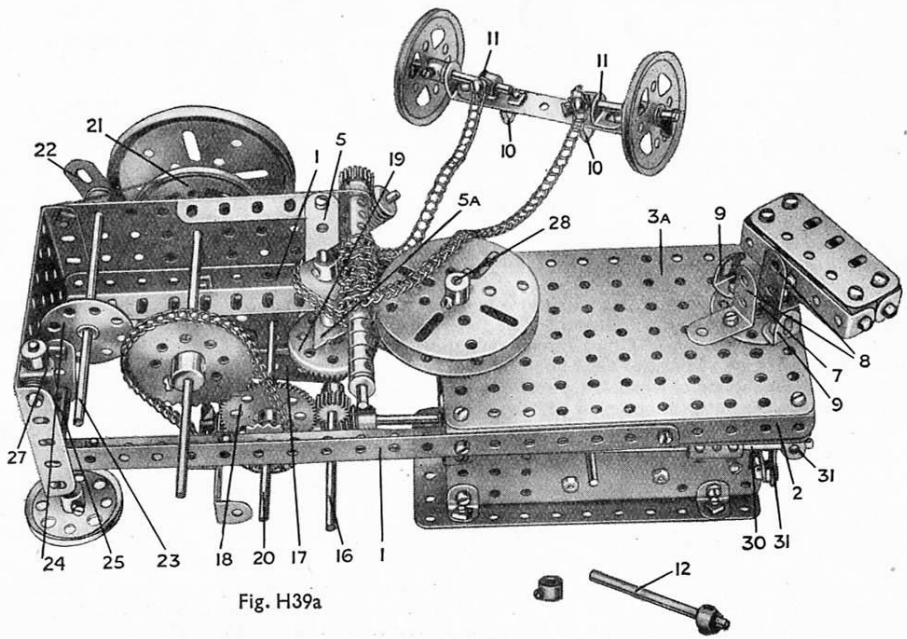


Fig. H39a

Parts required

7 of No. 3	1 of No. 14	2 of No. 24	21 of No. 38	2 of No. 62b	6 of No. 111c
4 „ „ 6a	2 „ „ 15	3 „ „ 26	1 „ „ 48	6 „ „ 63	2 „ „ 115
2 „ „ 8a	4 „ „ 15a	2 „ „ 27a	4 „ „ 48a	1 „ „ 70	1 „ „ 147b
2 „ „ 9	2 „ „ 16a	1 „ „ 28	2 „ „ 48b	1 „ „ 80a	
1 „ „ 10	2 „ „ 17	1 „ „ 29	3 „ „ 52a	34″ „ „ 94	No. E6 Electric Motor
1 „ „ 11	2 „ „ 18a	2 „ „ 32	3 „ „ 53	2 „ „ 95	
20 „ „ 12	2 „ „ 19b	7 „ „ 35	2 „ „ 53a	2 „ „ 96	(not included in Outfit)
4 „ „ 12a	4 „ „ 20a	85 „ „ 37	16 „ „ 59	1 „ „ 103f	
1 „ „ 13a	1 „ „ 21	4 „ „ 37a	1 „ „ 62	2 „ „ 109	

H40.
Truck Weighing Machine

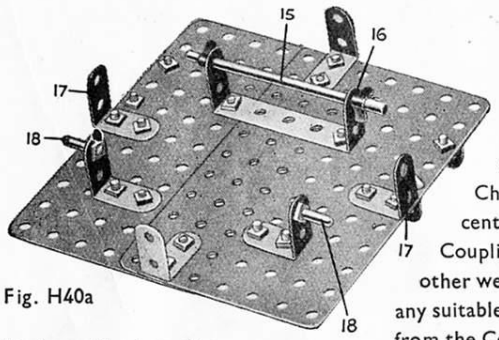
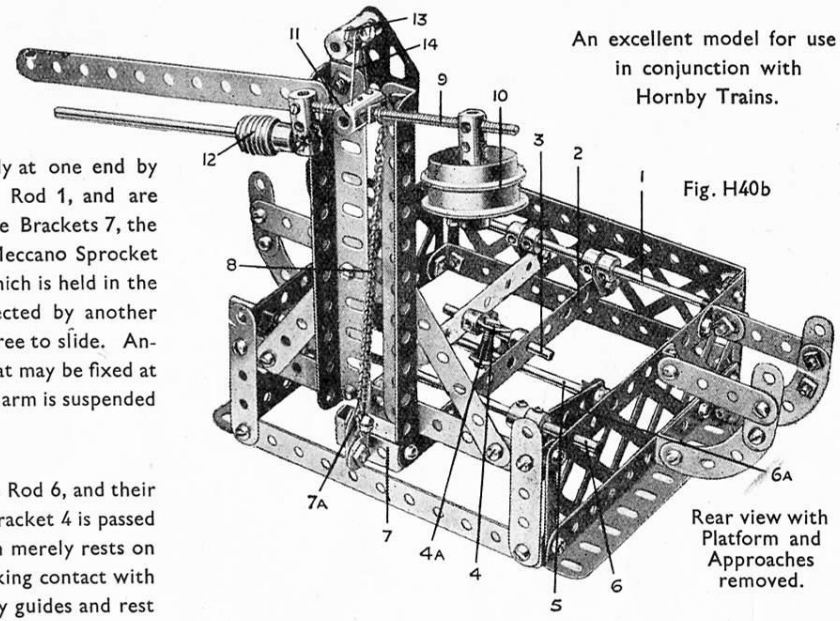


Fig. H40a

Underneath view of Weighing Platform.

Two $5\frac{1}{2}$" Strips 2 (Fig. H40b) are supported pivotally at one end by Flat Brackets held loosely between Collars on the Rod 1, and are spaced apart at the other end by two $\frac{1}{2}$" Reversed Angle Brackets 7, the out-turned portions of which carry a Flat Bracket 7a. Meccano Sprocket Chain 8 connects the Bracket 7a with the Screwed Rod 9, which is held in the centre transverse hole of a Coupling 11. This Rod 9 is connected by another Coupling to a $4\frac{1}{2}$" Rod on which a weight 12 (a Worm Wheel) is free to slide. Another weight 10 (two Flanged Wheels) is secured to a Coupling that may be fixed at any suitable point on the other end of the balance arm, and the entire arm is suspended from the Coupling 13 by means of a piece of strong silk 14.

Two $2\frac{1}{2}$" Strips 6a are connected pivotally by Flat Brackets to the Rod 6, and their other ends hold a Rod 5 that passes under the Strips 2. A Double Bracket 4 is passed over the Rods 3 and 5 and held in place by a $\frac{3}{4}$" Bolt 4a. The platform merely rests on the levers in the base, the Rod 15 and Threaded Pins 18 (Fig. H40a) making contact with the Strips 2 and 6a respectively. The Angle Brackets 17 are merely guides and rest against the inner sides of the Strip Plates in the base.



An excellent model for use in conjunction with Hornby Trains.

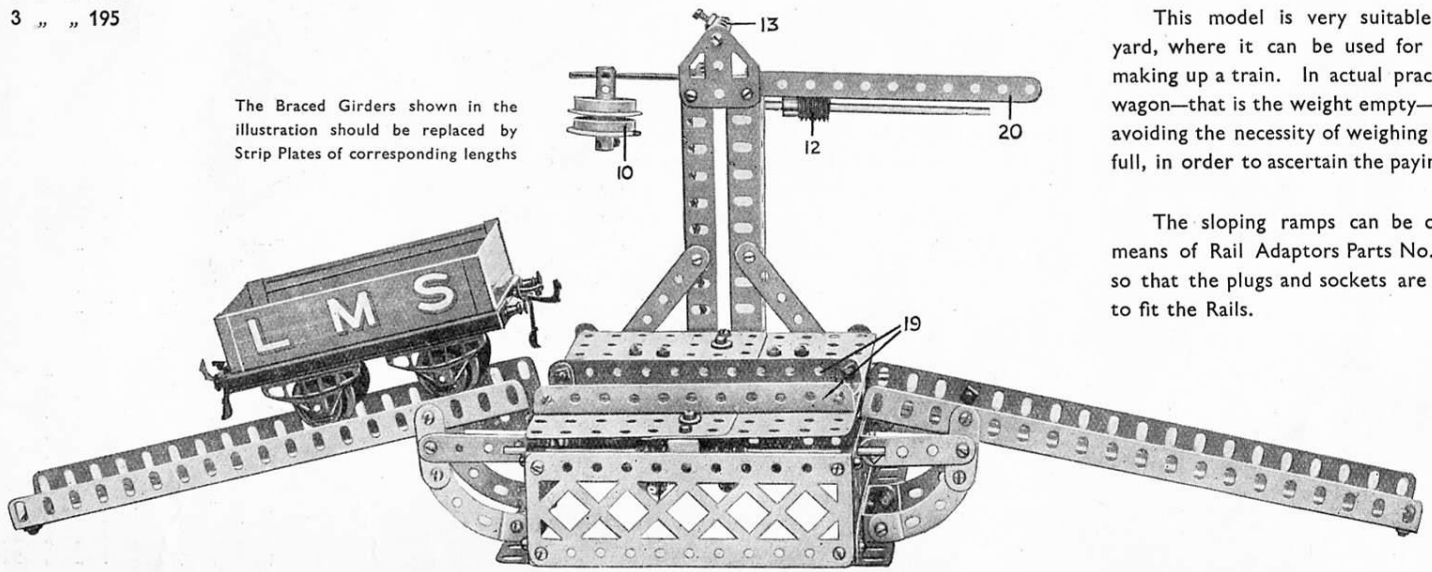
Fig. H40b

Rear view with Platform and Approaches removed.

Parts required				4 of No. 63
7 of No.	2			1 „ „ 80a
2 „ „	4			4 „ „ 90a
4 „ „	5			6" „ „ 94
4 „ „	6			1 „ „ 111
6 „ „	6a			1 „ „ 111c
4 „ „	8			2 „ „ 115
4 „ „	9			2 „ „ 125
9 „ „	10			1 „ „ 126a
1 „ „	11			3 „ „ 195
8 „ „	12			
6 „ „	12a			
2 „ „	14			
2 „ „	15a			
1 „ „	16			
1 „ „	17			
1 „ „	18a			
2 „ „	20			
1 „ „	32			
8 „ „	35			
76 „ „	37			
5 „ „	37a			
10 „ „	38			
1 „ „	46			
2 „ „	48			
4 „ „	48d			
2 „ „	52a			
13 „ „	59			

The position of the weight 10 should be adjusted so that the balance arm is horizontal when no load is applied to the platform. A truck placed on the rails 19 causes the arm 9 to be pulled downwards by the Chain 8, and the extent of the load may be calculated by noting the distance through which it is necessary to move weight 12 in order to return the arm to the horizontal.

The Braced Girders shown in the illustration should be replaced by Strip Plates of corresponding lengths



This model is very suitable for use in a Hornby goods yard, where it can be used for weighing the loaded wagons making up a train. In actual practice the tare weight of each wagon—that is the weight empty—is indicated on the side, thus avoiding the necessity of weighing the wagon twice, empty and full, in order to ascertain the paying load.

The sloping ramps can be connected to Hornby Rails by means of Rail Adaptors Parts No. 173. These should be fitted so that the plugs and sockets are in their respective positions to fit the Rails.

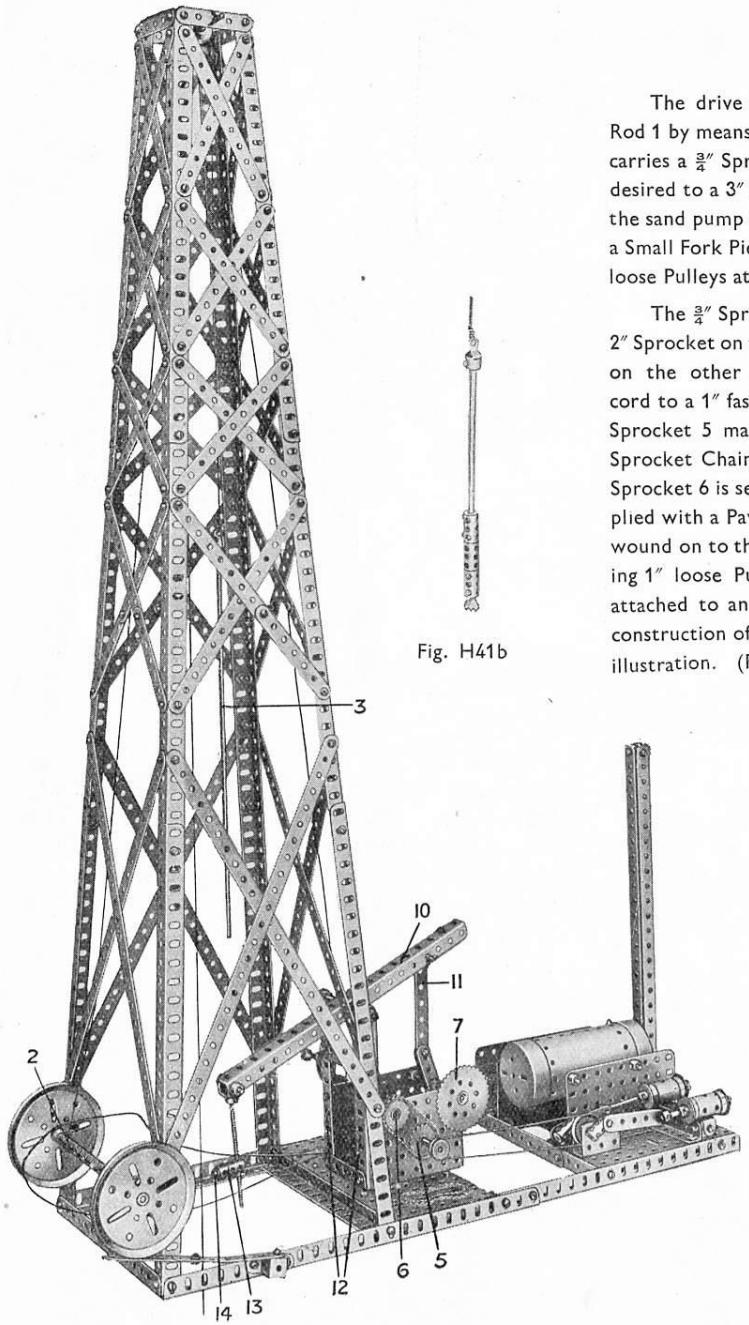


Fig. H41b

H 41
Oil Well-Drilling Apparatus.

The drive is transmitted from the Motor-armature Shaft to the Rod 1 by means of two sets of 57-teeth Gears and ½″ Pinions. This Rod carries a ¾″ Sprocket Wheel and 1″ fast Pulley that is connected when desired to a 3″ Pulley on the Rod 2, which forms the hoisting drum for the sand pump 3. The latter is represented by an 11½″ Rod secured by a Small Fork Piece to the hoisting cord, which passes over one of the 1″ loose Pulleys at the derrick head.

The ¾″ Sprocket on the Rod 1 is connected by Sprocket Chain to a 2″ Sprocket on the Rod 4. A 1″ Sprocket 5 and ½″ fast Pulley are nipped on the other end of this Rod, the ½″ Pulley being connected by cord to a 1″ fast Pulley on the crankshaft of the steam engine. The 1″ Sprocket 5 may be connected, by two different lengths of Sprocket Chain, to either of the Sprockets 6 and 7. The 1″ Sprocket 6 is secured to the tool hoisting drum, which is supplied with a Pawl and Ratchet 8. The cord is wound on to this shaft, carried over the remaining 1″ loose Pulley at the derrick head, and attached to an End Bearing on the tool, the construction of which is clearly shown in the illustration. (Fig. H41b)

The 2″ Sprocket 7 is secured to the crankshaft 9, which is built up from two short Rods and two Cranks, the latter being rigidly secured together at their ends by a ⅜″ Bolt having three Nuts. The crankshaft is connected to the beam 10 by a 3½″ Strip 11. The beam is pivoted at its centre on a 3½″ Rod journalled in the 7½″ Angle Girders 12, and a Double Bracket is attached pivotally to its inner end by means of a 1½″ Rod and Collars. A 3½″ Screwed Rod, turning freely between two Collars in the centre hole of this Double Bracket, passes through the end threaded hole of a Coupling 13. This Coupling carries a ⅜″ Bolt and Washer 14, behind which is clamped the tool cord when it is desired to carry out the actual digging operation.

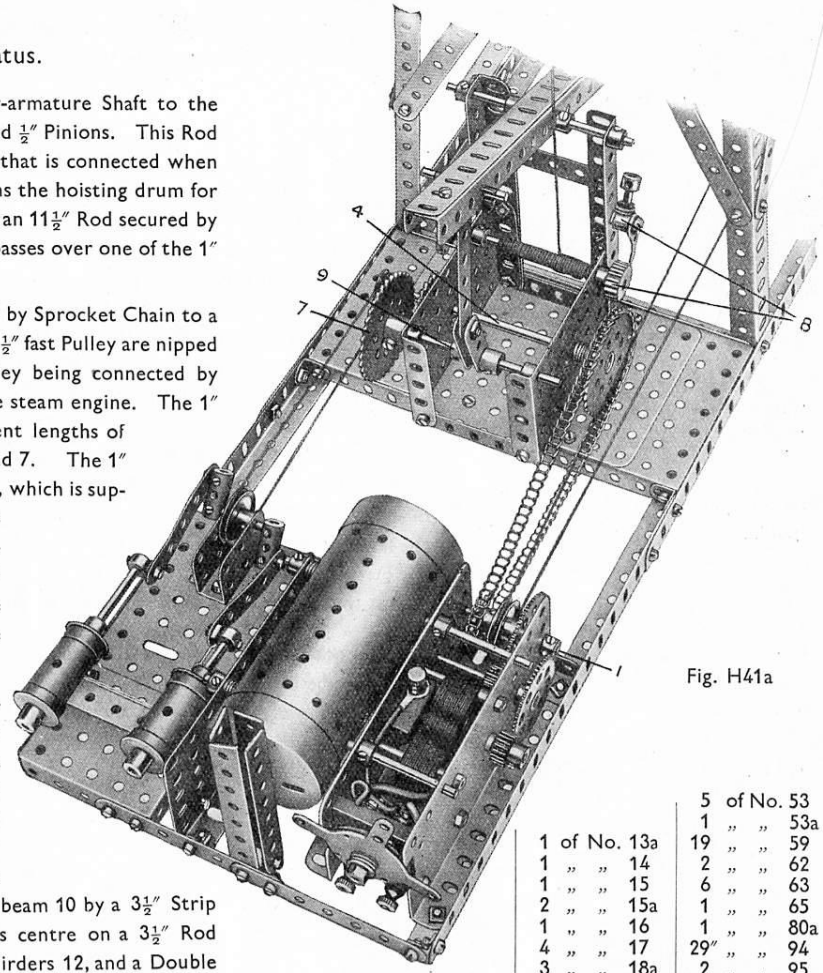


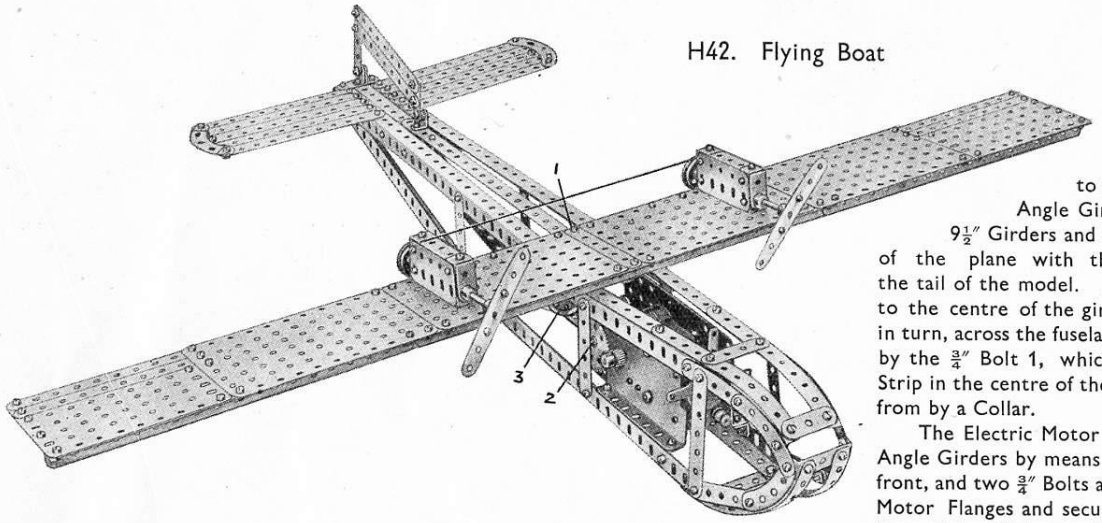
Fig. H41a

Parts required

12	of No.	1
2	„ „	1b
26	„ „	2
4	„ „	2a
11	„ „	3
7	„ „	5
14	„ „	8
4	„ „	8a
2	„ „	8b
4	„ „	9
1	„ „	9d
6	„ „	11
3	„ „	12
1	„ „	13
1	of No.	13a
1	„ „	14
1	„ „	15
2	„ „	15a
1	„ „	16
4	„ „	17
3	„ „	18a
2	„ „	19b
4	„ „	20b
2	„ „	22
2	„ „	22a
2	„ „	23a
1	„ „	26
2	„ „	27a
5	„ „	35
169	„ „	37
6	„ „	37a
20	„ „	38
2	„ „	40
1	„ „	45
2	„ „	48a
1	„ „	52
1	„ „	52a
5	of No.	53
1	„ „	53a
19	„ „	59
2	„ „	62
6	„ „	63
1	„ „	65
1	„ „	80a
29″	„ „	94
2	„ „	95
2	„ „	96
1	„ „	96a
6	„ „	111c
1	„ „	115
1	„ „	116a
2	„ „	126
1	„ „	147
1	„ „	148
1	„ „	160
1	„ „	162
2	„ „	163
1	„ „	165

No. E6 Electric Motor (not included in Outfit)

H42. Flying Boat



Parts required

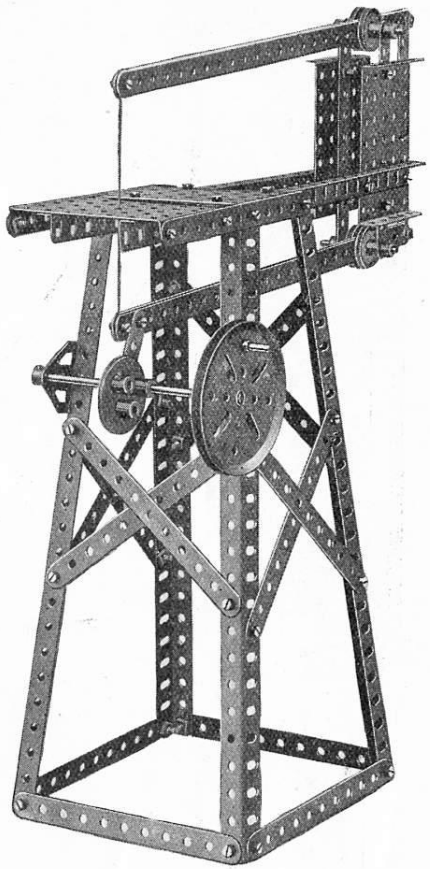
3 of No. 1	4 of No. 9	1 of No. 27a	5 of No. 59
20 „ „ 2	1 „ „ 9d	1 „ „ 29	2 „ „ 62b
2 „ „ 2a	2 „ „ 10	154 „ „ 37	4 „ „ 90
5 „ „ 3	8 „ „ 11	5 „ „ 37a	2 „ „ 90a
4 „ „ 4	8 „ „ 12	12 „ „ 38	4 „ „ 103f
6 „ „ 5	2 „ „ 15a	1 „ „ 45	3 „ „ 111
2 „ „ 6	2 „ „ 16a	2 „ „ 46	2 „ „ 111c
5 „ „ 6a	1 „ „ 21	1 „ „ 48	No. E6 Electric Motor (not included in outfit)
5 „ „ 8	2 „ „ 22	4 „ „ 52a	
4 „ „ 8a	1 „ „ 26	2 „ „ 53a	

The Flat Plates of the mainplane are secured to a girder consisting of one 12½″ Angle Girder extended at each end by 9½″ Girders and bolted along the leading edge of the plane with the projecting flange toward the tail of the model. A 2½″ Angle Girder is bolted to the centre of the girder so formed and is secured, in turn, across the fuselage. The wings are held rigid by the ¾″ Bolt 1, which is passed through the 12½″ Strip in the centre of the fuselage but is spaced therefrom by a Collar.

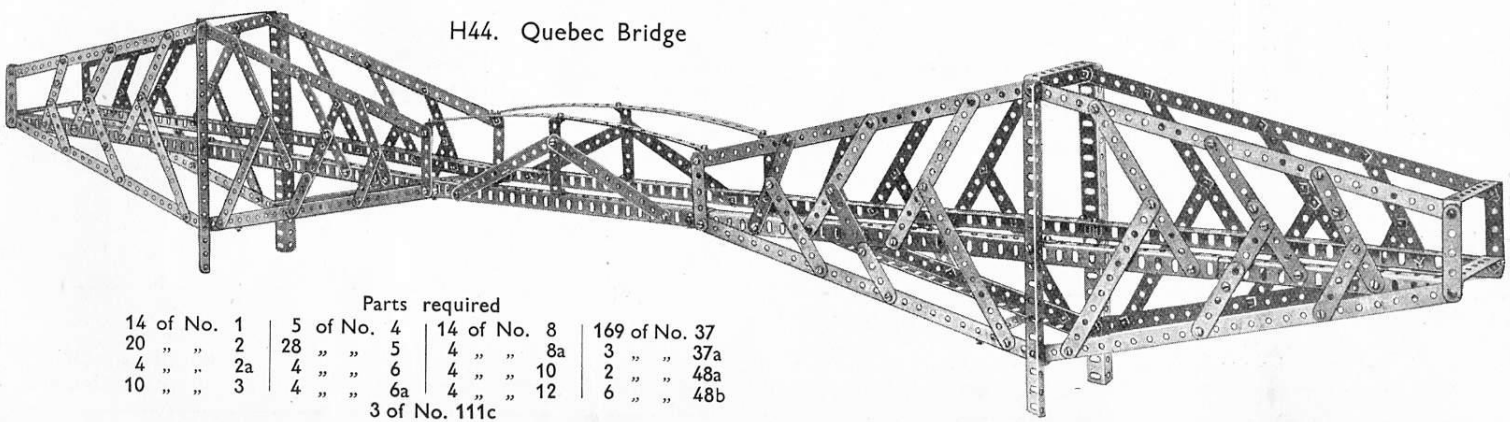
The Electric Motor is fixed to the lower pair of Angle Girders by means of two Angle Brackets at the front, and two ¾″ Bolts at the rear passed through the Motor Flanges and secured by nuts below the lower faces of the Girders. The armature spindle carries a ½″ Pinion meshing with a 57-teeth gear on the 2½″ Rod 2, which carries a ¾″ Contrate Wheel. The latter engages a Pinion on a further 2½″ Rod to which the 1½″ Pulley 3 is secured. Bearings for the Rod are formed by a 1½″ Strip and Double Bent Strip which are bolted by Angle Brackets to the side plates of the Motor. Cord is passed round the Pulley 3 to each of the 1″ Pulleys on the propeller shafts of the miniature engines.

Each of the engines consists of two 2½″ Flat Girders and a 2½″×1″ Double Angle Strip held together by means of Double Brackets and fixed to the wings by similar means.

H43. Fret Saw



H44. Quebec Bridge



Parts required

14 of No. 1	5 of No. 4	14 of No. 8	169 of No. 37
20 „ „ 2	28 „ „ 5	4 „ „ 8a	3 „ „ 37a
4 „ „ 2a	4 „ „ 6	4 „ „ 10	2 „ „ 48a
10 „ „ 3	4 „ „ 6a	4 „ „ 12	6 „ „ 48b

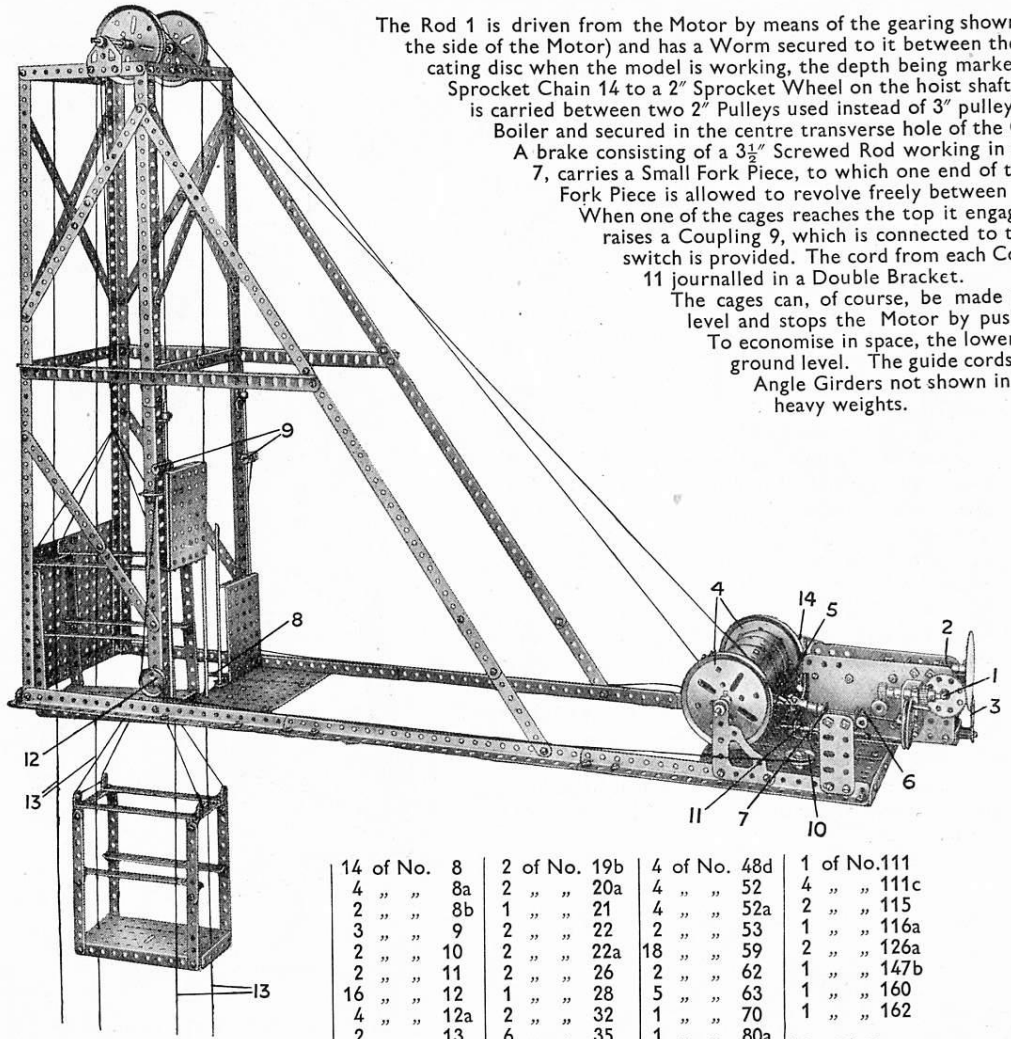
3 of No. 111c

Parts required

4 of No. 1	4 of No. 22
17 „ „ 2	53 „ „ 37
6 „ „ 8	4 „ „ 53
1 „ „ 15	5 „ „ 59
2 „ „ 17	1 „ „ 115
1 „ „ 19b	2 „ „ 126a

1 of No. 130

H45. Pit-Head Gear (Electric)



The Rod 1 is driven from the Motor by means of the gearing shown (the short Rod carrying the two ½″ Pinions being journalled in a Channel Bearing bolted to the side of the Motor) and has a Worm secured to it between the Motor side plates. This Worm engages with the ½″ Pinion 2, which rotates the depth indicating disc when the model is working, the depth being marked by the fixed pointer 3. A ¾″ Sprocket secured to the end of Rod 1 is connected by the Sprocket Chain 14 to a 2″ Sprocket Wheel on the hoist shaft, which consists of two 4½″ Rods joined together by a Coupling. The winding drum, a Boiler, is carried between two 2″ Pulleys used instead of 3″ pulleys 4, and to prevent the drum from slipping, a 3½″ Rod 5 is passed through both sides of the Boiler and secured in the centre transverse hole of the Coupling joining the two halves of the winding shaft.

A brake consisting of a 3½″ Screwed Rod working in the threaded hole of a fixed Coupling 6 and in the end hole of the 1″×1″ Angle Bracket 7, carries a Small Fork Piece, to which one end of the brake band is secured, the other end being attached to the base of the model. The Fork Piece is allowed to revolve freely between a Collar and locknuts.

When one of the cages reaches the top it engages with the 1½″ Strip 8 and thus raises the gate. As the latter nears the top of the slide it raises a Coupling 9, which is connected to the reversing lever of the Motor by a length of cord. In this way a very effective safety switch is provided. The cord from each Coupling 9 passes round a 1″ loose Pulley 12 and a 1″ fast Pulley 10 and finally round a 1½″ Rod 11 journalled in a Double Bracket.

The cages can, of course, be made to descend to any desired depth, but they must be arranged so that as one reaches ground level and stops the Motor by pushing the gate against one of the Couplings 9, the other is exactly at the bottom of the shaft. To economise in space, the lower cage is shown raised in the illustration to a point just below the cage which has reached ground level. The guide cords 13 are secured at the top to 5½″ Strips secured across the framework and at the bottom to 9½″ Angle Girders not shown in the illustration. The latter girders should be screwed to the floor or held down firmly by heavy weights.

Parts required

4	of No.	1
2	„ „	1b
26	„ „	2
4	„ „	2a
6	„ „	3
2	„ „	5
3	„ „	6a
14	of No.	8
4	„ „	8a
2	„ „	8b
3	„ „	9
2	„ „	10
2	„ „	11
16	„ „	12
4	„ „	12a
2	„ „	13
1	„ „	13a
2	„ „	14
2	„ „	16
1	„ „	16a
2	„ „	17
4	„ „	18a
2	of No.	19b
2	„ „	20a
1	„ „	21
2	„ „	22
2	„ „	22a
2	„ „	26
1	„ „	28
2	„ „	32
6	„ „	35
167	„ „	37
6	„ „	37a
13	„ „	38
4	„ „	40
1	„ „	48
4	„ „	48a
4	of No.	48d
4	„ „	52
4	„ „	52a
2	„ „	53
18	„ „	59
2	„ „	62
5	„ „	63
1	„ „	70
1	„ „	80a
16″	„ „	94
1	„ „	95
1	„ „	96
1	„ „	103f
2	„ „	108
1	„ „	109
1	of No.	111
4	„ „	111c
2	„ „	115
1	„ „	116a
2	„ „	126a
1	„ „	147b
1	„ „	160
1	„ „	162

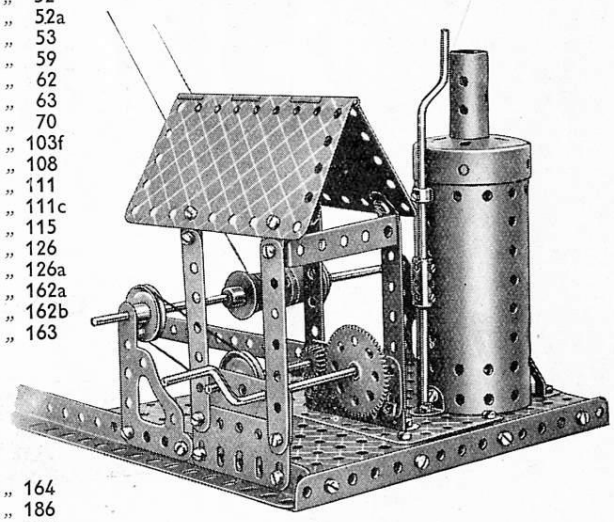
No. E6 Electric Motor (not included in Outfit)

H46. Pit-Head Gear (Hand Operated)

Parts required

4	of No.	1
2	„ „	1b
26	„ „	2
4	„ „	2a
10	„ „	3
3	„ „	5
2	„ „	6a
14	„ „	8
4	„ „	8a
2	„ „	8b
3	„ „	9
2	„ „	10
13	„ „	12
4	„ „	12a
4	„ „	12c
2	„ „	13
2	„ „	14
2	„ „	15a
2	„ „	16
2	„ „	18a
1	„ „	19
1	„ „	19s
2	„ „	20b
2	„ „	22a
1	„ „	26
1	„ „	27a
1	„ „	28
2	„ „	35
178	„ „	37
2	„ „	37a
13	of No.	38
4	„ „	40
5	„ „	48a
4	„ „	48d
4	„ „	52
4	„ „	52a
2	„ „	53
15	„ „	59
2	„ „	62
5	„ „	63
1	„ „	70
3	„ „	103f
2	„ „	108
1	„ „	111
4	„ „	111c
1	„ „	115
1	„ „	126
2	„ „	126a
1	„ „	162a
1	„ „	162b
2	„ „	163
1	„ „	164
1	„ „	186
1	„ „	198

The construction of this model is exactly the same as that of the electrically operated model, with the exception of the alterations necessary at that section representing the winding engine.



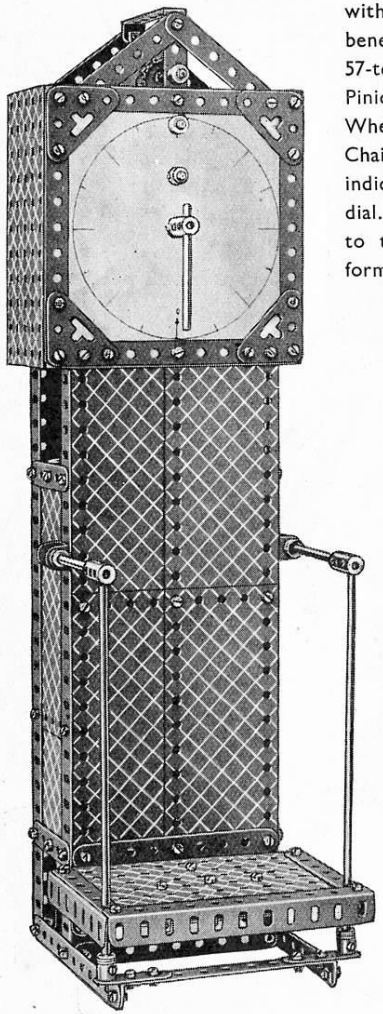
HOW TO CONTINUE

This completes our examples of models that may be made with MECCANO Outfit H (or G and Ga). The next models are a little more advanced, requiring extra parts to construct them. The necessary parts are all contained in a Ha Accessory Outfit, the price of which may be obtained from any Meccano dealer.

K1. Automatic Weighing Machine

The weighing platform is formed from a $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plate strengthened by means of Angle Girders, and secured to four Couplings by means of $\frac{3}{8}''$ Bolts. The Couplings are arranged as shown in Fig. K1a and are connected to the lower end of an $11\frac{1}{2}''$ Axle Rod that is free to slide in two $4\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips bolted across the centre of the frame. A Bush Wheel is secured on the Rod and one end of a length of Chain is attached to it. The Chain passes over a $\frac{3}{4}''$ Sprocket at the head of the model and is attached to a Spring, the lower end of which is anchored to the upper $4\frac{1}{2}''$ Double Angle Strip.

A 57-teeth Gear is carried on the same Rod as the Sprocket and meshes with a $\frac{1}{2}''$ Pinion on a Rod immediately beneath. This Pinion engages a second 57-teeth Gear that is in mesh with a $\frac{1}{2}''$ Pinion on the Rod carrying the pointer. When a load is placed on the platform the Chain causes the pointer to rotate, thus indicating the weight on the calibrated dial. The Spring returns the platform to the normal position against stops formed by Collars fixed on the handrails.



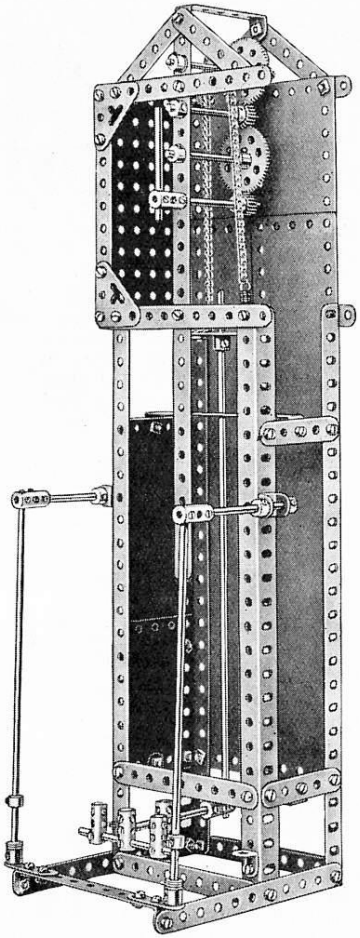


Fig. K1a

Parts required

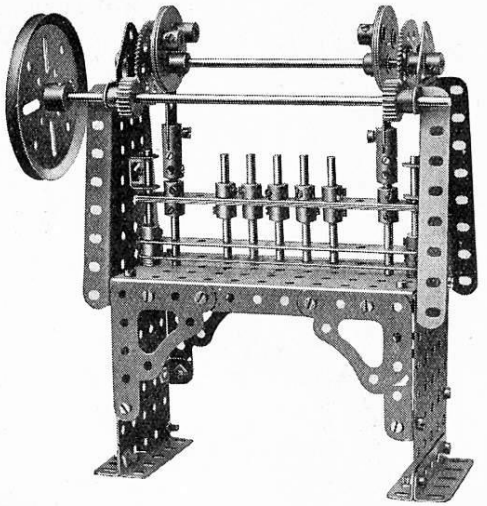
1	of No.	1
8	„ „	2
4	„ „	2a
4	„ „	4
4	„ „	5
1	„ „	6
4	„ „	8
1	„ „	9
2	„ „	9b
2	„ „	11
2	„ „	12
1	„ „	13
2	„ „	13a
6	„ „	16
1	„ „	16a
2	„ „	16b
1	„ „	24
2	„ „	26
2	„ „	27a
75	of No.	37
7	„ „	38
1	„ „	40
1	„ „	43
1	„ „	48a
3	„ „	48c
2	„ „	52
1	„ „	52a
13	„ „	59
2	„ „	62
8	of No.	63
12″	„ „	94
1	„ „	96a
4	„ „	111c
4	„ „	133
2	„ „	194
8	„ „	195
2	„ „	197

Cardboard for dial.

K2. Punching Press

Parts required

5	of No.	2
2	„ „	6
2	„ „	9d
2	„ „	11
1	„ „	13a
1	„ „	14
9	„ „	17
1	„ „	19b
2	„ „	25
2	„ „	27a
34	„ „	37
6	„ „	38
2	„ „	48a
1	„ „	52
2	„ „	53
2	„ „	54a
21	„ „	59
2	„ „	63b
4	„ „	108
2	„ „	126a
2	„ „	130

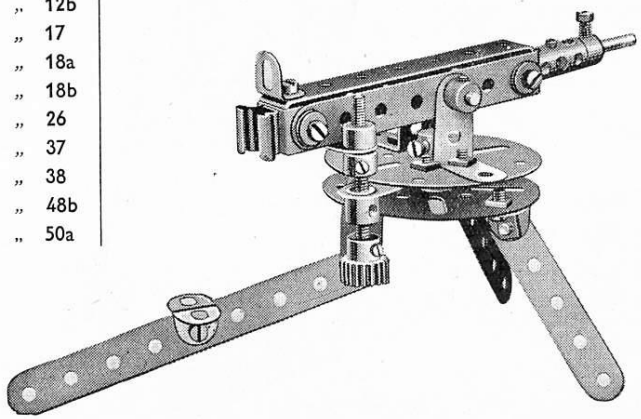


K3. Machine Gun

Parts required

1	of No.	2a
2	„ „	3
2	„ „	5
2	„ „	11
5	„ „	12
2	„ „	12a
2	„ „	12b
1	„ „	17
1	„ „	18a
1	„ „	18b
1	„ „	26
17	„ „	37
8	„ „	38
1	„ „	48b
1	„ „	50a
7	of No.	59
1	„ „	62a
1	„ „	63
1	„ „	81
2	„ „	109

The gun barrel is elevated by turning the $\frac{1}{2}''$ Pinion Wheel that is secured to a 2″ Screwed Rod. The Rod passes through the boss of a Threaded Crank that is secured to the upper Face Plate, and carries a Collar on each side of a $1'' \times \frac{1}{2}''$ Angle Bracket that is secured to the rear of the gun.



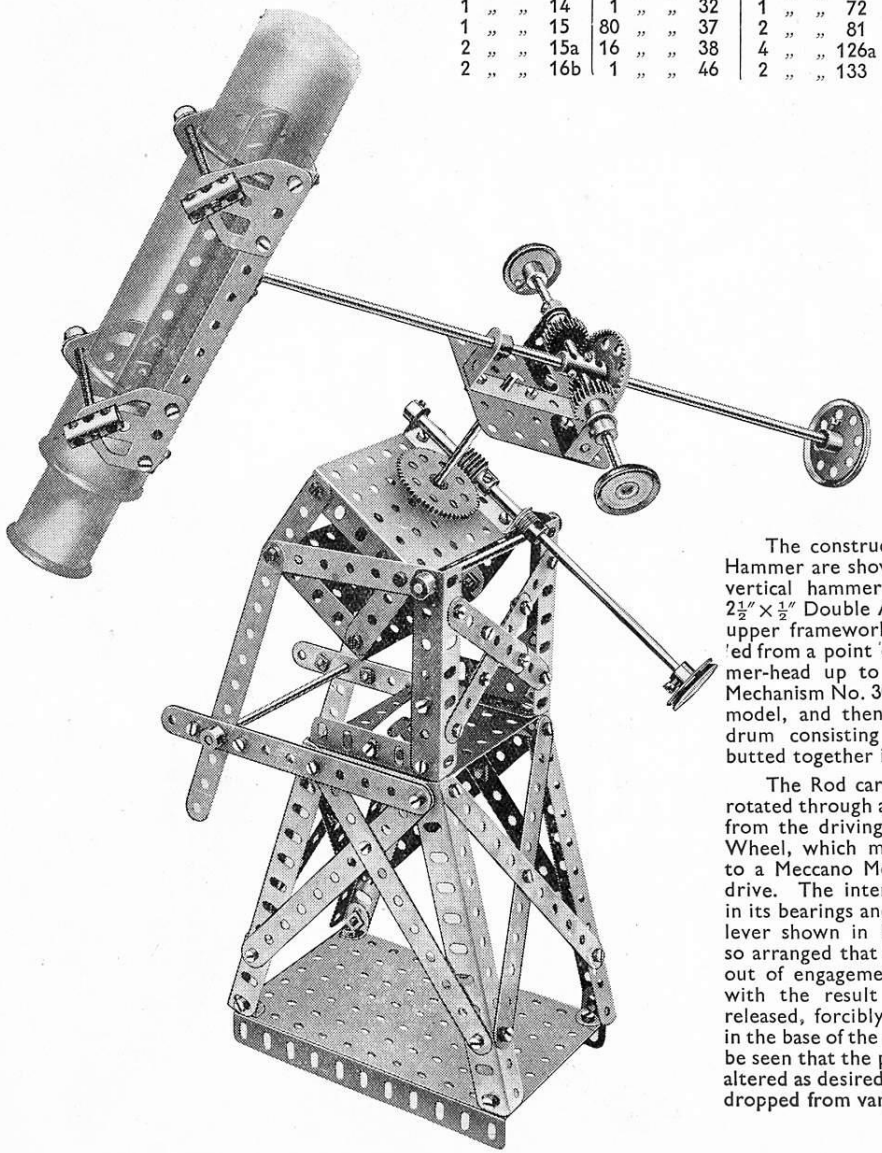
K4.

Equatorial Mounting

Parts required

4	of No.	2	4	of No.	4	8	of No.	9	1	of No.	21
2	„	3	4	„	6	2	„	9b	3	„	22
			2	„	6a	2	„	9d	2	„	24
						4	„	12	2	„	25
						2	„	12a	1	„	27a
						1	„	13	1	„	28
						1	„	14	1	„	32
						1	„	15	80	„	37
						2	„	15a	16	„	38
						2	„	16b	1	„	46

1	of No.	48a
1	„	52a
3	„	53
9	„	59
2	„	62
3	„	63
1	„	72
2	„	81
4	„	126a
2	„	133



The constructional details of the Drop Hammer are shown in the illustration. The vertical hammer shaft is guided through $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips secured in the upper framework. The operating Cord is led from a point on the shaft near the hammer-head up to a guide Pulley (Standard Mechanism No. 30) situated at the top of the model, and thence down to the winding drum consisting of two Flanged Wheels butted together in the gear-box.

The Rod carrying the winding drum is rotated through a chain of reduction gearing from the driving shaft carrying a Sprocket Wheel, which may, of course, be coupled to a Meccano Motor or any other form of drive. The intermediate shaft is slidable in its bearings and is controlled by the hand lever shown in Fig. K5a. The gears are so arranged that they may be easily slipped out of engagement with the driving shaft, with the result that the hammer, being released, forcibly strikes the table secured in the base of the machine. From this it will be seen that the power of the blow may be altered as desired, since the hammer may be dropped from varying heights.

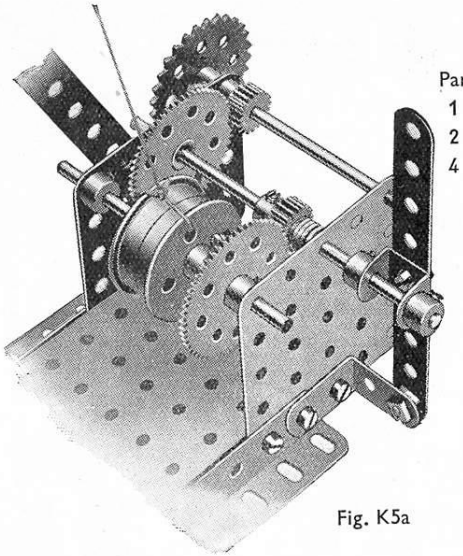


Fig. K5a

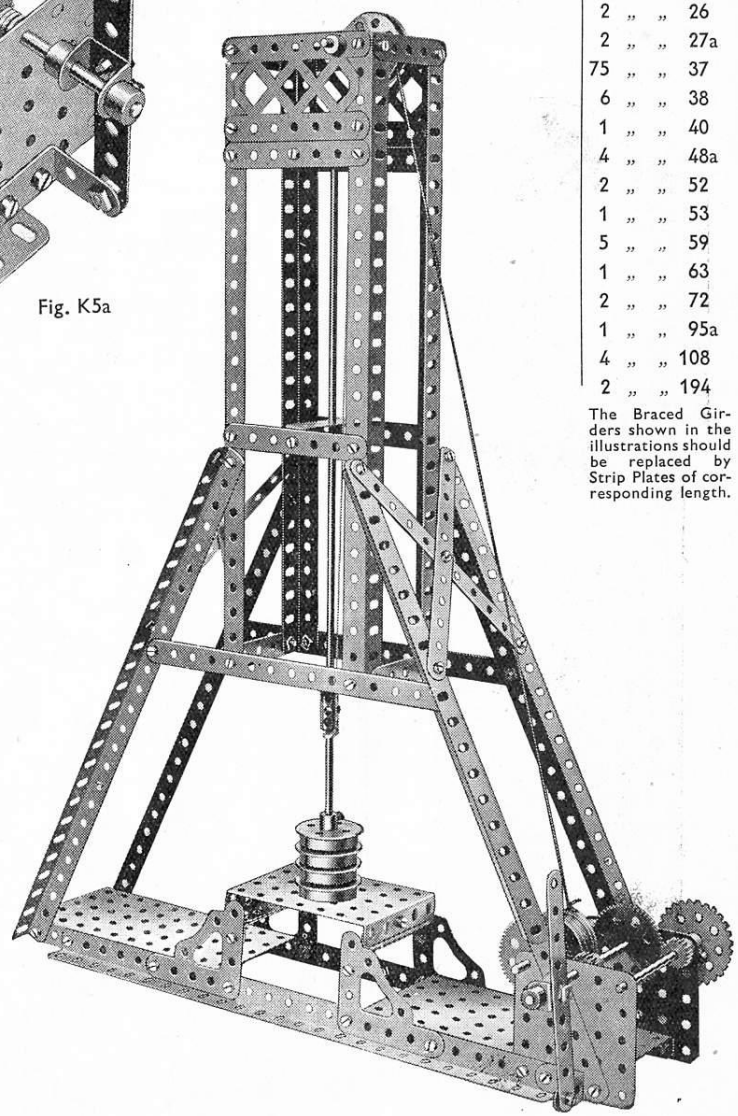
K5.

Drop Hammer

Parts required

1	of No.	1	1	of No.	2a	2	of No.	9d	1	of No.	15a
2	„	1b	4	„	3	1	„	11	4	„	16
4	„	2	4	„	5	1	„	12a	6	„	20
			10	„	8	1	„	13	1	„	22a
									2	„	24
									2	„	26
									2	„	27a
									75	„	37
									6	„	38
									1	„	40
									4	„	48a
									2	„	52
									1	„	53
									5	„	59
									1	„	63
									2	„	72
									1	„	95a
									4	„	108
									2	„	194

The Braced Girders shown in the illustrations should be replaced by Strip Plates of corresponding length.



K6. Dutch Windmill

Parts required

12 of No.	1	2 of No.	52a
18 „ „	2	2 „ „	53
4 „ „	3	5 „ „	59
4 „ „	4		
18 „ „	5		
4 „ „	8		
24 „ „	12		
1 „ „	14		
3 „ „	16		
1 „ „	21		
2 „ „	22		
1 „ „	24		
2 „ „	26		
1 „ „	27a		
1 „ „	32		
124 „ „	37		
2 „ „	40		
2 „ „	48a		
2 „ „	52		

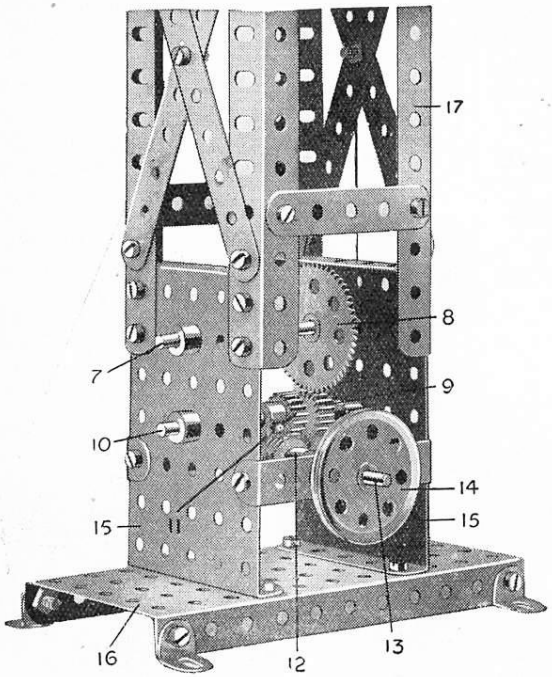
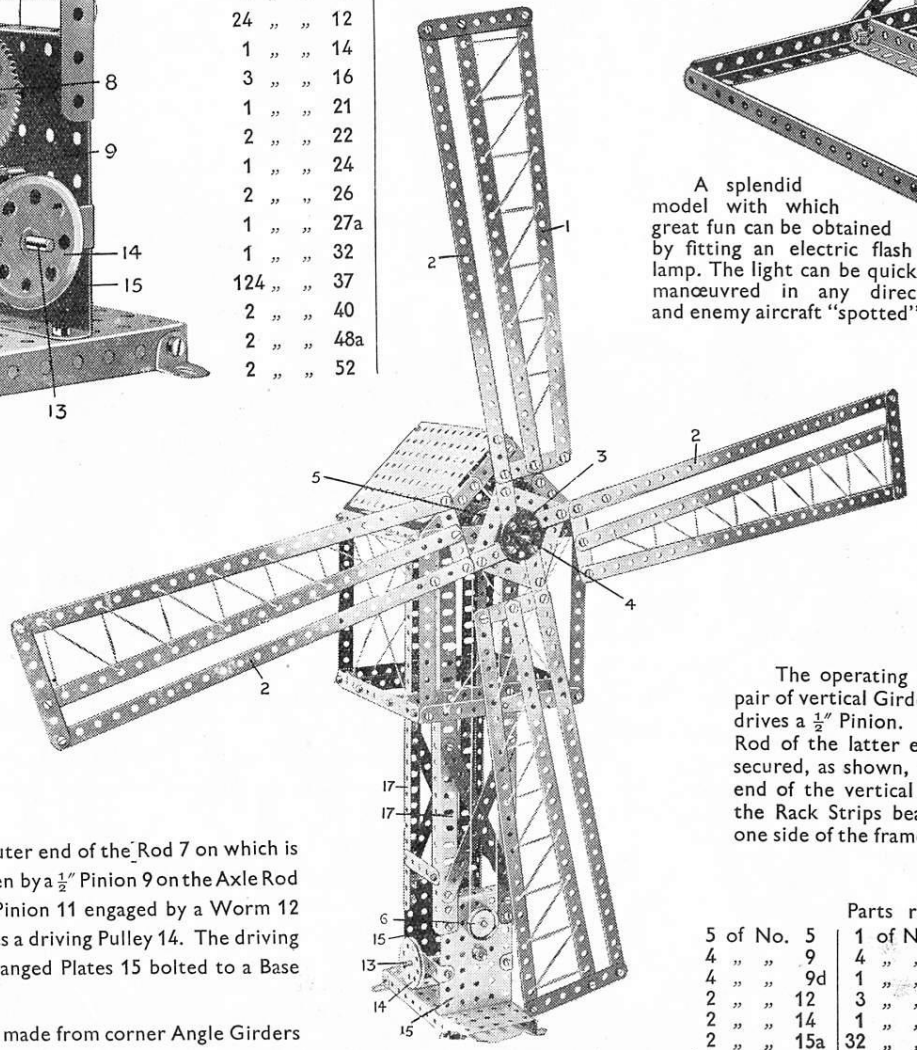


Fig. K6a



The construction of the sails 1 of the mill will be readily followed from the illustration. They are bolted to an inner strip frame 2 and to a Bush Wheel 3 fixed on a Rod 4, on which is also mounted a Pulley Wheel 5. The driving cord passes round this Pulley Wheel to a lower Pulley Wheel 6, the driving of which will be followed from Fig. K6a.

The Pulley Wheel 6 is on the outer end of the Rod 7 on which is fitted a 57-teeth Gear Wheel 8 driven by a $\frac{1}{2}$" Pinion 9 on the Axle Rod 10. The Axle Rod carries also a $\frac{1}{2}$" Pinion 11 engaged by a Worm 12 on the driving shaft 13 which carries a driving Pulley 14. The driving gear is enclosed in two $3\frac{1}{2}$" × $2\frac{1}{2}$" Flanged Plates 15 bolted to a Base Plate 16.

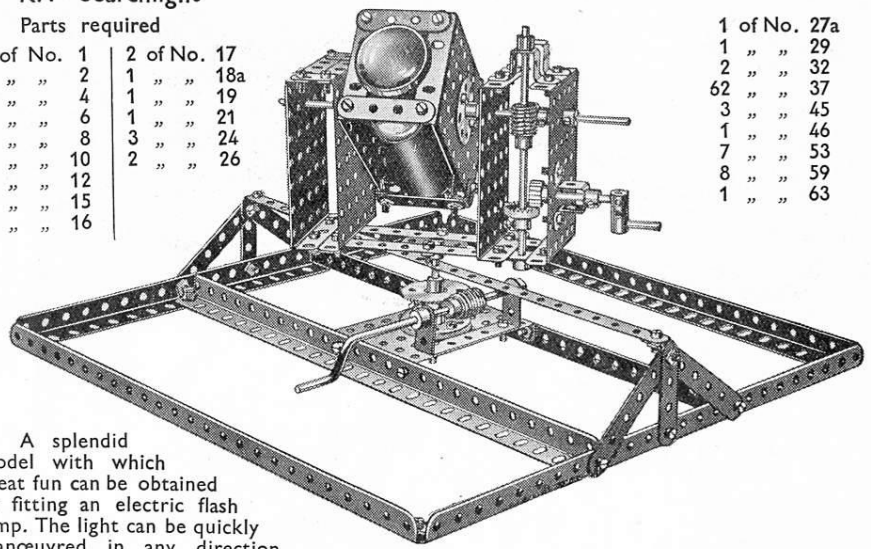
The vertical tower of the mill is made from corner Angle Girders 17 bolted to side Plates 15.

K7. Searchlight

Parts required

1 of No.	1	2 of No.	17
2 „ „	2	1 „ „	18a
4 „ „	4	1 „ „	19
6 „ „	6	1 „ „	21
6 „ „	8	3 „ „	24
2 „ „	10	2 „ „	26
6 „ „	12		
1 „ „	15		
1 „ „	16		

1 of No.	27a
1 „ „	29
2 „ „	32
62 „ „	37
3 „ „	45
1 „ „	46
7 „ „	53
8 „ „	59
1 „ „	63



A splendid model with which great fun can be obtained by fitting an electric flash lamp. The light can be quickly manœuvred in any direction and enemy aircraft "spotted" at once.

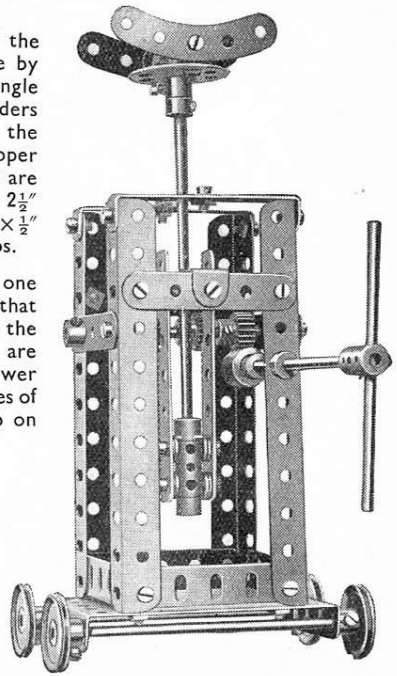
K8. Jack

The frame for the model Jack is made by bolting four $5\frac{1}{2}$" Angle Girders to $2\frac{1}{2}$" Girders that are fixed to the base plate. The upper ends of the Girders are spaced apart by $2\frac{1}{2}$" Strips and $2\frac{1}{2}$" × $\frac{1}{2}$" Double Angle Strips.

The operating handle is journalled in one pair of vertical Girders and carries a Worm that drives a $\frac{1}{2}$" Pinion. Two similar Pinions on the Rod of the latter engage Rack Strips that are secured, as shown, to a Coupling at the lower end of the vertical sliding Rod. The edges of the Rack Strips bear against the $2\frac{1}{2}$" Strip on one side of the frame.

Parts required

5 of No.	5	1 of No.	16b	3 of No.	48a
4 „ „	9	4 „ „	22	1 „ „	53
4 „ „	9d	1 „ „	24	7 „ „	59
2 „ „	12	3 „ „	26	2 „ „	63
2 „ „	14	1 „ „	32	2 „ „	90
2 „ „	15a	32 „ „	37	2 „ „	110
1 „ „	16	8 „ „	38		



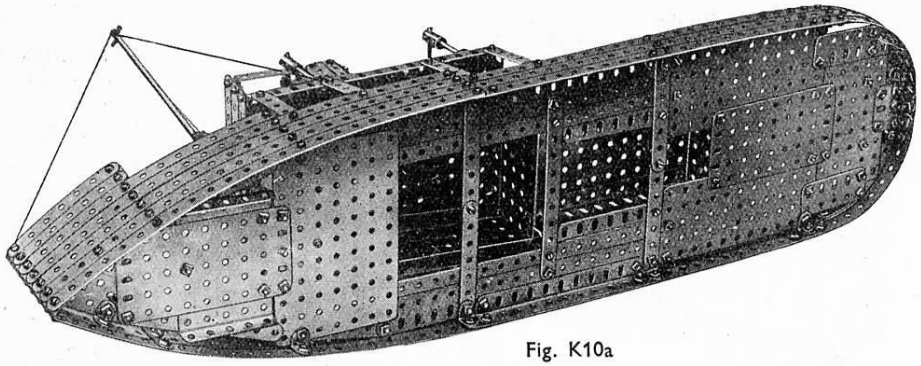


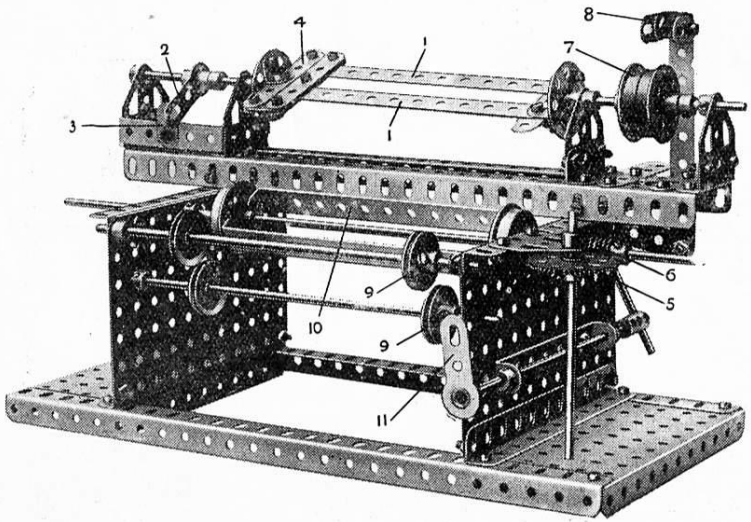
Fig. K10a

K9. Linen Winder

Parts required							
2	of No.	2	7	of No.	12	2	of No. 24
1	„	„ 2a	1	„	„ 13	1	„ „ 27a
8	„	„ 5	2	„	„ 13a	1	„ „ 32
4	„	„ 8	1	„	„ 14	66	„ „ 37
4	„	„ 9	1	„	„ 15a	2	„ „ 37a
4	„	„ 9f	2	„	„ 16	1	„ „ 37b
6	„	„ 10	1	„	„ 16a	6	„ „ 38
1	„	„ 11	4	„	„ 20	1	„ „ 44
			4	„	„ 22	1	„ „ 48a

1	of No.	48b
2	„ „	48d
2	„ „	52
2	„ „	52a
16	„ „	59
2	„ „	62
2	„ „	63
5	„ „	126a

In order to disengage the winding frame bars 1 the Crank 2 is lifted clear of the stop 3 and drawn back, this action disengaging the end cross Strips 4 from the tips of the frame bars 1 and permitting the wound linen to be removed. The Gear Wheel 5 engaging the Worm 6 forms a counter. The belt pulley consists of two $1\frac{1}{8}$" Flanged Wheels, one fixed and one free, and the driving belt is guided from one to the other by the Flat Brackets 8 controlled by the Crank 11.

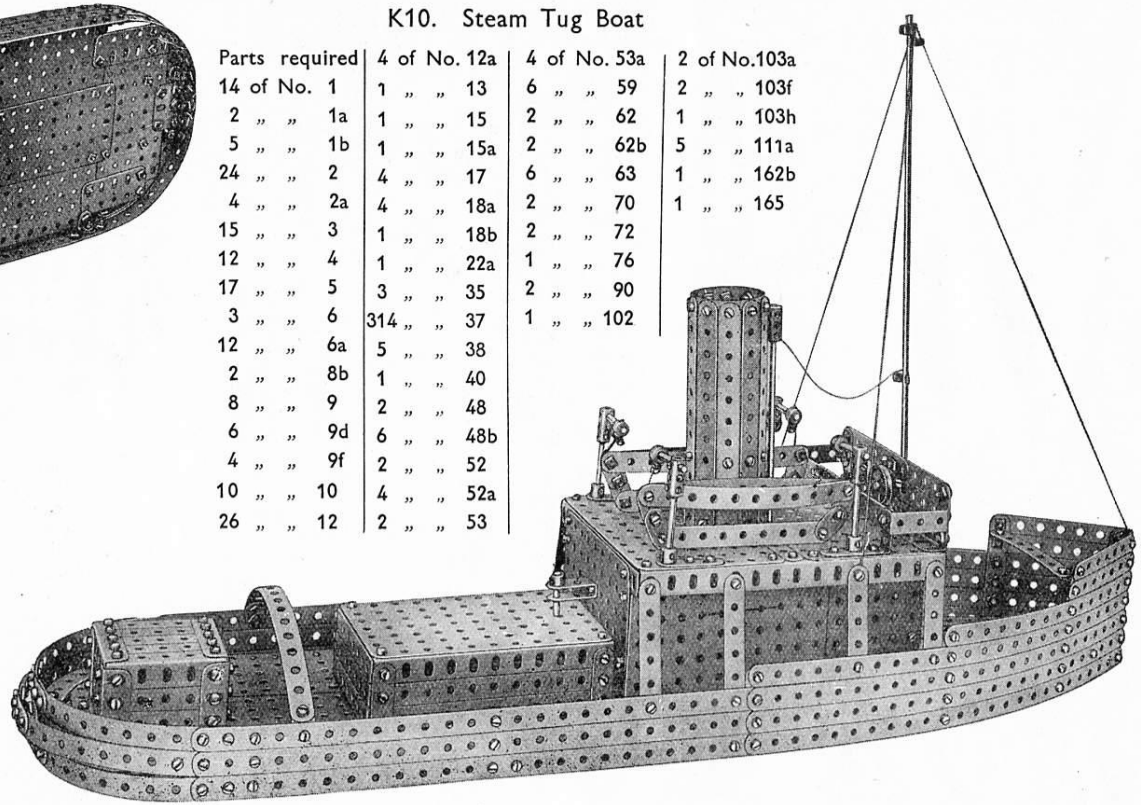


K10. Steam Tug Boat

Parts required							
14	of No.	1	1	„	„ 13	4	of No. 12a
2	„	„ 1a	1	„	„ 15	1	„ „ 13
5	„	„ 1b	1	„	„ 15a	1	„ „ 15
24	„	„ 2	4	„	„ 17	1	„ „ 15a
4	„	„ 2a	4	„	„ 18a	4	„ „ 17
15	„	„ 3	1	„	„ 18b	4	„ „ 18a
12	„	„ 4	1	„	„ 22a	1	„ „ 18b
17	„	„ 5	3	„	„ 35	1	„ „ 22a
3	„	„ 6	314	„	„ 37	3	„ „ 35
12	„	„ 6a	5	„	„ 38	314	„ „ 37
2	„	„ 8b	1	„	„ 40	5	„ „ 38
8	„	„ 9	2	„	„ 48	1	„ „ 40
6	„	„ 9d	6	„	„ 48b	2	„ „ 48
4	„	„ 9f	2	„	„ 52	4	„ „ 52
10	„	„ 10	4	„	„ 52a	2	„ „ 53
26	„	„ 12	2	„	„ 53	4	„ „ 53a

6	„ „	59
2	„ „	62
2	„ „	62b
6	„ „	63
2	„ „	70
2	„ „	72
1	„ „	76
2	„ „	90
1	„ „	102

2	of No.	103a
2	„ „	103f
1	„ „	103h
5	„ „	111a
1	„ „	162b
1	„ „	165



The funnel comprises ten $5\frac{1}{2}$" Strips bolted to a Boiler, which is compressed so that the edges overlap three holes, and it is secured to the superstructure by two $\frac{1}{2}$" × $\frac{1}{2}$" and one 1" × 1" Angle Brackets. The sides of the superstructure each consist of a $5\frac{1}{2}$" × $2\frac{1}{2}$" Flanged Plate and a $2\frac{1}{2}$" × $2\frac{1}{2}$" Flat Plate bolted end to end with a $7\frac{1}{2}$" Strip secured along the bottom. A $4\frac{1}{2}$" × $2\frac{1}{2}$" Flat Plate is bolted across the end flanges of the $5\frac{1}{2}$" × $2\frac{1}{2}$" Plates at the rear, and at the forward end of the superstructure a $3\frac{1}{2}$" × $2\frac{1}{2}$" Flanged Plate and two $3\frac{1}{2}$" × $\frac{1}{2}$" Double Angle Strips are secured.

The steam whistle is represented by a Coupling which is held to the funnel by a Bolt screwed into its centre tapped hole. A Rod secured in the Coupling and passed through a hole in the deck of the superstructure, represents the steam pipe.

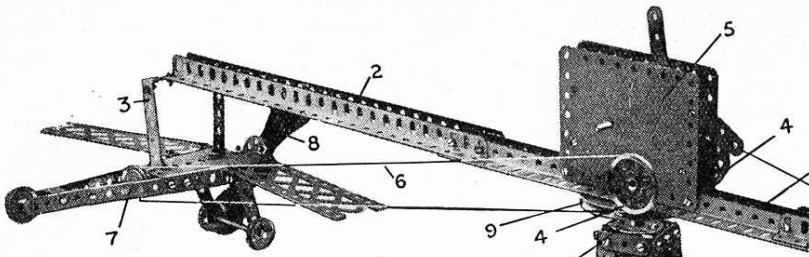
The mast consists of an $11\frac{1}{2}$" Rod extended at its lower end by a $4\frac{1}{2}$" Rod held in a Coupling. The latter is secured by means of a Bolt passed through the $5\frac{1}{2}$" Angle Girder of the bridge and inserted in its lower tapped hole, while the $4\frac{1}{2}$" Rod is passed through the deck of the model. A $\frac{1}{2}$" Bolt carries a 1" loose Pulley and a " spider " (removed from a Swivel Bearing), and is screwed into the upper tapped hole of the Coupling. Four $\frac{1}{2}$" Bolts are screwed into the tapped bores of the " spider."

The lifeboats, of which there are two, are constructed very simply, two $5\frac{1}{2}$" Strips that are bolted together at each end and bent to form the gunwales, being connected by means of Flat Brackets to a lower $4\frac{1}{2}$" Strip that forms the keel. Each completed boat is secured to its respective davits by two short lengths of cord.

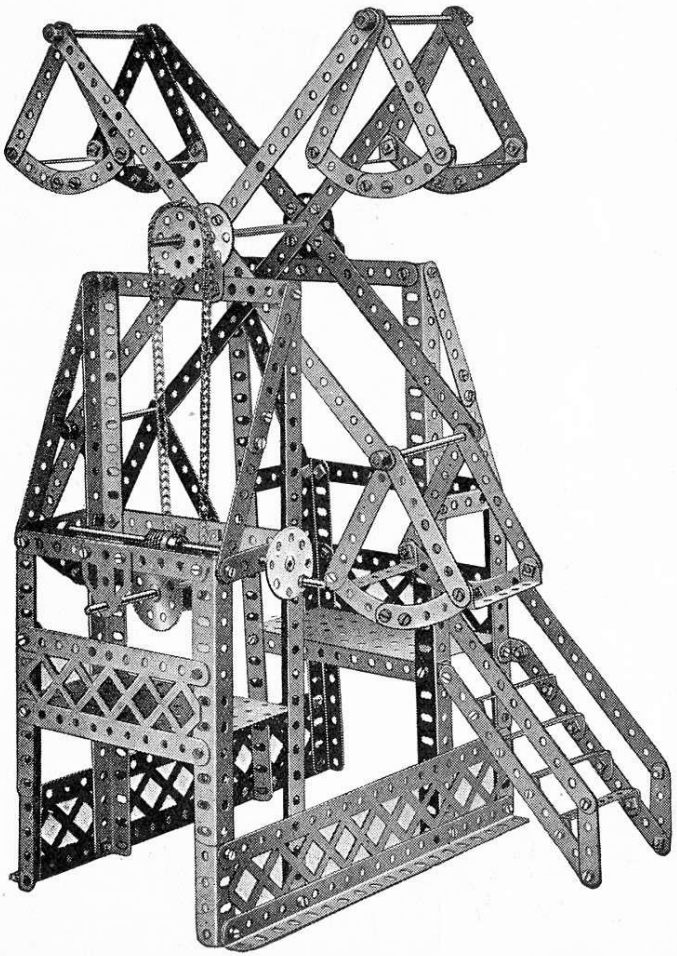
K11. Fly Boats

Parts required

4	of No.	1	15	of No.	37
9	„ „	2	24	„ „	38
24	„ „	3	12	„ „	48a
4	„ „	5	2	„ „	52
2	„ „	6	12	„ „	59
4	„ „	8	16	„ „	90
2	„ „	8a	18″	„ „	94
8	„ „	9	1	„ „	95a
4	„ „	12	1	„ „	96
2	„ „	14	1	„ „	115
5	„ „	16	4	„ „	126a
3	„ „	24	2	„ „	195
1	„ „	27a	2	„ „	196
1	„ „	32			



Note—The Braced Girders shown in Models K11 and K12 should be replaced by Strip Plates of corresponding lengths.



Parts required

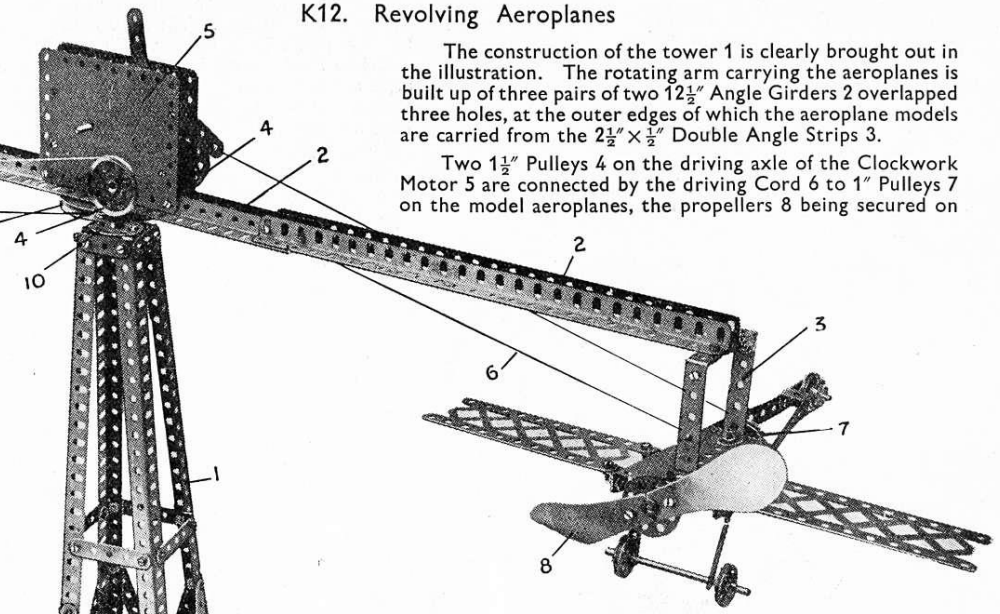
8	of No.	1	
8	„ „	2	
4	„ „	2a	
8	„ „	5	
4	„ „	6a	
14	„ „	8	
2	„ „	11	
14	„ „	12	
2	„ „	15	
3	„ „	16	
1	„ „	17	
2	„ „	18b	
1	„ „	19b	
2	„ „	21	
4	„ „	22	
4	„ „	22a	
3	„ „	24	
4	„ „	35	
122	„ „	37	
8	„ „	38	
1	„ „	40	
4	„ „	41	
6	„ „	48a	
2	„ „	54a	
2	„ „	59	
4	„ „	195	

No. 2 Clockwork Motor (not included in Outfit)

K12. Revolving Aeroplanes

The construction of the tower 1 is clearly brought out in the illustration. The rotating arm carrying the aeroplanes is built up of three pairs of two $12\frac{1}{2}$″ Angle Girders 2 overlapped three holes, at the outer edges of which the aeroplane models are carried from the $2\frac{1}{2}$″ × $\frac{1}{2}$″ Double Angle Strips 3.

Two $1\frac{1}{2}$″ Pulleys 4 on the driving axle of the Clockwork Motor 5 are connected by the driving Cord 6 to 1″ Pulleys 7 on the model aeroplanes, the propellers 8 being secured on

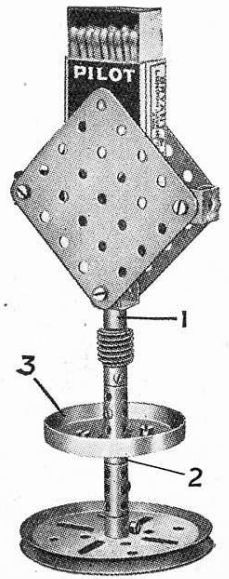


the other ends of the Rods of these Pulleys 7. Therefore, when the Motor is running, the propellers, in revolving, cause the arm 2 bolted to the 3″ Pulley 9 to swing round. This 3″ Pulley is secured to a short Rod which passes through the Bush Wheel 10 bolted on the top of the tower 1.

K13. Ash-Tray and Match Holder

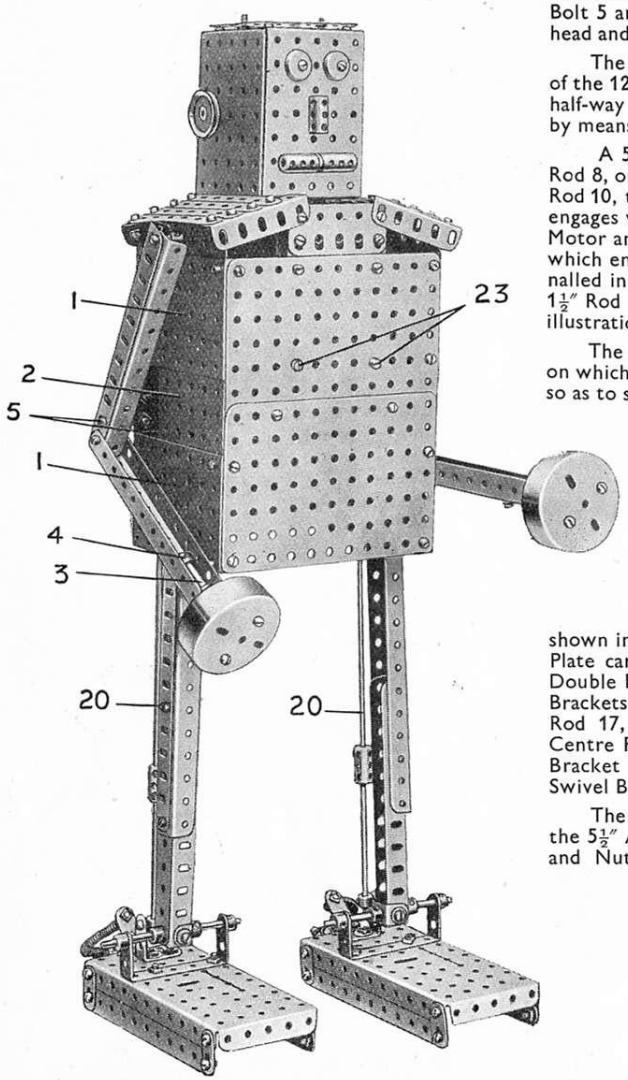
Parts required

2	of No.	11	2	of No.	63
1	„ „	19b	2	„ „	72
1	„ „	24	1	„ „	116
1	„ „	32	1	„ „	137
10	„ „	37			



The matchbox holder is fixed to the pedestal by a Fork Piece 1, and a Bush Wheel2 the Wheel carries Flange 3, which forms the ash-tray. A strip of sandpaper or the roughened portion of a matchbox cover may be pasted on each of the Flat Plates to facilitate the striking of the matches.

K14.
Robot (or Mechanical Man)



This general view of the Robot gives a good idea of the appearance of the finished model and shows the main details of construction.

The front and back of the body are built up from four $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plates and are joined together at the sides by means of $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates 1 and $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates 2. The $5\frac{1}{2}''$ Angle Girders forming the arms have attached to them Boiler Ends, inside which are 2" Pulleys, the "fists" so formed being attached to the arms by means of $2\frac{1}{2}''$ Rods 3 and Collars 4. The complete arms are attached by $\frac{3}{4}''$ Bolts to the shoulders, and an Angle Bracket and a $\frac{1}{2}''$ Bolt 5 are used to secure each elbow to the body. The construction of the head and shoulders will be seen in Fig. K14a.

The $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates forming the head are bolted to the top ends of the $12\frac{1}{2}''$ Girders 6. These Girders run from the top of the head to a point half-way down the body, and also support the Electric Motor, which is attached by means of the $2\frac{1}{2}''$ Flat Girders 7.

A 57-teeth Gear and $\frac{1}{2}''$ Pinion connect the armature spindle to the $2\frac{1}{2}''$ Rod 8, on which is fixed a Worm 9. This engages with a $\frac{1}{2}''$ Pinion 12 on the Rod 10, the latter also carrying two loose Coupings 11 and 11a. The Pinion 12 engages with a $\frac{3}{4}''$ Contrate 13 on a $1\frac{1}{2}''$ Rod journalled in the side plate of the Motor and in the lower loose Coupling 11. This Rod also carries a $\frac{1}{2}''$ Pinion which engages with the 57-teeth Gear 14 that is mounted on a $1\frac{1}{2}''$ Rod journalled in the Motor side plate and in the top loose Coupling 11a. The latter $1\frac{1}{2}''$ Rod is connected to the crankshaft 15 by Sprocket Chain as shown in the illustration.

The crankshaft carries two Bush Wheels 21 that are fitted with $\frac{3}{4}''$ Bolts on which are mounted loose Pulleys 16. These Pulleys are spaced by Washers so as to slide between the two $12\frac{1}{2}''$ Angle Girders forming each leg. A short Rod engaging with one of the holes in the reversing handle of the Motor is fixed to the Rod holding the " ears " by means of a Coupling and held in place by two Collars. This forms an easy means of stopping and starting the model.

The Motor unit may now be fixed in place. This is accomplished by bolting the two $12\frac{1}{2}''$ Angle Girders to the back of the body and the flanges of the Motor to the front. Two $\frac{1}{2}''$ Bolts 23 spaced by Washers are used to secure the flanges.

The feet should next be made, both being constructed similarly. A $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate is raised on $5\frac{1}{2}''$ Strips as shown in Fig. K14b and a $2\frac{1}{2}'' \times 1''$ Double Angle Strip bolted to the top of the Plate carries a $2\frac{1}{2}''$ Rod. Two $5\frac{1}{2}''$ Angle Girders connected together by a Double Bracket are held in place on this Rod by Collars. Two $1'' \times 1''$ Angle Brackets are bolted to the rear end of the foot as shown. One carries a $3\frac{1}{2}''$ Rod 17, while a Swivel Bearing 8 attached to the other by a $\frac{3}{4}''$ Bolt carries a Centre Fork 19, which is held against the ground by the Spring 20. A Flat Bracket 22, attached loosely by set-screws to the "spider" and boss of the Swivel Bearing, prevents excess movement of the Centre Fork.

The $12\frac{1}{2}''$ Angle Girders forming the upper parts of the legs are bolted to the $5\frac{1}{2}''$ Angle Girders of the feet and the complete legs are pivoted by Bolts and Nuts (see Standard Mechanism No. 1) immediately below the $\frac{3}{4}''$ Bolts holding the arms. The $3\frac{1}{2}''$ Rod 17 is connected to an $11\frac{1}{2}''$ Rod 20 by means of a Coupling, the whole being pivoted one inch to the rear of the leg pivot as follows : A Bolt is passed through the Plate 1 and inserted in the tapped hole of a Collar on the upper end of the Rod 20, and the Bolt is screwed home until the Collar is fast on the Rod, leaving the Bolt free to turn in the Plate. These Rods 20 ensure that the foot always remains parallel to the ground, to facilitate walking.

When the Motor is started the figure moves first one foot forward and then the other. Backward movement of the feet is prevented by the Centre Forks 19 which grip the ground.

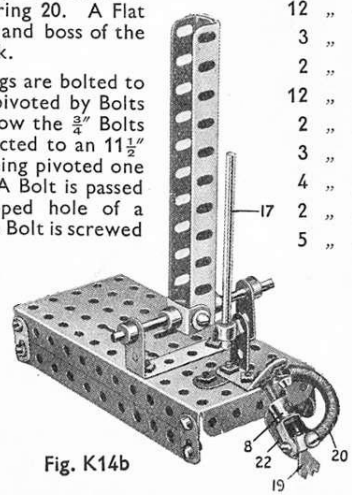


Fig. K14b

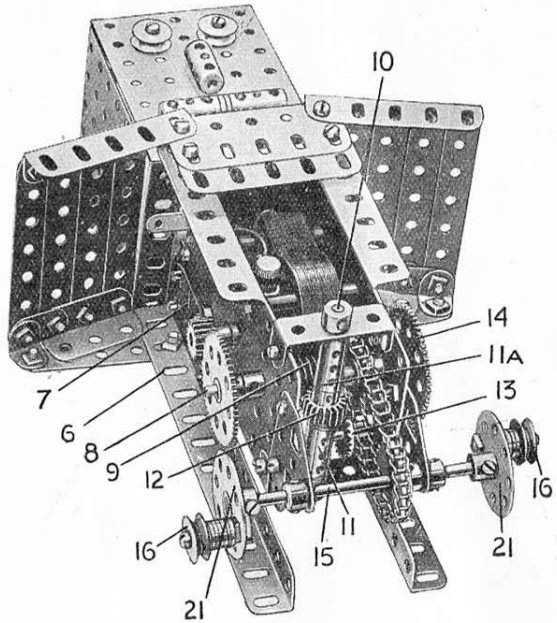
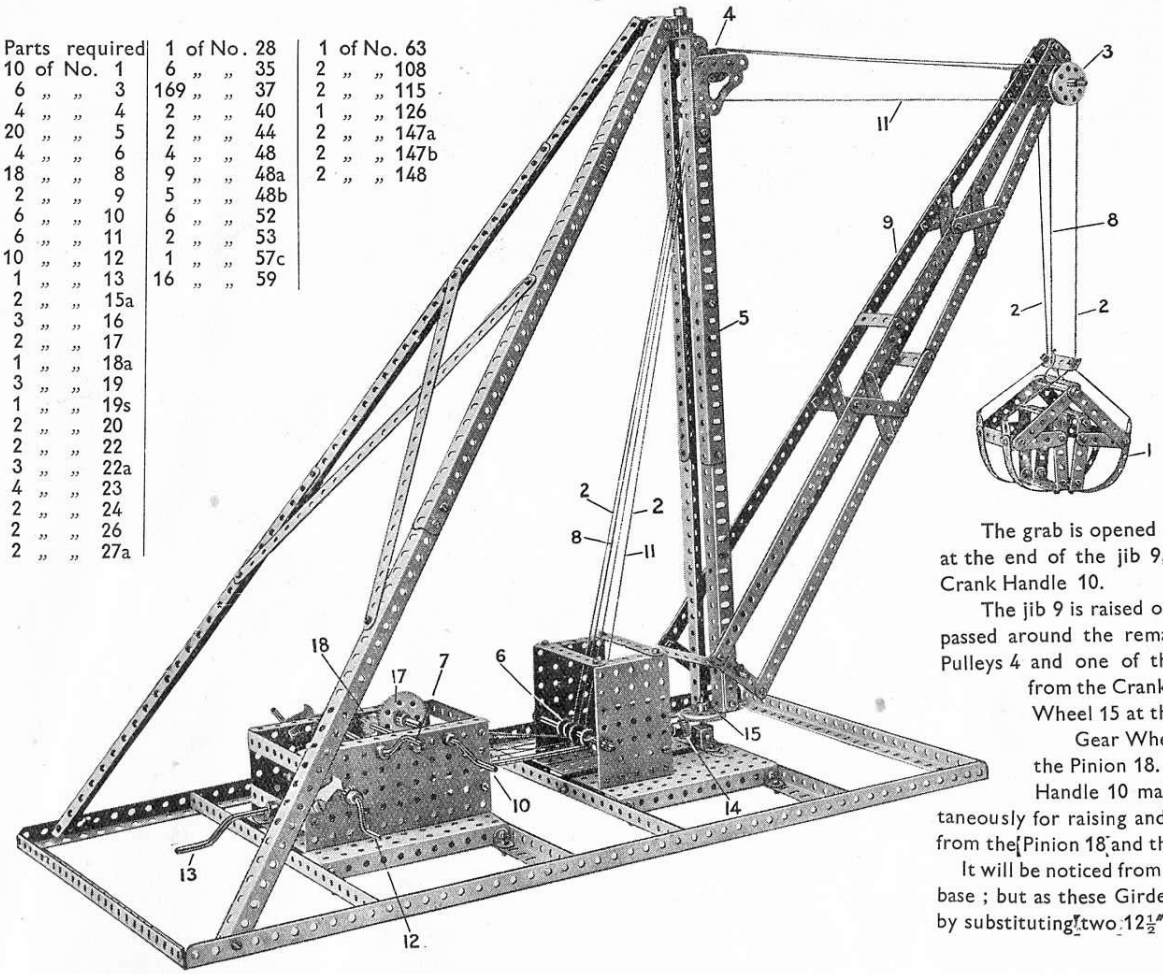


Fig. K14a

Parts required			3 of No. 16a			4 of No. 52a		
28 of No.	2		2 „ „	16b		7 „ „	53	
10 „ „	3		1 „ „	17		1 „ „	53a	
4 „ „	8		2 „ „	18b		23 „ „	59	
2 „ „	8b		2 „ „	20		8 „ „	63	
12 „ „	9		4 „ „	20a		2 „ „	65	
3 „ „	9d		2 „ „	22		2 „ „	70	
2 „ „	9f		4 „ „	23		1 „ „	72	
12 „ „	10		2 „ „	24		6" „ „	94	
2 „ „	11		3 „ „	26		1 „ „	96	
3 „ „	12		2 „ „	27a		1 „ „	96a	
4 „ „	12a		1 „ „	29		2 „ „	103f	
2 „ „	13		1 „ „	32		8 „ „	111	
5 „ „	16		114 „ „	37		4 „ „	111a	
			15 „ „	37a		6 „ „	111c	
			31 „ „	38		2 „ „	126a	
			2 „ „	43		2 „ „	162a	
			2 „ „	46		2 „ „	165	
			1 „ „	48		No. E6 Electric Motor		
			2 „ „	52		(Not included in Outfit)		

K15. Derricking Grab

Parts required					
10 of No.	1	1 of No.	28	1 of No.	63
6 „ „	3	6 „ „	35	2 „ „	108
4 „ „	4	169 „ „	37	2 „ „	115
20 „ „	5	2 „ „	40	1 „ „	126
4 „ „	6	2 „ „	44	2 „ „	147a
18 „ „	8	4 „ „	48	2 „ „	147b
2 „ „	9	9 „ „	48a	2 „ „	148
6 „ „	10	5 „ „	48b		
6 „ „	11	6 „ „	52		
10 „ „	12	2 „ „	53		
1 „ „	13	1 „ „	57c		
2 „ „	15a	16 „ „	59		
3 „ „	16				
2 „ „	17				
1 „ „	18a				
3 „ „	19				
1 „ „	19s				
2 „ „	20				
2 „ „	22				
3 „ „	22a				
4 „ „	23				
2 „ „	24				
2 „ „	26				
2 „ „	27a				



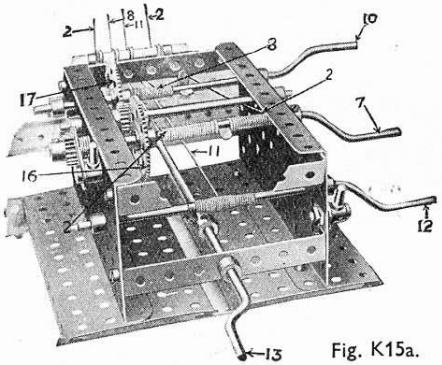


Fig. K15a.

The grab 1 is suspended by Cords 2 which pass over the Pulleys 3 and round the outer pulleys of a set of four 4 at the head of the standard 5. The cords continue down and under the outer pulleys of a set of smaller Pulleys 6 and are wound on a Crank Handle 7. They are connected by a Spring Clip on a Crank Handle. Care should be taken to see that, when winding up, the double lapping of each cord on the rod occurs simultaneously, as otherwise the grab will cant over.

The grab is opened or closed by the Cord 8 which, after passing over one of two inner Pulleys at the end of the jib 9, passes over another of the four Pulleys 4 and one of the Pulleys 6 to the Crank Handle 10.

The jib 9 is raised or lowered by the Cord 11 which is secured to the standard 5, and having passed around the remaining inner pulley at the jib-end is passed back and around one of the four Pulleys 4 and one of the Pulleys 6 to the Crank Handle 12. The swinging of the jib is effected from the Crank Handle 13 on the end of a Rod, on which is a ½" Pinion 14 engaging a Contrate Wheel 15 at the foot of the standard 5.

Gear Wheels 16 and 17 are bolted on the Crank Handles 10 and 7 and are connected by the Pinion 18. The Crank Handle 7 is fixed against longitudinal movement, but the Crank Handle 10 may be slid clear of the Pinion 18. The Handles 7 and 8 normally turn simultaneously for raising and lowering the grab, but if the Handle 10 is slid to disengage its Gear Wheel from the Pinion 18 and the Handle turned, the grab is opened or closed.

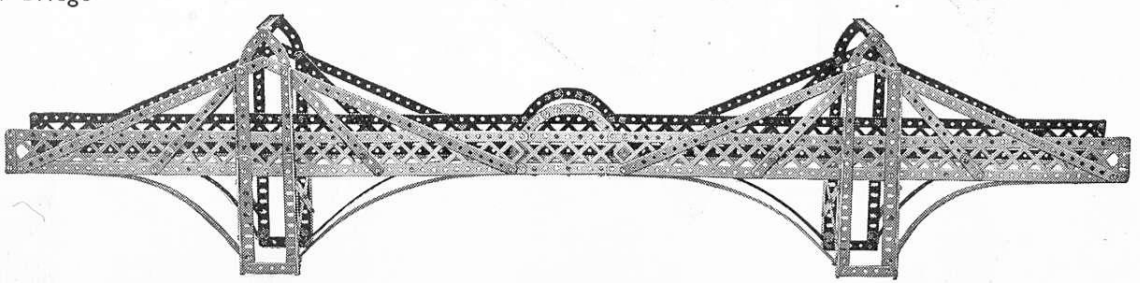
It will be noticed from the illustration that 24½" Angle Girders have been used as side-members in the base ; but as these Girders are not included in the K Outfit, they may be dispensed with, if desired, by substituting two 12½" Girders, bolted end to end, along each side of the base frame.

K16. Cantilever Bridge

Parts required

16 of No.	1	8 of No.	6a	2 of No.	48b
16 „ „	2	8 „ „	8	14 „ „	90
3 „ „	3	18 „ „	9	2 „ „	195
4 „ „	5	8 „ „	12	8 „ „	197
4 „ „	6	136 „ „	37		

The Braced Girders shown in the illustration should be replaced by Strip Plates of corresponding lengths.

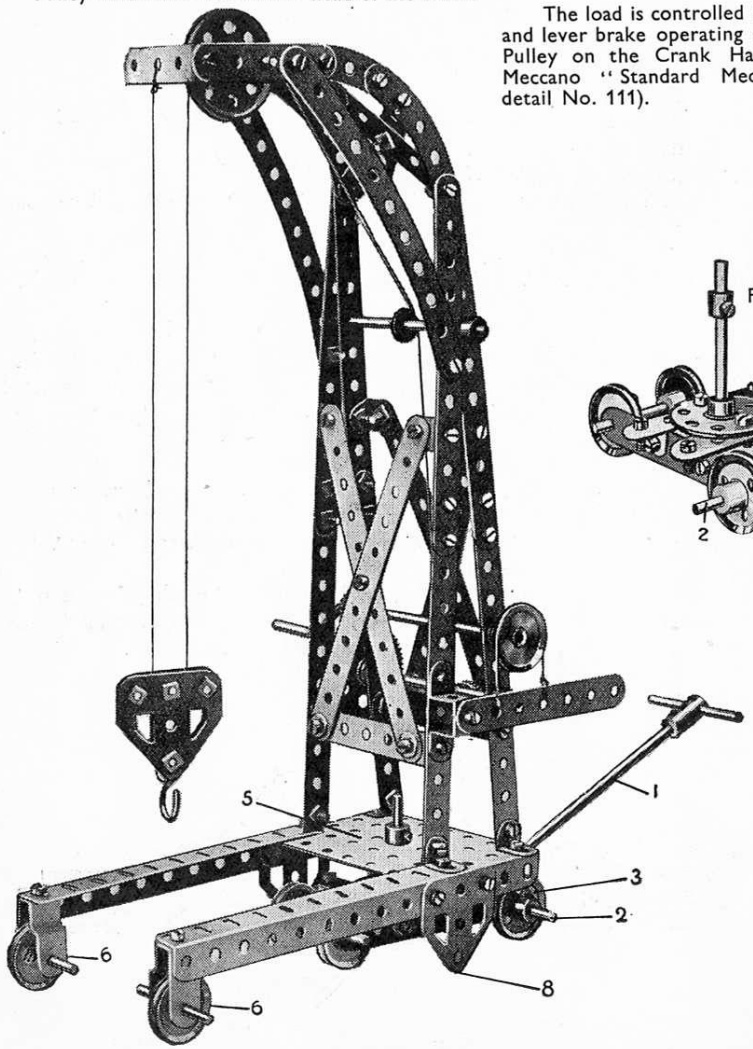


K17. Portable Crane

The construction of the tower is quite clear from the illustration. The crane is moved about by depressing the handle 1 carrying an Axle 2 for the 1″ loose Pulley Wheels 3, which are secured in position by Collars and Set Screws. A pair of Cranks 4 are secured to the Axle 2 and are arranged to bear against the underface of the 3½″ × 2½″ Flanged Plate 5, when the handle is depressed, and lift the crane so that it then runs on the Wheels 3 and 6. When the crane is brought to rest its weight forces down the Cranks 4 which raise the handle 1, and the tips 8 of the Flat Trunnions together with the Wheels 6 then support the crane.

A Crank Handle carries a ½″ Pinion and a 1″ Pulley Wheel and drives a 57-teeth Gear on the hoisting shaft. The hoisting cord passes round a ½″ loose Pulley Wheel serving as a guide pulley, and over the 1½″ Pulley before being passed through the Single Sheave Pulley Block and tied to the head of the crane.

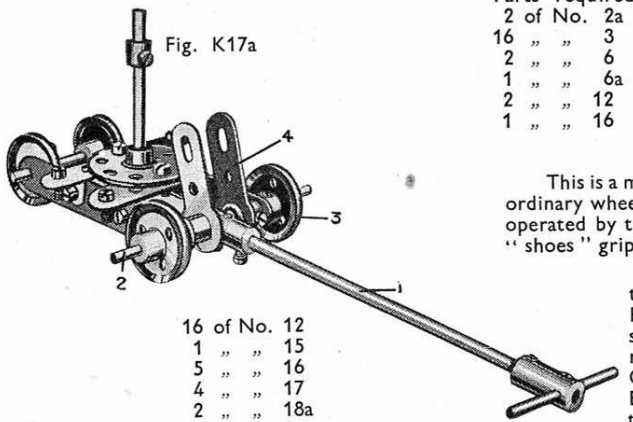
The load is controlled by a strap and lever brake operating on the 1″ Pulley on the Crank Handle (see Meccano "Standard Mechanisms," detail No. 111).



Parts required

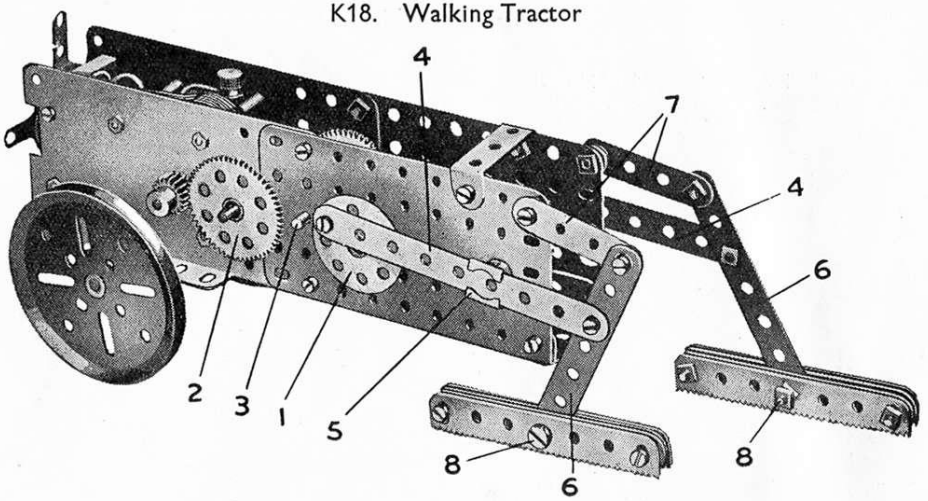
12	of No.	2
3	„ „	3
6	„ „	5
2	„ „	9

Fig. K17a



16	of No.	12
1	„ „	15
5	„ „	16
4	„ „	17
2	„ „	18a
1	„ „	19
1	„ „	21
5	„ „	22
2	„ „	22a
2	„ „	23
1	„ „	24
1	„ „	26
1	„ „	27a
74	„ „	37
4	„ „	37a
16	„ „	38
1	„ „	40
2	„ „	44
1	„ „	45
1	„ „	48
2	„ „	48a
1	„ „	53
1	„ „	57c

K18. Walking Tractor



Parts required

2	of No.	2a
16	„ „	3
2	„ „	6
1	„ „	6a
2	„ „	12
1	„ „	16
2	of No.	16a
1	„ „	17
2	„ „	19b
2	„ „	24
3	„ „	26
3	„ „	27a
12	„ „	37
2	of No.	38
1	„ „	48
2	„ „	50a
2	„ „	53a
1	„ „	59
2	„ „	110
4	„ „	111
6	of No.	111a
6	„ „	111c
2	„ „	147b
No. E6 Electric Motor (not included in Outfit)		

This is a model of a machine designed to travel over very rough surfaces where ordinary wheeled vehicles could not pass. The legs at the front of the model are operated by the Electric Motor and move with a peculiar walking motion. The "shoes" grip the uneven ground and draw the tractor along.

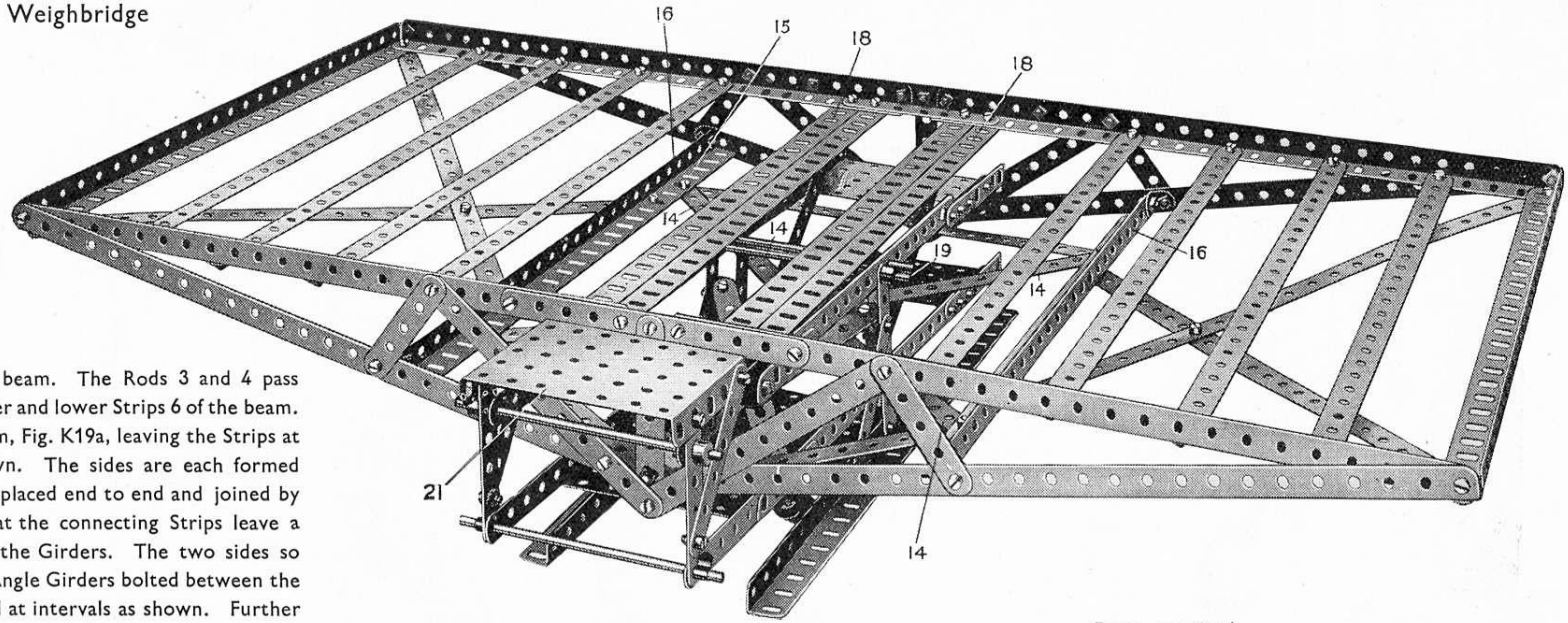
The gear train by which the motion from the Motor armature is transmitted to the "legs" of the machine, consists of three ½″ Pinions and three 57-teeth Gear Wheels. One of the latter can be seen at 2; the second 57-teeth Gear is secured to a 2″ Rod 3 and is rotated by a ½″ Pinion secured to the shaft of wheel 2. The third Gear is fixed to the 2″ Rod carrying the Bush Wheel 1. Another Bush Wheel is secured to the opposite end of the latter Rod, and these two Bush Wheels actuate the legs by means of connecting 4½″ Strips 4. The Bush Wheels should be arranged so that the pivots of the connecting Strips 4 are placed at 180 degrees to each other.

The Strips 4 slide to and fro in Eye Pieces 5, which are secured to the shanks of ⅜″ Bolts that are free to turn in the side Plates of the model. The Strips are pivoted to the 3½″ Strips 6 forming the legs, by means of bolts and locknuts, and their other ends are pivoted by the same method to the Bush Wheels 1. The legs are pivoted at their upper ends to two 2″ Strips 7, and the latter are pivoted to the side Plates.

Each of the "shoes" consists of a 3½″ Rack Strip and seven 3½″ Strips—the latter being used to increase the weight of the shoes. The Strips 6 are inserted in the centres of the shoes and Pivot Bolts 8 are passed through their end holes. Washers should be placed on the ½″ Bolts securing the ends of the shoes together, so that the shoes are quite free to move about the Pivot Bolts 8.

The Motor is mounted on 3″ Pulley Wheels, the axle of which is journalled through Angle Brackets bolted beneath the Motor.

K19. Weighbridge



Begin the construction of this model by making the weigh beam, Fig. K19b. The side Strips 1 are bolted to the base Angle Girders 2, and in the Strips 1 are journalled the Rods 3 which form the fixed pivots of the weigh beam. The upper and lower Rods 4 are journalled in the Strips 5 and form the moving pivots of the beam. The Rods 3 and 4 pass through perforations in the upper and lower Strips 6 of the beam.

Next construct the platform, Fig. K19a, leaving the Strips at one side unconnected, as shown. The sides are each formed from two 12½" Angle Girders placed end to end and joined by Strips. It should be noted that the connecting Strips leave a space of ½" between the ends of the Girders. The two sides so formed are connected by 12½" Angle Girders bolted between the ends, and 12½" Strips are added at intervals as shown. Further 12½" Strips are bolted to the side Girders and connected by the Angle Girders 16. They are braced by crossed 12½" Strips secured to the corners of the platform. The platform is now ready to be passed between the upper and lower parts of the weigh beam, and the unconnected Strips are bolted as follows : The ends 7 are bolted to the lowest hole 8, and the ends 9 to the third holes from the ends 7, as can be seen in Fig. K19. The outer holes of the crossed 12½" Strips 14, Fig. K19b, are then bolted to the same holes 15 in the Angle Girders 16 as the Strips 17. The other ends of the Strips 17 are secured to the Angle Bracket at 10. The double Angle Girders 18 are then bolted in position, and the upper holes 19, Fig. K19b, are bolted to the Angle Girders 18 in the centre holes, and the holes 20, Fig. K19b, to the Angle Girders 18 at the fifth holes from the Girder ends. The load to be weighed rests on the main platform, and the weights are placed on the small Rectangular Plate 21 at the end of the weigh beam. The platform can be filled in with stiff cardboard or three-ply wood, and by arranging a ramp at each end it may be used for weighing model lorries, in a similar manner to its prototype.

Parts required

22 of No. 1	6 of No. 5	6 of No. 15a	16 of No. 37a
10 „ „ 2	14 „ „ 8	2 „ „ 35	6 „ „ 53
8 „ „ 3	10 „ „ 12	107 „ „ 37	6 „ „ 59
6 „ „ 4			

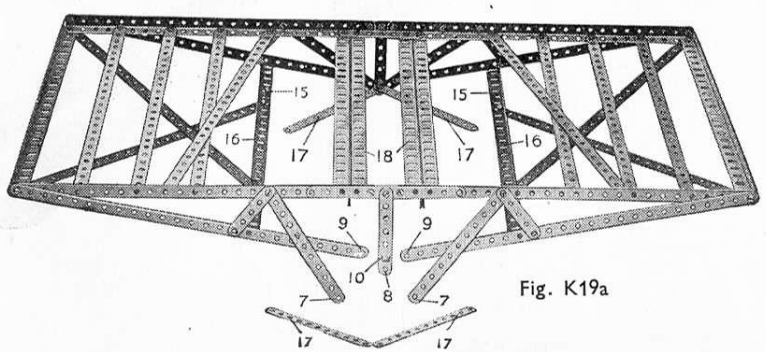


Fig. K19a

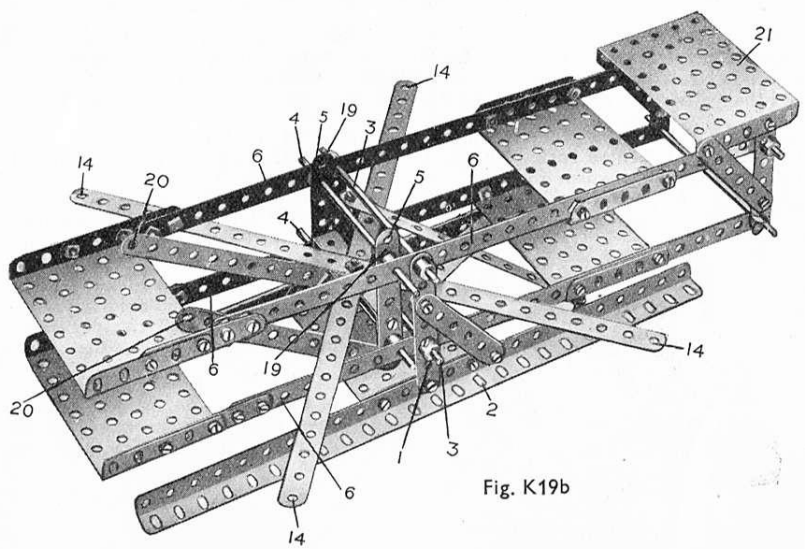
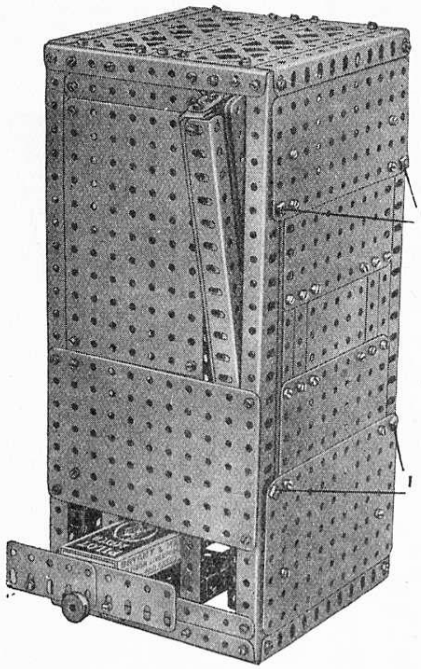


Fig. K19b



K20. Penny-in-the-Slot Machine

The sides of the model can be removed by undoing four Nuts 1 from Bolts that are firmly secured by additional Nuts to the corner Girders. Thus the machine can be re-loaded and attention can be given to the mechanism if necessary. Each side is built up from Flat Plates bolted to 9½" Angle Girders. Four 5½" × 2½" Flat Plates, and three 5½" Strips are bolted to the Girders at the back of the model.

Fig. K20a shows the mechanism removed from the model. Four 12½" Angle Girders are spaced apart by 2½" × ½" Double Angle Strips and 2½" Strips to form a receptacle for the match boxes. It will be seen that the Bolts are so arranged that they do not in any way interfere with the downward movement of the boxes. The 9½" Strip bolted between the rear pair of Girders is clamped between two 2½" Strips (see Fig. K20c) near its lower end.

Details of the drawer and slide are shown in Fig. K20b. The Bolts 2 holding the 2½" Strips to the 1½" × ½" Double Angle Strips of the slide should be passed through the vertical 12½" Angle Girders, one hole above their lower extremities. The Angle Brackets 3 form guides for the 5½" × ½" Double Angle Strips of the drawer. The Rack Strip 4 is secured to a 1" × 1" Angle Bracket and to a 3½" Strip that is fixed by an Angle Bracket to the Flat Girders at the front of the drawer.

A ¾" Pinion 5 (Figs. K20a and K20c) is mounted on a Pivot Bolt and gripped in place by a ½" Bolt 6. When the drawer is moved in or out, the Rack Strip engaging with the Pinion causes the latter to rotate. Normally, with the drawer closed, the Bolt 6 should be almost touching an Angle Bracket 7 (Fig. K20c) that is secured to a Crank on the end of a 4½" Axle Rod, which also carries a second Crank to which the Flat Bracket 8 is fixed by a ¾" Bolt. The Cranks are so arranged that when the ¾" Bolt strikes the vertical Angle Girder the Angle Bracket 7 just clears the teeth of the Pinion 5. A 4½" Strip is bolted to a Double Arm Crank fixed on the other extremity of the 4½" Rod, and carries two 2½" Strips as a balance weight. The weight is correctly adjusted by means of a bolt and Washers. The Flat Bracket 9 is spaced from the 4½" Strip by two Washers and a ⅜" Bolt 10 carrying four Washers is bolted in the fourth hole from the end of the Strip.

The slot for the penny is shown detached from the model in Fig. K20d. It is secured in place by a 1" Triangular Plate bolted to the upper transverse 5½" Angle Girder at the front of the outer casing of the model, and also by the ½" Reversed Angle Bracket shown in Fig. K20c. The penny is inserted between the two pairs of Girders 11 and 12 and falls between the Flat Bracket 9 (Fig. K20c) and the 4½" Strip. The Washers on the Bolt 10 serve as a "stop," but they will not retain a halfpenny in position.

The weight of the penny raises the Crank carrying the Angle Bracket 7, but only sufficiently to allow the Bolt 6 to pass unimpeded, for the Centre Fork 13 engages the Flat Bracket 8 and prevents further movement of the Crank. The Centre Fork is held in a Coupling which is loosely attached to the model by a ¾" Bolt passed through its centre transverse hole, and secured by two nuts to an Angle Bracket. The Rod 14 held in the lower transverse hole of the Coupling is forced upward by the Bolt 6 when the drawer is pulled out, and thus forces the Centre Fork 13 out of engagement with the Flat Bracket. The penny is then free to drop off the end of the lever. The weight of the Rod 14 then returns the Centre Fork to its normal position, and as the drawer is pushed back, the Bolt 6 temporarily raises the Angle Bracket 7, which should be arranged obliquely. When the drawer is pushed right in, the next box of matches should fall into position in the drawer, and the weight 15—consisting of a piece of lead—is provided to assist the downward movement of the boxes.

If the mechanism does not function satisfactorily when completed, the positions of the Cranks on the 4½" Axle Rod should be altered slightly. After adjustments have been made the model should work perfectly, and it is advisable to apply an occasional drop of oil to the working parts to ensure smoothness of operation.

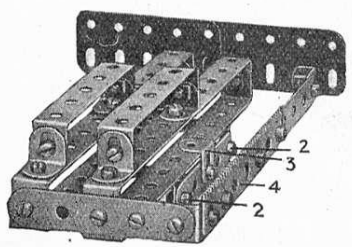


Fig. K20b

Parts required

1	of No.	1
1	„ „	1a
4	„ „	2
1	„ „	2a
2	„ „	3
11	„ „	5
8	„ „	8
8	„ „	8a
2	„ „	8b
8	„ „	9
1	„ „	9f
4	„ „	10
12	„ „	12
1	„ „	12a
1	„ „	15a
1	„ „	18b
1	„ „	23a
1	„ „	26
170	„ „	37
13	„ „	37a
16	„ „	38
2	„ „	48
4	„ „	48a
4	„ „	48d
4	„ „	52a
4	„ „	53a
1	of No.	59
2	„ „	62
1	„ „	62b
1	„ „	63
1	„ „	65
6	„ „	70
2	„ „	72
2	„ „	77
5	„ „	103f
1	„ „	110
1	„ „	111
2	„ „	111a
2	„ „	111c
1	„ „	125
1	„ „	147b
2	„ „	195

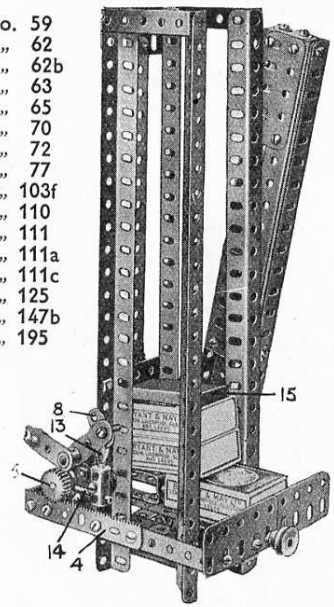


Fig. K20a

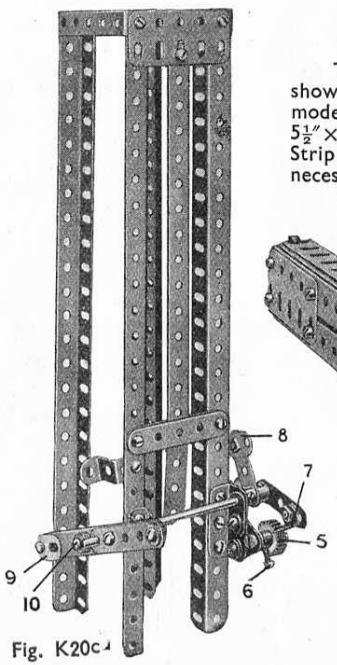


Fig. K20c

The Braced Girders that are shown filling in the top of the model should be replaced by 5½" × 2½" Strip Plates. The 2½" Strip between the Girders is not necessary if Strip Plates are used.

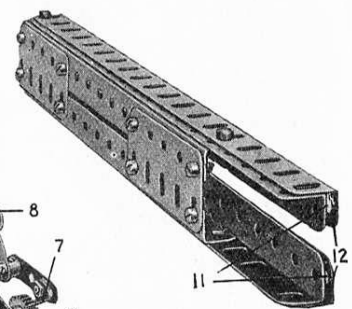
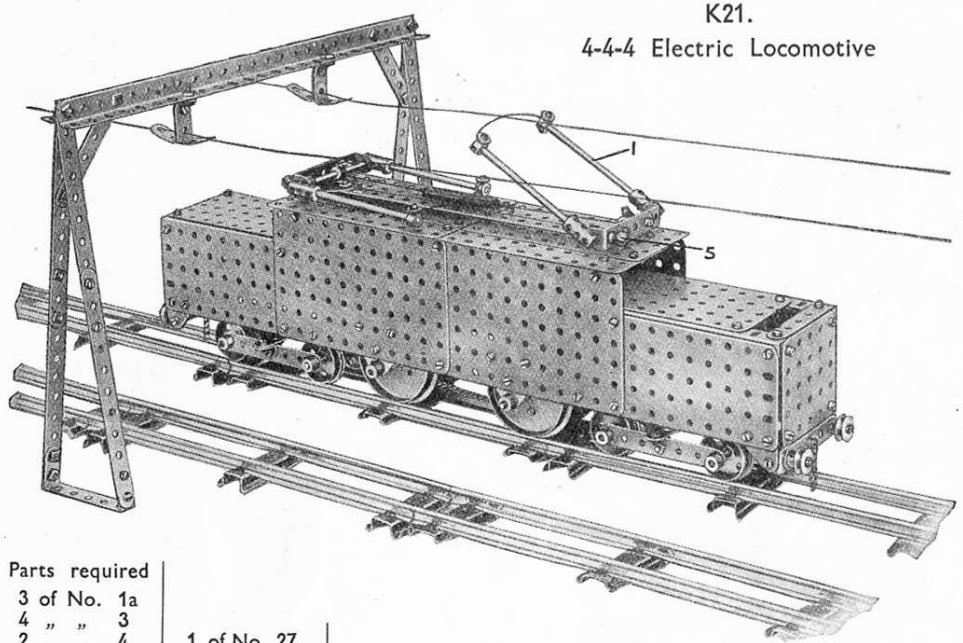


Fig. K20d

K21.
4-4-4 Electric Locomotive



Parts required

3	of No.	1a	1	of No.	27	1	of No.	95a	2	of No. 1583	
4	„ „	3	1	„ „	27a	2	„ „	96	No. E6 Electric Motor (not included in Outfit)		Parts required for Overhead Wire Standard as illustrated :
2	„ „	4	116	„ „	37	1	„ „	96a			8 of No. 2
6	„ „	5	4	„ „	37a	4	„ „	109			2 „ „ 4
4	„ „	6a	16	„ „	38	4	„ „	111	Parts Nos. 182, 1570, 1575 and 1583 are used for insulation purposes, but are not included in the Outfit		2 „ „ 8
2	„ „	8a	2	„ „	43	2	„ „	111c			2 „ „ 12
8	„ „	9	2	„ „	48a	2	„ „	126			4 „ „ 12a
2	„ „	9d	2	„ „	50a	4	„ „	126a			26 „ „ 37
4	„ „	10	4	„ „	52a	2	„ „	136			2 „ „ 46
18	„ „	12	4	„ „	53a	4	„ „	137			
6	„ „	16	25	„ „	59	2	„ „	182			
5	„ „	16a	4	„ „	63	2	„ „	1570			
2	„ „	16b	6	„ „	70	2	„ „	1575			
1	„ „	17	2	„ „	72						
8	„ „	20	20″	„ „	94						
4	„ „	23									
1	„ „	25									

In Fig. K21a one side has been removed from the model in order to reveal the constructional details. The body is built up from Plates that are held together by Angle Girders, and Flat Trunnions are bolted to the sides to form bearings for the axles of the driving wheels. The Electric Motor, mounted at one end of the loco, carries a ½ Pinion on its armature shaft and drives a 57-teeth Gear on a Rod that is fitted with a ¾″ Pinion. This Pinion drives a 50-teeth Gear and a ¾″ Sprocket on the same Rod as the Gear drives a 1½″ Sprocket on the Rod of the first pair of driving wheels. The two pairs of wheels are connected by Sprocket Chain running on 1″ Sprockets.

The bogies are each formed from two 3½″ Strips connected by a third similar Strip that is secured by Angle Brackets. The transverse Strip slides in an Eye Piece that pivots on a ⅜″ Bolt. The Bolt is passed through the centre hole of a 2½″ Strip bolted across the main frame.

The ½″×½″ Angle Brackets 6 are each duplicated in order that a Nut may be held between their lugs. Hence it is only necessary to insert the Bolt in the hole and screw it home. This device is necessary because the interior of the model is inaccessible when the sides are in place.

Each current collector is composed of two 3½″ Rods 1 secured by Couplings to a 3″ Rod that is journalled in a 2½″×½″ Double Angle Strip. The Double Angle Strips, in turn, are secured to a Trunnion at each end of a 9½″ Strip 2 (Fig. K21a), and the latter is attached to the roof of the locomotive by means of two 6 B.A. Bolts 3, which are insulated from the roof by Insulating Bushes and Washers. An ordinary Washer is placed over each Insulating Washer in order to prevent the Bolts on the Strip 2 touching the roof. The 6 B.A. Bolts and Insulating Washers are not included in the No. 6 Outfit, and if they are not available, ordinary Bolts may be used, provided that they are wrapped in insulating tape or otherwise prevented from making metal-to-metal contact with the roof.

A Collar is secured by means of a Set-screw on each of the 3″ Rods journalled in the Double Angle Strips, and a short length of cord is tied to the Set Screw and passed round the Rod before being fastened to two Springs 4. This results in both collectors tending to rise. Either of the collectors may be locked horizontally, however, by a Handrail Support 5, which is passed through a hole of the Double Angle Strip and inserted in the Grub Screw hole of a Collar, so that on turning the Handrail Support, the Rod is gripped and prevented from rotating.

Those parts of the collectors that are in contact with the overhead wire consist of short lengths of thick copper wire secured by Set Screws to Collars on the ends of the 3½″ Rods. A length of insulated wire is fastened to the 9½″ Strip 2 and is taken to one of the Motor terminals, while the remaining Motor terminal is connected to the frame of the model.

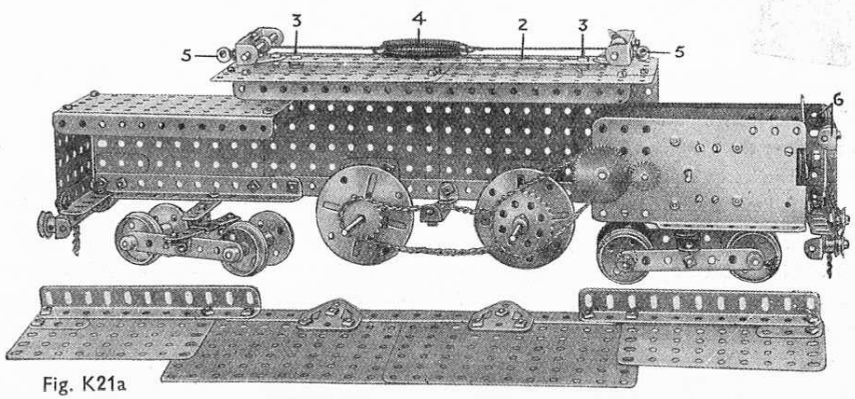


Fig. K21a

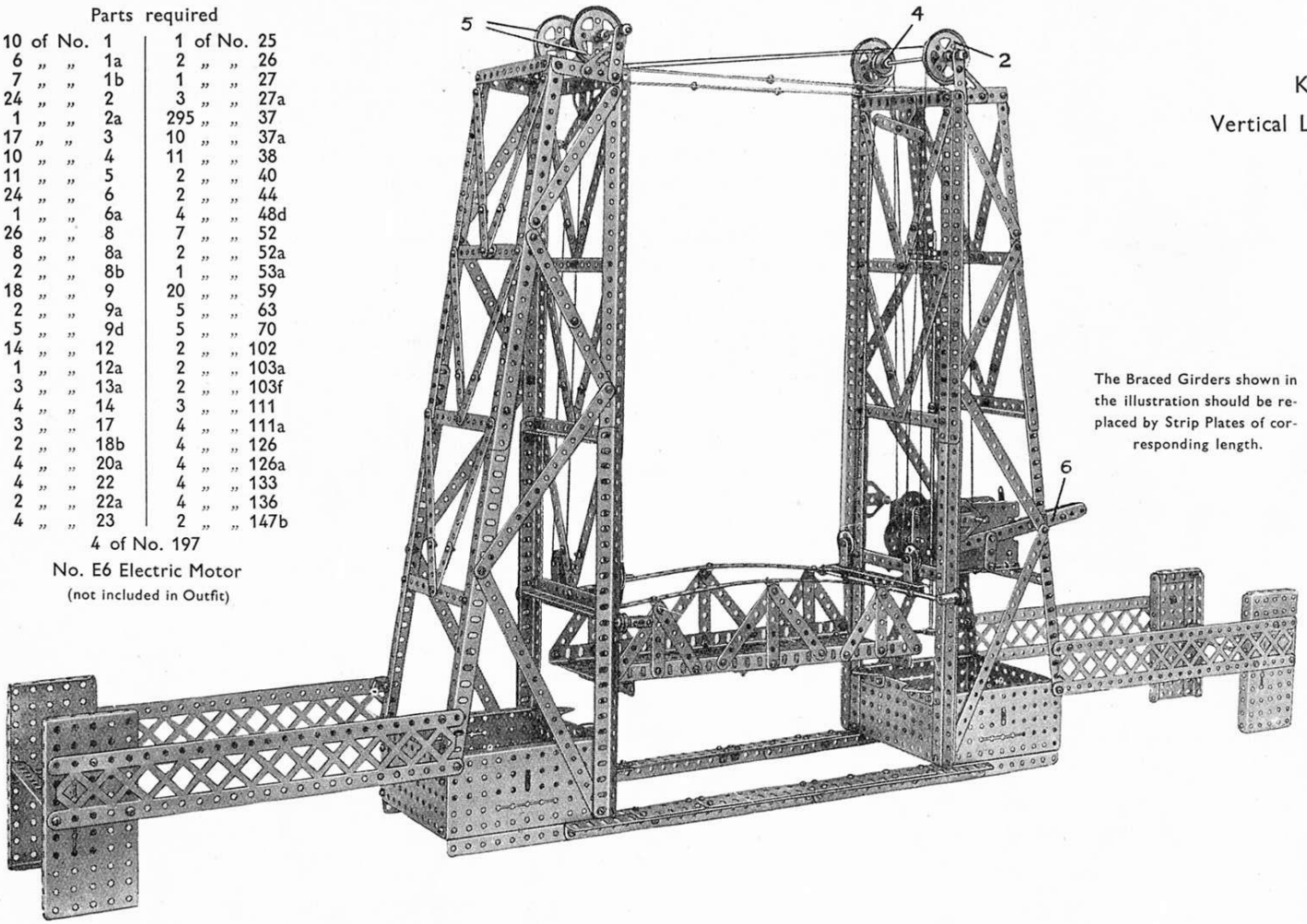
Parts required

10	of No.	1	1	of No.	25
6	„ „	1a	2	„ „	26
7	„ „	1b	1	„ „	27
24	„ „	2	3	„ „	27a
1	„ „	2a	295	„ „	37
17	„ „	3	10	„ „	37a
10	„ „	4	11	„ „	38
11	„ „	5	2	„ „	40
24	„ „	6	2	„ „	44
1	„ „	6a	4	„ „	48d
26	„ „	8	7	„ „	52
8	„ „	8a	2	„ „	52a
2	„ „	8b	1	„ „	53a
18	„ „	9	20	„ „	59
2	„ „	9a	5	„ „	63
5	„ „	9d	5	„ „	70
14	„ „	12	2	„ „	102
1	„ „	12a	2	„ „	103a
3	„ „	13a	2	„ „	103f
4	„ „	14	3	„ „	111
3	„ „	17	4	„ „	111a
2	„ „	18b	4	„ „	126
4	„ „	20a	4	„ „	126a
4	„ „	22	4	„ „	133
2	„ „	22a	4	„ „	136
4	„ „	23	2	„ „	147b

4 of No. 197

No. E6 Electric Motor

(not included in Outfit)



K22.

Vertical Lift Bridge

The Braced Girders shown in the illustration should be replaced by Strip Plates of corresponding length.

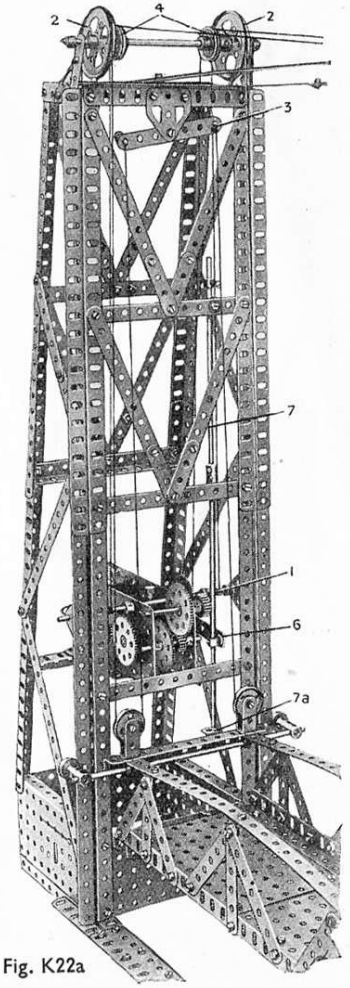
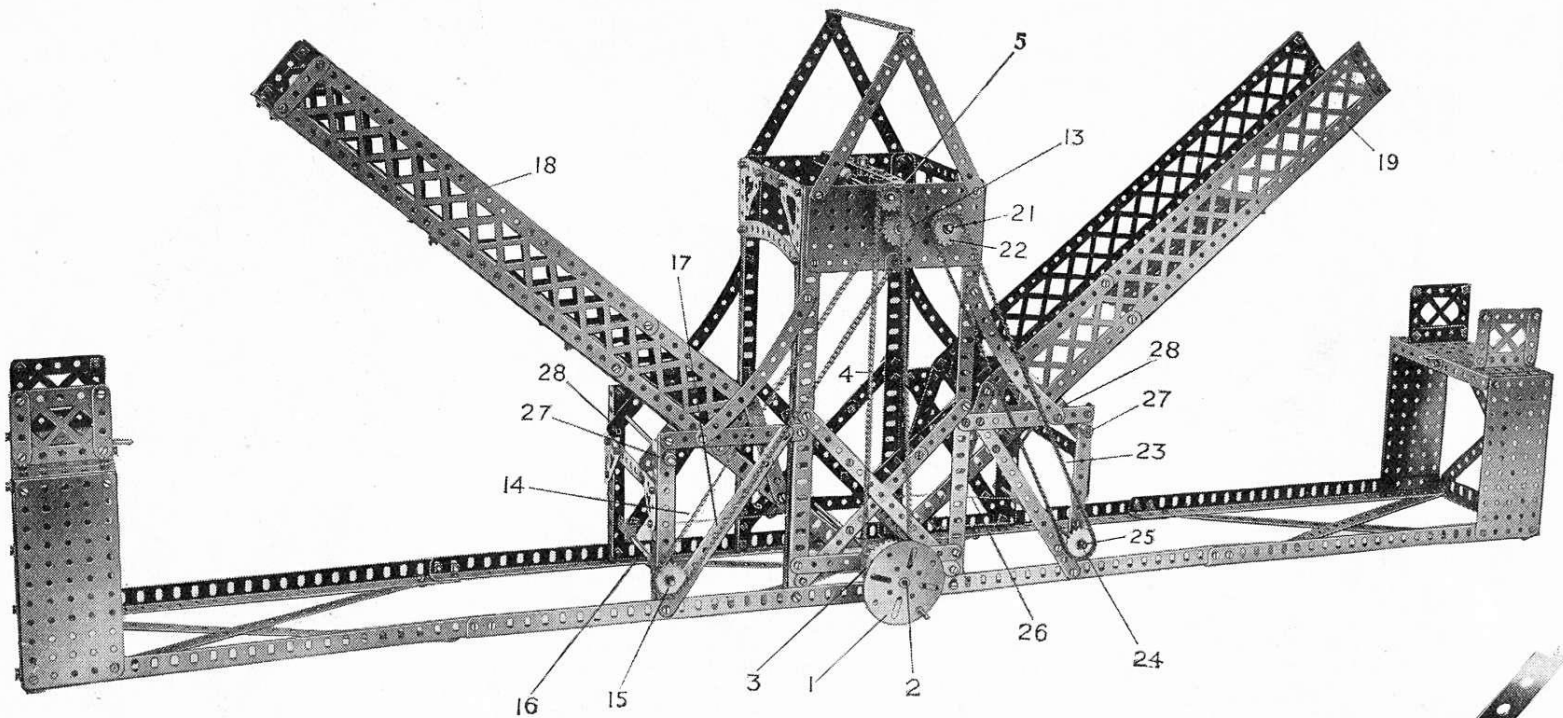


Fig. K22a

The lift span of the bridge is supported on four separate " falls " of cord, each of which is attached to the hoisting winch 1. The two lengths that pass over the 2" Pulleys 2 on the top of the first tower are rove through pulley blocks on the lifting span and are then attached to a compensating lever 3. The latter is pivoted and allows for variation in the lengths of the two cords. The other two cords pass over 1" fast Pulleys 4, then under and round 2" Pulleys 5 at the head of the second tower, after which they are treated in a similar manner to the first set.

The limit switch consists of a pivoted 7½" Strip 6, one end of which is attached to a Collar on the vertically-slidable Rod 7 (Fig. K22a), whilst its other end is attached by a ½" × ½" Angle Bracket to the switch arm of the Motor. This extremity of the lever carries also seven 2½" Strips that act as a balance weight. A ¾" Bolt, inserted in a Collar on each end of the Rod 7, comes into contact with a ½" × ½" Angle Bracket 7a on the lifting span at the limits of travel of the span, and thus cut off the Motor at the right moment.

K23. Jack-Knife Bridge



The arms of the bridge are raised or lowered by rotating the handwheel 1. On the 8″ Rod 2 of the handwheel is mounted a 1½″ Sprocket Wheel 3 which is coupled by a Chain 4 to a ¾″ Sprocket Wheel 5 on a 6½″ Rod, 6, Fig. K23a. On this rod a Worm 7 drives a ½″ Pinion 8 on a 3½″ Rod 9, on which is a ¾″ Contrate Wheel 10. This engages a ½″ Pinion 11 carried on a 3″ Rod 12, on the outer end of which is a 1″ Sprocket Wheel 13 connected by a Sprocket Chain 14 to a 1″ Sprocket Wheel 15 on a 6½″ Rod 16. A Cord 17 is wound on the Rod 16 and connected to the end of one arm 18 of the bridge. The other arm 19 is operated from a 57-teeth Gear Wheel 20, engaging a similar Wheel 29 on the 6½″ Rod 21. On the end of this rod a 1″ Sprocket Wheel 22 is coupled by a Chain 23 to another 1″ Sprocket Wheel 24 on the 6½″ winding Rod 25, the Cord 26 from which is connected to the other arm 19 of the bridge.

The arms 18 and 19 are pivotally carried on 6½″ Rods 27 by means of 2½″×1½″ Double Angle Strips 28.

Parts required		
6	of No.	1
4	„ „	1b
26	„ „	2
4	„ „	2a
4	„ „	3
16	„ „	6
20	„ „	8
6	„ „	9
4	„ „	9d
6	„ „	12
1	„ „	13a
6	„ „	14
1	„ „	16b
2	„ „	26
2	„ „	27a
1	„ „	29
1	„ „	32
210	„ „	37
6	„ „	38
1	„ „	40
2	„ „	47
1	„ „	48a
3	of No.	48d
2	„ „	52
2	„ „	52a
17	„ „	59
6	„ „	70
6	„ „	89
80″	„ „	94
1	„ „	95a
4	„ „	96
1	„ „	96a
4	„ „	108
1	„ „	109
1	„ „	115
4	„ „	133
4	„ „	193
4	„ „	195
4	„ „	197

The Braced Girders shown in the illustration should be replaced by Strip Plates of corresponding lengths.

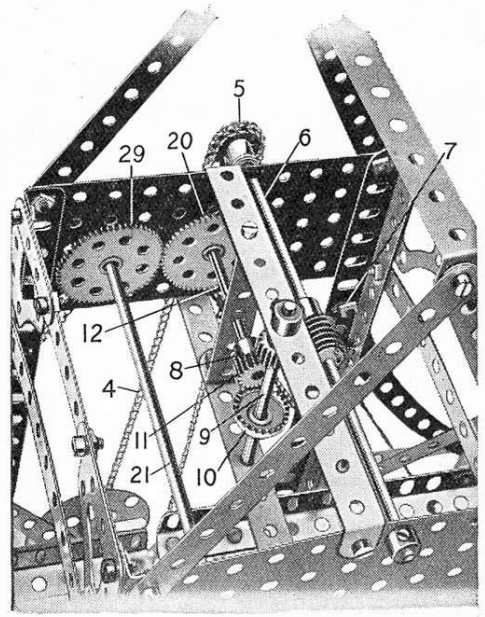
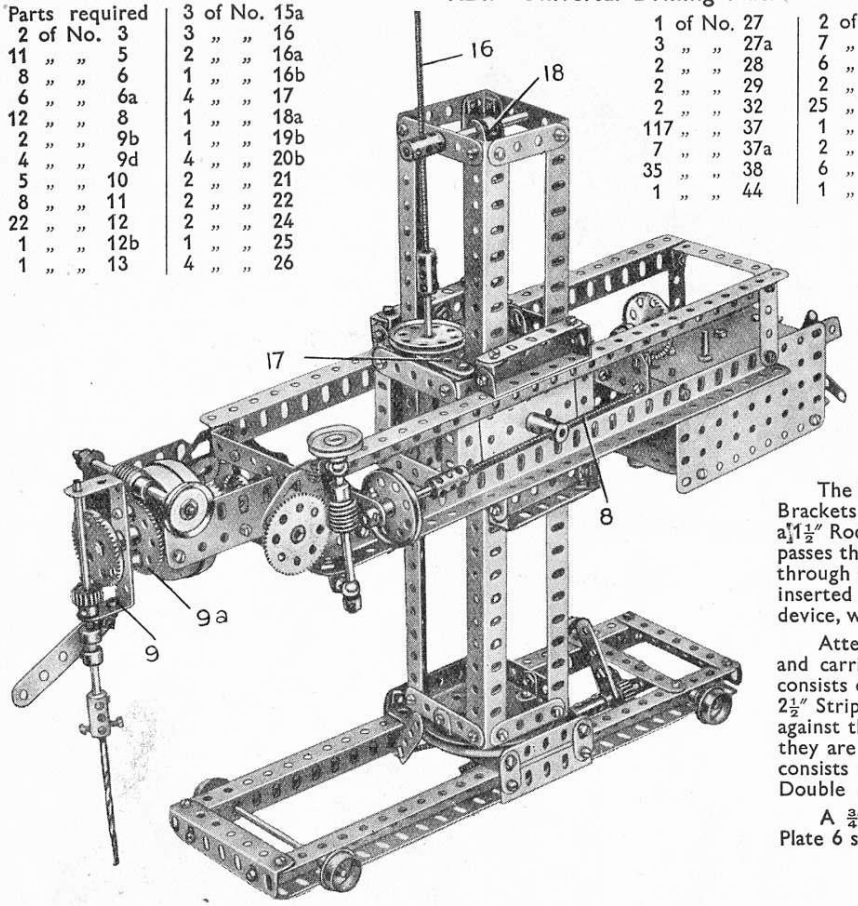


Fig. K23a

K24. Universal Drilling Machine

Parts required			3 of No. 15a			1 of No. 27			2 of No. 46			1 of No. 77			4 of No. 126a		
2 of No.	3		3 „ „	16		3 „ „	27a		7 „ „	48a		1 „ „	80a		2 „ „	136	
11 „ „	5		2 „ „	16a		2 „ „	28		6 „ „	53		2 „ „	80b		1 „ „	137	
8 „ „	6		1 „ „	16b		2 „ „	29		2 „ „	53a		1 „ „	81		1 „ „	162a	
6 „ „	6a		4 „ „	17		2 „ „	32		25 „ „	59		2 „ „	103f				
12 „ „	8		1 „ „	18a		117 „ „	37		1 „ „	62a		2 „ „	108		No. E6 Electric Motor (not included in Outfit)		
2 „ „	9b		1 „ „	19b		7 „ „	37a		2 „ „	62b		3 „ „	111				
4 „ „	9d		4 „ „	20b		35 „ „	38		6 „ „	63		2 „ „	111c				
5 „ „	10		2 „ „	21		1 „ „	44		1 „ „	64		1 „ „	115				
8 „ „	11		2 „ „	22													
22 „ „	12		2 „ „	24													
1 „ „	12b		1 „ „	25													
1 „ „	13		4 „ „	26													



The saddle 1 (Fig. K24a) that carries the pillar and slides on the bed, consists of two $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates secured together face to face by the Bolts that serve to fasten a Bush Wheel 2, and it is retained in place on the side members of the bed by $2\frac{1}{2}''$ Angle Girders. The traversing of the saddle along the bed is effected by a Screwed Rod, which is journalled in a Hand-rail Support 13 and works in a Threaded Boss 14; it is actuated by means of a reversible ratchet 3.

The base of the pillar is secured rigidly by $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets to a 3″ Pulley, which is attached to the saddle by a $1\frac{1}{2}''$ Rod. The Rod is fixed in the boss of the Pulley and passes through the centre holes of the Flanged Plates and through the Bush Wheel 2. A 2″ Screwed Rod, secured to a 2″ Strip is inserted in the Set Screw hole of the Bush Wheel and serves as a locking device, whereby the pillar may be locked in any desired position.

Attention should next be paid to the saddle that slides upon the pillar and carries the horizontal arm (Fig. K24b). The part fitting the pillar consists of two $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates 4 that are connected together by $2\frac{1}{2}''$ Strips. Double Brackets 5, bolted to the flanges of the Plates, press against the Girders of the pillar, and in order that they do so efficiently, they are packed out with Washers. Each of the slides carrying the arm consists of a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate 6 to the flanges of which $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips are attached by $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets.

A $\frac{3}{4}''$ Bolt is secured rigidly to a $3\frac{1}{2}''$ Strip 7, which is attached to one Plate 6 so that the shank of the Bolt passes through the centre holes of the Plates 4 and 6. The Strip 7 is spaced away from the Plate 6 by a Washer on each of its retaining Bolts, to make room for the Nut on the $\frac{3}{4}''$ Bolt. A Bush Wheel and a locking handle (the latter consisting of a Threaded Crank, to which is bolted a $2\frac{1}{2}''$ Strip), are then placed on the shank of the Bolt, so that by turning the locking handle, the arm may be locked and prevented from tilting. A $\frac{3}{8}''$ Bolt serves as a pivot for the two Plates on the other side of the saddle and is inserted in a Coupling, in the tapped hole of which works the $4\frac{1}{2}''$ Screwed Rod 8 (Fig. K24) that forms a means of traversing the arm. Vertical movement of the saddle upon the pillar is effected by the Screwed Rod 16, which is journalled in the Strip 17 on the saddle and works in a Coupling at the top of the Pillar.

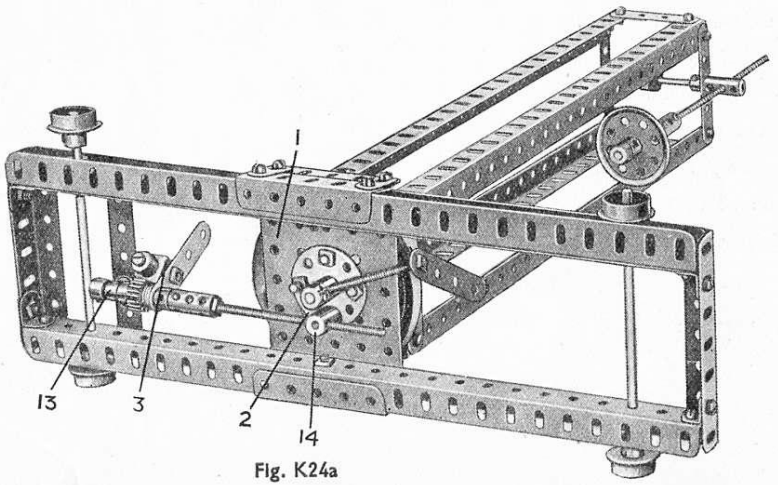


Fig. K24a

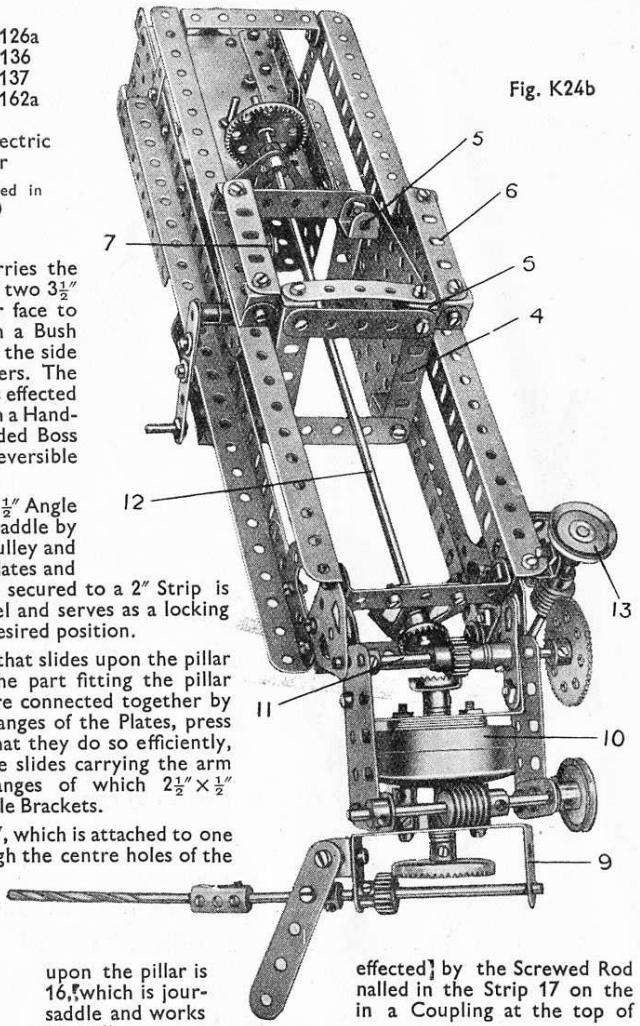
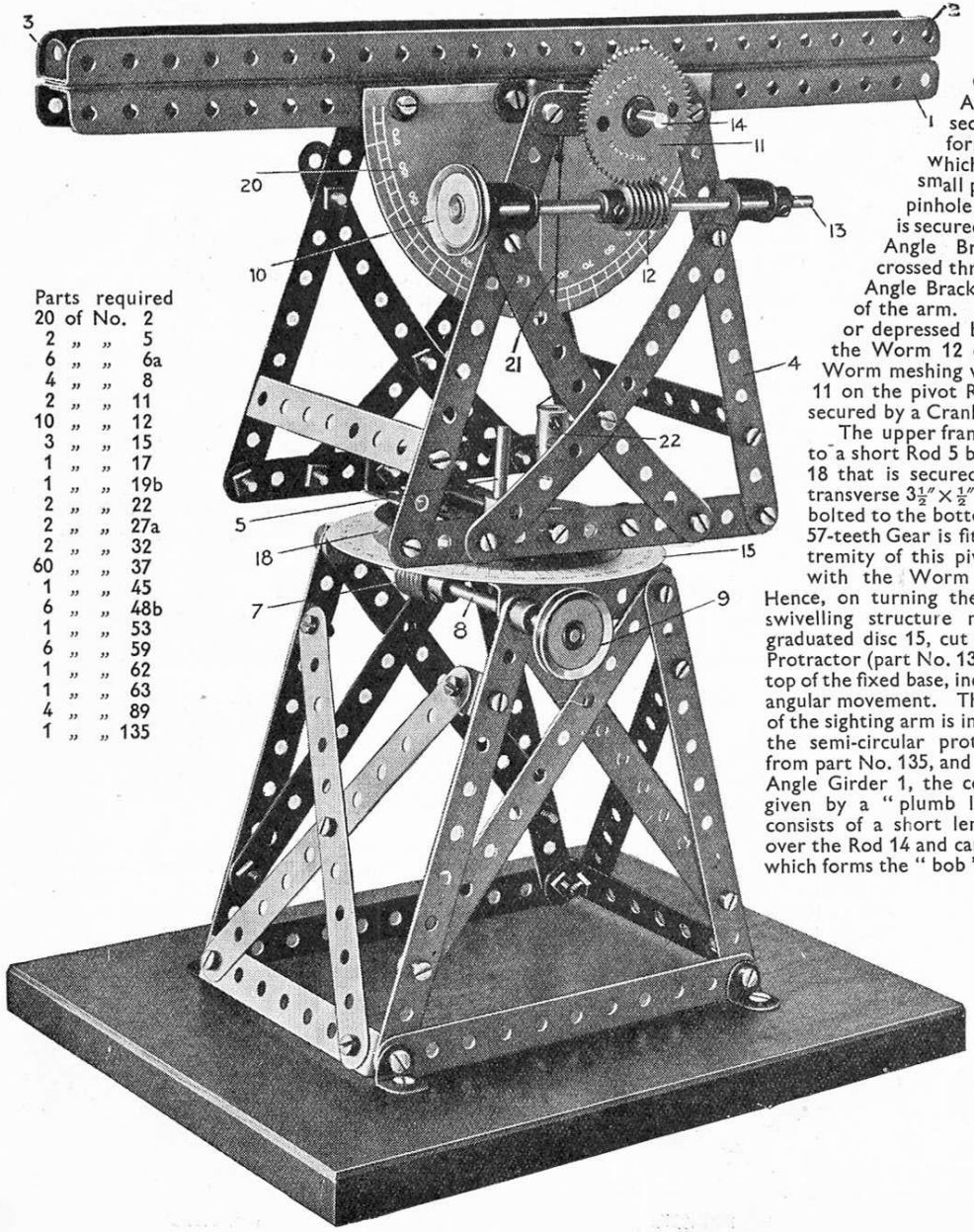


Fig. K24b

The drill head proper consists of a $2\frac{1}{2}'' \times 1''$ Double Angle Strip attached by two $\frac{3}{4}''$ Bolts to a 57-teeth Gear 9a (Fig. K24) and a Boiler End, the Gear being spaced equidistantly between the Double Angle Strip and the Boiler End by Collars on the Bolts. A Wheel Flange 10, attached to a $2\frac{1}{2}'' \times 1''$ Double Angle Strip, forms a bearing for the Boiler End, over which it fits. The object of this bearing is to relieve the central shaft of strain. The shorter arms of the Double Angle Strip are attached to Double Arm Cranks, that are secured by double Grub Screws to a Rod 11, the latter having secured to it a 57-teeth Gear that is in mesh with a Worm. By this gear the drill head may be tilted in a vertical direction. By turning a 1″ fast Pulley the drill head may be rotated through a complete circle about the central shaft, through the medium of a Worm that is in mesh with the 57-teeth Gear 9a.

K25.
Theodolite



Parts required	
20	of No. 2
2	„ „ 5
6	„ „ 6a
4	„ „ 8
2	„ „ 11
10	„ „ 12
3	„ „ 15
1	„ „ 17
1	„ „ 19b
2	„ „ 22
2	„ „ 27a
2	„ „ 32
60	„ „ 37
1	„ „ 45
6	„ „ 48b
1	„ „ 53
6	„ „ 59
1	„ „ 62
1	„ „ 63
4	„ „ 89
1	„ „ 135

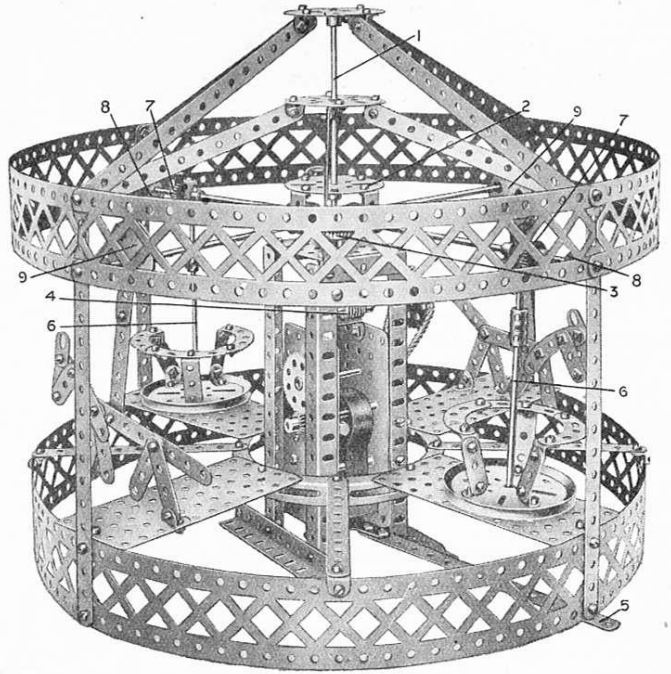
The Theodolite arm is represented by two reversed pairs of 12½" Angle Girders 1 and 2 an Angle Bracket being secured at each end to form the sights, one of which is shown at 3. A small piece of paper, with a pinhole punched in its centre is secured over the hole in the Angle Bracket 3 and two crossed threads over that in the Angle Bracket at the other end of the arm. The arm is elevated or depressed by the Pulley 10 and the Worm 12 on the Rod 13, the Worm meshing with a 57-teeth Gear 11 on the pivot Rod 14. This Rod is secured by a Crank to the sighting arm.

The upper framework 4 is secured to a short Rod 5 by means of a 3" Pulley 18 that is secured by ½" Bolts to the transverse 3½" × ½" Double Angle Strips bolted to the bottom of the frame. A 57-teeth Gear is fitted to the lower extremity of this pivot Rod and engages with the Worm 7 on the Rod 8. Hence, on turning the hand wheel 9, the swivelling structure may be rotated. A graduated disc 15, cut from the Theodolite Protractor (part No. 135) and bolted to the top of the fixed base, indicates the horizontal angular movement. The vertical movement of the sighting arm is indicated by means of the semi-circular protractor 20, also cut from part No. 135, and bolted to the lower Angle Girder 1, the correct reading being given by a "plumb line" 21. This line consists of a short length of cord looped over the Rod 14 and carrying a Coupling 22, which forms the "bob" at its lower end.

K26.
Roundabout

The vertical Rod 1 is driven from the Motor through the gearing shown, the final drive being taken through a Worm 4 and 57-teeth Gear Wheel. A Face Plate 2 secured to the Rod 1, carries four 1" × 1" Angle Brackets, in which are journalled the inner ends of the four 6½" Rods conveying the drive to the revolving cars and galloping horses. On the ends of these Rods are secured ½" Pinions, which engage with a fixed 1½" Contrate Wheel 3. The latter is attached to the top of the central column by ½" Bolts, on the shanks of which Collars are placed for spacing purposes.

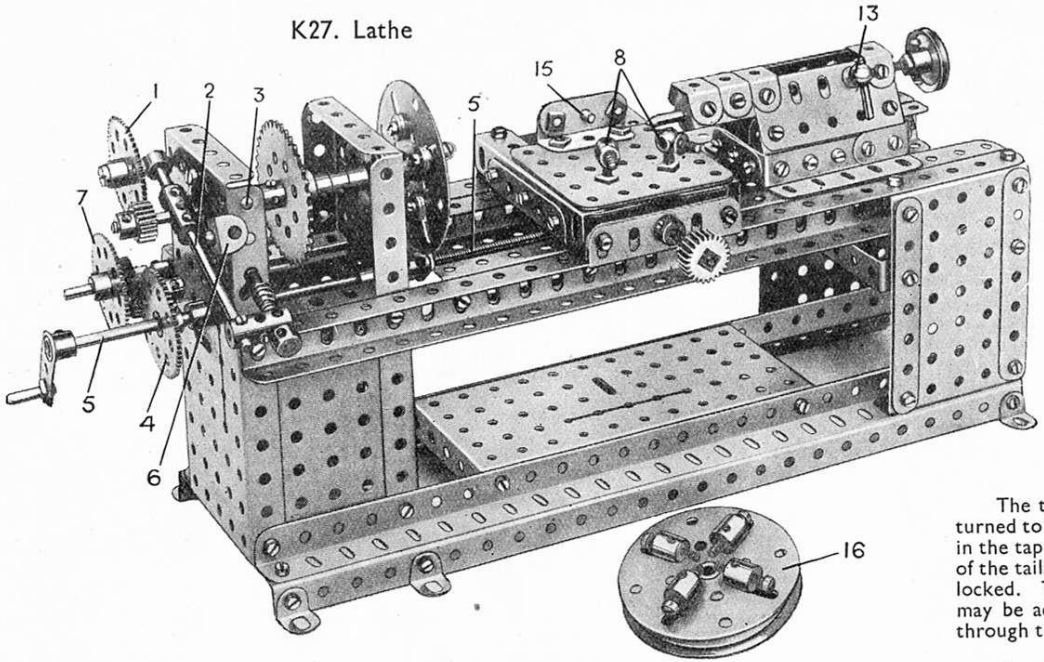
The vertical Rods 6 each carry a ¾" Contrate Wheel that is in mesh with a ¾" Pinion 7, the ends of the Rods being journalled in Couplings that are mounted loosely on the horizontal 6½" Rods. The outer ends of the latter are journalled in Double Brackets 8. The horses, which are attached pivotally by one leg to the roundabout, are caused to "gallop" by means of the Eccentrics 9. A 7½" Strip 5 operates the Motor switch.



Parts required															
4	of No.	1a	2	„	„	9d	2	of No.	25	4	of No.	63	1	of No.	143
9	„	„ 1b	2	„	„	10	4	„	„ 26	4	„	„ 70	8	„	„ 197
4	„	„ 2	4	„	„	11	2	„	„ 27a	1	„	„ 72	No. E6 Electric Motor		
34	„	„ 3	4	„	„	12	1	„	„ 28	2	„	„ 90	(not included in Outfit)		
2	„	„ 5	1	„	„	12a	2	„	„ 29	6	„	„ 90a			
2	„	„ 6	4	„	„	13a	1	„	„ 32	9	„	„ 94			
10	„	„ 6a	2	„	„	14	142	„	„ 37	1	„	„ 95a			
8	„	„ 8b	2	„	„	15	6	„	„ 37a	1	„	„ 96a			
2	„	„ 9	2	„	„	16a	8	„	„ 38	3	„	„ 109			
4	„	„ 9b	2	„	„	18a	2	„	„ 48	2	„	„ 111a			
2	„	„	2	„	„	19b	10	„	„ 59	2	„	„ 130			

The Braced Girders shown in the illustration should be replaced by Strip Plates of corresponding length.

K27. Lathe



The headstock of the lathe is composed of two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ and two $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates. Bush Wheels, bolted to the former Plates, form reinforced bearings for the "mandrel," which carries a 2" Sprocket Wheel and is strengthened by the addition of a Coupling and Collars.

The change-speed gearing for actuating the lead-screw 5 is arranged as follows : A $\frac{1}{2}''$ Pinion on the mandrel is in continual mesh with a 57-teeth Gear Wheel 1, which is mounted freely on a Pivot Bolt on the end of a lever 2. The latter pivots and is free to slide on the mandrel, so that by placing the spring-loaded plunger on the end of the lever in the hole 3, the Gear 1 is brought into mesh with a 57-teeth Gear 4 on the lead-screw. When the plunger is placed in the hole of a $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Bracket 6 (which is spaced from the Plate by three Washers on the securing Bolt), the Gear 1 engages with another 57-teeth Gear Wheel 7 on a Rod that carries a $\frac{1}{2}''$ Pinion and is journalled in a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip at the rear of the headstock. The Pinion is in mesh with an "idler" Pinion that is in mesh with the Gear Wheel 4. The lead-screw is a $4\frac{1}{2}''$ Screwed Rod secured by a Coupling to the Rod carrying the Gear 4. A Crank is provided to traverse the slide rest by hand if the mechanical movement is considered too fast for delicate work.

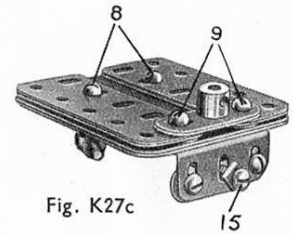


Fig. K27c

The bottom and top slides of the slide rest are shown in Figs. K27a and K27c. The portion that slides on the lathe-bed (see Fig. K27a) consists of a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, to the flanges of which are bolted $2\frac{1}{2}''$ Angle Girders, a $2\frac{1}{2}''$ Strip being placed between each Girder and the flange of the Plate. Two $3\frac{1}{2}''$ Angle Girders are secured to further $2\frac{1}{2}''$ Girders as shown, and upon these the top slide runs. The latter—of which the underside is shown in Fig. K27c—is built up from two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates, to two sides of which duplicated $2\frac{1}{2}''$ Flat Girders are secured by means of $\frac{3}{4}''$ Bolts 8 and $\frac{3}{8}''$ Bolts 9. Each pair of Flat Girders is packed away from the Plates by a $2\frac{1}{2}''$ Strip. The top slide is pushed on to the $3\frac{1}{2}''$ Angle Girders and the end of the feed-screw 10 inserted in the tapped holes of a Double Arm Crank. The lead-screw passes through the tapped bores of a Handrail Support 11. It is very important that there should be absolutely no slackness in the longitudinal and cross movements of the slide rest.

The tailstock is shown in Fig. K27b. The tailstock spindle is a $2\frac{1}{2}''$ Rod (one end of which is turned to a point in the lathe) that is secured by a Coupling to a 2" Screwed Rod. The latter works in the tapped bores of a "spider" 12 (removed from a Swivel Bearing) that is attached to the frame of the tailstock by a Handrail Support 13 (Fig. K27), so that by screwing up the latter the spindle is locked. The complete tailstock is slidable on the lathe bed in order that work of varying lengths may be accommodated. It may be retained in the required position by passing Threaded Pins through the holes in the tailstock Girders and those in the lathe bed.

The "chuck" for holding the work to be turned, consists of a Face Plate to which four equidistantly-spaced Collars are secured by Set-screws passed through the Face Plate and inserted in their tapped bores. A $\frac{3}{4}''$ Bolt is passed through each Collar and held in place by two Nuts, so that by turning the Nuts, the Bolts can be made to grip the work from four different directions.

A more satisfactory and stronger chuck is shown separately at 16, but this requires four Threaded Bosses while Outfit No. 6 contains only three. Two Face Plates and a Wheel Flange are clamped together by four $\frac{1}{2}''$ Bolts, which are screwed into the Threaded Bosses. The Bosses bed into the slotted holes of the Face Plate, and are hence prevented from twisting round. One Washer and a Collar is used on the shank of each $\frac{1}{2}''$ Bolt, between the two Face Plates, and a Washer is also placed under the head of each Bolt.

The turning tool may be held in place on the top side of the slide rest by Strips, which are placed over the shanks of the $\frac{3}{4}''$ Bolts 8 and over the tool, so that by screwing down the Handrail Supports, the tool is clamped firmly. The Bolt 15 forms a "steady" when turning work of small diameter.

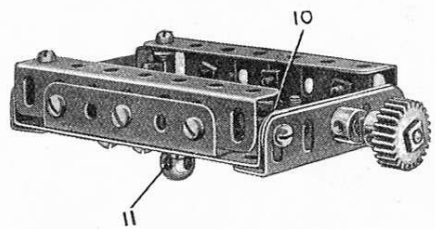


Fig. K27a

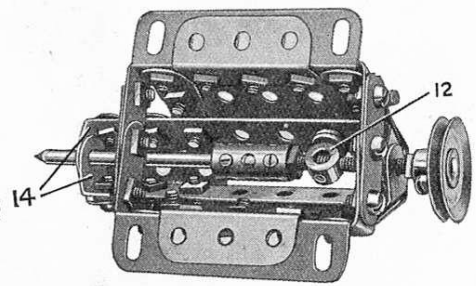
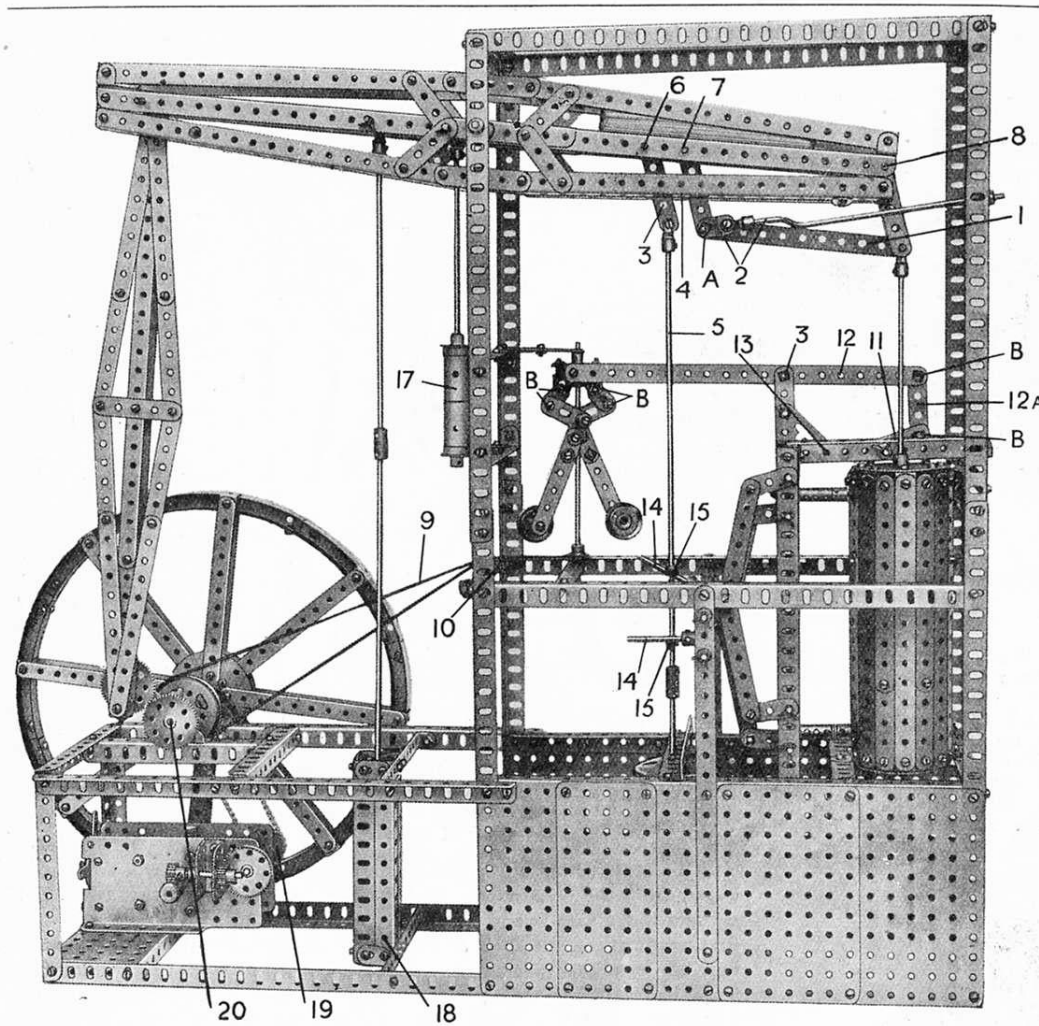


Fig. K27b

Parts required

8 of No. 3	4 of No. 11	1 of No. 22	1 of No. 48a	2 of No. 80b	5 of No.111c
6 „ „ 5	9 „ „ 12	2 „ „ 24	3 „ „ 48b	1 „ „ 81	3 „ „ 115
4 „ „ 6a	4 „ „ 12a	2 „ „ 25	3 „ „ 52	1 „ „ 95	1 „ „ 120b
8 „ „ 8	1 „ „ 15	2 „ „ 26	6 „ „ 53	6 „ „ 103f	4 „ „ 136
4 „ „ 8a	2 „ „ 15a	3 „ „ 27a	16 „ „ 59	1 „ „ 109	1 „ „ 147b
2 „ „ 9b	1 „ „ 16	1 „ „ 35	1 „ „ 62	6 „ „ 111	1 „ „ 165
6 „ „ 9d	2 „ „ 16a	95 „ „ 37	1 „ „ 62b	1 „ „ 111a	
3 „ „ 9f	1 „ „ 18a	19 „ „ 37a	5 „ „ 63		
4 „ „ 10	2 „ „ 18b	23 „ „ 38	2 „ „ 72		



K28. Watt's Beam Engine

Parts required

6	of No.	1	36	of No.	38	6	of No.	70	8	of No.	119
3	„ „	1a	2	„ „	43	4	„ „	77	1	„ „	125
10	„ „	1b	5	„ „	48a	1	„ „	80a	2	„ „	126
27	„ „	2	7	„ „	48b	1	„ „	81	1	„ „	126a
10	„ „	3	4	„ „	48d	11″	„ „	81	2	„ „	128
2	„ „	4	2	„ „	52	2	„ „	96	1	„ „	133
18	„ „	5	4	„ „	52a	4	„ „	109	1	„ „	147b
16	„ „	6	27″	„ „	58	4	„ „	111	1	„ „	160
13	„ „	6a	29	„ „	59	6	„ „	111a	1	„ „	162
26	„ „	8	3	„ „	62	6	„ „	111c	2	„ „	163
8	„ „	8a	8	„ „	63	2	„ „	115	1	„ „	164
18	„ „	9	2	„ „	64	1	„ „	116a	2	„ „	165
2	„ „	9f									
8	„ „	10									
8	„ „	11									
31	„ „	12									
2	„ „	12a									
2	„ „	12b									
3	„ „	13									
1	„ „	13a									
5	„ „	14									
2	„ „	15									
1	„ „	15a									
5	„ „	16									
1	„ „	16a									
4	„ „	17									
4	„ „	18a									
2	„ „	18b									
1	„ „	19									
1	„ „	20a									
2	„ „	20b									
4	„ „	22									
2	„ „	23									
1	„ „	23a									
4	„ „	24									
1	„ „	26									
2	„ „	27a									
1	„ „	28									
1	„ „	32									
19	„ „	35									
314	„ „	37									
6	„ „	37a									

2 of No. 166
No. E6 Electric Motor
(not included in Outfit)

In addition the following parts are used as the balance weight for the beam :—

1	of No.	2
4	„ „	2a
14	„ „	3
10	„ „	4

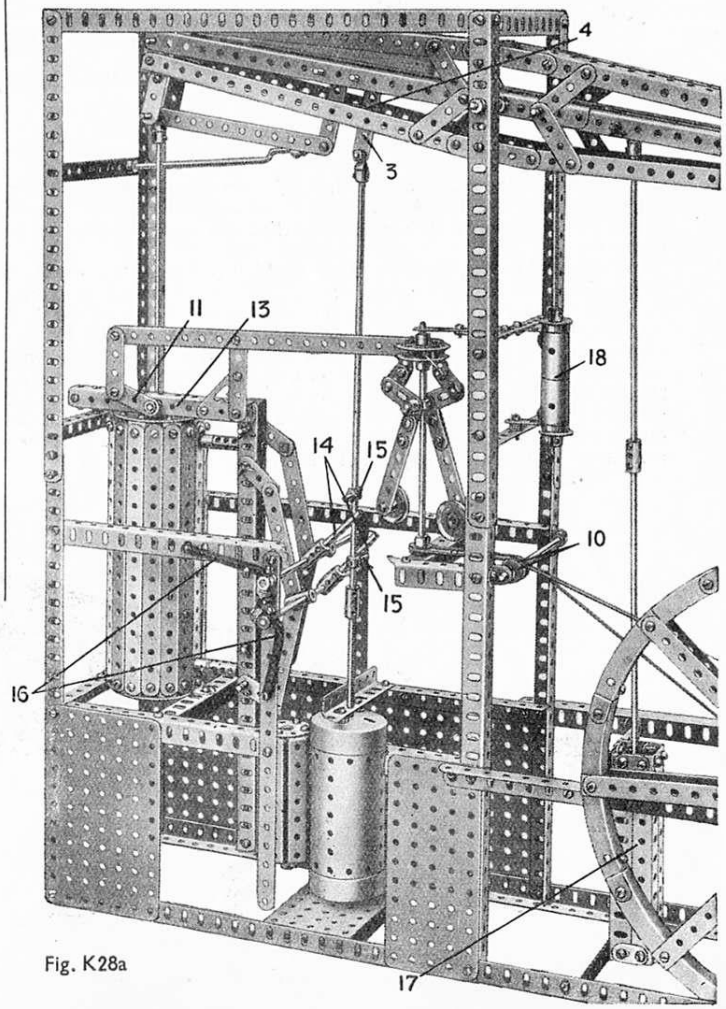


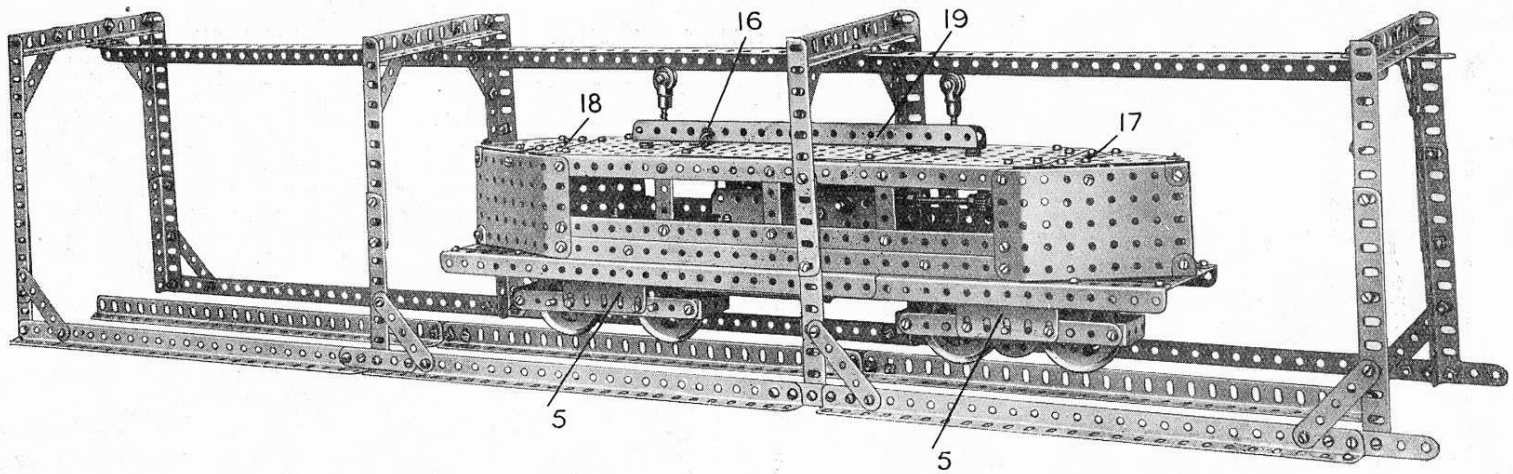
Fig. K28a

This model of James Watt's double-acting Beam Engine incorporates working reproductions of three of the great engineer's most notable achievements—sun-and-planet gear, steam governor and parallel motion—as well as a representation of a fourth—the water-cooled condenser. The 1″ Sprocket Wheel 19 is connected by Sprocket Chain to a similar Sprocket in the flywheel-shaft, which is journalled in two Trunnions secured to the main frames. The piston rod is given a straight-line movement by the parallelogram 1, the point A in which is connected by the Crank Handle and 1″ Reversed Angle Bracket 2 to the framework. The link 3, connected to the main parallelogram by the 1½″ Strip 4, is added to keep the condenser pump rod 5 perpendicular. The complete link unit is pivoted on the 2″ Rods 6, 7 and 8 and held in place by Collars. In constructing the cylinder it should be noted that 1½″ Strips and Flat Brackets are used at top and bottom respectively for connecting the separate Strips forming the sides. The governor is driven by the Spring Cord 9. It is connected to the Crank 11, forming the throttle valve, by the pivoted 12½″ Strip 12 and the 2″ Strip 12a. A bolt secured in the end hole of the Strip 12 slides between the two Bush Wheels on the governor, these Bush Wheels being spaced apart by means of Spring Clips held in place by ½″ Bolts. All joints marked B are lock-nutted.

The condenser and valve operating gear are shown in detail in Fig. K28a. The tappet Rods 14 are rocked by the Threaded Pins 15, and returned by the action of the Springs 16. The method of connecting the valves to the tappet rods will be seen clearly in Fig. K28a.

The sun-and-planet gear that is incorporated in the model is described in Standard Mechanism No. 79. To complete the engine a feed water pump 17 and water circulating pump 18 are fitted.

K29. Kearney's Monorail



Each side of the main frame of the car is composed of two 12½" Angle Girders overlapping eleven holes, these sides being joined together at each end by 3½" × 2½" Flanged Plates. Two 12½" Angle Girders 1 are bolted to the main frames as shown in Fig. K29a and have secured to their ends two further 3½" × 2½" Flanged Plates 2. The latter have Boiler Ends 3 attached to their undersides to form the bearings for the bogies. The Motor is carried between the main frames on the 5½" Angle Girders 4.

The bogie frames are 5½" Strips joined together by 1½" × ½" Double Angle Strips. Flat Girders 5 are bolted to the sides of the bogies and attached to the Wheel Flanges 6 by 2½" Angle Girders. The Boiler Ends 3 fit exactly into the Wheel Flanges and form very efficient swivel bearings. The bogie included in Fig. K29a is constructed similarly to that shown in Fig. K29b except that the latter embodies part of the driving mechanism.

Sprocket Chain connects the ½" Sprocket Wheel on the Motor armature shaft to a 1" Sprocket Wheel on the Rod 7. This Rod carries a ¾" Pinion that meshes with the ¾" Contrate 8, which is secured to a 3½" Rod 20 journalled in the 1" × 1" Angle Bracket 9 and in a Coupling 10. A second 3½" Rod 12, inserted in the end hole of this Coupling, carries a 1½" Contrate that meshes with the ½" Pinion 11 on the Rod 20. The Rod 12 passes through the Boiler End 3, through a Double Bent Strip and a Double Arm Crank bolted to the inside of the Wheel Flange 6, and enters the Coupling 13. Between this Coupling and the Wheel Flange a ½" Pinion 14 is nipped on the Rod and engaged with a 1½" Contrate on a 2" Rod 15. This Rod is journalled in the bogie sides and in the Coupling 13 and carries a ¾" Sprocket that is connected by Sprocket Chain to a 1" Sprocket Wheel on one of the driving axles. This axle is connected to the second driving axle by means of 1" Sprockets and Sprocket Chain.

Parts required

2	of No. 1	4	of No. 96
4	„ „ 2	2	„ „ 96a
6	„ „ 6	7	„ „ 103f
8	„ „ 8	1	„ „ 116a
2	„ „ 8a	2	„ „ 120b
4	„ „ 9	2	„ „ 137
4	„ „ 9d	2	„ „ 162a
2	„ „ 10	1	„ „ 165
12	„ „ 12	No. E6 Electric Motor (not included in Outfit)	
1	„ „ 12a		
1	„ „ 16		
1	„ „ 16a		
1	„ „ 16b		
5	„ „ 17		
1	„ „ 18a		
2	„ „ 18b		
4	„ „ 20a		
2	„ „ 23		
1	„ „ 25		
1	„ „ 26		
2	„ „ 28		
1	„ „ 29		
122	„ „ 37		
4	„ „ 37a		
36	„ „ 38		
4	„ „ 48		
3	„ „ 52a		
4	„ „ 53		
4	„ „ 53a		
12	„ „ 59		
2	„ „ 62		
2	„ „ 62b		
2	„ „ 63		
2	„ „ 76		
18	„ „ 94		

The following parts are used for insulation purposes, but are not included in the Outfit:—

1	of No. 182
2	„ „ 1570
2	„ „ 1575
2	„ „ 1583

Parts required to build Track and Overhead Wire supporting Standards as illustrated:—

8	of No. 4
17	„ „ 5
2	„ „ 6
3	„ „ 6a
12	„ „ 8
2	„ „ 8b
14	„ „ 9
2	„ „ 9a
2	„ „ 9b
102	„ „ 37

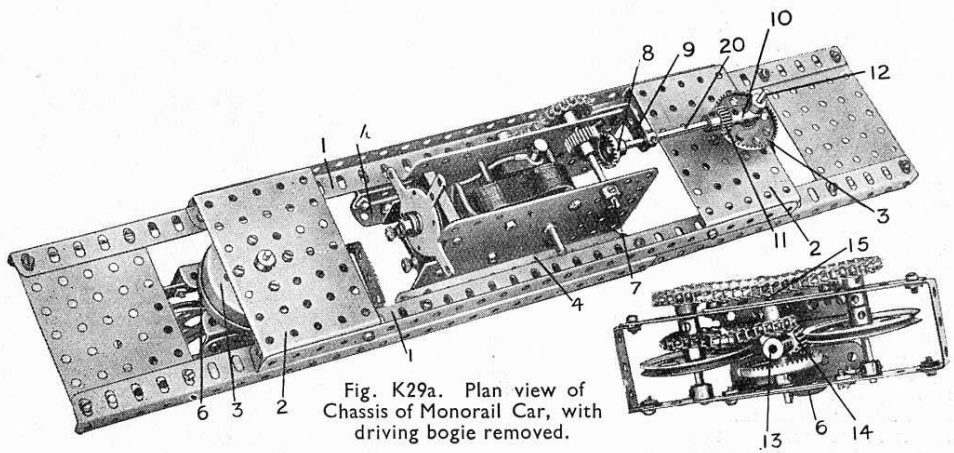


Fig. K29a. Plan view of Chassis of Monorail Car, with driving bogie removed.

Fig. K29b. Underneath view of Driving Bogie of Monorail Car.

The construction of the body, which is a complete unit, will be seen fairly clearly from the illustration. It should be noted however, that two 2½" Flat Girders 17 are used at one end of the roof and one 2½" Flat Girder and two Flat Brackets 18 at the other. Two ½" loose Pulleys carried in the jaws of two Swivel Bearings form the collectors. These are free on 1" Rods that are fitted with Springs and attached by Cranks to the Angle Girders 19. The latter are secured to the roof by 6 B.A. Bolts (part No. 1575) and insulated from the model by Insulating Bushes and Washers. These special electrical parts are not included in the Outfit and if they are not available ordinary bolts may be used provided that they are wrapped round with insulating tape so that they do not make contact with the metal parts. When the car is on the rails the ½" loose Pulleys collect the current, which is taken down the wire 16 to one of the terminals on the Motor. The other terminal is earthed to the car and the current returns through the wheels to the lower rail.

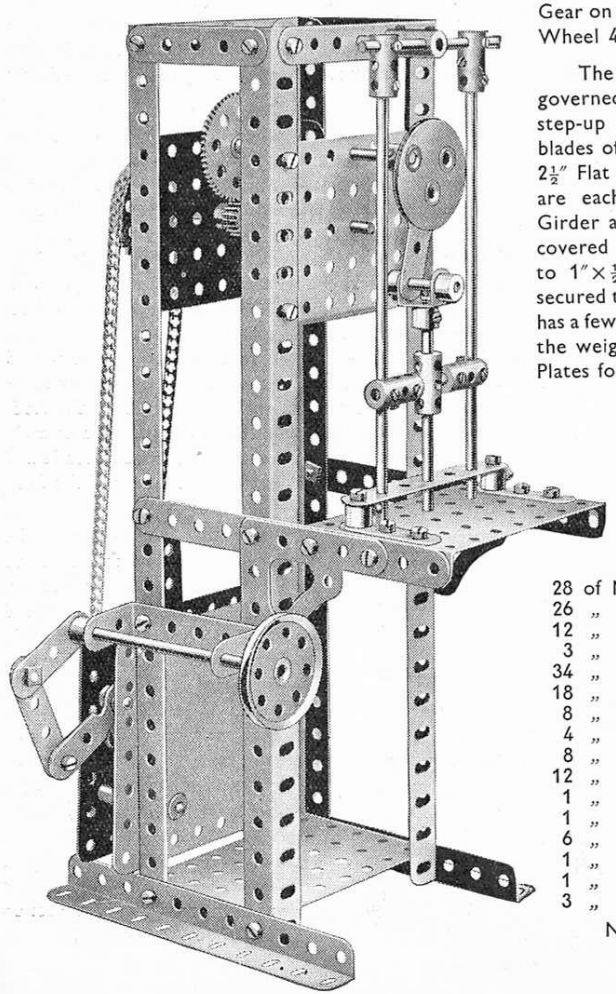
The construction of the rails will be seen fairly clearly from the illustration but it will be noticed that the standards are all built up from different length girders. This is in order to conform with the selection of girders supplied in the Outfit, but if Strips are used in conjunction with the Girders a considerable length of rail may be constructed.

K30. Punching Machine

Parts required

2 of No.	2	1 of No.	17	6 of No.	59
3 „ „	3	1 „ „	18a	3 „ „	62
2 „ „	5	2 „ „	18b	6 „ „	63
1 „ „	6	1 „ „	21	22″ „ „	94
4 „ „	8	1 „ „	26	1 „ „	95a
2 „ „	9	1 „ „	27a	1 „ „	96
2 „ „	14	42 „ „	37	2 „ „	108
2 „ „	15a	1 „ „	38	1 „ „	116
2 „ „	16	1 „ „	46	1 „ „	130
1 „ „	16b	4 „ „	53		

No. 2 Clockwork Motor
(not included in Outfit)



K31.
Big Wheel

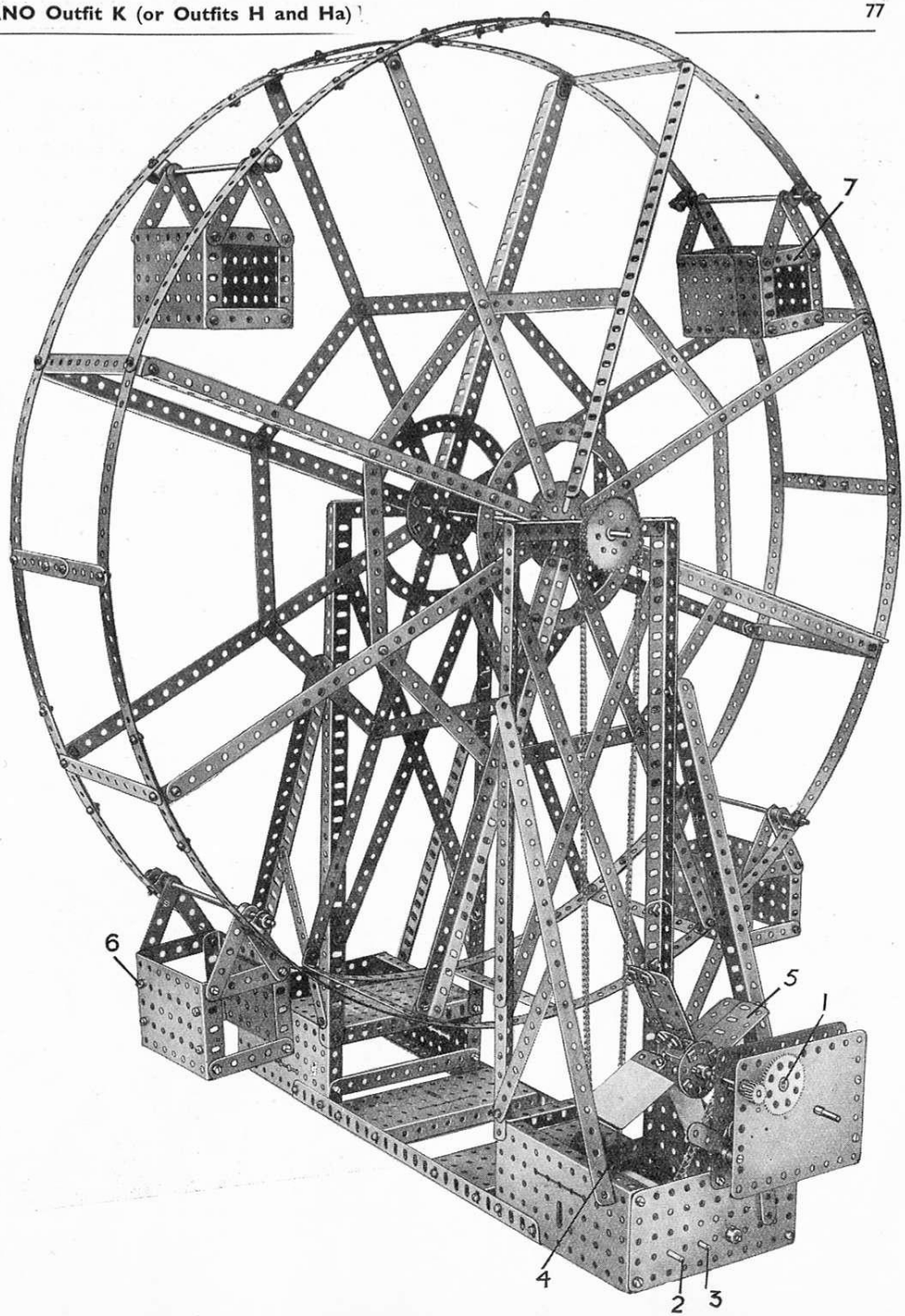
The only part of this model requiring description is the driving gear. A 1″ Sprocket Wheel on the driving spindle 1 of the Clockwork Motor is connected by Sprocket Chain to a similar Sprocket on a 6½″ Rod 2, which also carries a ½″ Pinion in mesh with a 57-teeth Gear on a second Rod 3. On the latter is a ½″ Pinion in mesh with another 57-teeth Gear on a Rod carrying a ¾″ Sprocket Wheel 4.

The speed of the Motor is governed by a fan 5, driven through a step-up gear of 3:1. Two of the blades of the fan each consist of two 2½″ Flat Girders while the other two are each composed of a 2½″ Flat Girder and a Strip. The blades are covered with paper and are bolted to 1″×½″ Angle Brackets that are secured to a Bush Wheel. The car 6 has a few Strips bolted to it to balance the weight of the two 2½″×2½″ Flat Plates forming one side of the car 7.

Parts required

28 of No.	1	3 of No.	27a		
26 „ „	2	258 „ „	37		
12 „ „	3	4 „ „	48d		
3 „ „	4	6 „ „	52		
34 „ „	5	7 „ „	53		
18 „ „	8	21 „ „	59		
8 „ „	9	3 „ „	70		
4 „ „	10	2 „ „	72		
8 „ „	11	16 „ „	90		
12 „ „	12	50″ „ „	94		
1 „ „	13	1 „ „	95		
1 „ „	13a	2 „ „	96		
6 „ „	14	1 „ „	96a		
1 „ „	16a	6 „ „	103f		
1 „ „	24	2 „ „	109		
3 „ „	26				

No. 2 Clockwork Motor
(not included in Outfit)



K32. Mill Engine

The most interesting feature of this model is the Corliss valve gear, which demonstrates faithfully all the characteristic movements of actual valve gear of this type. The Corliss gear is used on mill engines and other slow speed engines, and differs from most valve mechanisms in that there is a separate inlet and exhaust valve for each end of the cylinder. Thus there are four valves in all. They are given an oscillating movement by means of a " wrist plate " that is actuated by an eccentric on the crankshaft. A centrifugal governor automatically varies the cut-off according to the speed of the engine.

Details of the engine bed can be seen fairly clearly from Figs. K32 and K32a. The Braced Girders shown, should be replaced by Strip Plates of corresponding lengths, and it will be found necessary to overlap the edges of the Plates three holes instead of one as for the Braced Girders. From Fig. K32a it will be seen that one end of the bed is wider than the other and part of the platform overhangs to form a landing at the top of the stairway. The bed is filled in with Plates and a well is left open for the large flywheel. To finish off the platform the handrails are added, but it is advisable not to fit these until the engine and valve gear have been assembled.

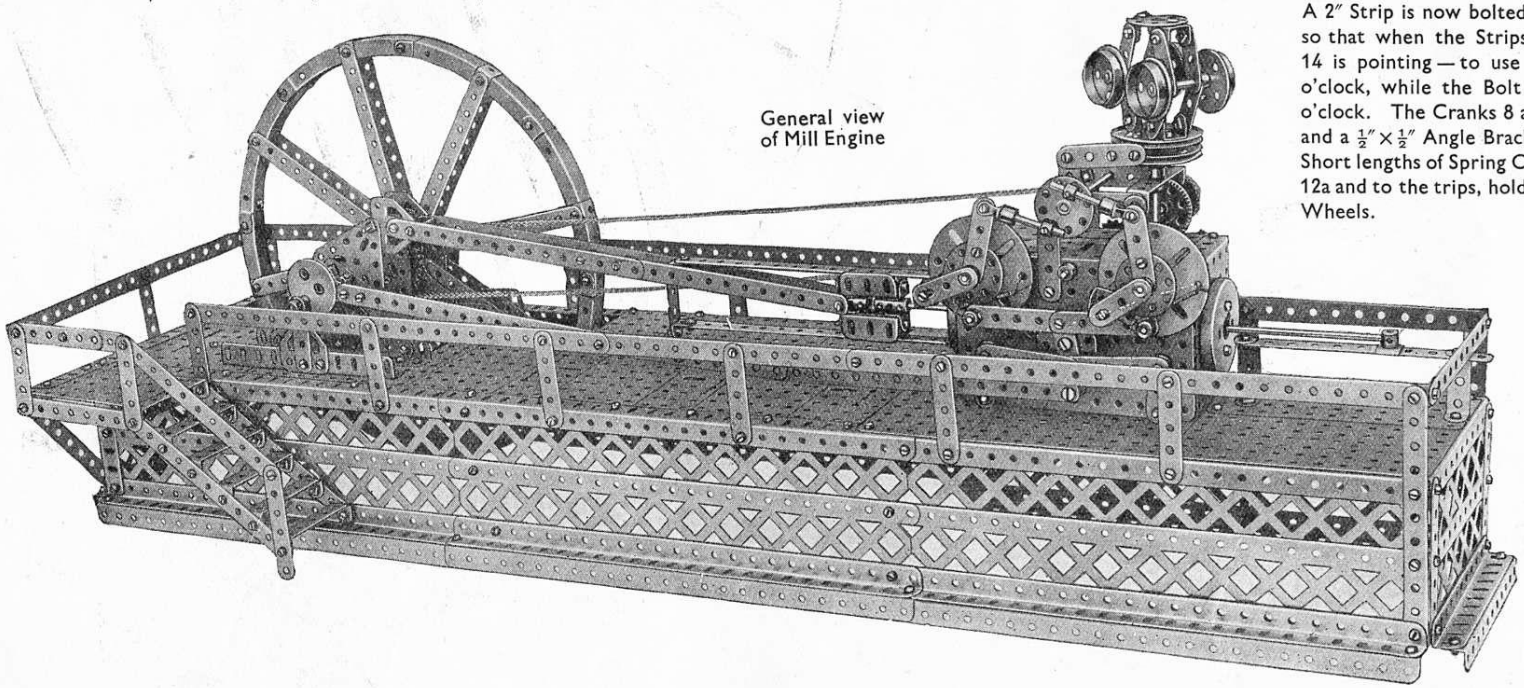
Parts required

6 of No. 1	8 of No. 11	300 of No. 37	6 of No. 70	1 of No. 130
4 „ „ 1a	29 „ „ 12	20 „ „ 37a	2 „ „ 72	2 „ „ 137
3 „ „ 1b	1 „ „ 12a	8 „ „ 38	2 „ „ 76	2 „ „ 147b
25 „ „ 2	2 „ „ 12b	1 „ „ 45	1 „ „ 81	2 „ „ 166
1 „ „ 2a	1 „ „ 13	4 „ „ 48	46 „ „ 94	4 „ „ 194
5 „ „ 3	1 „ „ 15	7 „ „ 48a	1 „ „ 95	8 „ „ 195
3 „ „ 4	2 „ „ 15a	1 „ „ 48b	2 „ „ 96	2 „ „ 196
28 „ „ 5	4 „ „ 16	1 „ „ 50a	1 „ „ 96a	8 „ „ 197
7 „ „ 6	1 „ „ 16a	6 „ „ 52	4 „ „ 108	
12 „ „ 6a	1 „ „ 16b	4 „ „ 52a	4 „ „ 109	No. E6 Electric Motor (not included in Outfit)
19 „ „ 8	3 „ „ 17	3 „ „ 53	2 „ „ 111	
1 „ „ 8a	3 „ „ 18a	4 „ „ 53a	5 „ „ 111a	
2 „ „ 8b	4 „ „ 20	10 „ „ 58	6 „ „ 111c	
9 „ „ 9	2 „ „ 20a	16 „ „ 59	2 „ „ 115	
2 „ „ 9b	5 „ „ 24	4 „ „ 62	8 „ „ 119	
4 „ „ 9f	1 „ „ 26	2 „ „ 62b	4 „ „ 126a	
2 „ „ 10	1 „ „ 28	5 „ „ 63	1 „ „ 128	

The " wrist-plate " 7 (Fig. K32b), which consists of a Bush Wheel, is free to turn about a Pivot Bolt that is secured to the $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plate forming one side of the cylinder block. The links connecting the steam valve cranks 8, 8a, and the exhaust valve cranks 9, 9a, consist of $2\frac{1}{2}''$ Strips that are attached pivotally to the wrist plate by $\frac{3}{8}''$ Bolts. These Bolts serve also to secure a 2" Strip 10, a Nut being placed on each side of the Bush Wheel to hold each $\frac{3}{8}''$ Bolt in position. The Eccentric on the crankshaft is connected to the wrist plate by two $12\frac{1}{2}''$ Strips overlapped eleven holes, and attached pivotally to the Strip 10 by a Pivot Bolt, a Collar being used for spacing purposes. The two exhaust valve cranks 9 and 9a are lock-nutted (Standard Mechanism No. 1) direct to their respective links, the Rods on which they are mounted representing the rotary exhaust valves.

The Face Plates 12, 12a are mounted loosely on $4\frac{1}{2}''$ Rods, which are journalled in the side plates of the cylinder to represent the actual steam valves. Each " trip " 13 and 13a consists of two $1\frac{1}{2}''$ Strips and one Flat Bracket bolted together by Set-screws to form an isosceles triangle, the apex of which is pivoted on a Threaded Pin secured to the Face Plate. A $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Bracket is bolted to each trip by its slotted hole. The connecting links between the wrist-plate are now slipped in place on the Threaded Pins and held in position by Collars ; the links are bent slightly to obtain sufficient clearance. Each of the two Bush Wheels 14, 14a, which turn freely on the valve rods, has an ordinary Bolt inserted in the set-screw hole and locked in place by a Nut

A 2" Strip is now bolted across the face of each Bush Wheel so that when the Strips are vertical the Bolt in the boss of 14 is pointing — to use a clock face as a comparison—to 5 o'clock, while the Bolt in the boss of 14a is pointing to 11 o'clock. The Cranks 8 and 8a, are now secured on the Rod, and a $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Bracket is bolted to the end hole of each. Short lengths of Spring Cord attached to the Face Plates 12 and 12a and to the trips, hold the latter against bosses of the Bush Wheels.



General view of Mill Engine

In the illustration the Crank 8 is about to be pulled down by the Angle Bracket on the trip 13. As this downward movement continues, the trip commences to ride up the bolt on the boss of the Bush Wheel 14, thus releasing the Angle Bracket on the Crank, which returns to its normal position under the influence of a length of Spring Cord that is fixed to the Coupling 19 (Fig. K32a). The other valve functions similarly, except that the Crank 8a is tripped in an upward direction instead of downward.

Mill Engine—continued

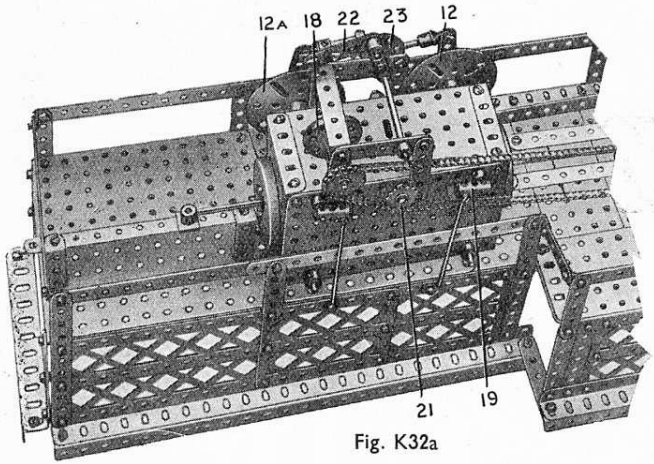
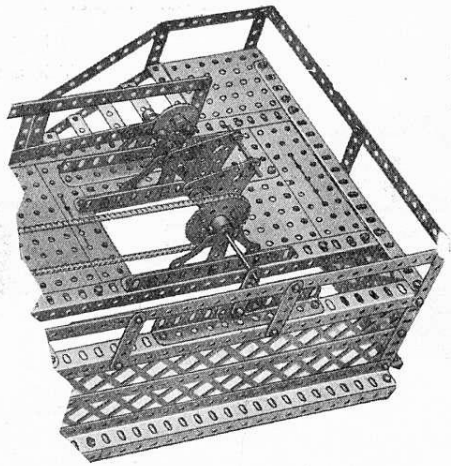


Fig. K32a



If the engine speed increases, the governor weights fly out and partially rotate the Bush Wheel 23 through the medium of the Crank 22. This alters the position of the bolts in the bosses of the Bush Wheels relative to the trips, so that the Cranks are tripped earlier in the stroke of the piston.

By altering the positions of the Rods in their respective Collars, both valves may be arranged to lift an equal amount by their trips. The Angle Brackets on the trips and Cranks 8 and 8a must be adjusted very carefully.

In constructing the crosshead the following notes will be useful. Two pairs of $1\frac{1}{2}''$ Angle Girders 1 and four $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets 2 are secured to two Couplings 3 and 4 by two $\frac{3}{4}''$ Bolts. One of these passes through the centre tapped hole of the Coupling 3 and the other through the end plain hole of the Coupling 4, and each Bolt has a Washer placed under its head. Two $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips 5 are next bolted to the Angle Brackets 2, thus forming two channel-shaped " shoes " that slide on the crosshead guides 6.

The crankshaft assembly can be seen in Fig. K32a. The webs of the crank are formed from two $2\frac{1}{2}''$ Triangular Plates to each of which a Double Arm Crank is bolted to carry the Rods forming the crankshaft. A $2\frac{1}{2}''$ Screwed Rod is secured between the two Plates and forms the crankpin.

It will be seen that by varying the positions of the Bush Wheels 14 and 14a, and hence the positions of the tripping bolts they carry, the instant at which the Cranks 8 and 8a are tripped can be varied to occur earlier or later in the stroke of the piston. These Cranks operate the inlet valves ; the exhaust valves being operated by the Cranks 9 and 9a, the timing of which is not variable. The purpose of the trip gear for the inlet valves is to provide means of controlling the time during which steam is entering the cylinder for any one stroke. As the speed of the engine increases, the amount of steam admitted is decreased, and the engine is said to be working with an early " cut off." The period of cut off is regulated automatically by means of a governor.

The $5\frac{1}{2}''$ Rod carrying the governor is journalled in a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip and in the top Plate of the cylinder. The links 15 ($1\frac{1}{2}''$ Strips) supporting the governor weights, are attached pivotally at their top ends to $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets that are secured to a Bush Wheel 16, while their lower extremities are attached in a similar manner to two 2" Pulleys 17, which are secured rigidly together by $\frac{1}{2}''$ Bolts and spaced apart by Collars. These Pulleys should be free to slide on the Rod. The drive for the governor is taken from a 2" Sprocket Wheel on the crankshaft by Sprocket Chain to a 1" Sprocket Wheel on a short Rod carrying a $1\frac{1}{2}''$ Contrate 18 (Fig. K32a), that meshes with a $\frac{1}{2}''$ Pinion 20 on the governor shaft ; a $\frac{3}{4}''$ Sprocket Wheel 21 (Fig. K32a) is used to keep the Sprocket Chain clear of the Coupling 19.

A Boss Bell Crank is bolted to the 2" Strip 22 (Fig. K32b), which carries a $\frac{3}{8}''$ Bolt locating between the Pulleys 17, and is secured by a Coupling to a $3\frac{1}{2}''$ Rod carrying a Bush Wheel 23. Two Collars are attached pivotally to the latter and are connected by $1\frac{1}{2}''$ Rods and End Bearings to the 2" Strips on the Bush Wheels 14 and 14a.

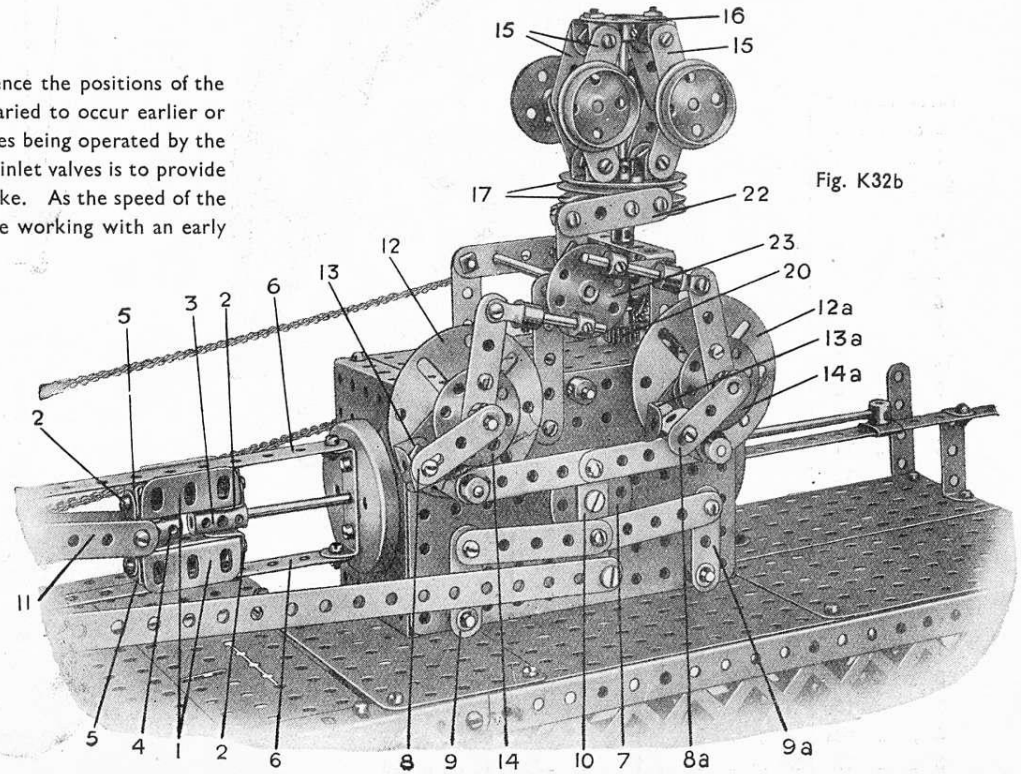


Fig. K32b

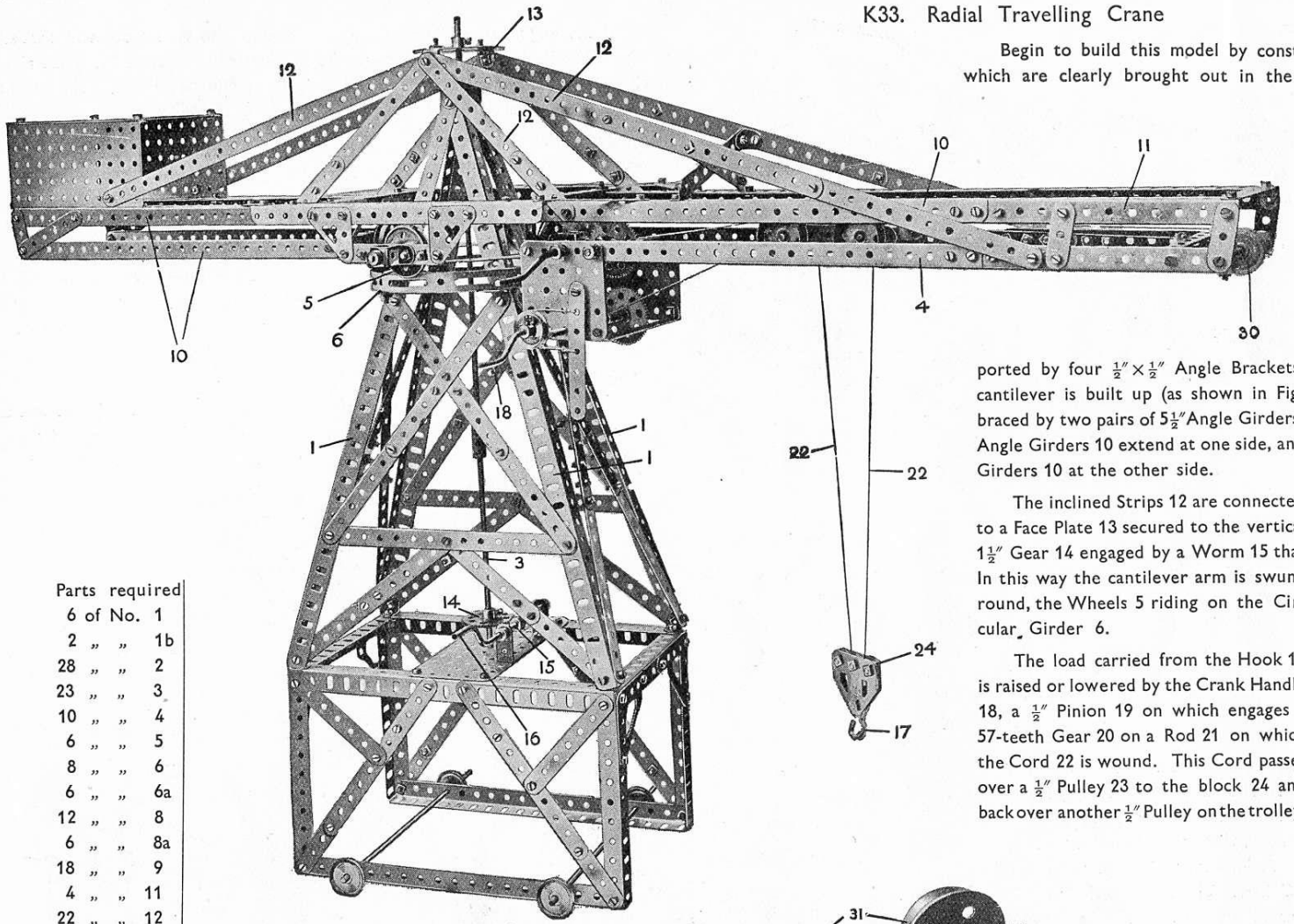
K33. Radial Travelling Crane

Begin to build this model by constructing the main tower, the details of which are clearly brought out in the illustrations on this and the following page. Notice that the inclined corner Angle Girders 1 are connected at the top (as shown in Fig. K33c) by a Bush Wheel 2 secured by Angle Brackets. This Bush Wheel forms a bearing for the vertical Rod 3 by which the cantilever arm 4 is turned.

The cantilever arm 4 turns on a bearing formed of Flanged Wheels 5, which run on a Circular Girder 6 supported by four $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets bolted to the Corner Girders 1. The cantilever is built up (as shown in Fig. K33b) from two $9\frac{1}{2}''$ Angle Girders 8, braced by two pairs of $5\frac{1}{2}''$ Angle Girders 9 overlapped nine holes. From these, $12\frac{1}{2}''$ Angle Girders 10 extend at one side, and $5\frac{1}{2}''$ Girders 11 are connected to similar Girders 10 at the other side.

The inclined Strips 12 are connected at the top, by means of Angle Brackets, to a Face Plate 13 secured to the vertical Rod 3. At the foot of the Rod 3 is a $1\frac{1}{2}''$ Gear 14 engaged by a Worm 15 that is operated by the Crank Handle 16. In this way the cantilever arm is swung round, the Wheels 5 riding on the Circular Girder 6.

The load carried from the Hook 17 is raised or lowered by the Crank Handle 18, a $\frac{1}{2}''$ Pinion 19 on which engages a 57-teeth Gear 20 on a Rod 21 on which the Cord 22 is wound. This Cord passes over a $\frac{1}{2}''$ Pulley 23 to the block 24 and back over another $\frac{1}{2}''$ Pulley on the trolley,



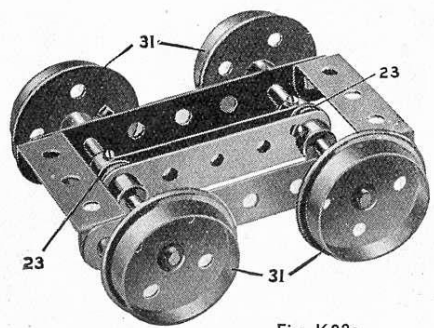


Fig. K33a

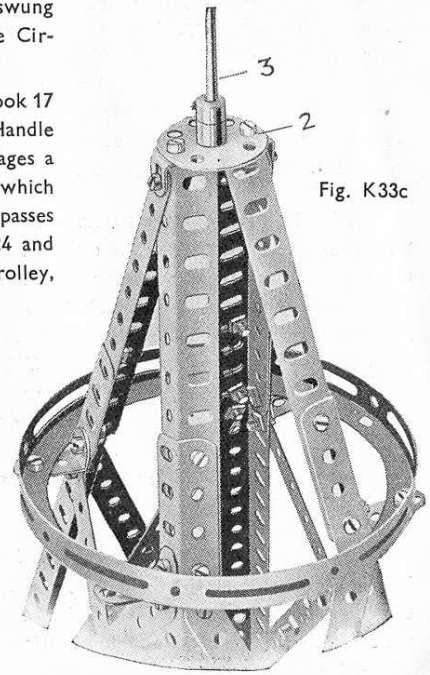
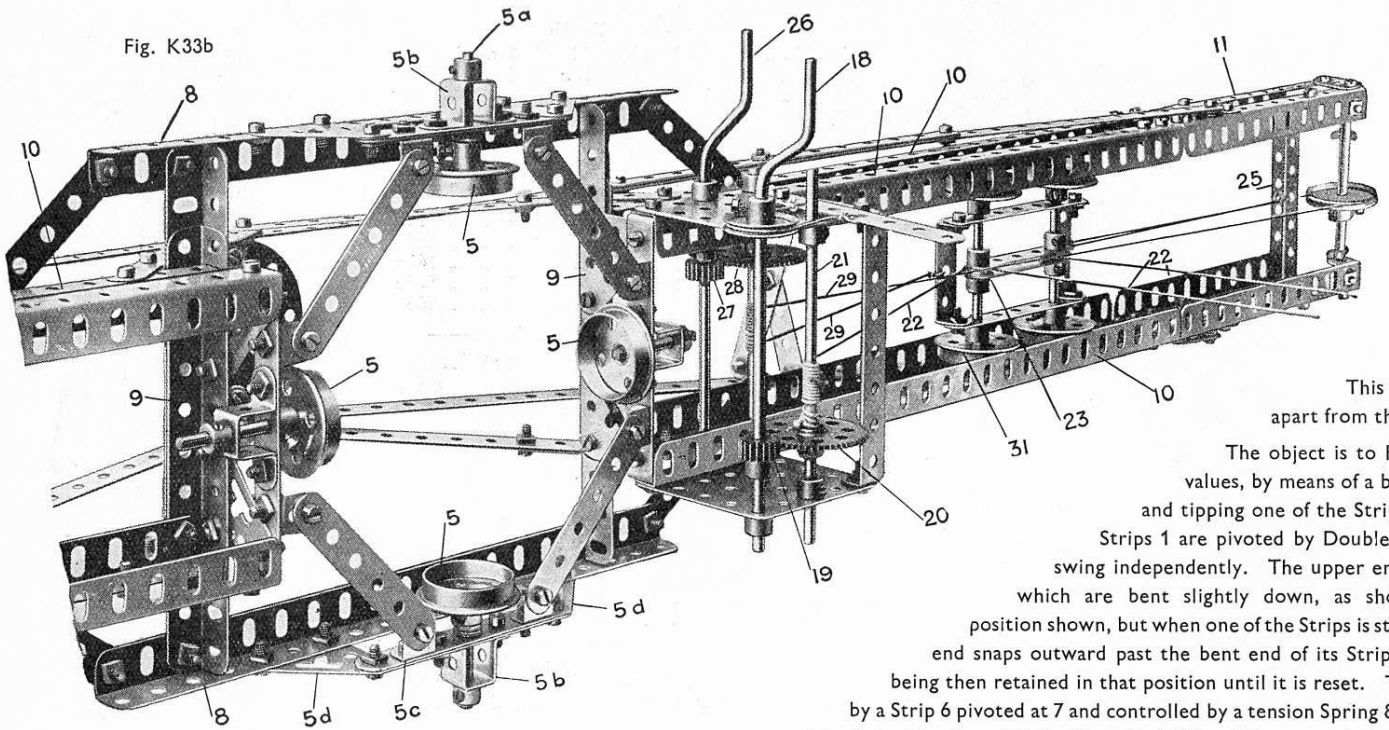


Fig. K33c

Parts required												
6	of No.	1	8	of No.	20	16	of No.	38	19	of No.	59
2	„	„ 1b	6	„	„ 22	1	„	„ 40	1	„	„ 63
28	„	„ 2	3	„	„ 23	4	„	„ 45	1	„	„ 70
23	„	„ 3	1	„	„ 24	1	„	„ 46	2	„	„ 72
10	„	„ 4	2	„	„ 26	2	„	„ 48	4	„	„ 108
6	„	„ 5	3	„	„ 27a	4	„	„ 48b	1	„	„ 109
8	„	„ 6	1	„	„ 32	2	„	„ 52	2	„	„ 126a
6	„	„ 6a	2	„	„ 35	1	„	„ 52a	8	„	„ 133
12	„	„ 8	274	„	„ 37	1	„	„ 57c	1	„	„ 143
6	„	„ 8a									
18	„	„ 9									
4	„	„ 11									
22	„	„ 12									
4	„	„ 12b									
1	„	„ 13									
2	„	„ 13a									
1	„	„ 14									
1	„	„ 15									
1	„	„ 15a									
3	„	„ 16									
2	„	„ 16b									
4	„	„ 18a									
3	„	„ 19									

Fig. K33b



K33. Radial Travelling Crane—continued

and is secured to the $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 25 at the outer end of the cantilever arm. Consequently, when the trolley is caused to travel along the cantilever arm the load remains suspended at a constant height—an important point and an interesting detail.

The trolley is caused to move to and fro along the cantilever arm by the action of the Crank Handle 26. On this, a $\frac{1}{2}''$ Pinion 27 engages a 57-teeth Gear 28 on a rod on which is wound the Cord 29, the opposite ends of which are connected to the opposite ends of the trolley. The Cord 29 passes round a Pulley 30 at the outer end of the jib. By turning the Crank Handle 26, therefore, the Cord 29 winds on and off its Rod, and moves the trolley to and fro. The lower Wheels 31, shown in Fig. K33a, run on the lower Angle Girders 10.

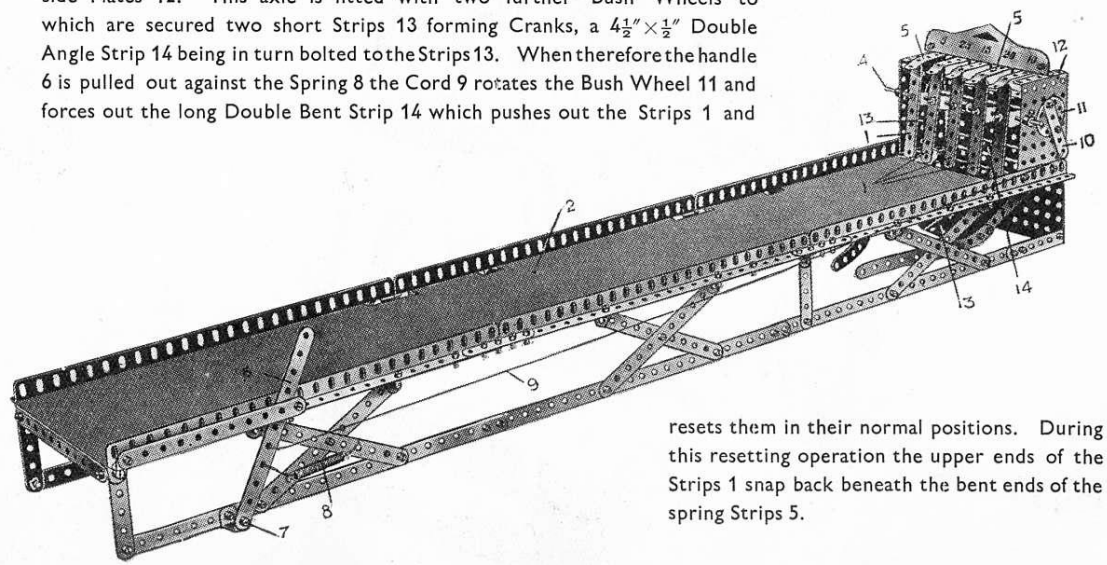
The Wheels 5 are connected to $1\frac{1}{2}''$ Rods 5a which are journalled in Double Bent Strips 5b bolted to $3\frac{1}{2}''$ Strips 5c carried below the Angle Girders 8 by Corner Brackets 5d.

K34. Box Ball Alley

Parts required			
6	of No.	1	
19	„	„ 2	
5	„	„ 3	
2	„	„ 4	
15	„	„ 5	
6	„	„ 8	
5	„	„ 11	
27	„	„ 12	
1	„	„ 14	
1	„	„ 15	
2	of No.	16	
1	„	„ 24	
8	„	„ 35	
132	„	„ 37	
1	„	„ 43	
1	„	„ 48c	
2	„	„ 52	
2	„	„ 53	
2	„	„ 54a	
2	„	„ 59	
2	„	„ 62	
1	of No.	63	

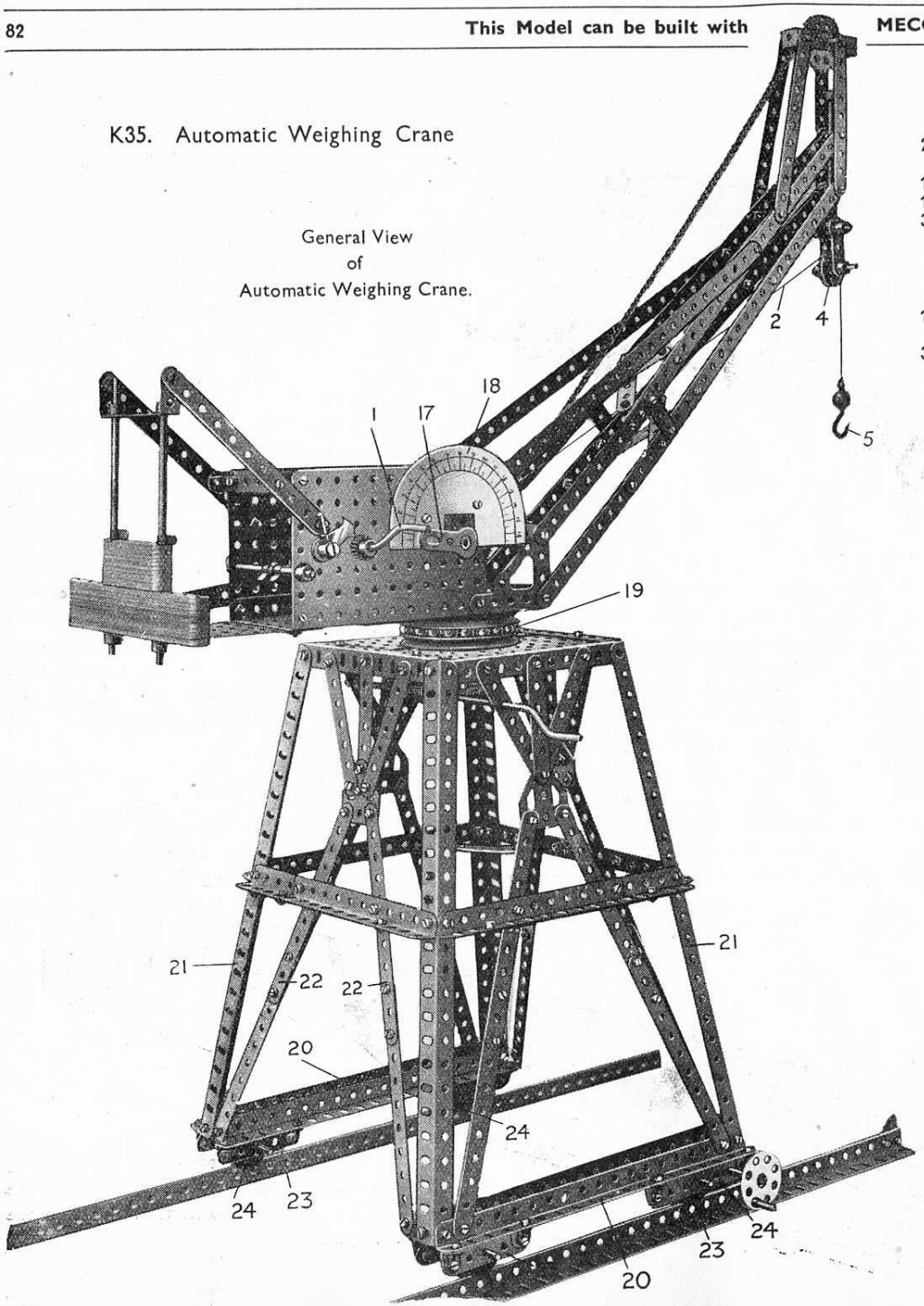
This model of a Box Ball Alley gives endless amusement, apart from the actual construction.

The object is to hit one of the Strips 1, which have various number values, by means of a ball rolled along the platform 2, the ball after striking and tipping one of the Strips being returned by the tray 3 to the player. The Strips 1 are pivoted by Double Bent Strips on to a Rod 4, so that each Strip may swing independently. The upper ends of the Strip are engaged by Strips 5, the ends of which are bent slightly down, as shown. The Strips 1 are normally held in the position shown, but when one of the Strips is struck by the ball it is deflected backward and its upper end snaps outward past the bent end of its Strip 5, which thus acts as a spring, the deflected Strip being then retained in that position until it is reset. To reset any or all of the Strips 1 a handle is formed by a Strip 6 pivoted at 7 and controlled by a tension Spring 8. A Cord 9 connects the Strip 6 to a short Strip 10 forming a Crank and bolted to a Bush Wheel 11 on an axle journalled in the side Plates 12. This axle is fitted with two further Bush Wheels to which are secured two short Strips 13 forming Cranks, a $4\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 14 being in turn bolted to the Strips 13. When therefore the handle 6 is pulled out against the Spring 8 the Cord 9 rotates the Bush Wheel 11 and forces out the long Double Bent Strip 14 which pushes out the Strips 1 and resets them in their normal positions. During this resetting operation the upper ends of the Strips 1 snap back beneath the bent ends of the spring Strips 5.



K35. Automatic Weighing Crane

General View of Automatic Weighing Crane.



Parts required

8	of No.	1	1	of No.	22	1	of No.	70
28	„ „	2	2	„ „	22a	2	„ „	77
2	„ „	2a	1	„ „	24	27″	„ „	94
10	„ „	3	1	„ „	25	1	„ „	95a
12	„ „	4	1	„ „	26	1	„ „	96
36	„ „	5	1	„ „	27	2	„ „	108
2	„ „	6	2	„ „	27a	2	„ „	115
2	„ „	6a	1	„ „	32	3	„ „	125
8	„ „	8	9	„ „	35	4	„ „	126a
4	„ „	8a	198	„ „	37	1	„ „	137
12	„ „	9	7	„ „	38	1	„ „	147a
5	„ „	11	1	„ „	40	1	„ „	147b
30	„ „	12	1	„ „	43	1	„ „	148
2	„ „	14	1	„ „	46			
5	„ „	16	4	„ „	48a			
2	„ „	16a	3	„ „	52	21	of No.	117
4	„ „	17	2	„ „	52a	(not included in Outfit)		
3	„ „	18a	1	„ „	57b			
2	„ „	18b	15	„ „	59			
2	„ „	19	3	„ „	62			
4	„ „	20	2	„ „	63			

This is a model of a crane that, when raising a load, automatically indicates the weight carried. The load is raised or lowered by the operation of the Crank Handle 1 upon which is wound a lifting Cord 2 passing round a 1″ Pulley 3 and over another 1″ Pulley 4 (Fig. K35c) to the Loaded Hook 5.

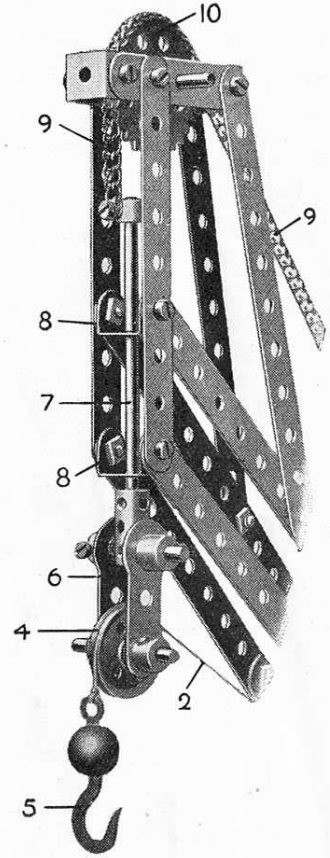


Fig. K35c

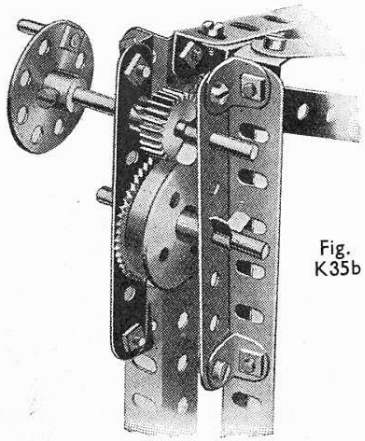


Fig. K35b

The Crank Handle carries a Ratchet Wheel and a 1″ fast Pulley. A Pawl is arranged to engage the Ratchet to hold the load in the raised position, but it can be swung clear of the Ratchet teeth to allow the load to descend. A strap and lever brake operates on the 1″ fast Pulley to control the downward movement of the load.

The 1″ Pulley 4, which bears the weight of the load, is carried by two Cranks 6 connected to a 3½″ Rod 7, that is slidable in two Double Brackets 8.

A Sprocket Chain 9 is connected to the top of the rod and passed over a 1½″ Sprocket Wheel 10 and under a 1″ Sprocket Wheel 11 (Fig. K35a), the other end of the Chain being connected to a Spring 12, secured to a 3½″ Rod 13. Thus, when a load is being raised the weight is carried by the Rod 7, which is pulled down in its bearings thus extending

K35. Automatic Weighing Crane—Continued

the Spring 12 In this movement, the Chain 9 rotates the Sprocket Wheel 11, and a 1½″ Gear Wheel 14, on the rod of the Sprocket 11, engages a ½″ Pinion 15 on a Rod 16. On the outer end of this Rod 16 is a Crank 17 that sweeps round the graduated Dial 18 to indicate the weight of the load that is being lifted.

The construction of the remainder of the model will be clearly seen from the illustrations. The Bearings 23 carrying the Flanged Wheel 24 are formed by 2½″ Strips connected to the Girders 20 by Angle Brackets.

It will be noted that the crane jib is carried upon a Ball Bearing 19, the Balls (Part No. 117) for which are not supplied in the K Outfit but may be obtained separately. The crane will work well without the ball bearing, but the operation is easier when such a bearing is fitted.

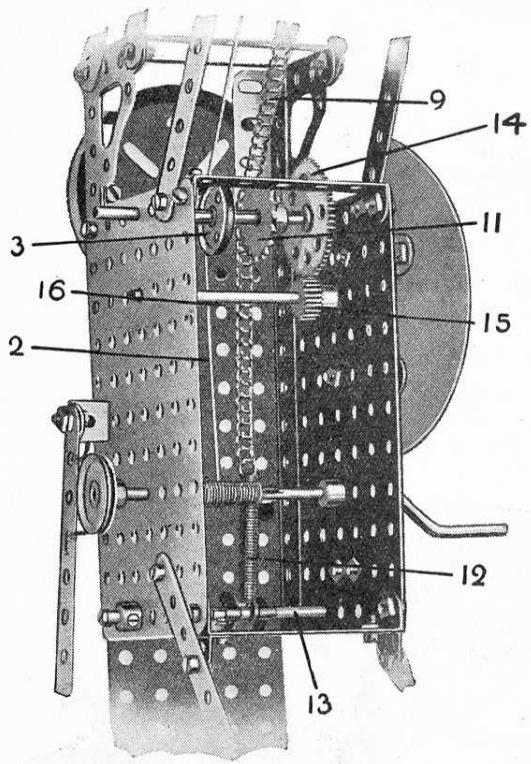
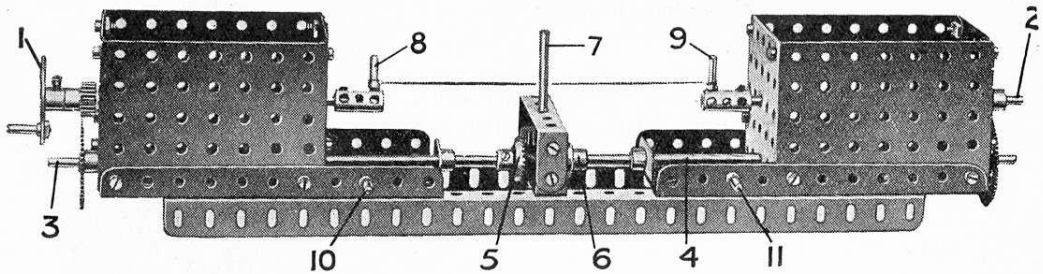


Fig. K35a

Parts required

6	of	No.	5
2	„	„	6a
2	„	„	8
2	„	„	12
2	„	„	12b
2	„	„	14
2	„	„	15a
1	„	„	16a
1	„	„	25
2	„	„	26
2	„	„	27a
2	„	„	29
50	„	„	37
3	„	„	37a
2	„	„	46
2	„	„	52
4	„	„	53
2	„	„	59
2	„	„	63
2	„	„	72
3	„	„	111
2	„	„	115

K36. Heald-Making Machine



This model converts thin lengths of wire into healds for use in Meccano looms. Two typical specimens of healds made with the machine are shown in Fig. K36a.

Two 4½″ Axle Rods are placed longitudinally in the model. One of these Rods carries a handle composed of a Threaded Pin and Bush Wheel 1, and a ½″ Pinion that engages with a 57-teeth Gear Wheel secured to an 8″ Rod 3.

The other 4½″ Rod 2 revolves in the opposite direction to the handle 1, the reverse motion being obtained in the following manner. The inner end of the 8″ Rod 3 is journalled in one end of a Coupling through the centre hole of which passes the vertical 2½″ Rod 7. The latter carries a ¾″ Pinion and is journalled in the centre holes of two 2½″×1″ Double Angle Strips bolted to the base Angle Girders. Another 8″ Rod 4 is journalled in the opposite end of the Coupling, and this Rod is fitted with a 57-teeth Gear Wheel meshing with a ½″ Pinion on the Rod 2. Rods 3 and 4 are both free to revolve in the ends of the Coupling, but the drive is transmitted from Rod 3 to Rod 4 via two ¾″ Contrate Wheels 5 and 6 and the Pinion on Rod 7 ; hence the direction of rotation of Rod 4 is reversed.

Each of the two 4½″ Rods is fitted with a Coupling carrying a Threaded Pin (8, 9) secured at right-angles to its end. These Pins form hooks over which is slipped the loop of wire from which the heald is formed. Each Rod is also equipped with a Compression Spring that is mounted between a 2½″×2½″ Flat Plate (forming the inner bearing for the Rod) and a Collar on the Rod, in such a way that it tends to hold the Coupling against the Plate. Two ¾″ Bolts 10 and 11 are bolted to the side of the machine to form a gauge by which the correct length of wire may be ascertained.

The healds are manufactured as follows : a piece of suitable wire, about 13″ in length, is passed round the Bolts 10 and 11, and the ends are twisted together with a pair of pliers to form a loop. A convenient size of wire is 26 S.W.G. (.018″ in diameter).

Next the loop of wire is removed and passed over the Rod 7, and its ends are slipped over the Pins 8 and 9. The handwheel is now rotated and the loop of wire is twisted into the form of a heald, the Rod 7 forming the hole through which will pass the warp threads of the loom. As the loop of wire is twisted the 4½″ Rods carrying the Threaded Pins 8 and 9 are drawn slightly towards the Rod 7. This movement is allowed for by the small Compression Springs already mentioned.

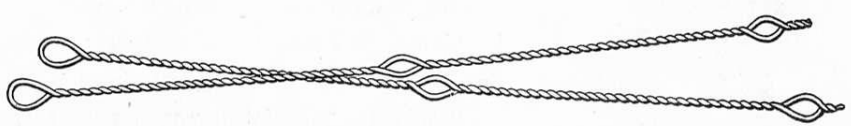
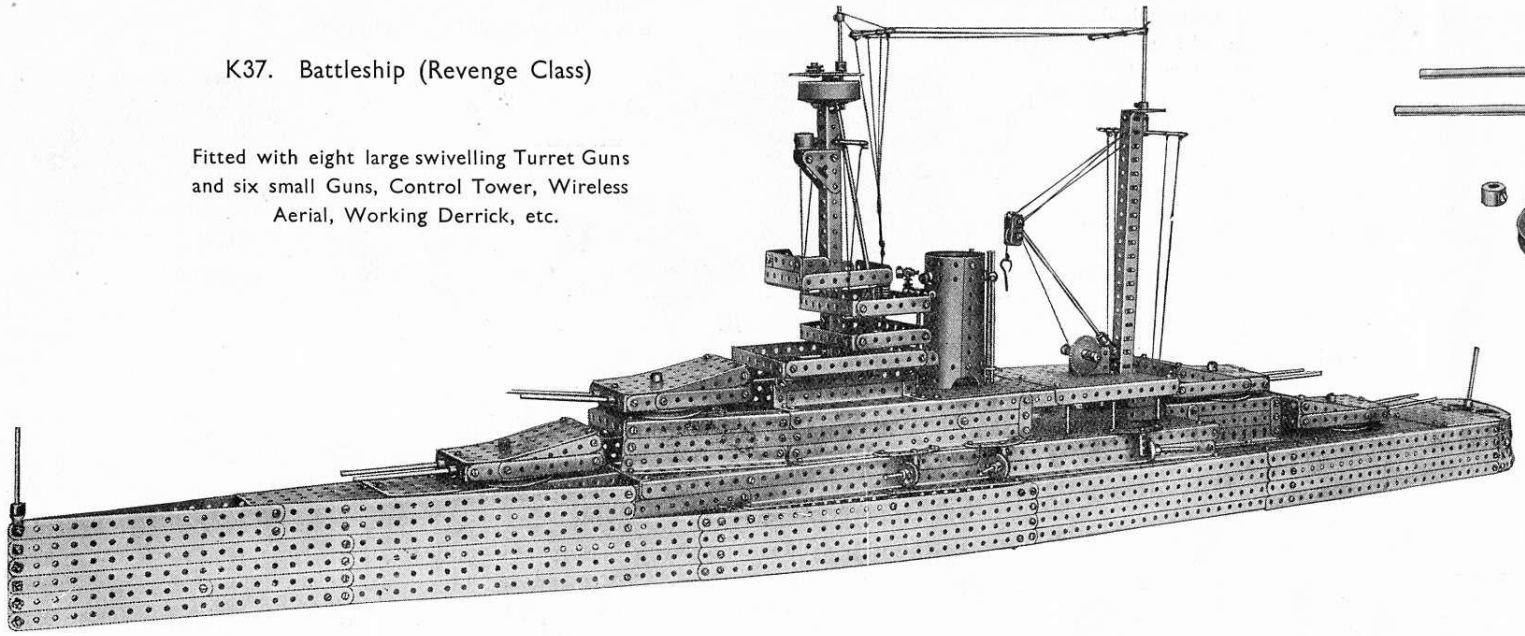


Fig. K36a

K37. Battleship (Revenge Class)

Fitted with eight large swivelling Turret Guns and six small Guns, Control Tower, Wireless Aerial, Working Derrick, etc.



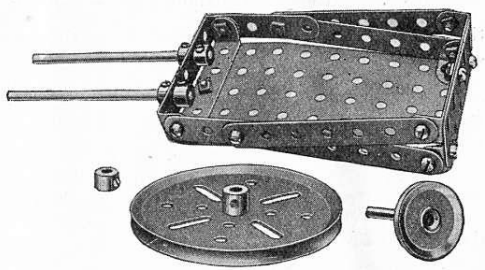


Fig. K37d

Underneath view of one of the Gun Turrets dismantled.

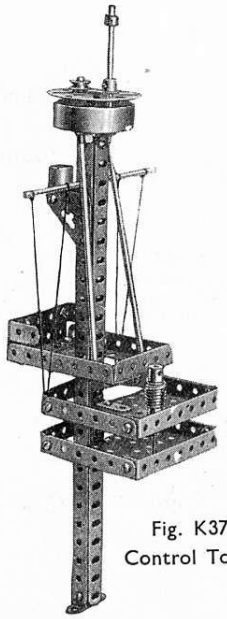


Fig. K37c
Control Tower

The hull is shown in Fig. K37a. The sides are composed mainly of $12\frac{1}{2}''$ Strips that are bolted to short cross Strips. Six sets of Strips are placed edge to edge at the bows but the remainder of the hull is the depth of only four Strips. Plates are used for filling in the decks, and at the stern a Hub Disc is bolted to the $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plate. Braced Girders are shown bolted to this, but Strip Plates should be used instead. A Crank is bolted to the Hub Disc and carries the after flag pole or ensign staff. The flag staff at the bows is carried in an End Bearing. Angle Girders are bolted along the sides of the midship section of the hull to receive the superstructure.

The complete superstructure is shown in Fig. K37b, it is attached to the hull section (Fig. K37a) by bolting Flat Brackets 1 to the side Girders 2 of the superstructure. Additional security is effected by attaching $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets 3 and the flange of a Flanged Plate 4 to the front girder of the superstructure.

The control tower (Fig. K37c) is secured in place by bolting the Double Bent Strip at the foot of the tower to a transverse $7\frac{1}{2}''$ Strip 5 in the hull. It is additionally supported by a $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Bracket that is attached to the front of the tower and to the Flanged Plate 6 (Fig. K37b). The fire control station (a Boiler End) is secured to a Double Bent Strip that is fixed to the top of the tower.

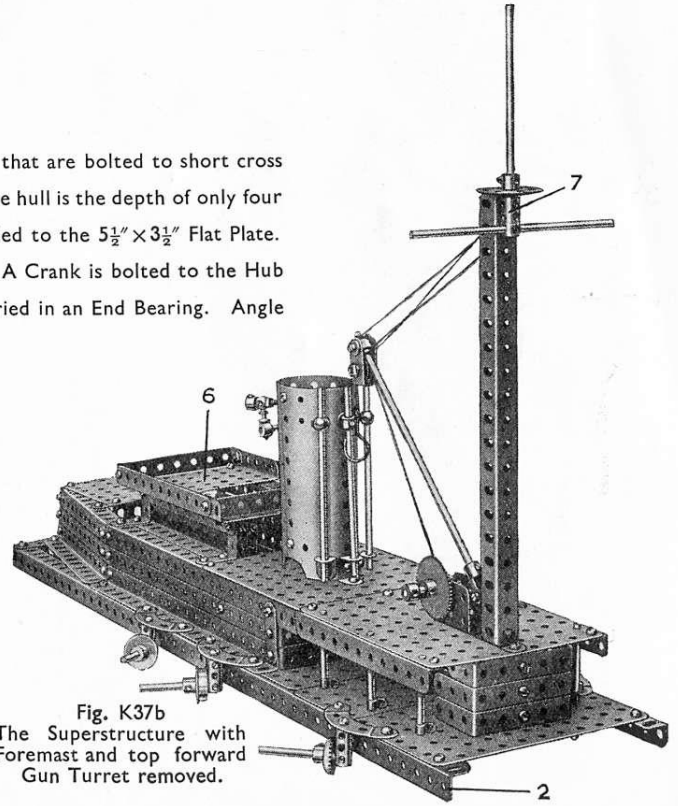


Fig. K37b
The Superstructure with Foremast and top forward Gun Turret removed.

K37. Battleship (Revenge Class)—cont'd

Fig. K37d gives an underneath view of one of the 15″ gun turrets, two of which are constructed in the same manner. It is mounted in place by passing a Rod up through the deck and through the boss of a 3″ Pulley, then placing the turret over the end of the Rod, and securing it finally by a Collar on the Rod.

The other two turrets swivel on Wheel Flanges bolted to 2½″ Strips which are secured beneath the turrets by Angle brackets.

Set Screws serve to secure the Coupling 7 to the mast (Fig. K37b) and the Collar supporting the centre escape pipe is secured to the funnel in the same manner. Set Screws are used also to attach to the funnel the Coupling that carries the "branch pipe" on the ends of which the two syrens are mounted.

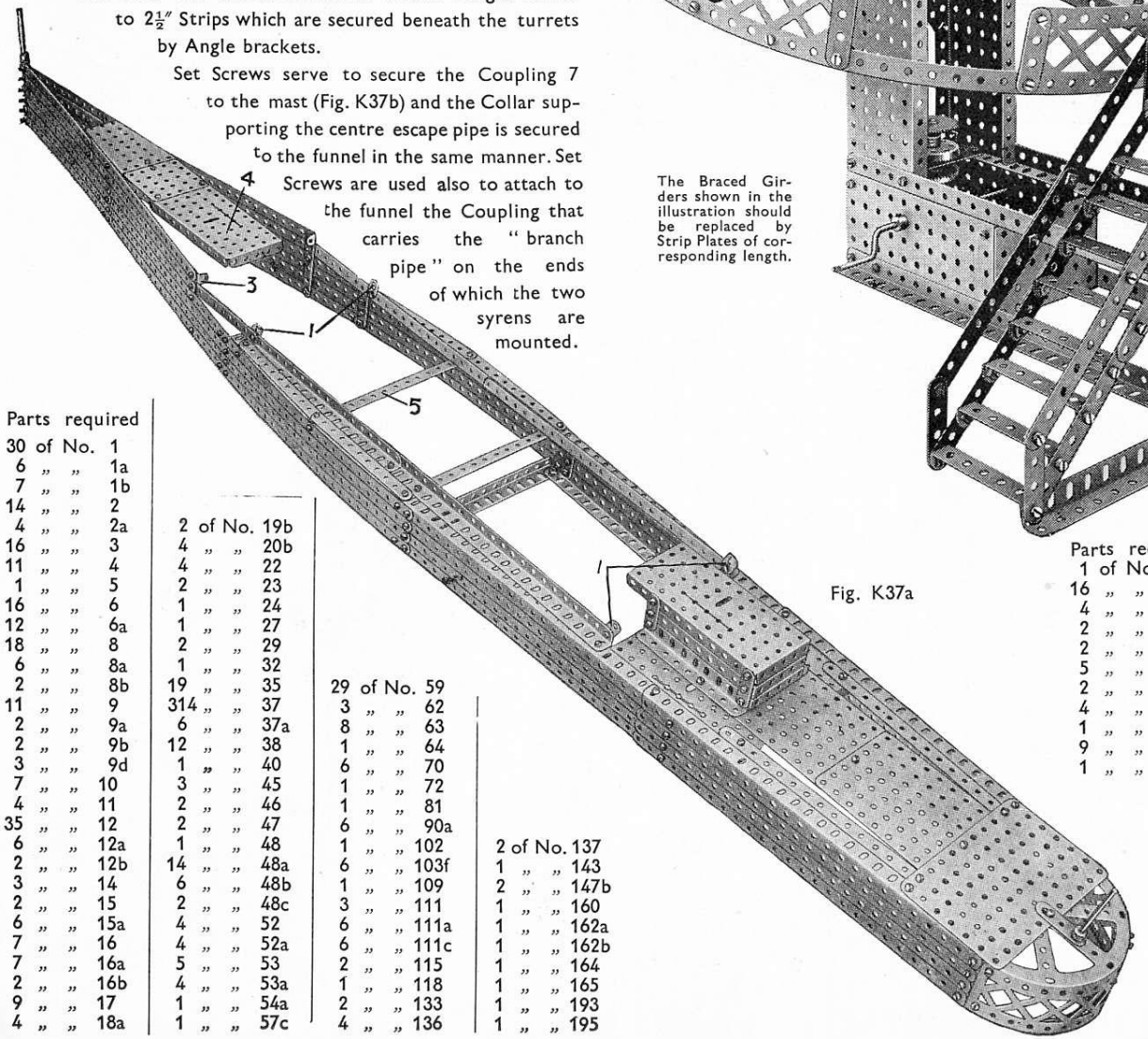
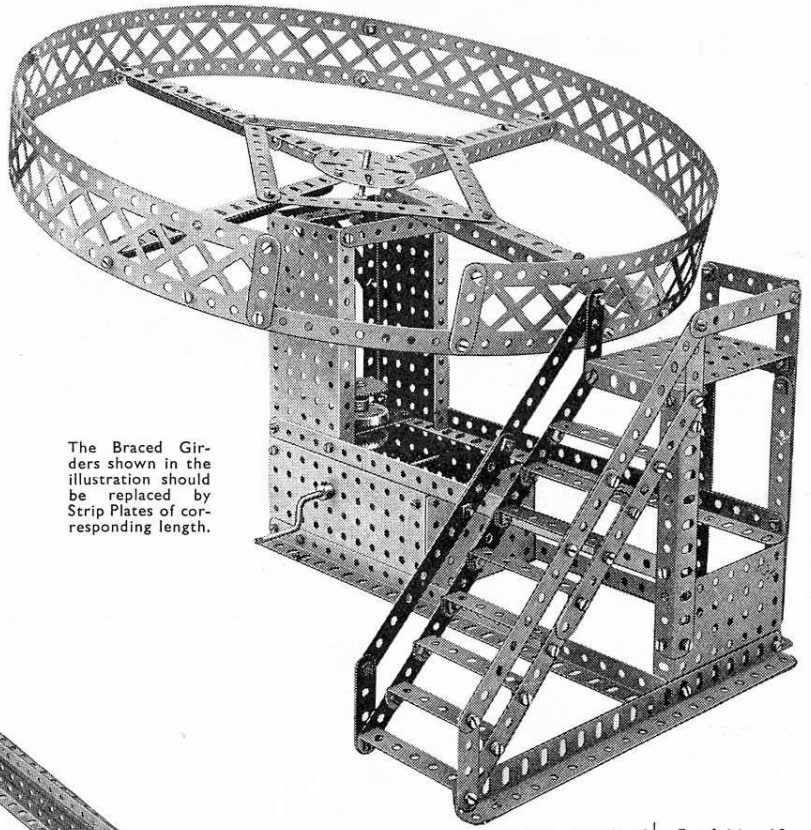


Fig. K37a



The Braced Girders shown in the illustration should be replaced by Strip Plates of corresponding length.

Parts required

30	of No.	1
6	„ „	1a
7	„ „	1b
14	„ „	2
4	„ „	2a
16	„ „	3
11	„ „	4
1	„ „	5
16	„ „	6
12	„ „	6a
18	„ „	8
6	„ „	8a
2	„ „	8b
11	„ „	9
2	„ „	9a
2	„ „	9b
3	„ „	9d
7	„ „	10
4	„ „	11
35	„ „	12
6	„ „	12a
2	„ „	12b
3	„ „	14
2	„ „	15
6	„ „	15a
7	„ „	16
7	„ „	16a
2	„ „	16b
9	„ „	17
4	„ „	18a
2	of No.	19b
4	„ „	20b
4	„ „	22
2	„ „	23
1	„ „	24
1	„ „	27
2	„ „	29
1	„ „	32
19	„ „	35
314	„ „	37
6	„ „	37a
12	„ „	38
1	„ „	40
3	„ „	45
2	„ „	46
2	„ „	47
1	„ „	48
14	„ „	48a
6	„ „	48b
2	„ „	48c
4	„ „	52
4	„ „	52a
5	„ „	53
4	„ „	53a
1	„ „	54a
1	„ „	57c
29	of No.	59
3	„ „	62
8	„ „	63
1	„ „	64
6	„ „	70
1	„ „	72
1	„ „	81
6	„ „	90a
1	„ „	102
6	„ „	103f
1	„ „	109
3	„ „	111
6	„ „	111a
6	„ „	111c
2	„ „	115
1	„ „	118
2	„ „	133
4	„ „	136
2	of No.	137
1	„ „	143
2	„ „	147b
1	„ „	160
1	„ „	162a
1	„ „	162b
1	„ „	164
1	„ „	165
1	„ „	193
1	„ „	195

Parts required

1	of No.	1a
16	„ „	2
4	„ „	3
2	„ „	4
2	„ „	5
5	„ „	6
2	„ „	6a
4	„ „	8
1	„ „	8a
9	„ „	9
1	„ „	9d
5	of No.	12
1	„ „	14
1	„ „	16
1	„ „	17
1	„ „	19
2	„ „	26
1	„ „	27
1	„ „	27a
2	„ „	28
1	„ „	32
110	„ „	37
19	„ „	38
8	„ „	48a
2	„ „	48b
4	„ „	52
4	„ „	53
6	„ „	59
1	„ „	109
1	„ „	126
4	„ „	197

K38. Joy Wheel

This model comprises a new and very interesting Meccano motion.

The Crank Handle drives, by means of a Worm and 57-teeth Gear Wheel, a vertical Rod carrying two 1½″ Contrate Wheels and a Gear Wheel, as shown in Fig. K38a. The lower Contrate Wheel is secured to the shaft but the upper one revolves freely upon it. The upper Wheel is driven from the fixed Contrate by means of a ½″ Pinion, and its direction of rotation is consequently reversed.

The end of the shaft carrying the revolving part of the model is journalled in a short Strip bolted to the upper Contrate Wheel and carries a ½″ Pinion which engages with the Gear Wheel secured on the vertical shaft. Thus on operation of the Crank Handle, the wheel revolves upon its axis, at the same time twisting slowly round with an amusing "wobble." A circular piece of cardboard is cut and placed in position to represent the floor found in real "joy-wheels."

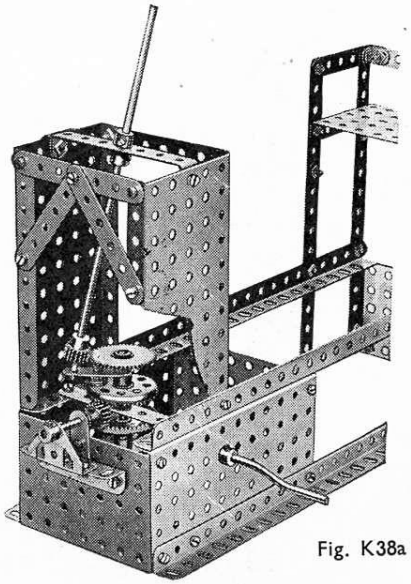


Fig. K38a

K39. Crane

The travelling base, shown separately in Fig. K39a, should be constructed and fitted with the operating mechanism before the superstructure is mounted over it. A No. E6 Electric Motor is bolted to one of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates, and two $4\frac{1}{2}''$ Angle Girders, bolted between the remaining two Plates, carry $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates between which the mechanism is housed. The Plates are connected together at the top by $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips.

A $\frac{1}{2}''$ Pinion on the Motor armature shaft drives a 57-teeth Gear on the Rod of which is a $\frac{3}{4}''$ Pinion driving a 50-teeth Gear, the latter being carried on a $2\frac{1}{2}''$ Rod that is fitted with a $\frac{3}{4}''$ Sprocket Wheel. The Sprocket transmits the drive through a short Chain to another similar Sprocket on a $3\frac{1}{2}''$ Axle Rod carrying a $\frac{1}{2}''$ Pinion. The Pinion is in constant mesh with a similar Pinion immediately beneath it, and the latter engages a third $\frac{1}{2}''$ Pinion on a sliding $4\frac{1}{2}''$ Rod the movement of which is controlled by a lever. A $3\frac{1}{2}''$ Strip forms the lever and is pivoted to a $1'' \times 1''$ Angle Bracket and to a Double Bracket between Collars on the sliding Rod.

When the lever is moved towards the gear box the Pinion is brought into engagement with a 57-teeth Gear on a Rod fitted with a 1″ Sprocket Wheel that will later be connected up with a Sprocket on the hoisting drum mounted in the superstructure. With the lever vertical the Pinion is in the neutral position, and when the lever is moved outwards the Pinion engages a second 57-teeth Gear. The Rod of this Gear carries a $\frac{3}{4}''$ Sprocket that drives a 1″ Sprocket on a $6\frac{1}{2}''$ Rod journalled in the side frames. This Rod drives one pair of travelling wheels through two 1″ Sprockets and Chain. Thus it will be seen that by operating the lever the Motor can be made to drive the hoisting or travelling movements.

Slewing is effected by turning a Crank that is fitted with a Threaded Pin and carried on a Rod journalled in one of the vertical frame Girders and a Double Bent Strip. The Rod is fitted with a 1″ Pulley that drives a similar Pulley on a $4\frac{1}{2}''$ Rod journalled above the hoisting Rod in the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates of the tower. A $1\frac{1}{2}''$ Pulley on the same Rod drives cord that passes over 1″ guide Pulleys and round the 3″ Pulley to which the boom is bolted. Slewing movement is limited by a $\frac{3}{8}''$ Bolt fixed to the 3″ Pulley to serve as a stop. The hoisting cord passes through one of the holes in the Pulley, over a drum formed from a $1\frac{1}{8}''$ Flanged Wheel and Bush Wheel, and round the Pulleys at the end of the boom and in the Pulley block.

To counterbalance the weight of the boom and a load that may be suspended from it, a weight consisting of Strips bolted to a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate is attached beneath the Sector Plates at the rear end of the boom. Fourteen $3\frac{1}{2}''$ Strips and twenty-four $2\frac{1}{2}''$ Strips are used.

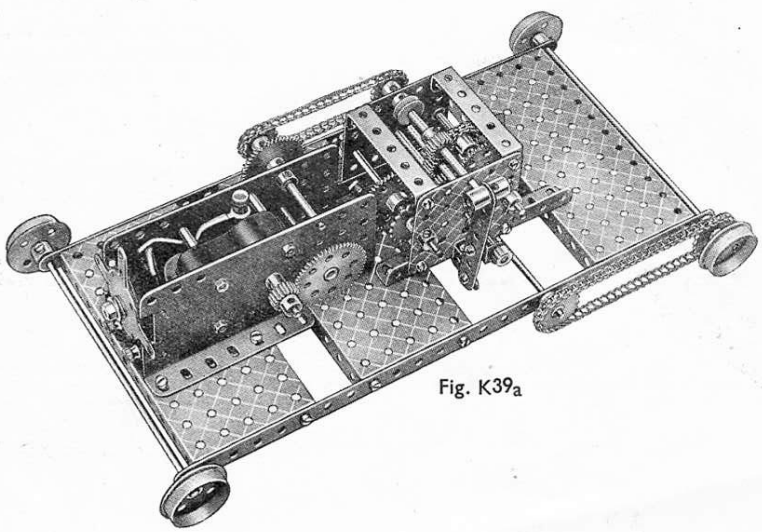
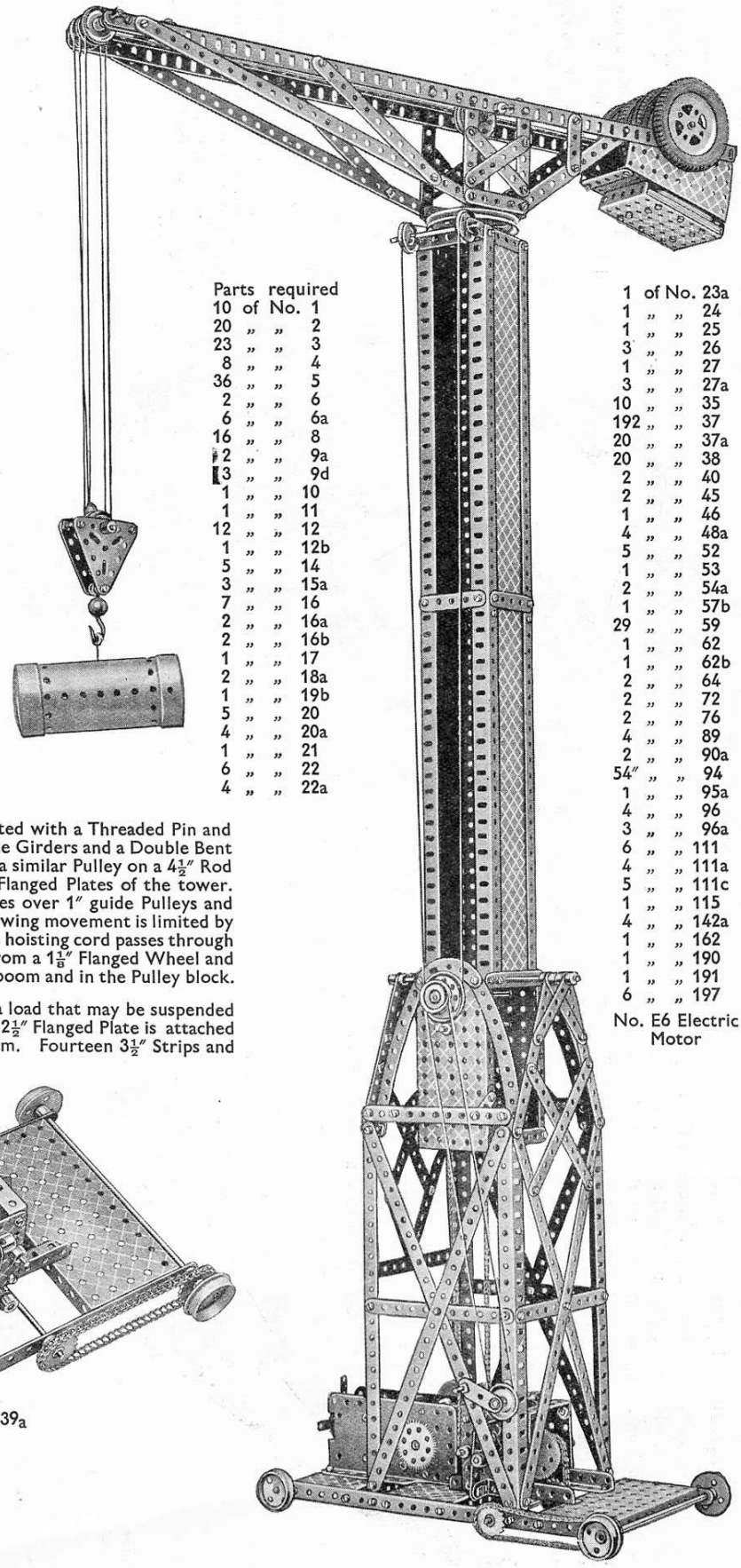


Fig. K39a

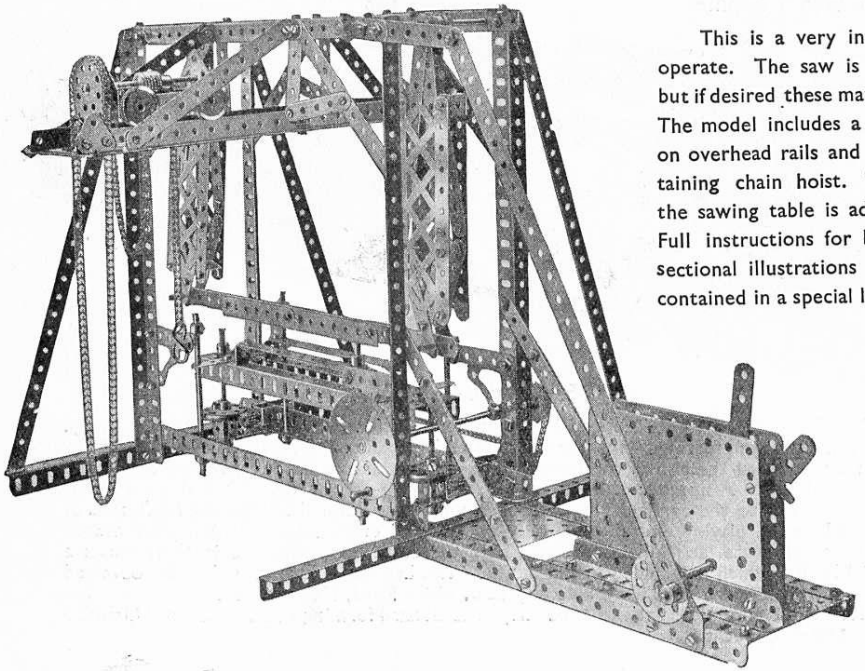


Parts required

10	of	No. 1
20	„	„ 2
23	„	„ 3
8	„	„ 4
36	„	„ 5
2	„	„ 6
6	„	„ 6a
16	„	„ 8
2	„	„ 9a
3	„	„ 9d
1	„	„ 10
1	„	„ 11
12	„	„ 12
1	„	„ 12b
5	„	„ 14
3	„	„ 15a
7	„	„ 16
2	„	„ 16a
2	„	„ 16b
1	„	„ 17
2	„	„ 18a
1	„	„ 19b
5	„	„ 20
4	„	„ 20a
1	„	„ 21
6	„	„ 22
4	„	„ 22a
1	of	No. 23a
1	„	„ 24
1	„	„ 25
3	„	„ 26
1	„	„ 27
3	„	„ 27a
10	„	„ 35
192	„	„ 37
20	„	„ 37a
20	„	„ 38
2	„	„ 40
2	„	„ 45
1	„	„ 46
4	„	„ 48a
5	„	„ 52
1	„	„ 53
2	„	„ 54a
1	„	„ 57b
29	„	„ 59
1	„	„ 62
1	„	„ 62b
2	„	„ 64
2	„	„ 72
2	„	„ 76
4	„	„ 89
2	„	„ 90a
54″	„	„ 94
1	„	„ 95a
4	„	„ 96
3	„	„ 96a
6	„	„ 111
4	„	„ 111a
5	„	„ 111c
1	„	„ 115
4	„	„ 142a
1	„	„ 162
1	„	„ 190
1	„	„ 191
6	„	„ 197

No. E6 Electric Motor

K40. Stone-Sawing Machine

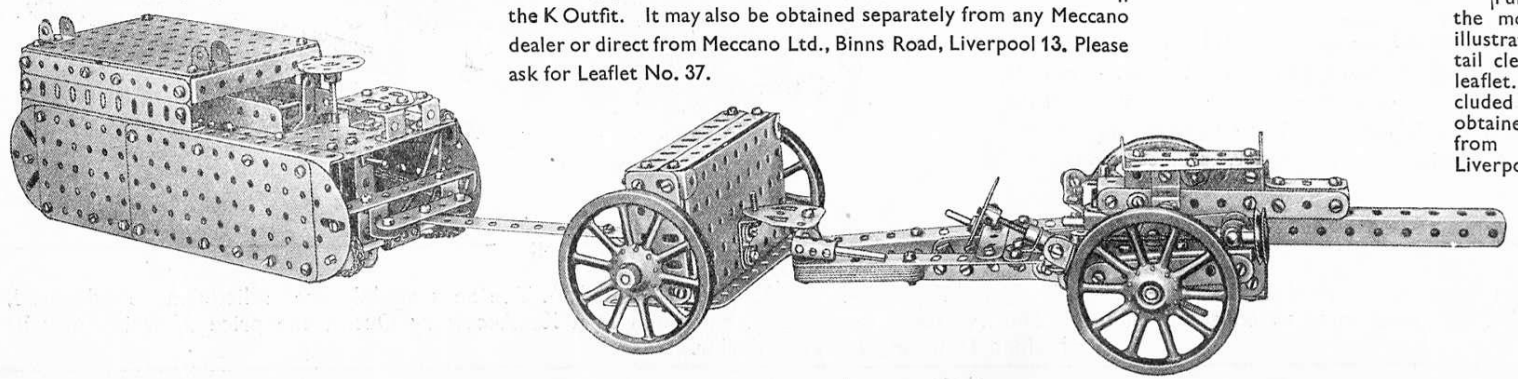


This is a very interesting model to construct and operate. The saw is represented by two Rack Strips, but if desired these may be replaced by a hack saw blade. The model includes a trolley that runs on overhead rails and carries a self-sustaining chain hoist. The elevation of the sawing table is adjusted by means of a handwheel. Full instructions for building the model, together with sectional illustrations that make every detail clear, are contained in a special leaflet included in the Outfit. This Leaflet (No. 12) may also be obtained from your dealer, or direct from Meccano Ltd., Binns Road, Liverpool 13.

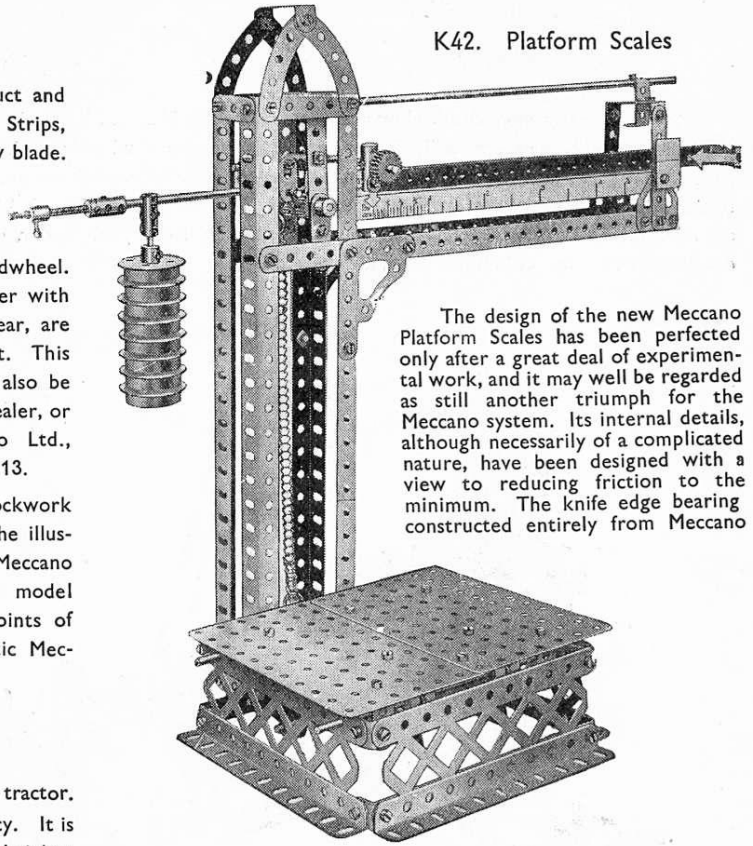
Driven by a Clockwork Motor, as shown in the illustration, or by a Meccano Electric Motor, the model will provide many points of interest to enthusiastic Meccano boys.

K41. Howitzer and Tractor

The illustration shows an accurate reproduction of a big gun with its ammunition carriage, or "limber," and tractor. The gun fires ammunition in the shape of Washers for a considerable distance with a remarkable degree of accuracy. It is fitted with brakes on the road wheels, fixing spade, recoil cylinder that actually functions, training apparatus and sights. The Washers used in the gun are carried in racks in the limber. The tractor, which is fitted with endless tracks and may be steered in any desired direction, is driven by an Electric Motor, making the whole a self-contained and mobile unit. There is far too much detail in the model to permit of a proper description in this Manual, and a special Instruction Leaflet has therefore been prepared. This leaflet, which describes every part of the model and is amply illustrated, is included in the K Outfit. It may also be obtained separately from any Meccano dealer or direct from Meccano Ltd., Binns Road, Liverpool 13. Please ask for Leaflet No. 37.



K42. Platform Scales

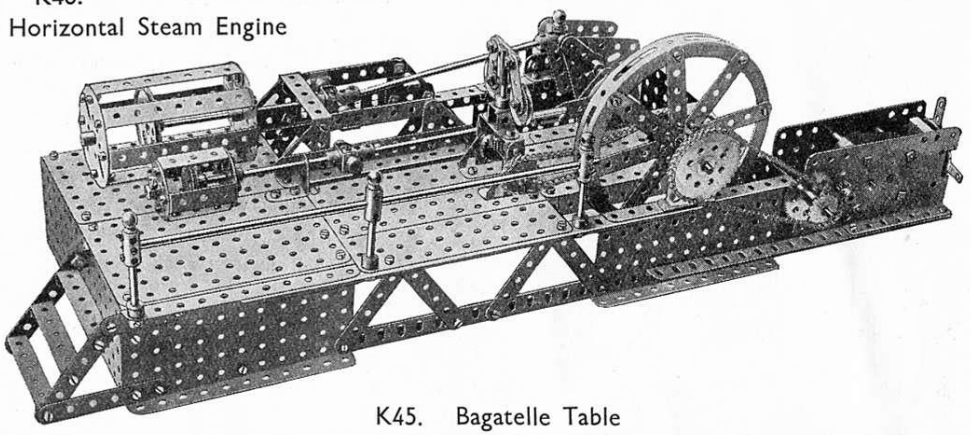


The design of the new Meccano Platform Scales has been perfected only after a great deal of experimental work, and it may well be regarded as still another triumph for the Meccano system. Its internal details, although necessarily of a complicated nature, have been designed with a view to reducing friction to the minimum. The knife edge bearing constructed entirely from Meccano parts, is an important feature, which makes the model so efficient that objects ranging from ½ oz. to 4½ lb. can be weighed with remarkable accuracy.

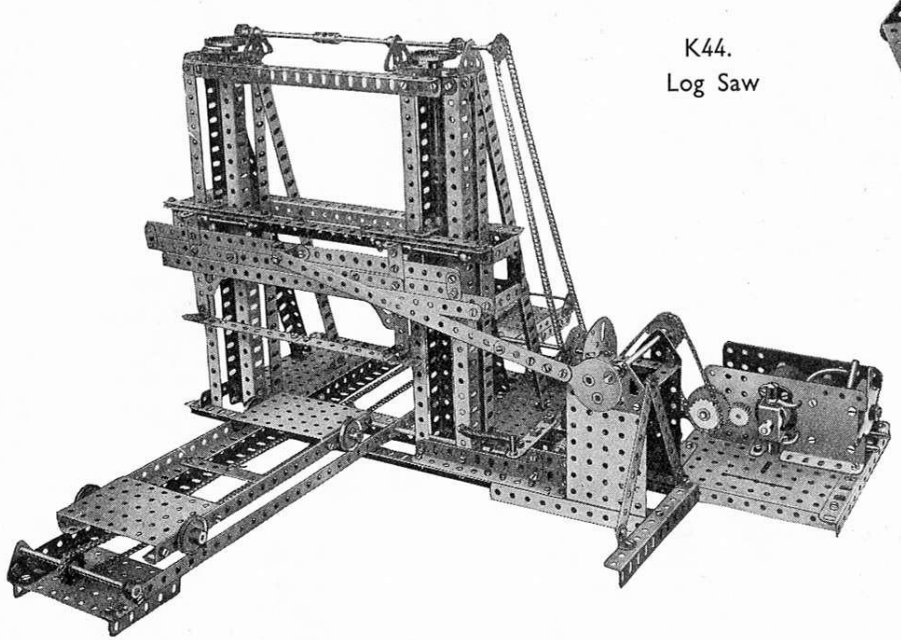
Full instructions for building the model, together with sectional illustrations that make every detail clear, are contained in a special leaflet. This Leaflet (No. 7) is included in the K Outfit ; it may also be obtained from your dealer, or direct from Meccano Ltd., Binns Road, Liverpool 13.

K43.
Single Cylinder Horizontal Steam Engine

Models of steam engines are always very popular with Meccano boys. This particular model is an exceptionally fine one, and it looks splendid when in motion. All necessary instructions for building the engine, together with sectional illustrations that make every detail clear, are contained in a special leaflet included in the Outfit. This Leaflet (No. 11) may also be obtained from your dealer, or direct from Meccano Ltd., Binns Road, Liverpool 13.



K44.
Log Saw

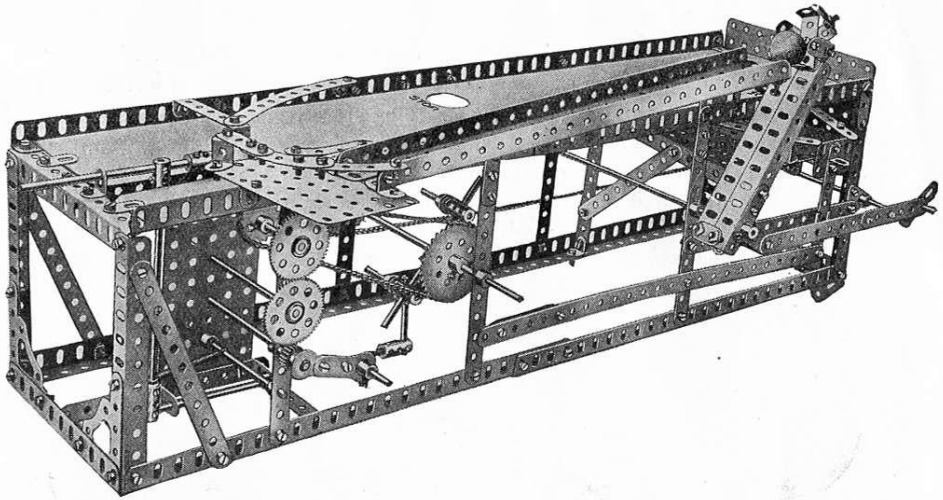


In addition to the operation of the saw, the movements of this model include the vertical adjustment of the saw frame and the to-and -fro movement of the feed carriage Several sectional views are necessary in order to explain the construction of the Log Saw. These are included in a special instruction leaflet contained in the Outfit. The Leaflet (No. 10) may also be obtained from your dealer, or direct from Meccano Ltd., Binns Road, Liverpool 13.

K45. Bagatelle Table

The Meccano Bagatelle Table will provide hours of fun for all members of the family. The game is played merely by turning the handle. The ball or marble is struck automatically and rolled toward the end of the table (which consists of a sheet of cardboard cut to the required shape). A number of holes are pierced in the end of the table and the score is made according to the particular hole through which the ball falls. The ball is afterwards returned to the playing end automatically. A detailed explanation of this model would require much space, and full instructions have therefore been prepared in the form of a special leaflet, which is included in the Outfit. The Leaflet (No. 9) may also be obtained from your dealer, or direct from Meccano Ltd., Binns Road, Liverpool 13.

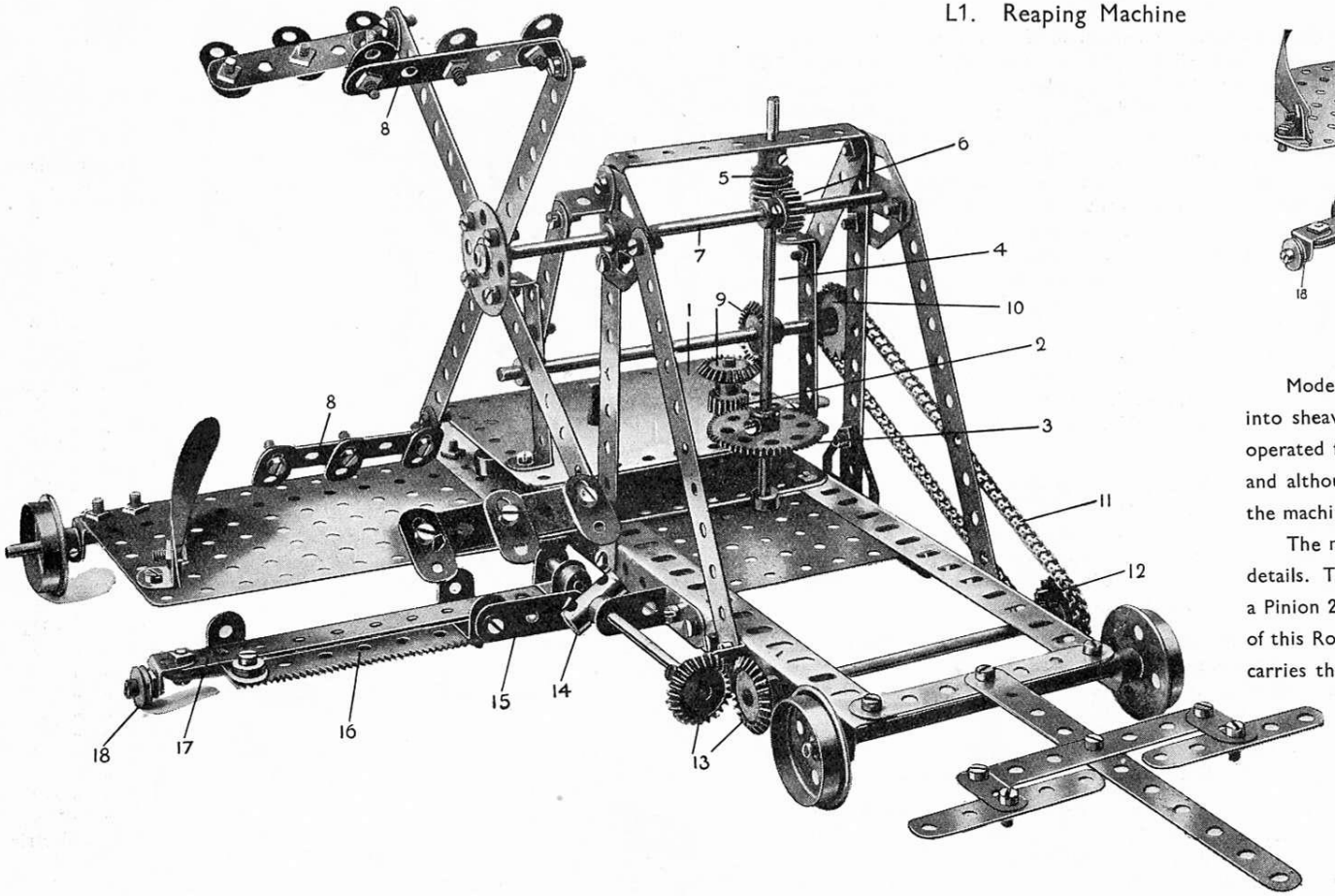
It should be noted that the ball and strip of cardboard forming the table are not included in the Meccano Outfit.



HOW TO CONTINUE

This completes our examples of models that may be made with MECCANO Outfit K (or H and Ha). The next models are a little more advanced, requiring a number of extra parts to construct them. The necessary parts are all contained in a Ka Accessory Outfit, the price of which may be obtained from any Meccano dealer.

L1. Reaping Machine



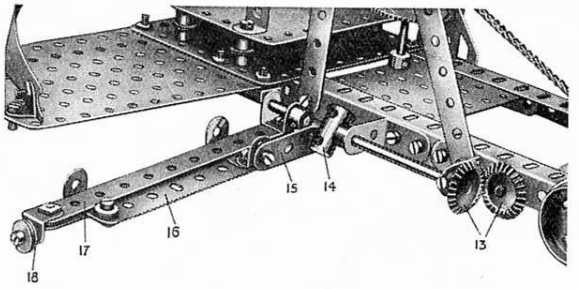


Fig. L1a

Modern reaping machines cut down the corn and bind it up into sheaves as they travel along. The binding mechanism is operated from the wheels of the machine as it is drawn forward, and although horses are still used to a large extent for hauling the machines, tractors are proving their utility for this purpose.

The model can be built with the assistance of the following details. The spindle of the Meccano Clockwork Motor 1 carries a Pinion 2 engaging a Gear Wheel 3 on the Rod 4. At the top of this Rod is a Worm 5 driving a ½″ Pinion 6 on a Rod 7 which carries the arms 8 that sweep towards the knife.

The driving spindle of the Motor also drives through Bevel Gears 9 a 1″ Sprocket Wheel 10 coupled by a Sprocket Chain 11 to another 1″ Sprocket Wheel 12, which in turn drives through Bevels 13 a Coupling 14. This Coupling acts as a crank and is connected by a 1½″ Strip 15 lock-nutted to the cutter 16. The cutter is formed by a Rack Strip guided to and fro by two 1″ × ½″ Angle Brackets between two 5½″ Strips 17 that are spaced apart by Washers at each end. The outer end of these Strips is fitted with a ½″ Pulley 18 serving as a travelling wheel. The remainder of the detail of the model will be made quite clear from our illustration. When completed the model works in a very realistic manner.

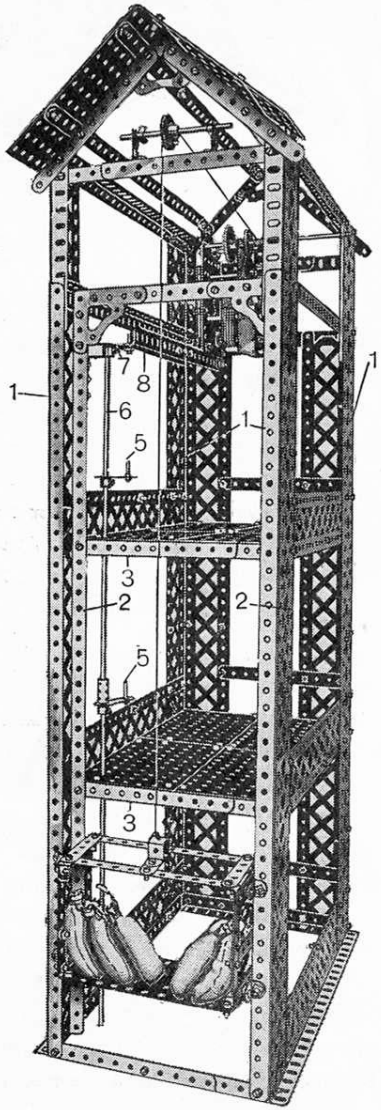
Parts required

7 of No. 2	1 of No. 11	2 of No. 15	1 of No. 24	6 of No. 38	1 of No. 53
6 „ „ 3	7 „ „ 12	1 „ „ 15a	2 „ „ 26	1 „ „ 41	7 „ „ 59
8 „ „ 5	2 „ „ 12a	2 „ „ 16b	1 „ „ 27a	1 „ „ 48	1 „ „ 63
1 „ „ 6a	4 „ „ 12b	1 „ „ 17	4 „ „ 30	2 „ „ 48a	16″ „ „ 94
2 „ „ 8a	1 „ „ 13	4 „ „ 20	1 „ „ 32	1 „ „ 48b	1 „ „ 110
14 „ „ 10	2 „ „ 14	1 „ „ 23	66 „ „ 37	1 „ „ 52a	1 „ „ 125

3 of No. 126a

No. 2 Clockwork Motor

L2. Warehouse



This view of the model Warehouse shows the cage, loaded with sacks, being raised from ground level.

Commence the construction of this model by building the framework, the details of which can be seen in the general view of the warehouse. Four 24½" Angle Girders are used to form the corner uprights 1 which are extended by 5½" Angle Girders overlapped three holes at the top. These vertical members are connected at top and bottom by 12½" Angle Girders at the sides of the model, and at the front and back by 5½" Girders overlapped eight holes. Two 24½" Angle Girders 2, bolted to the 12½" Girders at the base and to two additional 12½" Girders between the vertical members, are used to carry the front portion of the warehouse floors, the latter each being bolted to two 5½" Angle Girders 3 overlapped eight holes and connected across the two inner Angle Girders 2. Two similar 5½" Angle Girders are bolted to the back of the framework, to carry the other end of each of the floors. Each floor is formed of four 5½" × 3½" Flat Plates butted together and bolted in the centre to a 5½" Flat Girder on the underside. The sides are partially filled in by means of Strip Plates that should be used instead of the Braced Girders Illustrated.

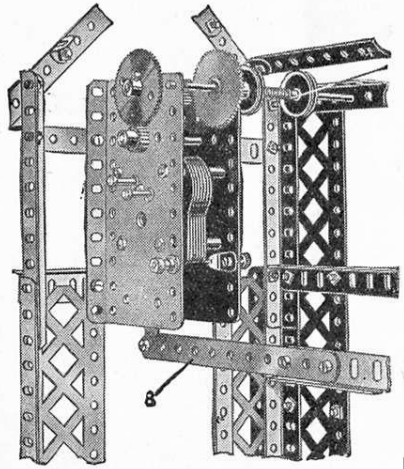


Fig. L2a

Fig. L2a shows the position of the Motor. This may be started and stopped from the control Crank Handles 5, one on each floor of the warehouse. These Crank Handles are fixed on a vertical Rod 6 composed of two 11½" Rods connected by a Coupling. A Crank 7 is secured to the upper end of this Rod and is connected by a 5½" Angle Girder and Strip 8 to the operating lever of the Motor. Two 1" × 1" Angle Brackets fixed to the sides of the warehouse by Strips form the bearings for the upper and lower ends of the vertical Rod.

Fig. L2b shows the construction of the cage. This is guided by bolt heads 4, at each side, riding along the inwardly turned flanges of the Angle Girders. The bolts are attached to Angle Brackets, which are secured to a 1½" Strip, the latter being bolted to the side-strips of the cage but spaced with three Washers on each fixing bolt to take up the play between the cage and the upright Girders.

A ½" Pinion on the armature shaft of the Electric Motor drives a 57-teeth Gear on a Rod fitted with a ½" Pinion. This engages another 57-teeth Gear the Rod of which carries a ½" Pinion driving a Gear on the hoisting shaft.

The Rod forming the hoisting shaft is provided with two 1" Pulleys between which the hoisting Cord is wound. The Cord passes over a 1" Pulley Wheel that is carried on a Rod journalled in a 2½" × 1" Double Angle Strip. The Double Angle Strip is bolted to the 5½" Angle Girders that connect the upper ends of the front vertical members, and can be seen in Fig. L2. A Double Bent Strip is bolted to a 2½" Strip at the centre of the cage top, and to this the hoisting Cord is tied.

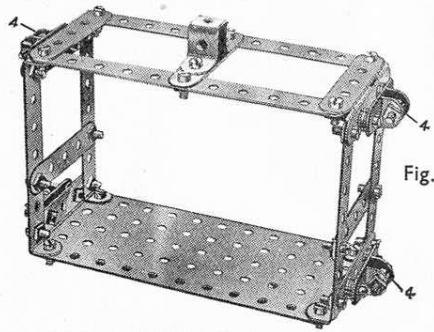


Fig. L2b

To raise or lower the lift cage one of the handles 5 is operated. By moving the handle to one side the cage is raised, and is stopped when the hande is returned to the central position. To lower the cage, the handle is moved to the other side.

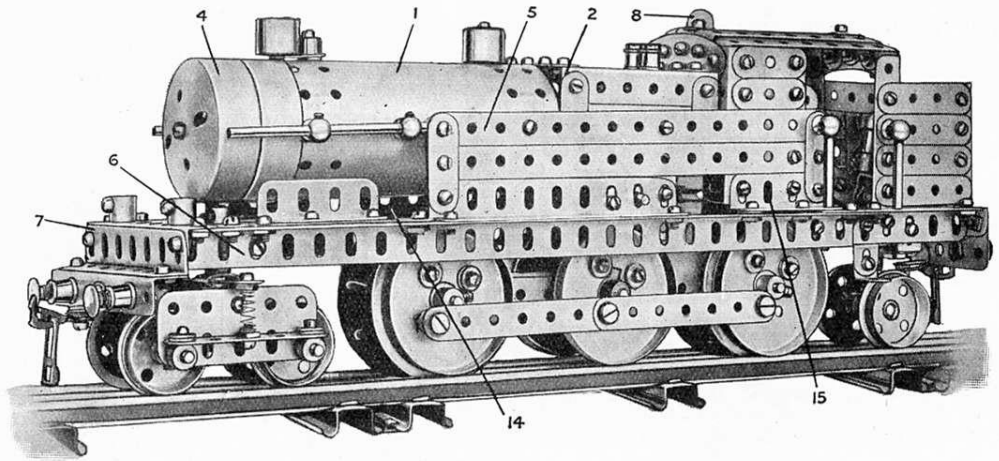
In the general view of the model the cage is shown filled with Meccano Miniature Loaded Sacks, parts No. 122. These are excellent for use with the model and can be stacked up on the floors to represent sacks of grain or other merchandise. Meccano parts such as Gears, Pulleys, etc., can be used to represent stocks of engineering parts, and blocks of wood can be made into miniature packing cases.

Several model lorries for delivering or collecting goods to or from the Warehouse will add to the interest of the model, which may be set up on a miniature reproduction of a quay side. In this case, model cranes would be arranged for loading and unloading cargoes from the vessels

Parts required

18	of	No.	1
21	„	„	2
9	„	„	5
1	„	„	6
4	„	„	6a
6	„	„	7
6	„	„	8
23	„	„	9
16	„	„	12
2	„	„	12a
2	„	„	13
1	„	„	14
1	„	„	16
3	„	„	22
2	„	„	26
3	„	„	27a
2	„	„	35
240	„	„	37
30	„	„	38
1	„	„	45
1	„	„	46
8	„	„	52a
1	„	„	59
4	„	„	62
1	„	„	63
3	„	„	70
2	„	„	103
4	„	„	108
4	„	„	115
4	„	„	195
18	„	„	197

No. E6 Electric Motor



L3. Clockwork Pacific Tank Locomotive

The frame of the locomotive is shown in Fig. L3a and it will be seen that each side member comprises a 12½" Angle Girder extended by a 3½" Girder, while 3½" Girders are bolted to the ends. Additional Girders 7 are attached at the front of the frame to form the front beam. The buffer beam at the rear of the engine comprises a 3½" Flat Girder.

A 7½" Angle Girder 14 is bolted to the right-hand side of the main frame and to each of its ends a 1½" Strip is secured in a vertical position. Two 7½" Strips bolted to these complete the right-hand side tank. The left-hand tank 5 is constructed similarly, with the exception that 4½" and 2" Girders are used in place of the 7½" Girder, so that an aperture is formed to receive the winding key of the Clockwork Motor.

To complete the cab, Angle Girders 16 (Fig. L3a) are bolted to the Girders 14 and 15, and 2½" Strips are secured two holes further back, while 1½" Strips hold the Strips and Girders the correct distance apart. The roof is composed of four 3½" × ½" Double Angle Strips and one 3½" Strip bolted to two 2½" large radius curved Strips, one of which is bolted between the tops of the girders 16 whilst the other is bolted across two 3" Girders 17. The 3½" Strip in the centre of the roof is supported by Angle Brackets ; this Strip is so arranged to obtain a slot through which may protrude the reversing lever 8 of the Clockwork Motor. Four 2" Strips form each side of the coal bunker and two Girder Brackets bolted to their ends form the rear, the space between these Girders being filled in by a 2" Strip.

The firebox top consists of two 3" Angle Girders 2 spaced apart by 2" Strips. Two 3" Strips are secured to the latter between the Girders and on these is mounted the Ross pop safety valve, which consists of two outer "sleeves" removed from Meccano Spring Buffers, and held in place by means of Pivot Bolts. Each side of the firebox consists of two horizontal 3" Strips secured at their ends to vertical 1½" Strips which, in turn, are bolted to the Girders 2. The completed firebox is held in position by means of an Angle Bracket bolted to the cab, and Flat Brackets secured to the Boiler 1.

The Boiler is secured in position by bolts passed through the side tanks, and rests on two 2" Angle Girders bolted to 3" Flat Girders that, in turn, are secured to the side frames of the locomotive. Two Chimney Adaptors are mounted on the Boiler, one being inverted to form the steam dome while the other, which represents the chimney, is secured to the Boiler by a Flat Bracket and ½" Bolt carrying a Collar. The smoke-box 4 is formed from two Boiler Ends held together by a ¾" Bolt passed through their centres.

Fig. L3b shows the power unit. This consists of a Clockwork Motor, the drive being taken from the pinion on the driving shaft by a ¾" Pinion 12 on the Axle of the rear pair of driving wheels. A 7½" Strip is bolted to each side plate of the Motor to form a journal for the axle of the front driving wheels, and two 5½" Angle Girders are also secured in position to give extra strength. The centre pair of wheels are not provided with flanges, Bush Wheels being substituted for the Face Plates, thus allowing the loco to negotiate sharper curves than would otherwise be possible. The Motor is held in position by Axle Rods passed through the Double Arm Cranks 10 (Fig. L3a) so that the reversing lever 8 (Fig. L3) passes through the cab top. A 1½" Strip is bolted to the brake lever and an End Bearing, connected pivotally to its extremity carries an Axle Rod which, after passing through a 1" × 1" Angle Bracket secured to the coal bunker, is fitted with a Collar to form a control knob.

The rear pony truck consists of two 1⅛" Flanged Wheels mounted on a 1½" Rod that is passed through a Collar. A Threaded Pin gripped in the tapped hole of this Collar is secured in the boss of an Eye Piece 18 (Fig. L3a) and is spaced from same by a Collar. The Eye Piece slides on the 2½" Curved Strip 11. The front bogie construction can be seen from the photograph which is reproduced at Fig. L3c. This illustration shows an old style Eye Piece at 6, but a new part should be used. The improved pattern is shown in Fig. L3.

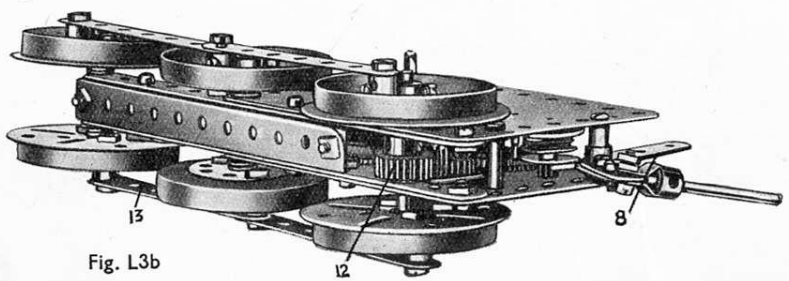


Fig. L3b

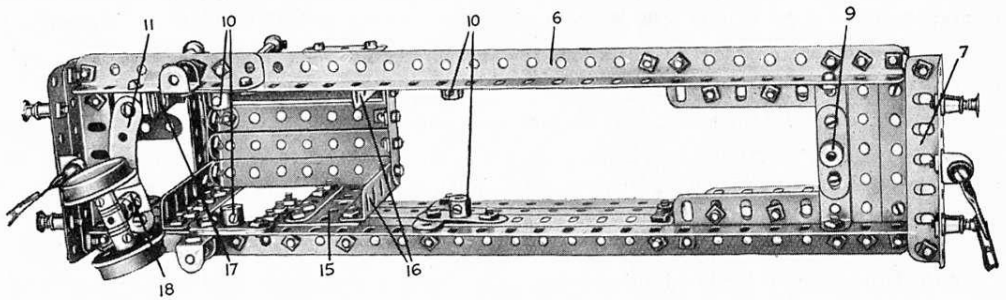


Fig. L3a

Parts required

4 of No. 1b	2 of No. 16a	4 of No. 109
5 „ „ 3	4 „ „ 17	3 „ „ 111
7 „ „ 4	5 „ „ 18a	1 „ „ 111a
5 „ „ 5	6 „ „ 20	1 „ „ 111c
11 „ „ 6	2 „ „ 24	1 „ „ 115
9 „ „ 6a	1 „ „ 25	6 „ „ 120a
2 „ „ 8	156 „ „ 37	2 „ „ 120b
1 „ „ 8b	8 „ „ 37a	2 „ „ 121
3 „ „ 9	25 „ „ 38	8 „ „ 136
6 „ „ 9b	5 „ „ 48b	6 „ „ 137
2 „ „ 9c	2 „ „ 50a	8 „ „ 147b
2 „ „ 9d	25 „ „ 59	2 „ „ 161
2 „ „ 9e	5 „ „ 62b	1 „ „ 162
3 „ „ 10	2 „ „ 64	2 „ „ 164
8 „ „ 12	3 „ „ 90	1 „ „ 166
1 „ „ 12a	1 „ „ 103d	
2 „ „ 12b	2 „ „ 103e	No. 1a Clockwork Motor
4 „ „ 16	2 „ „ 103f	

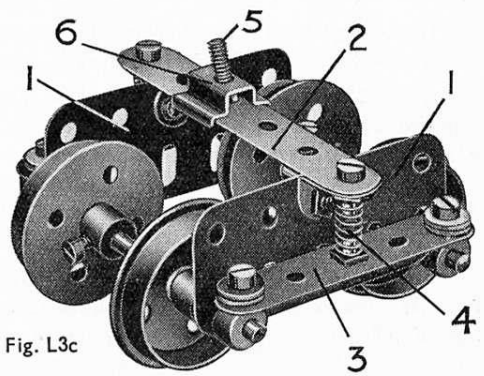
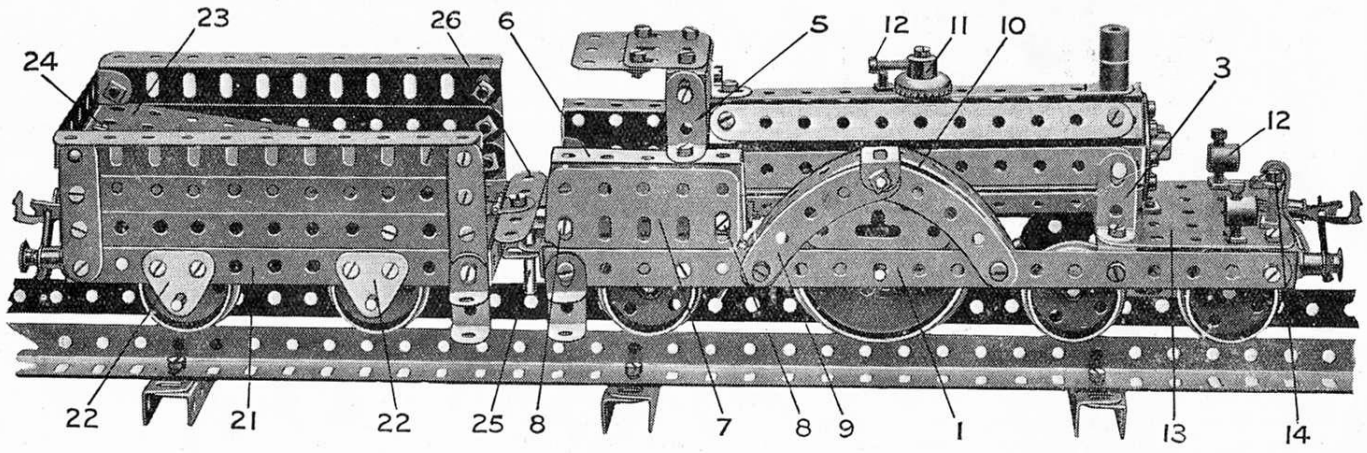


Fig. L3c

L4. Locomotive and Tender (Midland 4-2-2)



Parts required

2	of No.	1a	10	of No.	48a
13	„ „	2	1	„ „	52
1	„ „	5	1	„ „	53a
4	„ „	6	2	„ „	58
1	„ „	6a	6	„ „	59
2	„ „	9	4	„ „	64
2	„ „	9d	2	„ „	72
1	„ „	11	4	„ „	77
41	„ „	12	4	„ „	90
8	„ „	12b	2	„ „	103f
3	„ „	16	3	„ „	103h
3	„ „	18a	2	„ „	109
1	„ „	18b	4	„ „	111
10	„ „	20	3	„ „	111a
2	„ „	24	1	„ „	114
1	„ „	29	5	„ „	120a
131	„ „	37	2	„ „	121
11	„ „	38	2	„ „	126
2	„ „	46	2	„ „	133
1	„ „	48	2	„ „	137

This is a well-proportioned model of an old-style Midland " single-wheeler " locomotive. The engine frame is built up from two 9½" Strips 1 joined by 2½" × ½" Double Angle Strips 2 (Fig. L4a) and further strengthened at each end by 2½" Angle Girders. The boiler is composed of seven 5½" Strips bolted at each end to a Bush Wheel by means of Angle Brackets. It is supported by 1" × ½" Angle Brackets 3, and an Angle Bracket secured to the lowest hole of the rear Bush Wheel is bolted at 4 (Fig. L4a) to the floor of the cab.

The cab roof consists of 1½" Flat Girders bolted by Angle Brackets to 1" × ½" Brackets 5. Each of the sides is formed from a 2½" × 1" Double Angle Strip 6 and Flat Girders 7 bolted together by Angle Brackets at 8 and bolted by Angle Brackets to the footplate.

The wheel covers for the main drivers are each constructed from two 2½" Curved Strips 9 and a 5½" Strip 10 bent to the same curvature. A Corner Bracket is secured in the centre as shown.

A safety valve in the centre of the boiler consists of a Contrate Wheel 11, secured by means of a ¾" Bolt and carrying a further ½" Bolt 12. The smoke stack is composed of two Threaded Bosses mounted on the shank of a ¾" Bolt passing through the top Strip of the boiler. Two lamps are carried on the front of the engine-frame and consist of Threaded Bosses 12 mounted on the upturned shanks of ½" Bolts secured in the 2½" × 2½" Flat Plate 13, and gripped in position by 7/32" Bolts inserted in the tops of the Bosses. A piece of Spring Cord, secured to a ¾" Bolt 14, represents the front vacuum brake pipe connection.

It will be noticed from Fig. L4a that the front bogie consists of two 2½" Strips 15, bolted to a Double Bracket 16. It is attached to the locomotive frame by means of a ¾" Bolt, secured by two nuts on its end to the Flat Plate 13. A Compression Spring (Meccano Part No. 120b) is placed on the Bolt between the Double Bracket and the Plate. The rear trailing Wheels 17 are mounted on a 1½" Rod passed through two Trunnions 18 bolted to the underside of the footplate. The Wheels are retained in their correct position by means of a Collar 19, spaced between two Washers.

The driving wheels are built up from Face Plates and Wheel Flanges, and are secured to a 3" Rod 20. They are spaced in the correct position in the centre of the frame by means of three Washers placed between the boss of each Face Plate and the sides 1 of the engine.

A 5½" × 2½" Flanged Plate 21 forms the base of the tender and the sides are each built up from two 5½" Strips and one 5½" Angle Girder. The back consists of four 2½" × ½" double Angle Strips. The Wheels are carried on axles journalled in 1" Triangular Plates 22 bolted to the Base Plate 21. A 4½" × 2½" Flat Plate 23 is secured inside the tender by means of an Angle Bracket bolted to the back at 24, and a 2½" × ½" Double Angle Strip at the other end of the plate.

The loco and tender are coupled together by means of a 1" Rod 25, passed through two Angle Brackets. An extension of the footplate consists of a 1½" Flat Girder and a 2½" Strip 26, bolted by means of a Hinge to the tender.

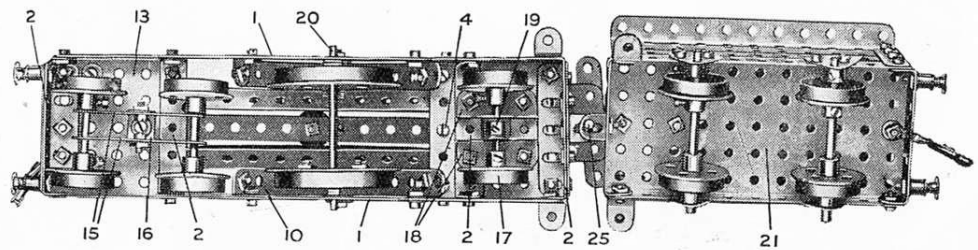


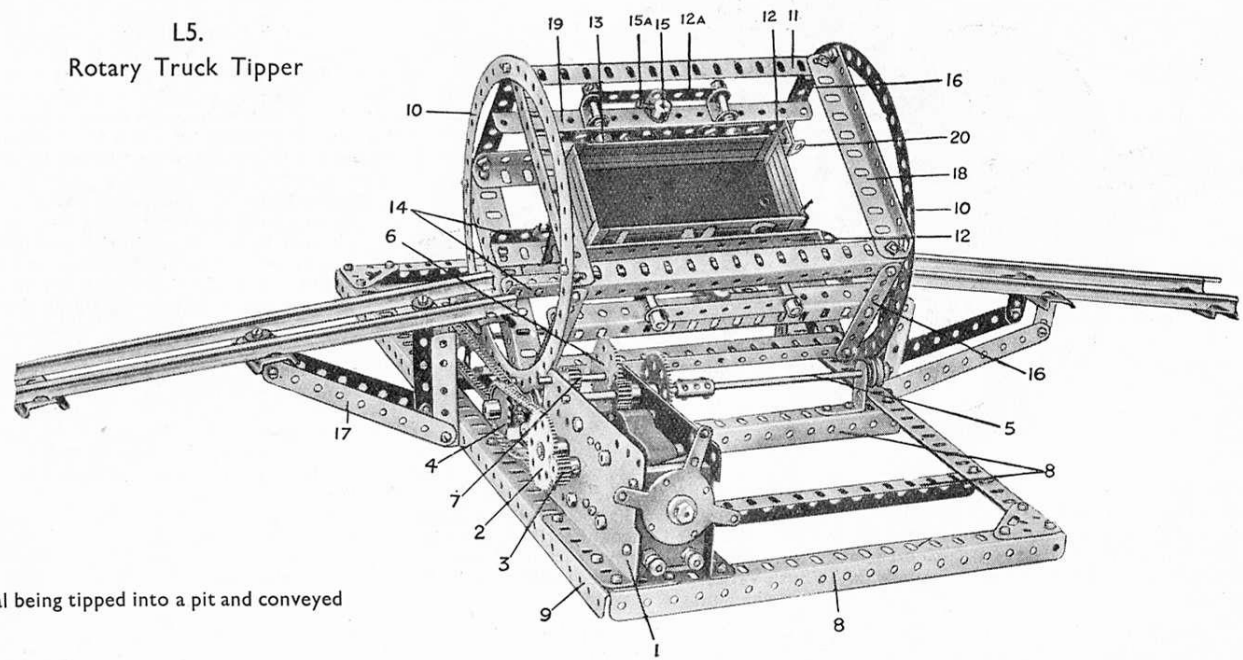
Fig. L4a.

Parts required

9 of No. 2a	4 of No. 11	4 of No. 26	2 of No. 63
6 „ „ 3	8 „ „ 12	4 „ „ 27a	18″ „ „ 94
2 „ „ 7a	4 „ „ 12a	98 „ „ 37	1 „ „ 96
5 „ „ 8a	2 „ „ 12b	4 „ „ 37a	3 „ „ 96a
8 „ „ 8b	4 „ „ 15a	8 „ „ 38	4 „ „ 111a
4 „ „ 9	5 „ „ 16a	4 „ „ 48d	4 „ „ 120b
4 „ „ 9d	4 „ „ 18a	7 „ „ 59	4 „ „ 133
2 „ „ 9f	4 „ „ 23a	4 „ „ 62b	2 „ „ 145

No. E6 Electric Motor

L5.
Rotary Truck Tipper



The model represents a type of wagon tipper used on railways for emptying coal wagons in locomotive coaling plants. The coal is tipped into a pit from which it is conveyed by a bucket elevator, to a hopper mounted over the railway track. The locomotive to be coaled takes up its position beneath the hopper and coal is released into the tender.

Tippers of similar type are used for stone and gravel, the material being tipped into a pit and conveyed to screening plant, etc.

These and other interesting operations can be carried out with the model, which will add much interest to model railway operation.

The base is built up from five 9½″ Angle Girders 8 bolted to 18½″ Angle Girders 9. The " cage " is formed by two Circular Strips 10, to each of which are bolted two 5½″ Angle Girders 18 that, in turn, support four 7½″ Angle Girders 11. Two further 7½″ Angle Girders 14 bolted to the lower pair of transverse Angle Girders 18 form the rail track.

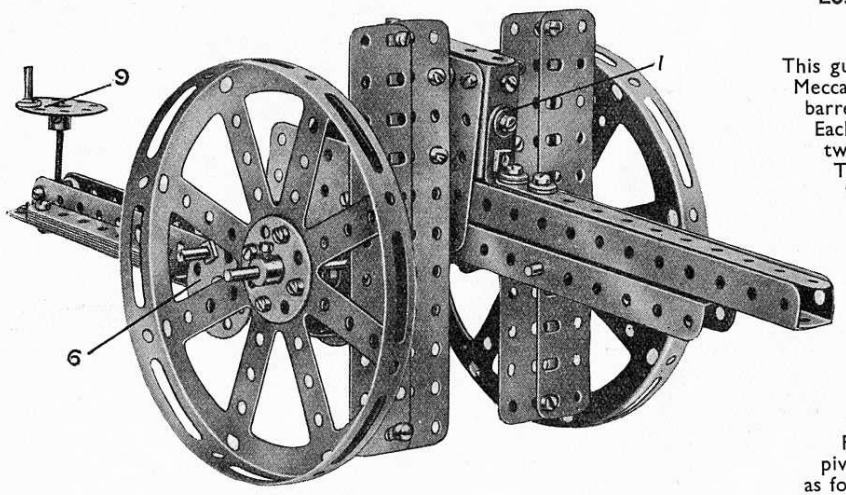
To the Girders 11 are bolted four 3½″ Strips 16 which support two more 7½″ Angle Girders 19, one on each side of the cage. These Girders support spring " pads " which grip the truck while the tipping operations are in progress. Two 5½″ × ½″ Double Angle Strips 12 are connected together by bolts passed through their turned-up ends. These bolts also carry Angle Brackets 20 that are bent slightly so as to form guides for the entrance and egress of the truck. Two Double Arm Cranks 13 bolted to the outer Double Angle Strip 12 carry 1½″ Rods. These Rods are journalled in Double Brackets bolted to the Angle Girder 19 and each carries a Compression Spring placed between the Double Brackets and the inner Double Angle Strip 12.

After passing the Rods through the Double Brackets a 3½″ Strip 12a is placed over their ends. A Bolt 15, passed through the Girder 19, is held loosely in position by a nut, and carries an Angle Bracket locked on the bolt by a second nut. A Collar is then secured to the bolt and carries a ½″ Bolt 15a as shown. This completes the " gripping " device, and it will now be found that the Double Angle Strips 12 are forced by the Springs against the side of the truck. Using the Bolt 15a as a lever to turn the Bolt 15 the corner of the Angle Bracket may be brought into contact with the Strip 12a, thus withdrawing the " pad " 12 and releasing the truck. The gripping device is duplicated on the other side of the cage.

The cage rests on four Pulleys that are mounted on Rods 5 (two 4½″ Rods coupled together) and journalled in 1″ × 1″ Angle Brackets bolted to the Angle Girders 8.

The Electric Motor is mounted on the base of the model, and a ½″ Pinion 3 on the armature spindle engages a 57-teeth Gear, the spindle of which carries, on the other side of the Motor, a ½″ Pinion engaging a further 57-teeth Gear. The Rod of this latter Gear carries a ½″ Pinion meshing with another 57-teeth Gear 6, on the Rod of which is a further ½″ Pinion 7 engaging a fourth 57-teeth Gear carried on a Rod journalled in the Motor framework. On this Rod is a ¾″ Sprocket connected by Sprocket Chain to a 1″ Sprocket Wheel 4 on one of the Rods 5. The latter carries also another ¾″ Sprocket Wheel connected by Sprocket Chain to a ¾″ Sprocket Wheel on the other Rod 5. Rotation of the Motor therefore causes the Rods 5 with their Pulleys to revolve, and the Pulleys to impart rotary movement to the cage.

L6. Field Gun



This gun has a quick-firing action and will fire twelve Meccano Steel Balls at one loading. Fig L6a shows the barrel and firing mechanism, with one side removed. Each side of the magazine chamber is built up from two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates with corners overlapping. The two upper Plates have two $1\frac{1}{2}''$ Angle Girders 10 and one Channel Bearing 1 bolted to them and the bottom Plates are joined together by a Double Bracket. The barrel consists of two $7\frac{1}{2}''$ Angle Girders secured together to form a channel by two bolts in the two inner end holes only. The end bolt secures a Double Bracket inside the barrel and the recoil chamber 11 is held rigidly by the other. The Double Bracket inside the barrel carries a 2″ Rod on which is fixed a Small Fork Piece 3 carrying a $\frac{3}{8}''$ Bolt. A second 2″ Rod 4, working freely in the jaws of the Small Fork Piece, is secured to a Coupling that is pivoted on the Rod 12. The action of the model is as follows. On turning the Bush Wheel 6, which is fixed to the Rod 6a, the Bush Wheel 5 is rotated through the gears 13. The latter Bush Wheel carries in one of its holes a $\frac{3}{8}''$ Bolt that catches the Rod 4 and pulls back the Small Fork Piece 3, with the plunger attached, against the action of the Springs 15. The plunger is now clear of the space formed by the 2″ Strip 2 and the end of the Channel Bearing 1, and this movement allows a single Steel Ball to fall from the magazine chamber to a position directly in front of the plunger. On continuing the movement of the hand wheel 6 the bolt in the Bush Wheel 5 disengages itself from the Rod 4, thereby allowing the plunger to strike the " shell " and so shoot it from the gun.

The 8″ Rod that carries the road wheels is journalled in the end holes of the 3″ Strips 8, and axle covers are provided by bolting a $1\frac{1}{2}''$ Angle Girder on each side of the gun to the $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets 14. The Angle Brackets 7 form supports for the shields, which are built up from $5\frac{1}{2}''$ Flat Girders.

The trailing girder is built up from two $7\frac{1}{2}''$ Angle Girders joined together at the far end by means of a $1\frac{1}{2}''$ Strip and secured at the near end to the lower holes of the magazine chamber. A 2″ Threaded Rod surmounted by the Bush Wheel 9 and working in a Threaded Boss, which is fixed to the $7\frac{1}{2}''$ Angle Girders by Bolts and spaced by Washers, forms the elevating apparatus. When the gun is assembled a $5\frac{1}{2}''$ Strip should be placed along the top of the barrel and attached to the magazine chamber by a $1'' \times 1''$ Angle Bracket

Parts required

1 of No. 2	1 of No. 14	1 of No. 64
24 „ „ 3	4 „ „ 17	4 „ „ 72
2 „ „ 4	2 „ „ 18b	1 „ „ 81
1 „ „ 5	5 „ „ 24	4 „ „ 103
1 „ „ 6	1 „ „ 26	6 „ „ 111c
1 „ „ 6a	1 „ „ 27a	1 „ „ 114
4 „ „ 8b	52 „ „ 37	2 „ „ 115
2 „ „ 9	4 „ „ 37a	1 „ „ 116a
4 „ „ 9f	20 „ „ 38	2 „ „ 118
2 „ „ 11	2 „ „ 43	1 „ „ 160
9 „ „ 12	9 „ „ 59	
1 „ „ 12a	1 „ „ 63	

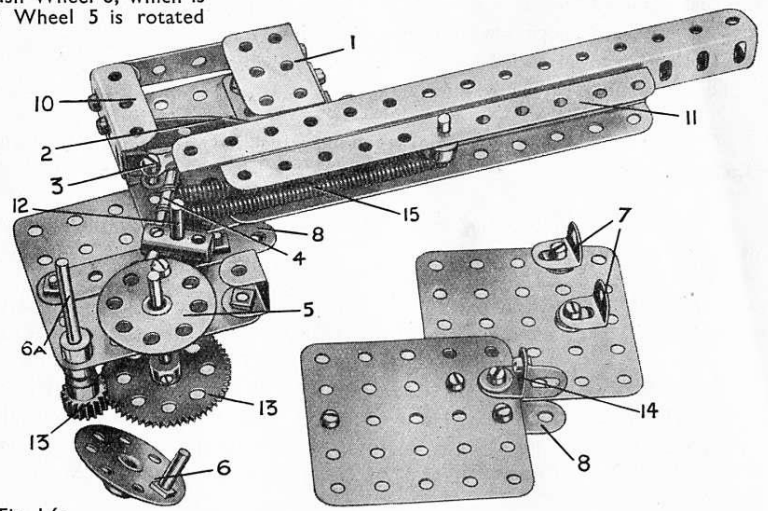
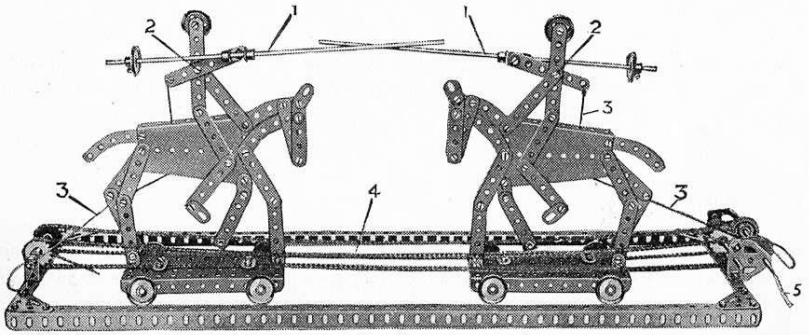


Fig. L6a

L7. The Tilters



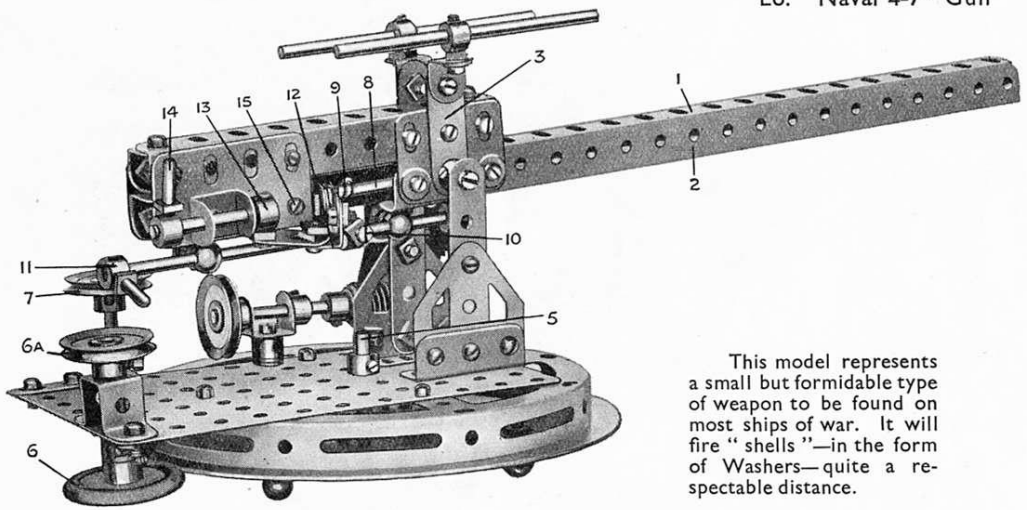
Parts required

2 of No. 3	1 of No. 15a	1 of No. 46
4 „ „ 4	5 „ „ 16	1 „ „ 47
22 „ „ 5	1 „ „ 19	2 „ „ 52
2 „ „ 7	10 „ „ 22	2 „ „ 54a
2 „ „ 8b	2 „ „ 22a	8 „ „ 59
10 „ „ 10	2 „ „ 31	6 „ „ 90
2 „ „ 11	73 „ „ 37	50″ „ „ 94
10 „ „ 12	2 „ „ 37a	4 „ „ 96
2 „ „ 13	4 „ „ 38	2 „ „ 126a
		4 „ „ 133

The lances 1 pivoted at 2 are raised into position by the Cords 3 and the figures caused to advance together by the Chains 4 on turning the Handle 5.

The Cords 3, instead of being tied where indicated in the illustration, should, after aim, be made fast to some part of the moving figures.

L8. Naval 4-7″ Gun



This model represents a small but formidable type of weapon to be found on most ships of war. It will fire " shells "—in the form of Washers—quite a respectable distance.

The " barrel " of the gun is composed of a 12½″ Angle Girder 1 and a 9½″ Angle Girder 2 arranged to form a " square tube." A 4½″ Flat Girder is bolted to one end of the 12½″ Girder and a 1½″ Flat Girder is secured to the corresponding end of the 9½″ Angle Girder. Two 4½″ Angle Girders—bolted together to form a channel-section girder—are next secured to the top edges of the 4½″ and 1½″ Flat Girders, and on the same side of the barrel as the 1½″ Flat Girder a 2″ Flat Girder is attached to the 4½″ Angle Girder.

The gun is " trained " by means of the 1″ fast Pulley 6a mounted at the top end of a Rod carrying the 1″ Pulley 6, which is shod with a small Rubber Ring (part No. 155). The Rubber Ring is arranged to press on the periphery of the Circular Plate, so that by turning the Pulley 6 the entire gun is moved about the central pivot 5. Two 3½″ Rods—representing the telescopic sights—are mounted in Collars that are secured to Angle Brackets bolted to the top ends of the Cranks 3. The barrel of the gun is elevated or depressed by means of the simple mechanism that is controlled from the Pulley 4.

The firing mechanism is arranged as follows. An 11½″ Rod 8 is placed inside the barrel and attached to the rear end by means of a Coupling. This Coupling is secured to the 2″ and 4½″ Flat Girders by Bolts that are passed through the holes of the Flat Girders and inserted in the tapped holes of the Coupling, and the latter is spaced from the Flat Girders by two Washers on each retaining Bolt. The loading mechanism consists of a Bolt 10 locked by a Nut in the tapped hole of a Collar, which is secured to a Rod that is free to turn and slide in its bearings, formed by two Handrail Supports. The Rod is fitted with a handle 11.

The trigger mechanism is assembled as follows. A Hinge secured by the Bolt 15 to the front hole of the 2″ Girder has a Flat Bracket secured to it by the slotted hole, two Washers being placed on the retaining bolt between the Flat Bracket and the Hinge. A ½″×½″ Angle Bracket 12 is secured in the round hole of the Flat Bracket, and is connected pivotally by means of a second Flat Bracket to the Collar 13. This Collar is secured to a short Rod carrying the handle 14, by means of which the Rod may be moved to and fro in the Double Bracket forming its bearings.

To load the gun, the Washer forming the projectile is placed on the front end of the 11½″ Rod 8 and the barrel of the gun tilted up to allow it to slide down the Rod to the Compression Springs 9. Next the handle 11 is pushed away from the operator, turned so that the head of the Bolt 10 engages with the Washer, and then pulled back—or toward the operator—so that the Washer compresses the Spring 9. Previous to this, however, the handle 14 controlling the trigger should be pulled toward the operator. The handle may now be pushed outward so that the Flat Bracket engages with the Washer. The gun is now ready for firing.

Parts required

2 of No. 5	1 of No. 13	1 of No. 24	4 of No. 62	2 of No. 115
2 „ „ 6a	1 „ „ 15a	1 „ „ 32	1 „ „ 63	1 „ „ 118
1 „ „ 8	2 „ „ 16	53 „ „ 37	1 „ „ 103c	1 „ „ 120b
1 „ „ 8a	1 „ „ 16a	2 „ „ 37a	1 „ „ 103g	2 „ „ 126a
2 „ „ 9a	1 „ „ 17	16 „ „ 38	1 „ „ 103h	1 „ „ 129
2 „ „ 9f	1 „ „ 18a	1 „ „ 45	1 „ „ 111a	6 „ „ 136
2 „ „ 10	3 „ „ 18b	1 „ „ 52a	1 „ „ 111c	1 „ „ 146
2 „ „ 11	4 „ „ 22	10 „ „ 59	1 „ „ 114	1 „ „ 155
3 „ „ 12				

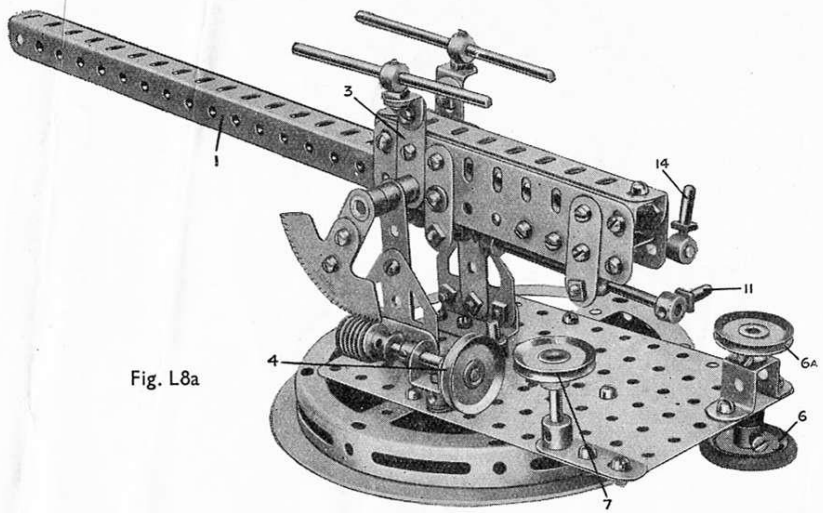
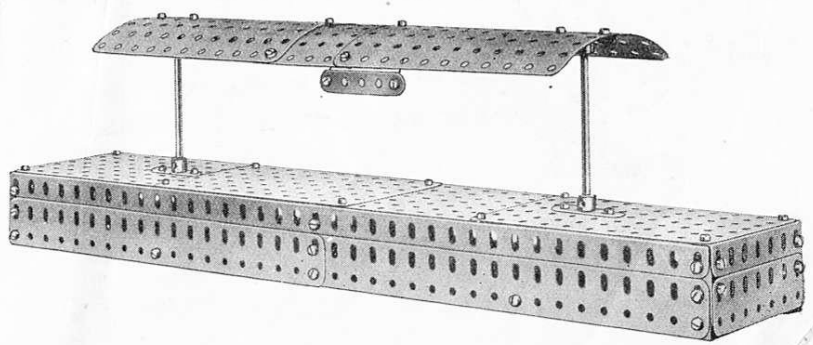


Fig. L8a

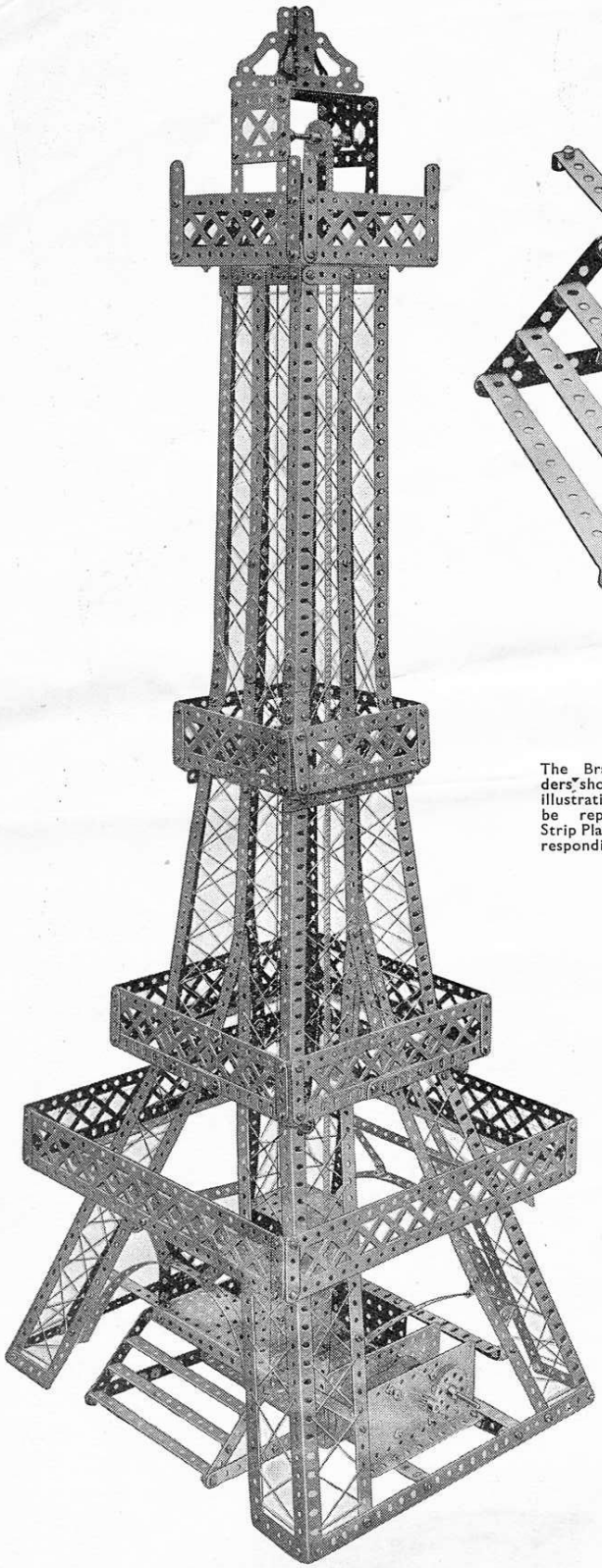
L9. Railway Island Platform

Parts required

1 of No. 5	4 of No. 9f	2 of No. 62b
4 „ „ 7a	2 „ „ 16	4 „ „ 70
2 „ „ 9d	54 „ „ 37	2 „ „ 103d
	4 „ „ 52a	4 „ „ 103h



L10. Eiffel Tower



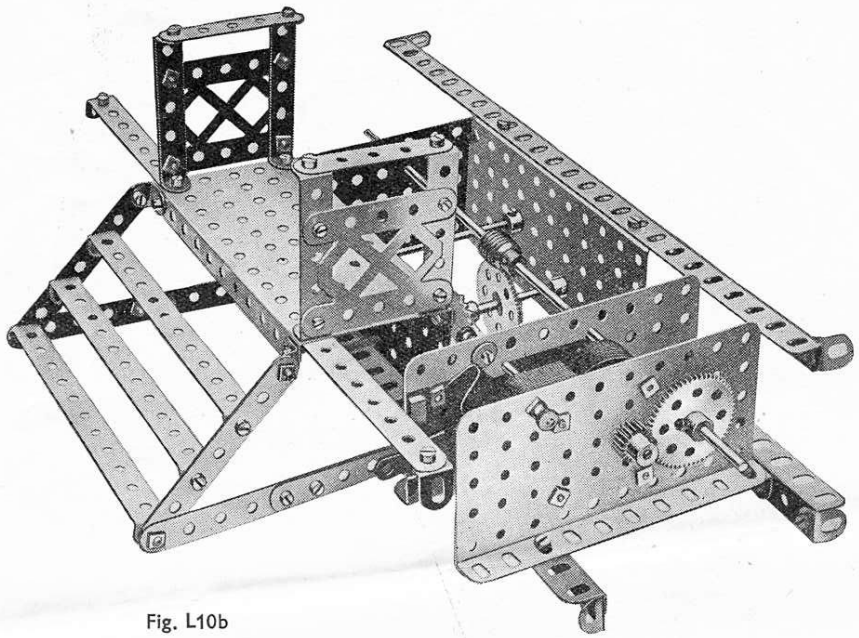


Fig. L10b

The Braced Girders shown in the illustrations should be replaced by Strip Plates of corresponding lengths.

Parts required

22	of No.	1	2	of No.	14	3	of No.	52
24	„ „	2	1	„ „	16	4	„ „	53
8	„ „	3	1	„ „	18b	8	„ „	59
16	„ „	4	1	„ „	26	2	„ „	72
20	„ „	5	2	„ „	27a	3	„ „	94
18	„ „	8	1	„ „	32	2	„ „	96
16	„ „	9	337	„ „	37	4	„ „	108
2	„ „	9d	6	„ „	40	4	„ „	193
4	„ „	10	1	„ „	47	16	„ „	195
72	„ „	12	6	„ „	48a	4	„ „	197
4	„ „	12a	1	„ „	48b	No. E6 Electric Motor		
1	„ „	13a	3	„ „	48d			

The construction of the tower may be followed from the illustrations, but the 2in. Strips across the ends of the Braced Girders are not necessary if Strip Plates are used. The lift carriage is built up from two $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates and two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates and runs on a length of cord which acts as a guide line. This cord is secured to the top of the tower and to a transverse Rod in the base, and passes through holes in the Plates of the lift. The operation of the lift is effected by means of a length of Sprocket Chain passing round the 1″ Sprocket Wheel situated in the top of the tower, Fig. L10a, and round a similar wheel in the base, Fig. L10b. The ends of the Chain are secured to the lift. The lower Sprocket Wheel is operated through worm gearing from the Electric Motor, Fig. L10b.

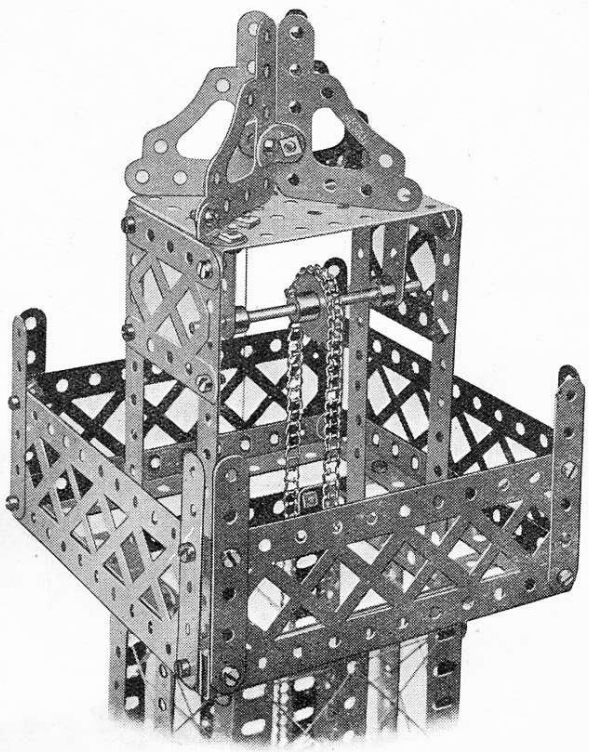
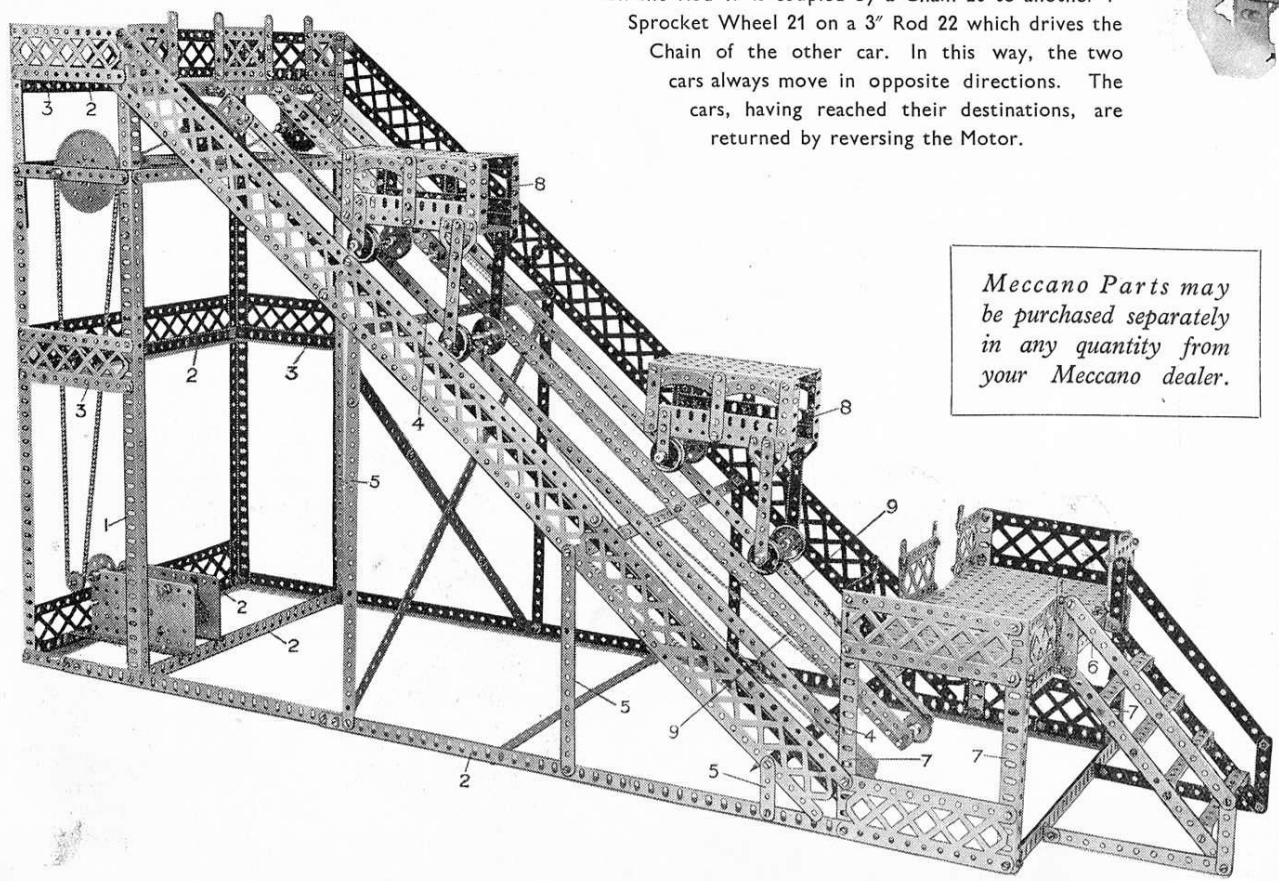


Fig. L10a

L11. Funicular Railway

The inclined rails are made from four sets of 24½″ Angle Girders and 9½″ Girders butted together and connected by 3″ Strips. The loading platform consists of three 5½″ × 3½″ Flat Plates and one 5½″ × 2½″ Flat Plate, and is supported by the 12½″ Girders 6 and uprights 7. The side Girders 2 in the base of the model are each formed from one 24½″, one 12½″ and one 3″ Girders overlapped two holes each.

The cars 8 are connected to the Chains 9 which pass over Sprocket Wheels 10, 2″ diameter at the top and 1″ at the bottom. They move in opposite directions so that the weight of the descending car assists the other car to ascend. This is effected by driving a 3″ Sprocket Wheel 11, Fig. L11a, from the Motor, the 8″ Rod 12 of the Sprocket Wheel 11 carrying a 1″ Sprocket 13 which is coupled by the Chain 14 to a similar Sprocket 15 on the 3″ Rod 16. The Rod 12 is coupled to another 8″ Rod 17 by a pair of ½″ Pinions 18 in order to obtain a reversed rotation, and a 1″ Sprocket Wheel 19 on the Rod 17 is coupled by a Chain 20 to another 1″ Sprocket Wheel 21 on a 3″ Rod 22 which drives the Chain of the other car. In this way, the two cars always move in opposite directions. The cars, having reached their destinations, are returned by reversing the Motor.



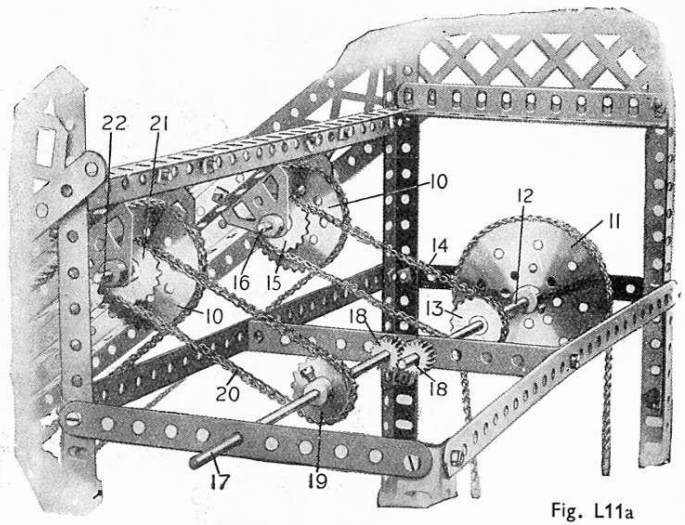


Fig. L11a

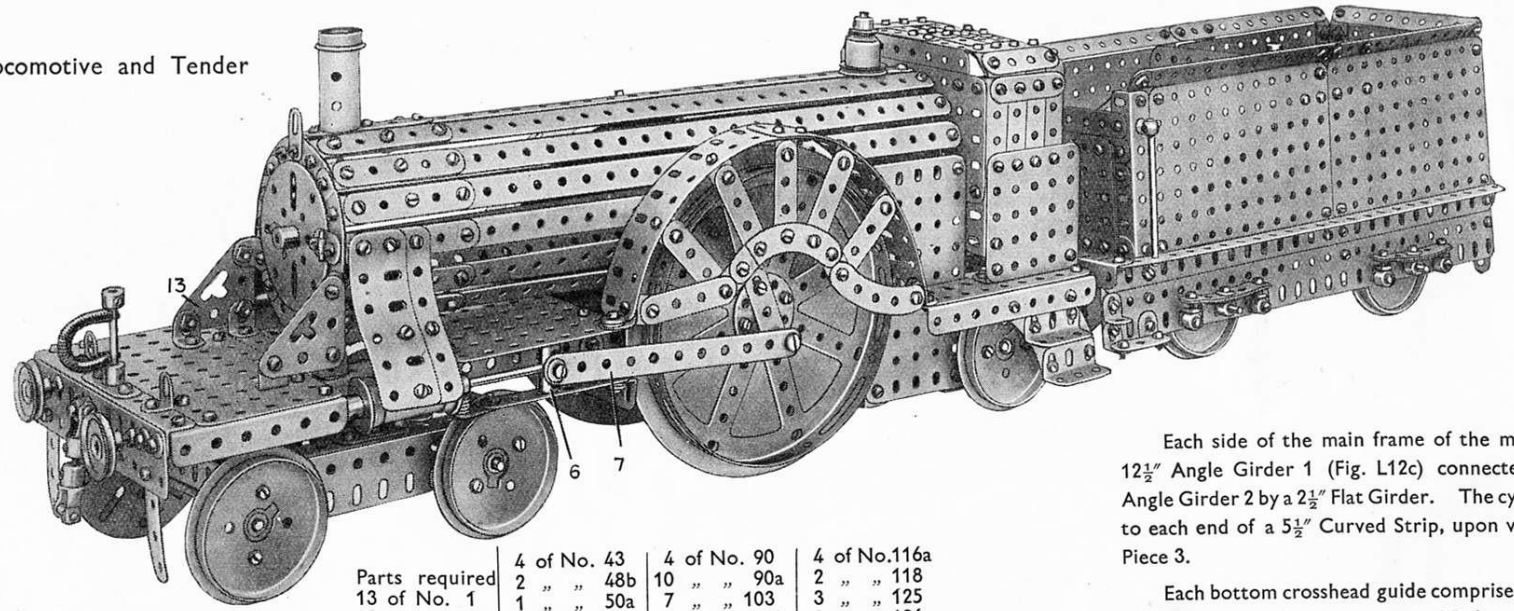
The Braced Girders shown in the illustrations should be replaced by Strip Plates of corresponding lengths.

Meccano Parts may be purchased separately in any quantity from your Meccano dealer.

Parts required

9	of No. 1	3	of No. 27a
4	„ „ 1b	274	„ „ 37
6	„ „ 2	5	„ „ 48d
4	„ „ 2a	4	„ „ 52
4	„ „ 4	6	„ „ 52a
26	„ „ 5	19	„ „ 59
6	„ „ 6	2	„ „ 70
6	„ „ 7	8	„ „ 90
4	„ „ 7a	160″	„ „ 94
13	„ „ 8	2	„ „ 95
4	„ „ 8a	1	„ „ 95b
4	„ „ 8b	6	„ „ 96
8	„ „ 9	1	„ „ 96a
2	„ „ 9b	4	„ „ 103
2	„ „ 9c	8	„ „ 126a
4	„ „ 9d	4	„ „ 193
38	„ „ 12	4	„ „ 194
2	„ „ 13a	8	„ „ 195
9	„ „ 16	9	„ „ 197
2	„ „ 17	No. E6 Electric Motor	
8	„ „ 20		
4	„ „ 26		

L12. 4-2-2 Locomotive and Tender



Each side of the main frame of the model consists of a 12½″ Angle Girder 1 (Fig. L12c) connected rigidly to a 9½″ Angle Girder 2 by a 2½″ Flat Girder. The cylinders are secured to each end of a 5½″ Curved Strip, upon which slides an Eye Piece 3.

Each bottom crosshead guide comprises a 3″ Strip 4 and a Flat Bracket and is attached by a ⅜″ Bolt to the boss of the ¾″ Flanged Wheel forming one of the cylinder covers, and also to a transverse 5½″ Angle Girder. Five Washers are used to space the guide the correct distance from the Flanged Wheel, and two Washers space the 5½″ Angle Girder from each of the Angle Brackets by which it is attached to the main frame.

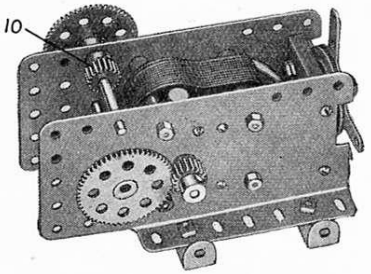


Fig. L12a

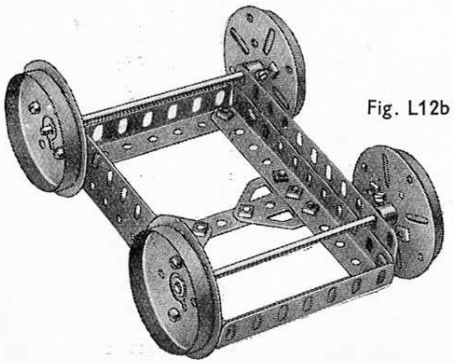


Fig. L12b

Parts required

13	of No.	1	
2	„	„	1b
4	„	„	2
5	„	„	2a
12	„	„	3
2	„	„	4
33	„	„	5
28	„	„	6
6	„	„	6a
4	„	„	8
2	„	„	8a
8	„	„	9
7	„	„	9a
4	„	„	9b
2	„	„	9c
2	„	„	9d
4	„	„	9f
29	„	„	10
2	„	„	11
74	„	„	12
4	„	„	15a
2	„	„	16
1	„	„	16a
4	„	„	16b
3	„	„	17
3	„	„	18a
1	„	„	20
5	„	„	20b
5	„	„	22
1	„	„	23a
2	„	„	24
2	„	„	26
2	„	„	27a
1	„	„	27b
443	„	„	37
40	„	„	38
4	of No.	43	
2	„	„	48b
1	„	„	50a
7	„	„	52a
6	„	„	53a
2	„	„	55a
25	„	„	59
2	„	„	62
1	„	„	62b
4	„	„	63
1	„	„	70
2	„	„	72
1	„	„	81
1	„	„	89
4	of No.	90	
10	„	„	90a
7	„	„	103
2	„	„	103b
4	„	„	103c
1	„	„	103d
6	„	„	103e
7	„	„	103f
11	„	„	109
3	„	„	111
12	„	„	111a
10	„	„	111c
1	„	„	114
5	„	„	115
4	of No.	116a	
2	„	„	118
3	„	„	125
2	„	„	126
2	„	„	126a
2	„	„	133
2	„	„	136
10	„	„	137
2	„	„	146
2	„	„	147b
3	„	„	163
2	„	„	164
No. E6 Electric Motor			

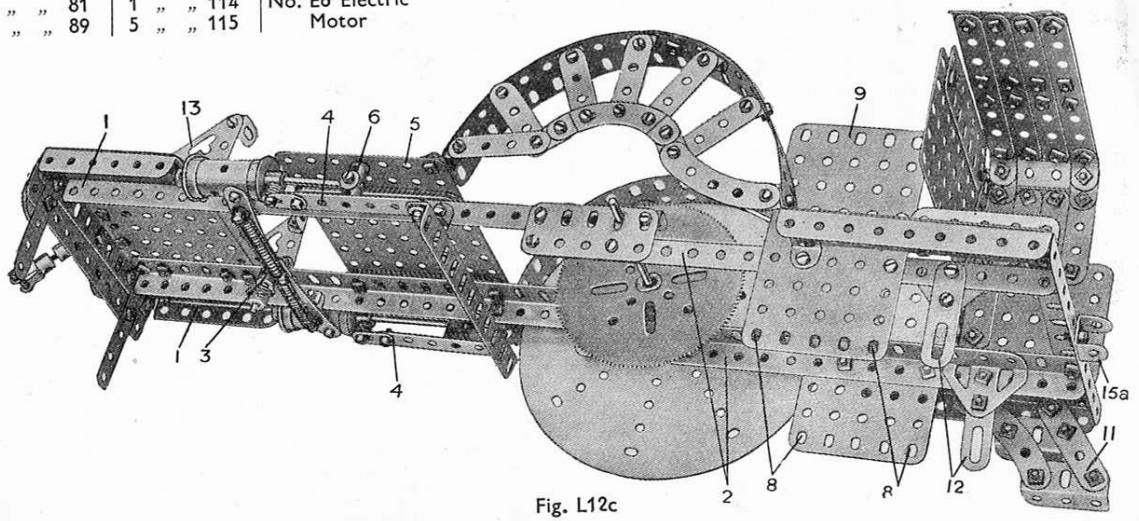


Fig. L12c

L12. 4-2-2 Locomotive and Tender—(continued)

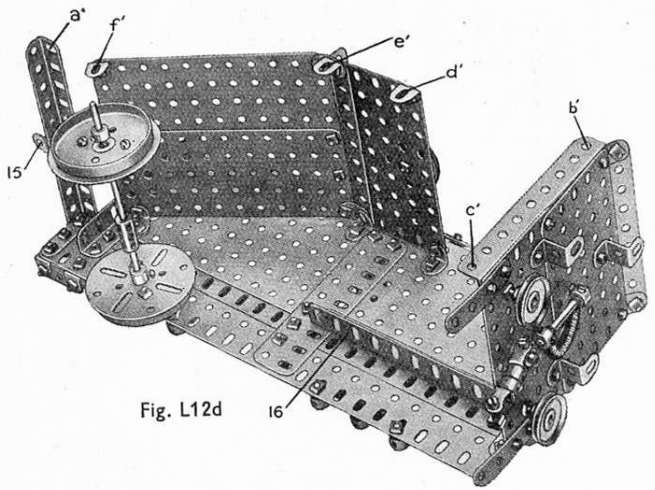


Fig. L12d

The top crosshead guide is formed by the end of a $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plate 5, which is bolted across the top of the main frame and is packed up therefrom by five $3\frac{1}{2}''$ Strips on each side. A Coupling 6, which is secured to the end of the piston rod and slides freely between the crosshead guides, represents the crosshead, to one end of which the connecting rod 7 (Fig. L12) is attached.

The Motor is held in place in the main frame by Bolts, which pass through holes 8 in the $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates 9 and through the ends of $3\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips on the Motor. When the Motor is secured in place, the $\frac{1}{2}''$ Pinion 10 (Fig. L12a) should mesh with the $3\frac{1}{2}''$ Gear Wheel on the driving wheel axle. The steps 11 are fixed in place by $\frac{3}{8}''$ Bolts and are spaced away from the Girder to which they are attached, by Collars on the shanks of the Bolts.

The construction of the bogie should be quite plain from Fig. L12b. It is mounted pivotally on the bogie pin (a 1″ Rod), which is secured in the boss of the Eye Piece 3, and the lateral movement of the latter upon the Curved Strip is restricted by means of Springs. The trailing wheels are fixed to an axle that is journalled freely in the slotted holes of 2″ Slotted Strips 12.

The smokebox end of the boiler is attached to Corner Brackets 13 and the firebox end is secured to the $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates 9. Before mounting the boiler in position, the chimney and the safety valve should be attached. In the case of the former a Chimney Adaptor is secured to the top of the smokebox by a 2″ Screwed Rod. The Sleeve Piece forming the chimney is then pushed on to the Chimney Adaptor, and a $\frac{3}{4}''$ Flanged Wheel is fixed on the end of the Screwed Rod to form the chimney cap.

The tender is shown dismantled in Fig. L12d ; one side has been removed and reversed (Fig. L12e) to show its interior construction. The two portions may be constructed as indicated and then placed together so that the lettered holes coincide (a with a′, b with b′, and so on). The front plate of the tender has a sliding door, which consists of a $2\frac{1}{2}''$ Flat Girder 14 sliding between two pairs of $2\frac{1}{2}''$ Flat Girders, each pair being spaced apart by a $2\frac{1}{2}''$ Strip.

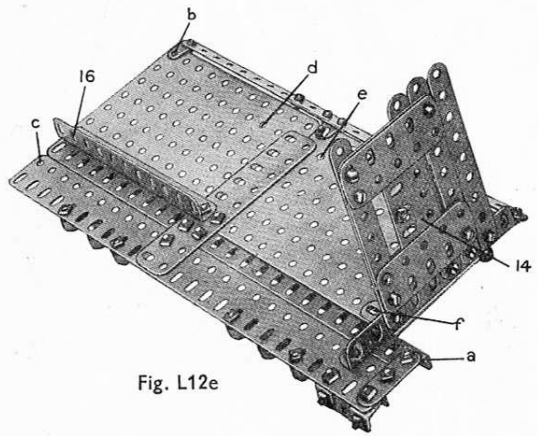


Fig. L12e

The locomotive and tender are connected together by passing a short Rod through the Double Brackets 15, 15a. This Rod is held in place by Collars. The 6-volt Accumulator may be accommodated in the tender, thus making the model entirely self-contained ; the bottom of the Accumulator rests on the Angle Girders 16.

L13. Clockwork Motor Tractor

This tiny tractor is driven by the Clockwork Motor and is capable of exerting tremendous power. It has been tested to pull a load exceeding 10 stone.

The front axle (a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip) is pivoted on a $2\frac{1}{2}''$ Rod that is carried in Double Brackets attached to the Motor by means of the $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates 1 and two $5\frac{1}{2}''$ Strips. The steering is similar to Standard Mechanism No. 159 except that cord is used instead of Sprocket Chain. The driver's seat is a Bush Wheel secured by Angle Brackets to two $3\frac{1}{2}''$ Strips that in turn are attached to the Motor side plates by 1″ Triangular Plates.

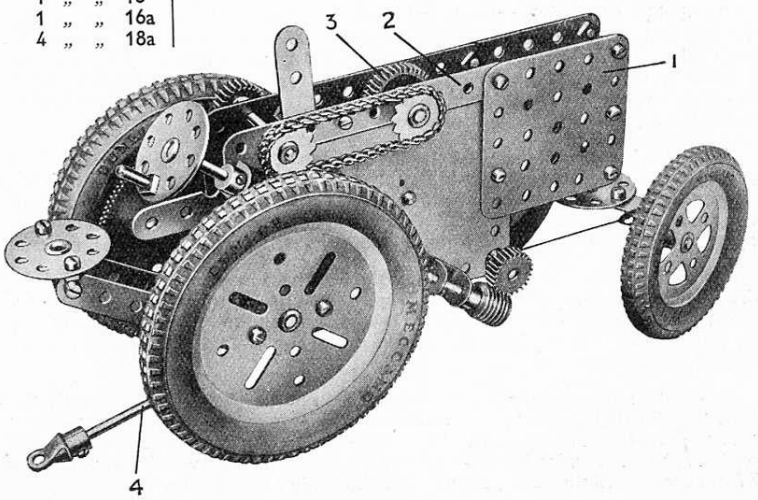
The drive for the rear wheels is taken from a 1″ Gear 3 meshing with the main driving gear of the Motor and carried on a $1\frac{1}{2}''$ Rod journalled in the Motor side plates. This Rod carries a $\frac{3}{4}''$ Sprocket Wheel connected by Sprocket Chain to a second $\frac{3}{4}''$ Sprocket that is nipped on a short Rod carrying a $\frac{3}{4}''$ Pinion. The latter engages with a $3\frac{1}{2}''$ Gear that is secured by double set-screws to the rear axle. It should be noted that to obtain a more positive grip on the rear axle the 3″ Pulleys, in addition to being secured by set-screws, are each connected by two $\frac{3}{4}''$ Bolts to a Bush Wheel that also is secured to the Rod by two set-screws.

If a No. 3 Clockwork Motor is used a $\frac{3}{4}''$ Pinion should be substituted for the gear 3 and its Rod journalled in the holes 2.

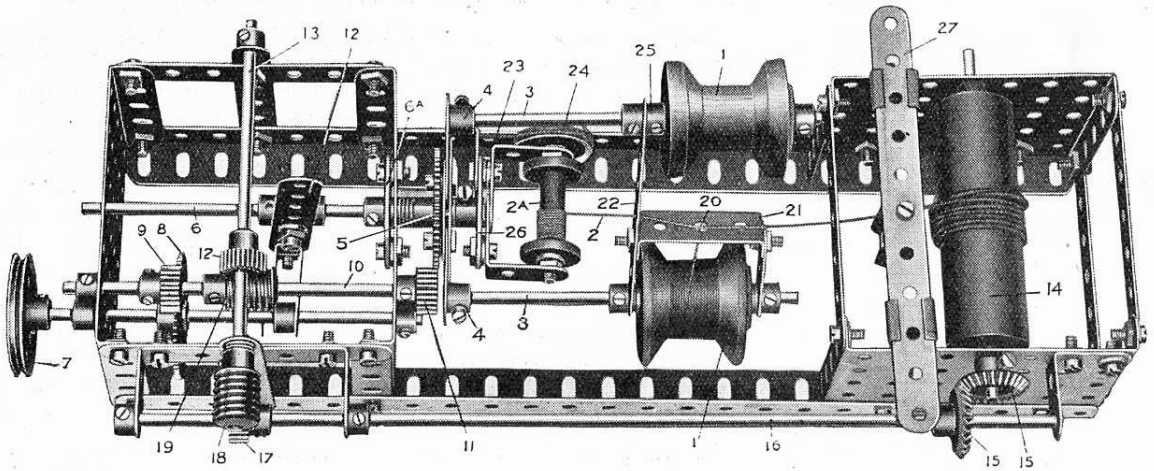
The draw-bar is composed of a $4\frac{1}{2}''$ Rod 4 carrying an End Bearing and pivoted on a short Rod in the bottom row of holes in the side plates.

Parts required

2 of No. 2	2 of No. 19b	1 of No. 32	2 of No. 72	2 of No.142a
2 „ „ 3	2 „ „ 20a	30 „ „ 37	2 „ „ 77	2 „ „ 142b
4 „ „ 11	5 „ „ 24	12 „ „ 38	9″ „ „ 94	2 „ „ 147b
4 „ „ 12	2 „ „ 25	1 „ „ 48a	2 „ „ 96a	1 „ „ 166
1 „ „ 14	1 „ „ 27b	9 „ „ 59	6 „ „ 111	No. 1a Clockwork Motor
1 „ „ 15a	1 „ „ 31	1 „ „ 63	1 „ „ 115	
1 „ „ 16				
1 „ „ 16a				
4 „ „ 18a				



L14. Wire Covering Machine



Parts required

1 of No.	2	2 of No.	8	3 of No.	15	4 of No.	26	17 of No.	38	4 of No.	53	1 of No.	106
7 „	„ 3	1 „	„ 10	4 „	„ 15a	2 „	„ 27a	2 „	„ 44	12 „	„ 59	1 „	„ 181
2 „	„ 4	2 „	„ 12	1 „	„ 21	2 „	„ 30	1 „	„ 46	2 „	„ 62		
1 „	„ 5	3 „	„ 12a	1 „	„ 22	2 „	„ 32	1 „	„ 48	1 „	„ 63		
2 „	„ 6a	1 „	„ 13	2 „	„ 24	41 „	„ 37	2 „	„ 50a	1 „	„ 81		

The bobbins 1, carrying the thread by means of which the wire 2 is covered, are carried in a yoke consisting of two Rods 3 that are secured in Cranks 4. The Cranks are held together by a 2½″ Strip on one side and a 1½″ Strip at the other, and are bolted to the 57-teeth Gear 5 that is free to rotate on the fixed 5″ Rod 6. The Rod is prevented from rotating by a Bush Wheel 6a, bolted to the frame. A Bush Wheel 26 on the end of the Rod 6 retains the revolving yoke in position and carries two 1″×1″ Angle Brackets. The Angle Brackets form a frame for carrying the bobbin 2a, from which the bare wire is unwound.

The yoke is rotated from the Pulley Wheel 7 on a Rod carrying a 57-teeth Gear 8. The Gear engages the Pinion 9, the Rod of which is fitted with a Worm 19 and another ½″ Pinion 11. The latter Pinion engages the Gear 5 carrying the yoke. The hand lever 12 is pivoted on a Coupling secured to the Rod 6 and carries a Cranked Bent Strip that engages a Collar on the Rod of the Pulley 7. Operation of the lever causes the Gear 8 to engage or disengage the Pinion 9 so that the winding operation can be easily stopped if necessary.

As the yoke rotates, the thread from the bobbins 1 is wound closely round the wire 2, and at the same time the wire is fed slowly on to the roller 14. The roller is driven through the Bevels 15 and Worm and Pinion 17 from the Worm 19. The movement of the roller is very slow, and the wire is unwound from the bobbin 2a against the action of a brake. The 1″ Pulley 24 on the spindle of the bobbin 2a is retarded by a length of cord tied to a Flat Bracket on the Bush Wheel 26.

It will be noticed that a Collar 25 is placed on one side of the yoke Strip 22, and has the effect of setting one of the bobbins slightly to the rear of the other. This gives two windings round the wire, one over the other. In order to cause the covered wire to be wound evenly on the take-up Roller 14, a distributor is provided, consisting of a Strip 27, beneath which is bolted a Double Bracket through which the covered wire passes. By moving the Strip 27 from one side to the other, the wire winds evenly on the Roller 14.

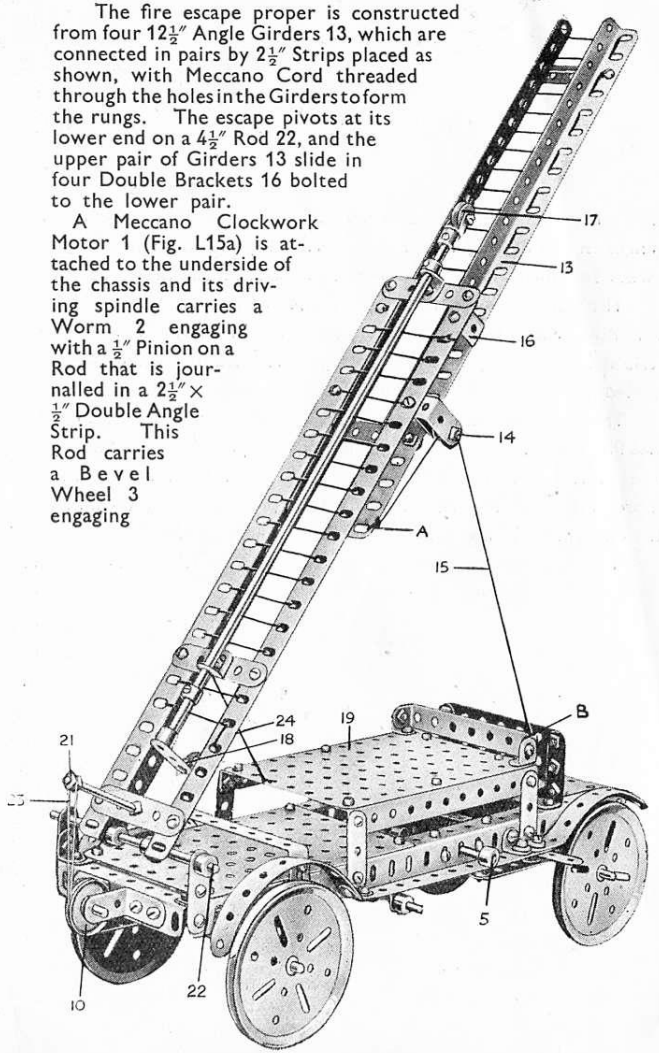
L15. Automatic Fire Escape

Parts required

2 of No.	2	1 of No.	13	2 of No.	30	1 of No.	81
4 „	„ 2a	1 „	„ 14	1 „	„ 32	1 „	„ 102
4 „	„ 3	3 „	„ 15	86 „	„ 37	5 „	„ 111c
7 „	„ 5	2 „	„ 16	8 „	„ 37a	1 „	„ 116
10 „	„ 6a	2 „	„ 16a	2 „	„ 38	2 „	„ 126
6 „	„ 8	1 „	„ 18a	1 „	„ 40	4 „	„ 126a
2 „	„ 9	1 „	„ 18b	2 „	„ 43	1 „	„ 140
2 „	„ 9b	4 „	„ 19a	1 „	„ 48a		
2 „	„ 10	1 „	„ 22	2 „	„ 48b	No. 2 Clockwork Motor	
4 „	„ 11	2 „	„ 23	2 „	„ 52a		
10 „	„ 12	1 „	„ 23a	20 „	„ 59		
4 „	„ 12a	1 „	„ 26	1 „	„ 62		

The fire escape proper is constructed from four 12½″ Angle Girders 13, which are connected in pairs by 2½″ Strips placed as shown, with Meccano Cord threaded through the holes in the Girders to form the rungs. The escape pivots at its lower end on a 4½″ Rod 22, and the upper pair of Girders 13 slide in four Double Brackets 16 bolted to the lower pair.

A Meccano Clockwork Motor 1 (Fig. L15a) is attached to the underside of the chassis and its driving spindle carries a Worm 2 engaging with a ½″ Pinion on a Rod that is journalled in a 2½″×½″ Double Angle Strip. This Rod carries a Bevel Wheel 3 engaging



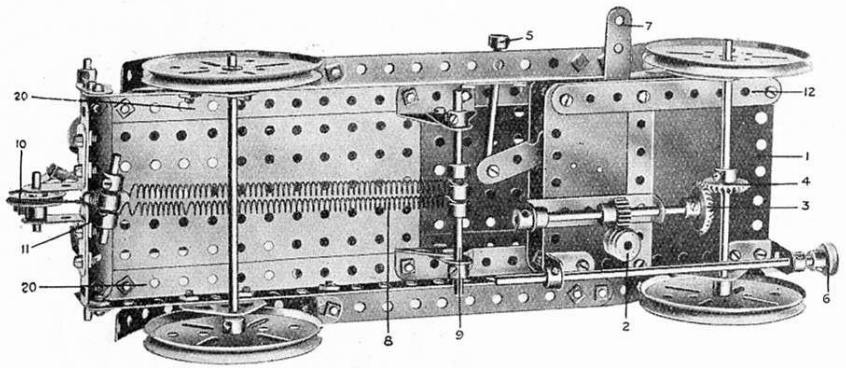


Fig. L15a

L15. Automatic Fire Escape—*Continued.*

a further Bevel 4 carried on the Axle Rod of the front wheels. The Motor may be reversed by means of the lever 7 and may be started or stopped by pulling or pushing on the handle 5. The Strip 12 is bolted to the Motor casing, and to prevent nuts obstructing the action of the lever 7, it is necessary to space the Strip from the Motor by means of a Collar that is placed on the securing bolt at each end of the Strip. The Double Angle Strip carrying the Rod of Bevel 3 is bolted at one end to the Motor casing (from which it also is spaced by a Collar) and at the other end to a 3½″ Strip. One end of the latter is bolted to the 4½″ Strip 12, while the other end is attached to the Motor and spaced by a Collar in the manner already described.

In action, the escape is run up to the wall of the "burning building" until the ½″ Pulley 17 touches the wall, when it is forced back, releasing by its movement the catch 18 from the Double Angle Strip that is bolted across the Flat Plate of the chassis. The bottom portion of the ladder is then raised by the Springs connected to the ladder by the cord 23 and the 2″ Threaded Rod 21. Simultaneously the ladder is extended by means of the cord 15 fixed at the points A (on the moving part of the ladder) and B (on the body of the fire engine). This cord passes over the ½″ Pulley 14, which is carried in a Single Bent Strip attached to the bottom portion of the ladder by an Angle Bracket. The ½″ Pulley 6 is a "stop" to hold the engine from the wall while the ladder is rising.

If required Road Wheels may be used instead of the four 3″ Pulleys illustrated.

L16. Boat-Lowering Gear

The davit arms 1 are connected to Face Plates 2 to which are bolted two Rack Segments 3 forming the usual geared quadrants. The davit arms are secured to Rods 4 journalled in the Flanged Plates 5, the Rack Segments 3 being engaged and driven by 1″ Gear Wheels 6 on an Axle Rod 7. This Rod 7 carries a Pinion 8, Fig. L16a, driven by a Worm 9 on a Rod, to which is secured a 57-teeth Gear Wheel 10. This is driven by a ½″ Pinion 11 on a Rod carrying also a 57-teeth Gear 12 driven by a ½″ Pinion 13 that is rotated by a hand wheel formed by a Face Plate 14. As the hand wheel is rotated, the davit arms are swung outward when launching the boat 16 or inward when it is desired to deposit the boat on the chocks 15.

The boat 16 is raised or lowered from the blocks 17 by the ropes 18 which wind on to a Rod 19. On this Rod is secured a ½″ Pinion 20 engaged by a Worm 21 which is rotated by the crank handle 22 formed of two Cranks bolted together, and in this way the boat may be lowered over the ship's side.

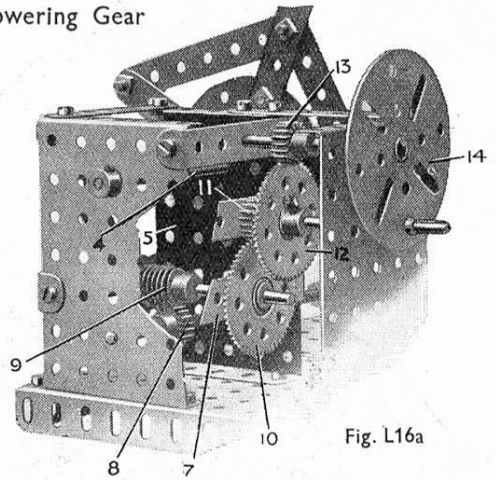
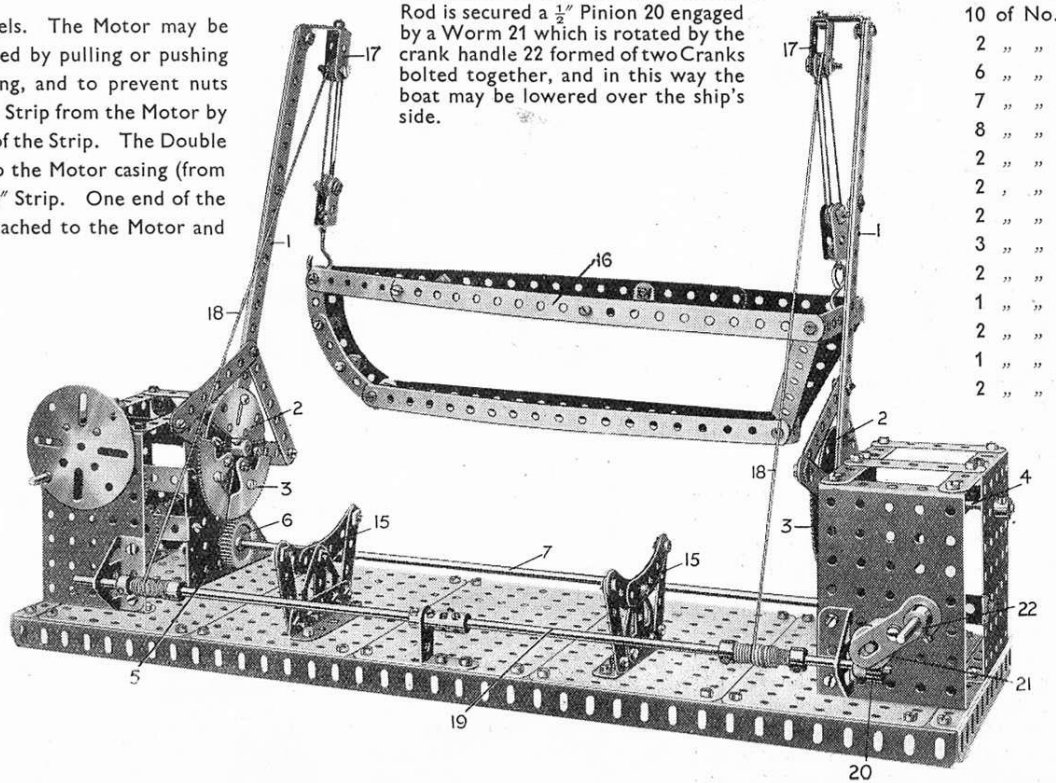


Fig. L16a



Parts required

10	of No.	1a
2	„ „	2a
6	„ „	3
7	„ „	5
8	„ „	6
2	„ „	7a
2	„ „	9
2	„ „	9d
3	„ „	11
2	„ „	12
1	„ „	12a
2	„ „	12b
1	„ „	13
2	„ „	13a
1	of No.	15
3	„ „	16
2	„ „	16a
1	„ „	18a
6	„ „	23
4	„ „	26
2	„ „	27a
2	„ „	31
2	„ „	32
142	„ „	37
14	„ „	38
1	„ „	40
5	„ „	48a
2	„ „	48b
5	„ „	52a
6	„ „	53
2	„ „	57c
13	„ „	59
2	„ „	62
2	„ „	63
8	„ „	90
4	„ „	102
3	„ „	109
1	„ „	115
2	„ „	126
2	„ „	126a
4	„ „	129
4	„ „	147b

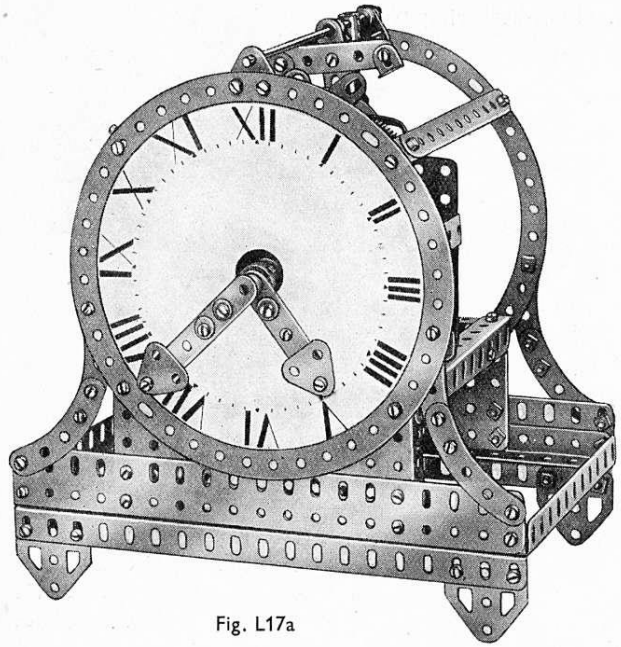


Fig. L17a

L17. Mantel Clock

Parts required

2 of No. 2	1 of No. 16	1 of No. 35
1 „ „ 3	1 „ „ 16b	95 „ „ 37
2 „ „ 4	3 „ „ 17	2 „ „ 37a
2 „ „ 5	2 „ „ 18a	13 „ „ 38
4 „ „ 8a	3 „ „ 25	2 „ „ 48
8 „ „ 9	2 „ „ 26	1 „ „ 52
1 „ „ 9f	3 „ „ 27	1 „ „ 52a
8 „ „ 10	3 „ „ 27a	12 „ „ 59
11 „ „ 12	1 „ „ 30a	3 „ „ 62
1 „ „ 13a	1 „ „ 30c	2 „ „ 63
1 „ „ 14	4 „ „ 31	2 „ „ 70
1 „ „ 15	1 „ „ 32	4 „ „ 77

8 of No. 90
2 „ „ 103a
1 „ „ 109
2 „ „ 111c
6 „ „ 126a
1 „ „ 136
2 „ „ 145
1 „ „ 171
No. 2 Clockwork Motor

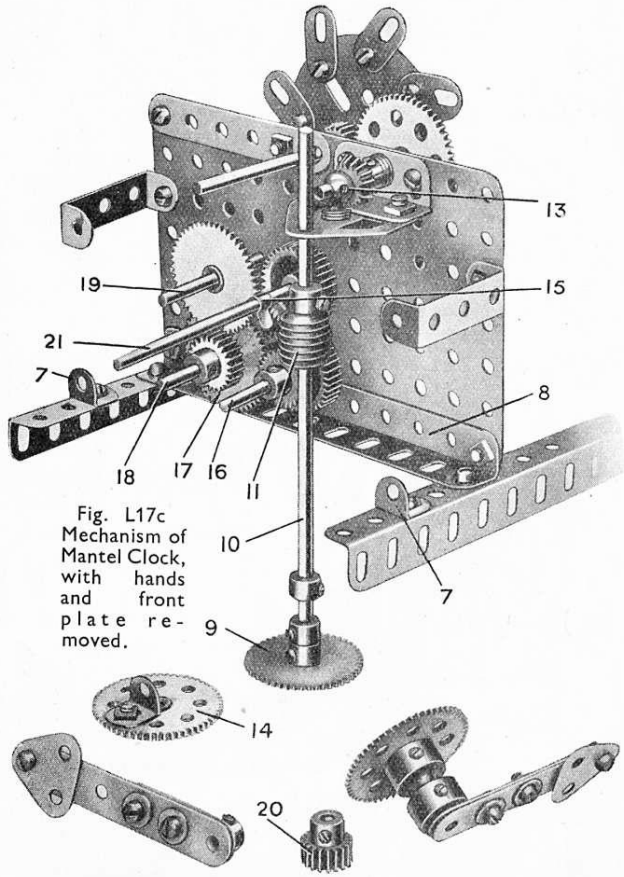


Fig. L17c Mechanism of Mantel Clock, with hands and front plate removed.

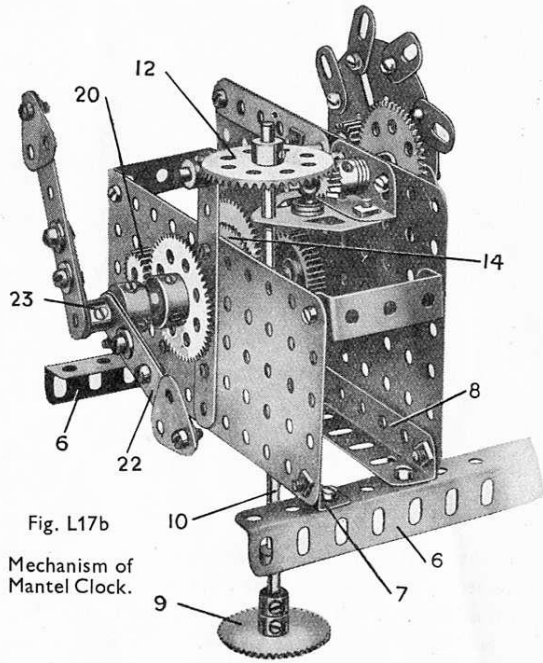


Fig. L17b Mechanism of Mantel Clock.

This clock will keep good time for four hours at a single winding of the Clockwork Motor. The framework of the model will be seen fairly clearly in Fig. L17a. The Clockwork Motor is secured rigidly to the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate 1 by means of a $5\frac{1}{2}''$ Angle Girder. A second $5\frac{1}{2}''$ Angle Girder, shown fitted with Angle Brackets 2 and bolted to the rear edge of the Motor, will be secured later to the mechanism framework. The Motor is also fitted with a Flat Trunnion 3, which is secured so as to allow the three centre holes to be in alignment with the Motor driving shaft.

The pendulum is weighted with two 1″ Gears and is attached to the Rod 4 by a Coupling. Rod 4 also carries the pallet, which consists of a Crank 5 that carries a $2\frac{1}{2}''$ Strip fitted with Angle Brackets.

The mechanism housing (Fig. L17b) is composed of one $5\frac{1}{2}'' \times 2\frac{1}{2}''$ and one $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plates connected together by two $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips and secured to the $5\frac{1}{2}''$ Angle Girders 6 by the Angle Brackets 7 and Girder 8.

A $\frac{3}{4}''$ Pinion on the Motor driving shaft engages with the 50-teeth Gear 9 secured to a 6″ Rod 10. This Rod is journalled at its lower end in the centre hole of the Flat Trunnion 3 and carries a Worm 11 (Fig. L17c) and a $1\frac{1}{2}''$ Bevel Gear 12. The latter meshes with a $\frac{1}{2}''$ Bevel Gear secured to a short Rod that is journalled in the Handrail Support 13 and in the mechanism side plate, and the 57-teeth Gear on this Rod meshes with a $\frac{1}{2}''$ Pinion on the escapement shaft. The escapement consists of a Face Plate with Flat Brackets set round its circumference as shown in the illustration.

The Worm 11 engages with the 57-teeth Gear 14. This is free on the Rod 21, and has bolted to it an Angle Bracket, the flat edge of which engages with the arms of the Spring Clip 15. In this way is obtained a neat friction clutch that enables the hands of the clock to be set without the gears moving. A 1″ Gear, also secured to the clutch Rod 21, engages with a second 1″ Gear on the Rod 16. This Rod carries a $\frac{3}{4}''$ Pinion that engages with the 50-teeth Gear 17 on the Rod 18. A further reduction Gear consisting of a $\frac{3}{4}''$ Pinion and a 50-teeth Gear connects this Rod to the shaft 19, which carries a $\frac{1}{2}''$ Pinion 20 outside the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate.

A Socket Coupling secured to a Crank and 57-teeth Gear is free on the Rod 21, the 57-teeth Gear engaging with the $\frac{1}{2}''$ Pinion 20. The Crank carries the hour hand, which is composed of a 1″ Triangular Plate attached to the $2\frac{1}{2}''$ Strip 22. The minute hand, a 3″ Strip and 1″ Triangular Plate, is carried on a second Crank 23, that is secured to the Rod 21.

The $5\frac{1}{2}''$ Angle Girders 6 are bolted in position across the frame of the clock between the Plate 1 and the Angle Girder 24 and the Angle Brackets

L17. Mantel Clock (*continued*)

2 are bolted to the Girders 6. The Crank 5 of the pallet should be nipped on the Rod 4 so that the Angle Brackets on the $2\frac{1}{2}$" Strip engage with the escapement teeth. The Angle Brackets need careful adjustment to obtain the best results, and also it will be found necessary to adjust the position of the Crank 5 in relation to the pendulum.

A clock face should now be cut out of stiff white card the same diameter as the Circular Strip, a hole being pierced in the centre to allow the Socket Coupling to revolve freely.

The clock may be regulated by moving the 1" Gears on the end of the pendulum, lowering them if the clock is fast and raising them if it is found to lose time.

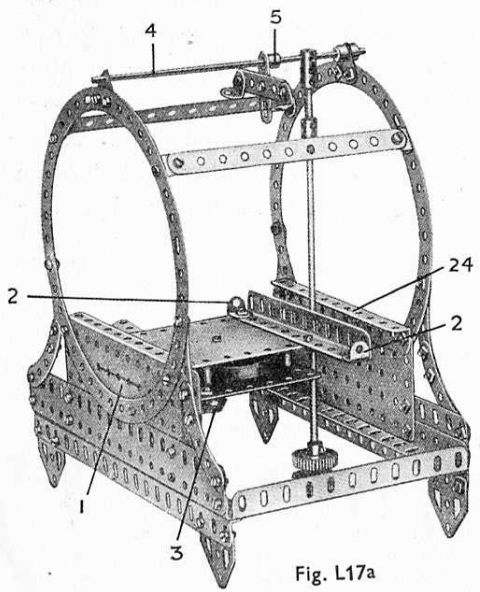
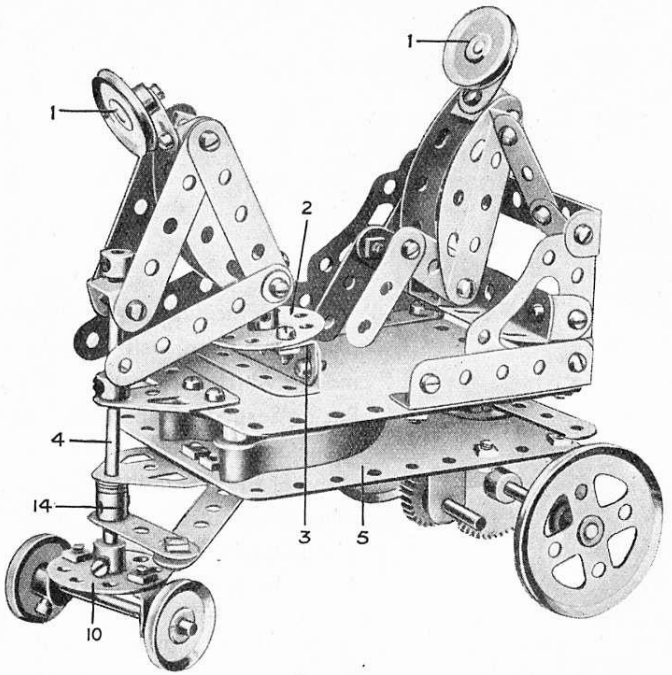


Fig. L17a



L18. Crazy Driver

The Strips forming the body and legs of the " driver " are bolted to a Fork Piece secured to a short Rod which, in turn, is secured to the boss of a Bush Wheel. This Bush Wheel is connected to the Motor by means of two $3\frac{1}{2}$" Angle Girders bolted together as shown.

The Motor actuates the rear wheels through a Bevel Wheel 6 secured to the driving spindle of the Motor and engaging the Bevel 7 on the Rod 8 (Fig. L18a). This Rod also carries a $\frac{3}{4}$" Pinion engaging a 50-teeth Gear Wheel 9 secured to the axle of the rear wheels.

The steering column 4 carries at its lower end a Bush Wheel 10 to which is secured a $1\frac{1}{2}$"×$\frac{1}{2}$" Double Angle Strip that forms a support for the $2\frac{1}{2}$" front axle. The steering is controlled as follows : two $1\frac{1}{2}$" Strips 11 are bolted together by three bolts, and two Washers are placed on each bolt between the Strips for spacing purposes. The link thus formed fits over the Motor key shaft, and when the Motor is set in motion the link will be rotated slowly with the keyshaft. One end of the link carries a Collar 13 which is secured on the link bolt in place of a nut. A 3" Strip 12 is pivoted on a bolt that is secured in one of the tapped holes in the Collar 13 and its other end is attached pivotally to the end of a Crank 14 that is secured to the steering column. Hence, when the Motor is started, the link 11 rotates slowly and imparts motion to the Strip 12 which, in turn, influences the steering column, resulting in the front wheels being turned first to the right and then to the left alternately, so causing the model to perform some very amusing antics.

Parts required

1 of No. 4	4 of No. 12a	1 of No. 25	3 of No. 59
8 „ „ 5	1 „ „ 15a	1 „ „ 27	1 „ „ 62
7 „ „ 6a	2 „ „ 16	2 „ „ 30	4 „ „ 90a
1 „ „ 9b	1 „ „ 16a	44 „ „ 37	2 „ „ 108
4 „ „ 9d	1 „ „ 18b	4 „ „ 37a	6 „ „ 111c
3 „ „ 10	2 „ „ 20a	13 „ „ 38	2 „ „ 126a
4 „ „ 11	4 „ „ 22	1 „ „ 48	No. 2 Clockwork Motor
1 „ „ 12	3 „ „ 24	3 „ „ 48b	

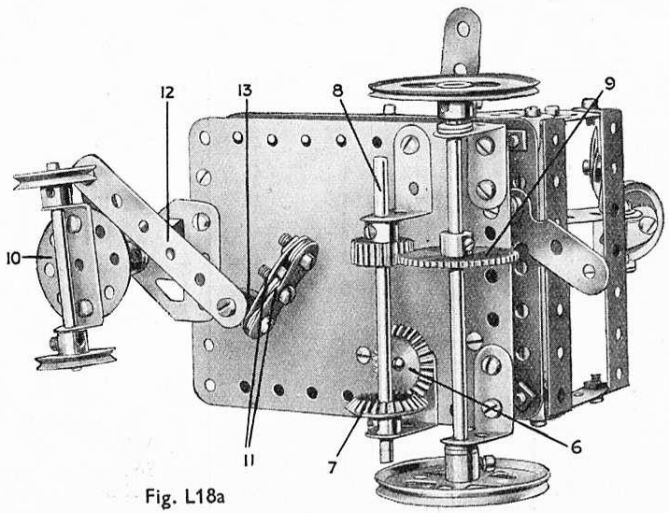
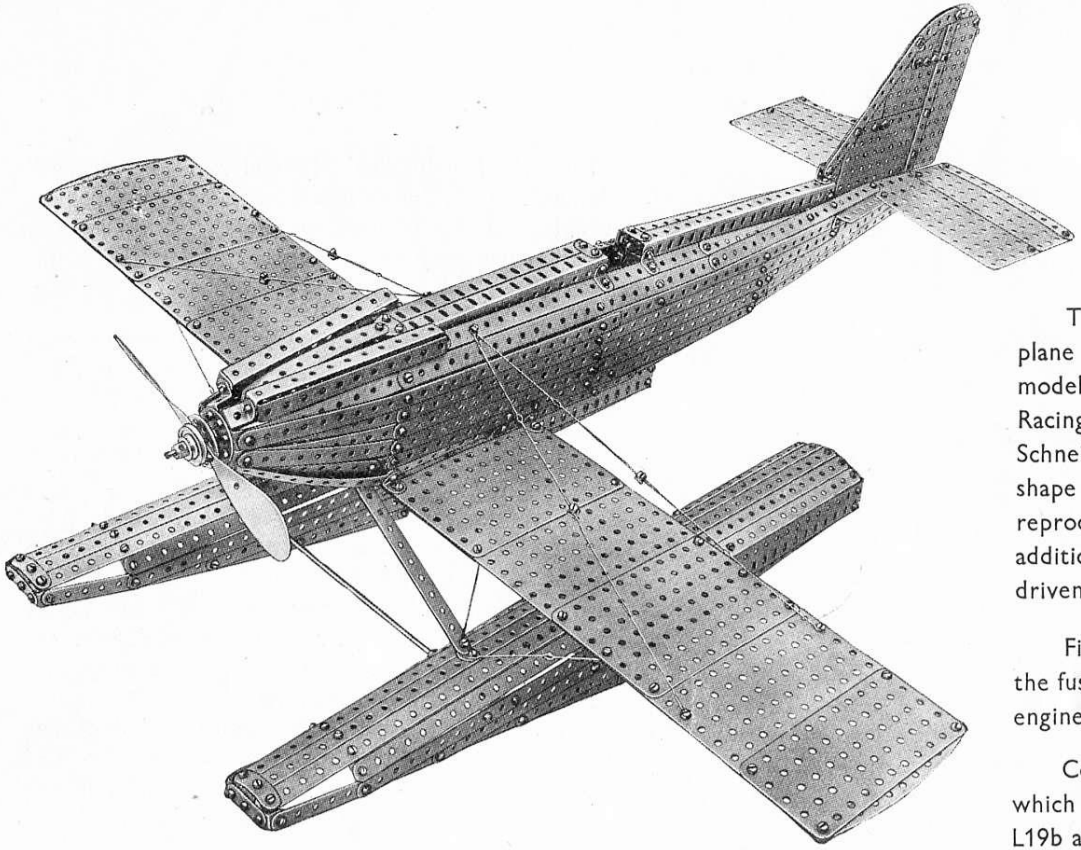


Fig. L18a



L19. Racing Seaplane

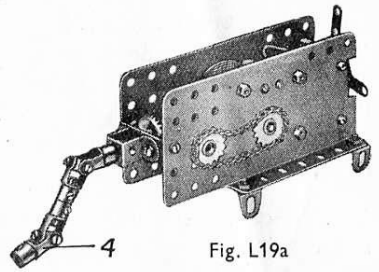


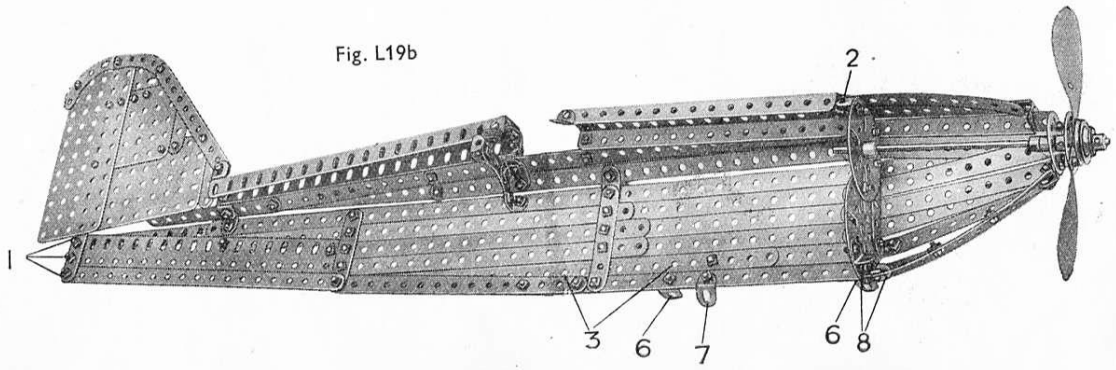
Fig. L19a

The graceful lines of a high-speed seaplane have been well brought out in this model, which represents the Supermarine Racing Seaplane S.6B that finally won the Schneider Trophy for Great Britain. The shape of the streamlined fuselage has been reproduced as closely as possible, and the large fin and stepped floats are additional features that add to the interest of the model. The propeller is driven by a Meccano Electric Motor incorporated in the fuselage.

Fig. L19d shows the underside of the model, whilst Fig. L19b illustrates the fuselage with one side removed to disclose internal details. Fig. L19a is the engine unit.

Construction of the model should be commenced by building the fuselage, which should be fairly clear on referring to the illustrations, particularly Figs. L19b and L19c. The left-hand side should be built up as shown in Fig. L19b and the right-hand side (Fig. L19c) afterwards bolted to it. The sides are formed chiefly from 12½″ Strips that are bolted to cross strips, curved slightly to the form of the fuselage. Two Face Plates, secured rigidly together by 2½″ Angle Girders, are fitted at the forward end of the fuselage to strengthen it and produce

Fig. L19b



Parts required									
38	of No.	1	2	of No.	9d	8	of No.	37a	2 of No. 90
16	„ „	1a	14	„ „	9f	4	„ „	38	4 „ „ 90a
13	„ „	1b	8	„ „	10	2	„ „	41	4″ „ „ 94
22	„ „	2	71	„ „	12	1	„ „	45	2 „ „ 96a
9	„ „	2a	4	„ „	12c	1	„ „	48	18 „ „ 101
2	„ „	3	2	„ „	13	2	„ „	48a	2 „ „ 103a
2	„ „	4	1	„ „	14	4	„ „	48d	4 „ „ 103b
6	„ „	5	1	„ „	17	8	„ „	52a	1 „ „ 103h
1	„ „	6	1	„ „	18a	1	„ „	53a	4 „ „ 109
6	„ „	6a	1	„ „	18b	10	„ „	59	2 „ „ 111
2	„ „	8a	1	„ „	22a	4	„ „	62b	6 „ „ 111c
4	„ „	8b	1	„ „	23a	7	„ „	70	2 „ „ 125
2	„ „	9	2	„ „	24	1	„ „	72	2 „ „ 140
2	„ „	9a	2	„ „	30	1	„ „	77	No. E6 Electric Motor
			360	„ „	37	6	„ „	89	

the correct cross section. The tapering nose of the fuselage is shaped from 5½″ Strips, secured to a Bush Wheel by means of Angle Brackets. Angle Girders in the form of channel sections are bolted along the top of the fuselage and a gap is left for the cockpit opening. The engine cowling is made from 5½″ × ½″ Double Angle Strips.

The rear ends of the fuselage sides are drawn together by the ⅜″ Bolts 1, which pass through a 7½″ Strip that serves to support the fin. The other points at which bolts are inserted should be clear with the exception, perhaps, of the point 2. In this case a bolt is passed through the end hole of the 12½″ Strip, through the Angle Bracket that is secured to the Face Plate in the nose of the fuselage, and lastly through the Flat Bracket on the fuselage side.

The Motor, complete with gearing, is illustrated in Fig. L19a. Two ¾″ Sprockets transmit the drive through Chain to a Rod carrying a ⅞″ Bevel that meshes with a similar part on a Rod journalled in a Double Bent Strip and 1½″ × ½″ Double Angle Strip. This Rod is fitted with a Universal Coupling and a further Coupling 4 is secured to the propeller shaft. The Motor is mounted in place in the fuselage by passing bolts through the holes 3 and through ½″ × ½″ Angle Brackets attached to the Motor flanges.

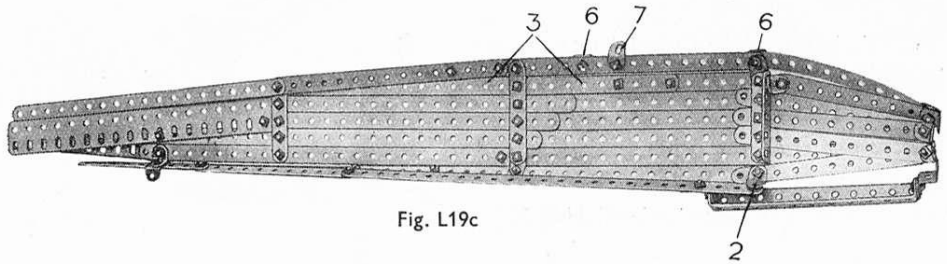


Fig. L19c

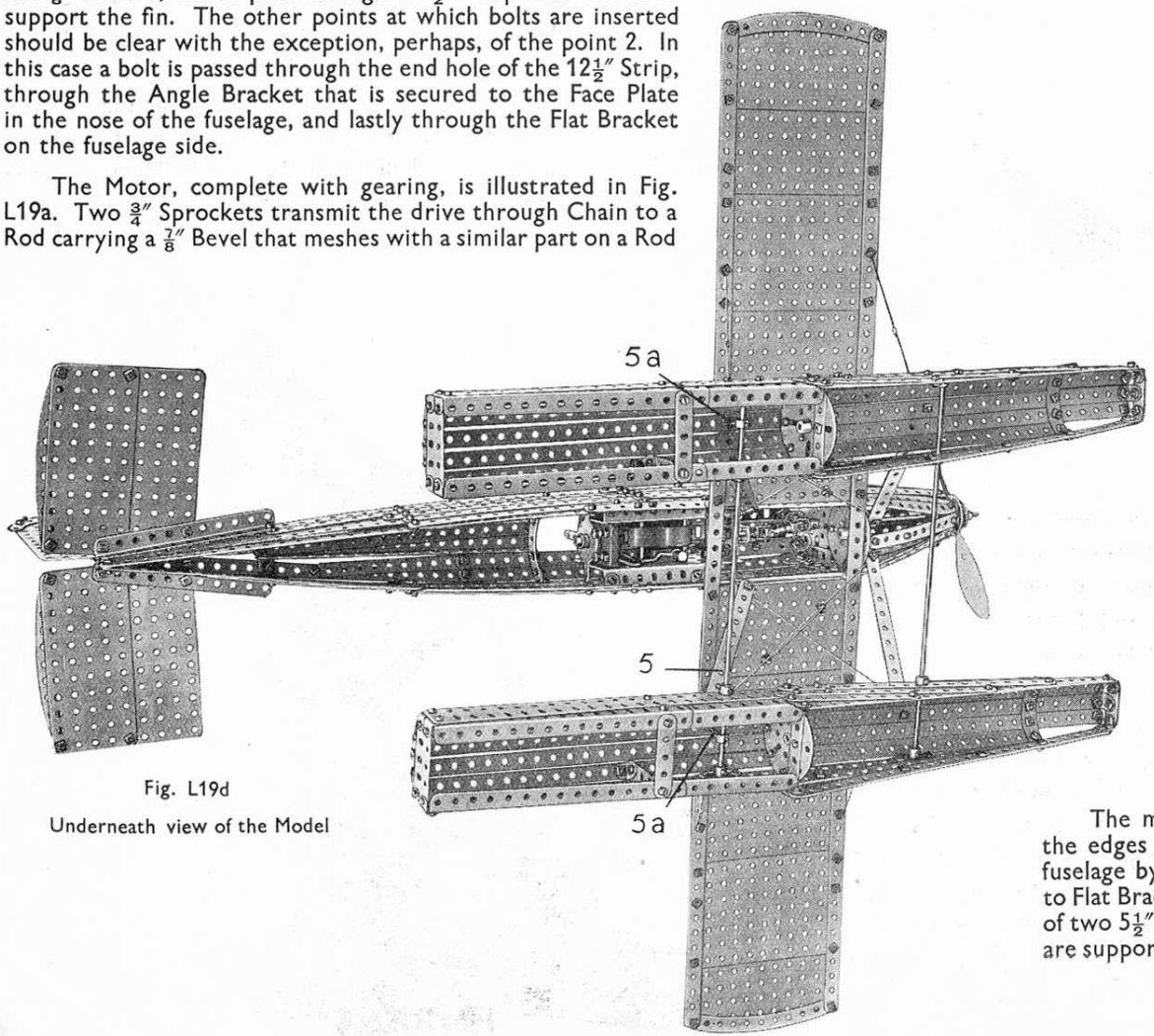


Fig. L19d
Underneath view of the Model

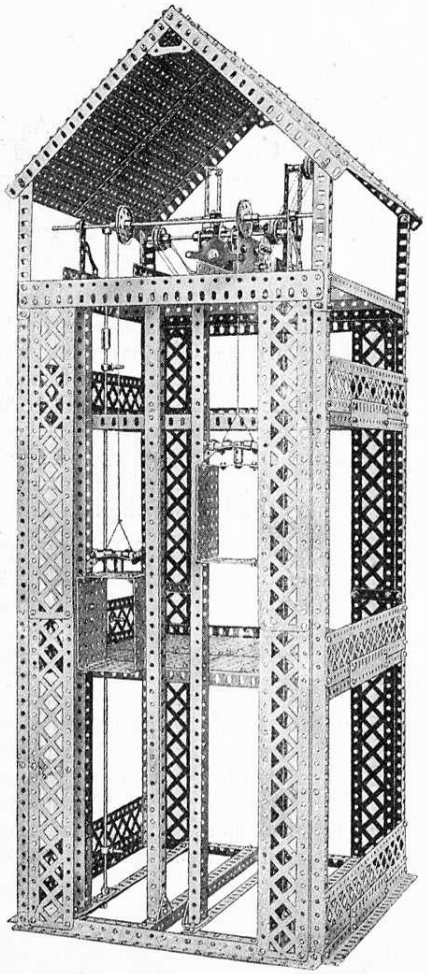
Little difficulty should be experienced in the construction of the floats as their general features are fairly apparent in the underneath view of the model (Fig. L19d). One point that may not be quite clear, however, is the fact that the Strips forming the curved top of each float are attached to the Face Plate by ½″ × ½″ Angle Brackets and also to each other by Flat Brackets. The rear ends of the Strips are attached by ½″ × ½″ Angle Brackets to a 2½″ small radius Curved Strip, which in turn is bolted to a 2½″ Flat Girder forming the back of the float.

Each of the rear struts 5 connecting the fuselage to the floats, is bolted to an obtuse Angle Bracket secured to the top of the float by a ¾″ Bolt 5a, which is screwed into a Collar on an 11½″ Rod. This Rod, and also the corresponding one at the front end of the floats, is secured in Double Arm Cranks that are bolted inside the floats.

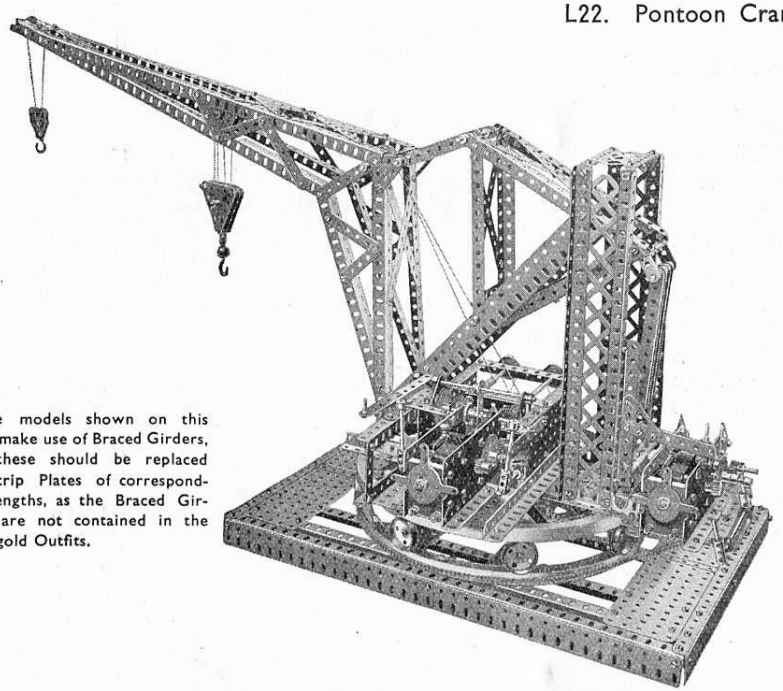
The mainplane is built up from Flat Plates with Strips bolted along the edges and 5½″ Curved Strips across the ends. It is attached to the fuselage by the ½″ × ½″ Angle Brackets 6, and the float struts are secured to Flat Brackets 7 and Angle Brackets 8. Each of the float struts is composed of two 5½″ Strips placed face to face for strength. The floats and mainplane are supported further by bracing wires composed of Meccano Loom Healds.

L20. Goods Warehouse with Electric Elevators

This is a model of special interest. It incorporates two cages which are operated automatically in such a manner that, as one rises, the other falls. Complete instructions for building this model are contained in Instruction Leaflet No.31



The models shown on this page make use of Braced Girders, but these should be replaced by Strip Plates of corresponding lengths, as the Braced Girders are not contained in the blue-gold Outfits.



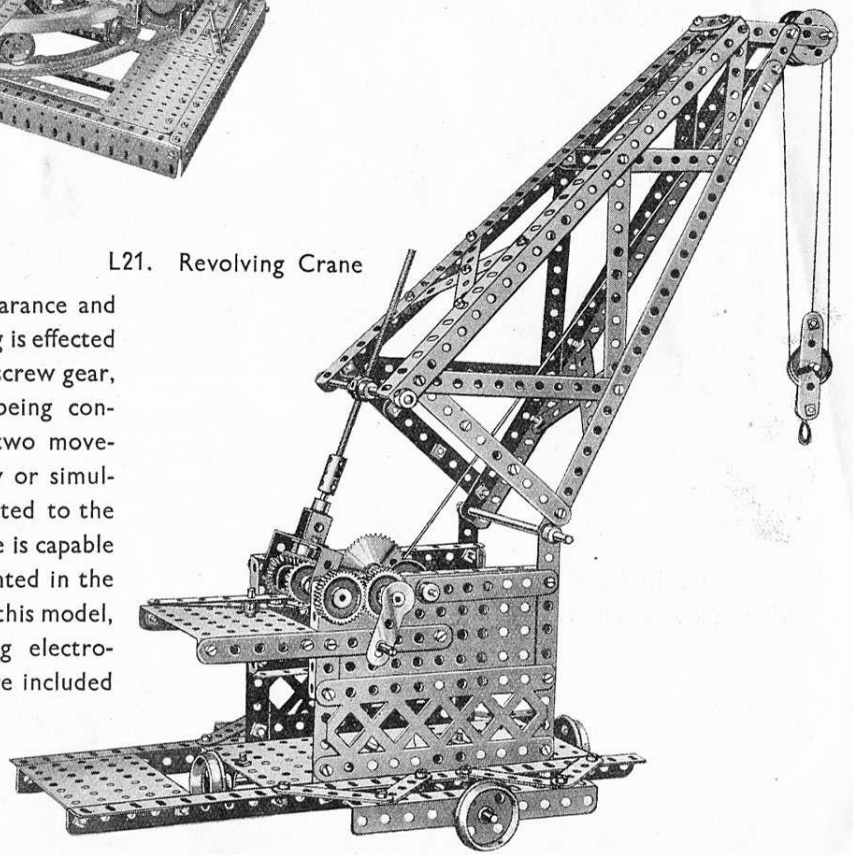
L22. Pontoon Crane

Of the many different types of cranes in a modern dock system, perhaps the most useful for handling heavy loads is the floating pontoon crane. This interesting crane can be taken to any site on the water front, and some of them are capable of lifting loads up to 350 tons.

The model is equipped with two Electric Motors, one of which controls the swivelling and luffing movements while the other controls the two pulley blocks. The luffing movement is carried out by a powerful screw mechanism that is connected to the jib by a system of levers as in the prototype. Full instructions for building the crane are contained in Instruction Leaflet No. 28.

L21. Revolving Crane

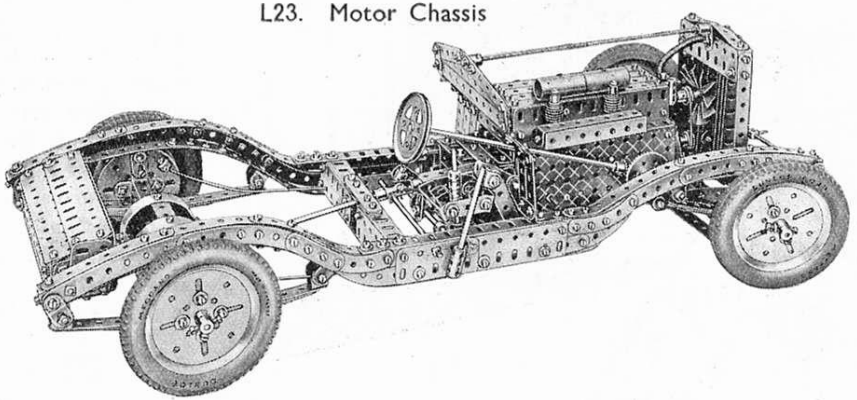
This crane is realistic in appearance and very efficient in operation. Luffing is effected by means of a simple but powerful screw gear, luffing and hoisting movements being controlled by separate levers. The two movements can be controlled separately or simultaneously. Reversing motion is fitted to the luffing gear and the whole structure is capable of revolving upon the wheels mounted in the base. Full instructions for building this model, including details of an interesting electromagnet that can be used with it, are included in Instruction Leaflet No. 18.



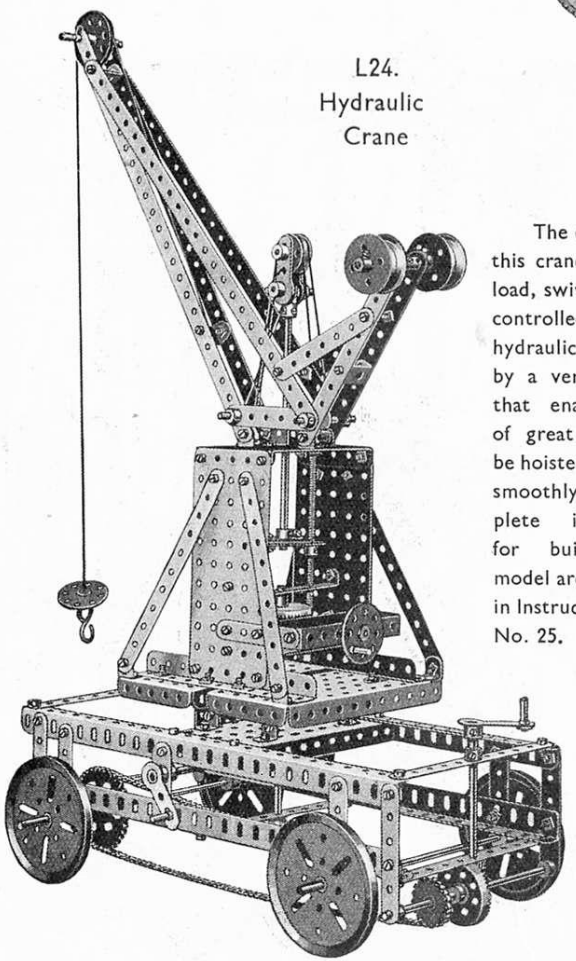
L23. Motor Chassis

The Meccano Motor Chassis is a model of exceptional interest, for it provides a complete demonstration of the principles of a real motor chassis. It is equipped with differential, clutch, internal expanding brakes on front and rear wheels, Ackermann steering gear, and gear-box giving four forward speeds and reverse, with central change lever.

Complete instructions for building this model are contained in Instruction Leaflet No. 1.

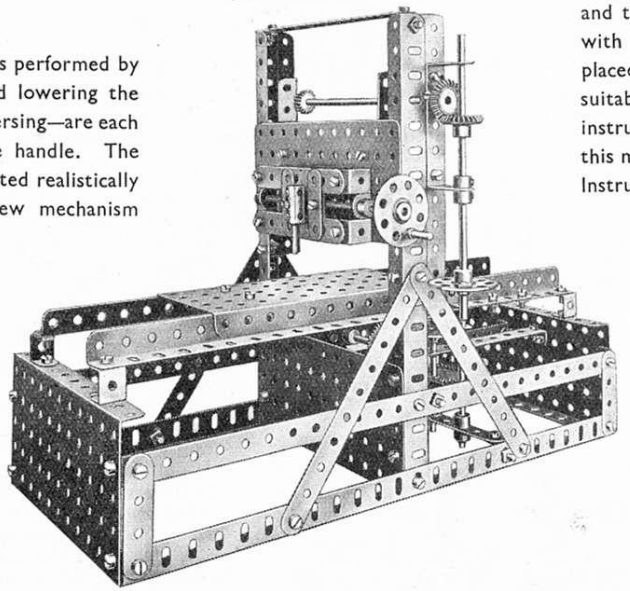


L24. Hydraulic Crane



The different motions performed by this crane — raising and lowering the load, swivelling and traversing—are each controlled by a separate handle. The hydraulic ram is represented realistically by a very powerful screw mechanism that enables loads of great weight to be hoisted easily and smoothly. Complete instructions for building the model are contained in Instruction Leaflet No. 25.

L25. Planing Machine

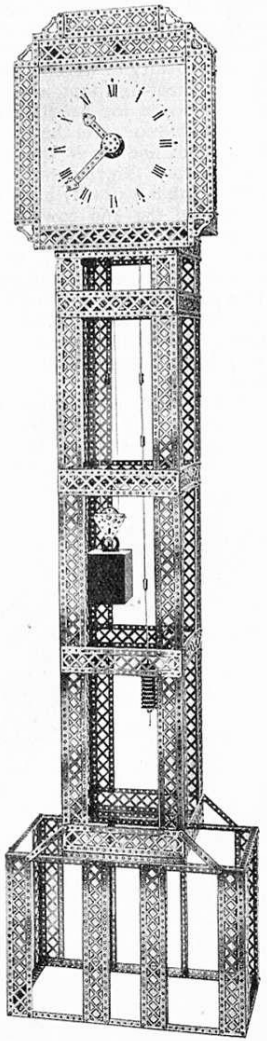


Planing machines are utilised in large workshops for finishing the surface of castings, etc., and for producing smooth and accurate surfaces. These machines vary greatly in size and general features according to the type of work to be carried out. The Meccano model incorporates the main features of a planing machine, the reciprocating motion of the work table being controlled by a quick return motion to speed up the idle return stroke. The tool is capable of being racked vertically or moved horizontally by means of screw mechanism. Complete instructions for building this model are contained in Instruction Leaflet No. 17.

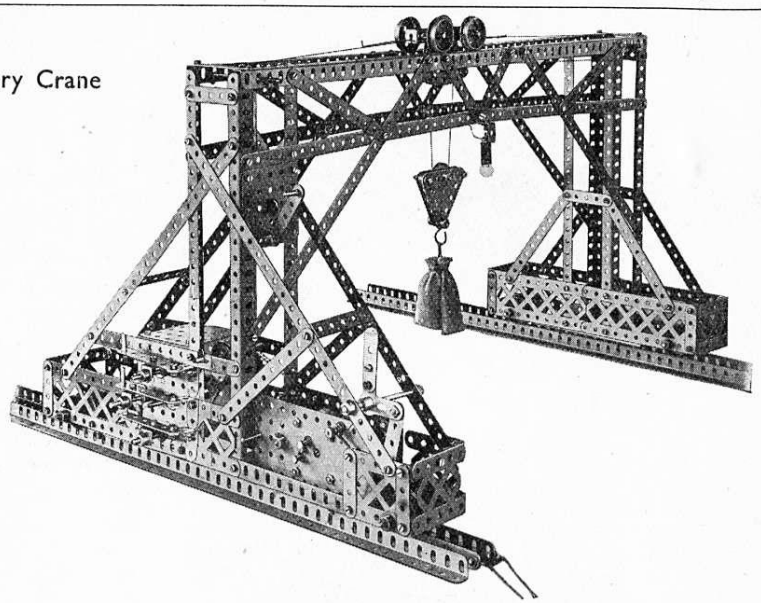
L26. Grandfather Clock

This new Meccano model of a Grandfather Clock stands over 6 ft. in height, keeps perfect time, and runs for eighteen hours without re-winding.

It should be noted that in constructing the clock frame exactly as shown in the illustration, Braced Girders are required in addition to the No. 7 Outfit. These Girders are only ornamental, however, and they can be dispensed with if necessary, or replaced by Strip Plates of suitable lengths. Complete instructions for building this model are contained in Instruction Leaflet No. 14a.



L27. Travelling Gantry Crane

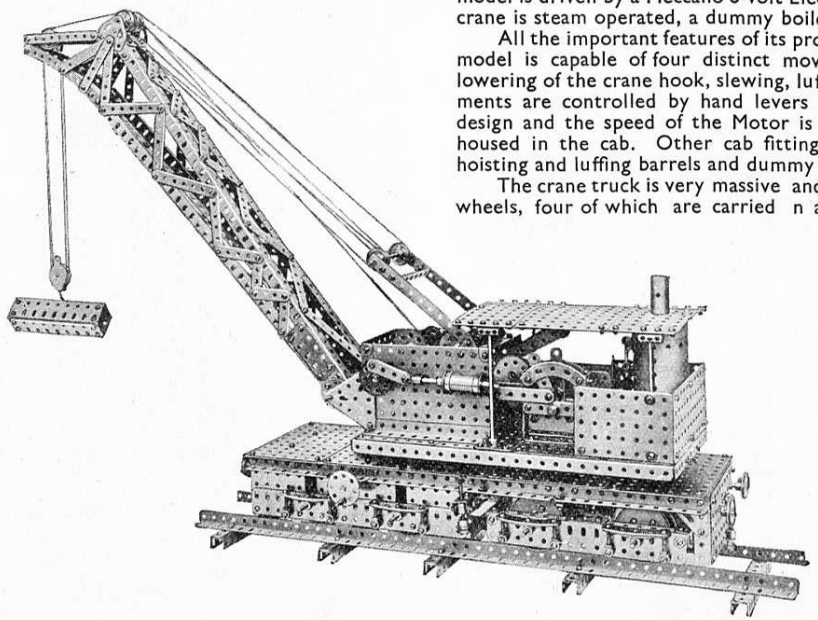


By manipulating the various control levers the Electric Motor can be caused to raise or lower the load on the Hook, traverse the trolley along the rails on the top of the gantry, or drive the entire gantry along on its rails. The movements can be controlled simultaneously or separately at the will of the operator.

Actual cranes of this type are of greatest utility in warehouses, foundries and engineering shops, etc., where they are employed for handling heavy loads and are able to travel the entire length of long sheds and cover the whole of the floor space. On the smaller cranes the driving cabin is usually placed at the foot of one of the end towers, but in the larger and more powerful types the driver is located in a control cabin situated on or beneath the gantry trolley. This position enables him to see all that is taking place on the site over which the crane is working, an advantage that is very important when handling a heavy load.

Complete instructions for building this interesting model are contained in Instruction Leaflet No. 24.

L28. Railway Breakdown Crane



This very realistic model is a faithful representation of a typical breakdown crane in use on British Railways. The prototype is usually taken to scene of operations by a locomotive, but is capable of travelling under its own power for carrying out manœuvres when at work. The model is driven by a Meccano 6-volt Electric Motor, but since the actual crane is steam operated, a dummy boiler and engine are incorporated.

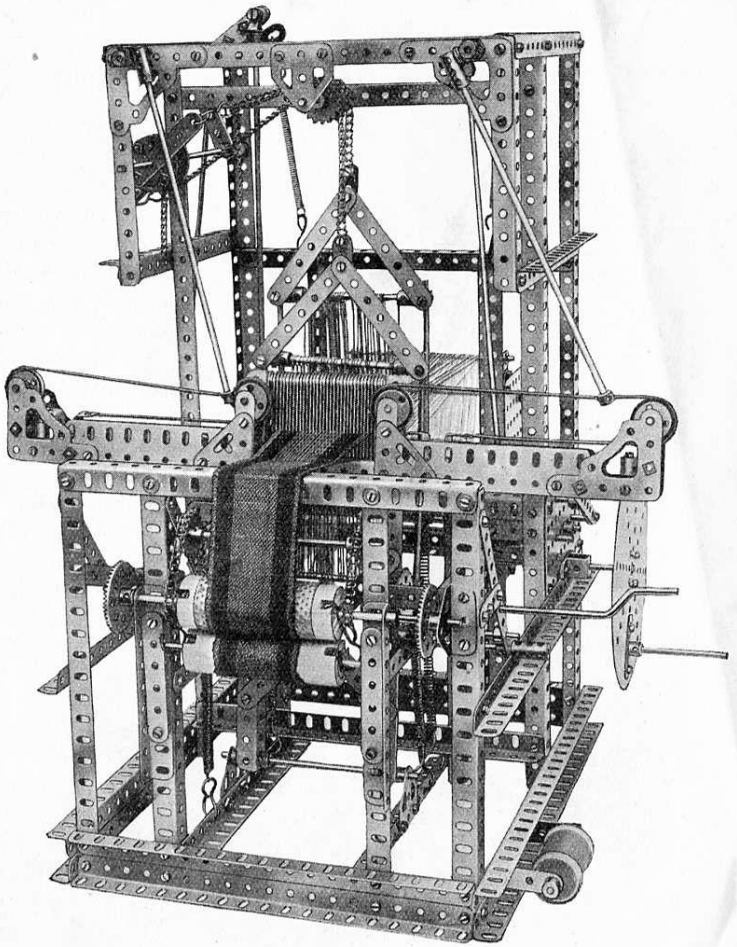
All the important features of its prototype are reproduced, and the model is capable of four distinct movements, i.e., the hoisting and lowering of the crane hook, slewing, luffing and travelling. The movements are controlled by hand levers through a gear box of unique design and the speed of the Motor is regulated by a neat controller housed in the cab. Other cab fittings include brake levers for the hoisting and luffing barrels and dummy gauges on the boiler.

The crane truck is very massive and is mounted on eight sprung wheels, four of which are carried n a swivelling bogie. Brakes are fitted to the four driving wheels and are operated from a hand wheel at the side of the truck. Sliding outriggers are incorporated in the truck for use when the crane is operating at right angles to the track. These follow actual practice for relieving the crane truck of the heavy stresses set up under such conditions.

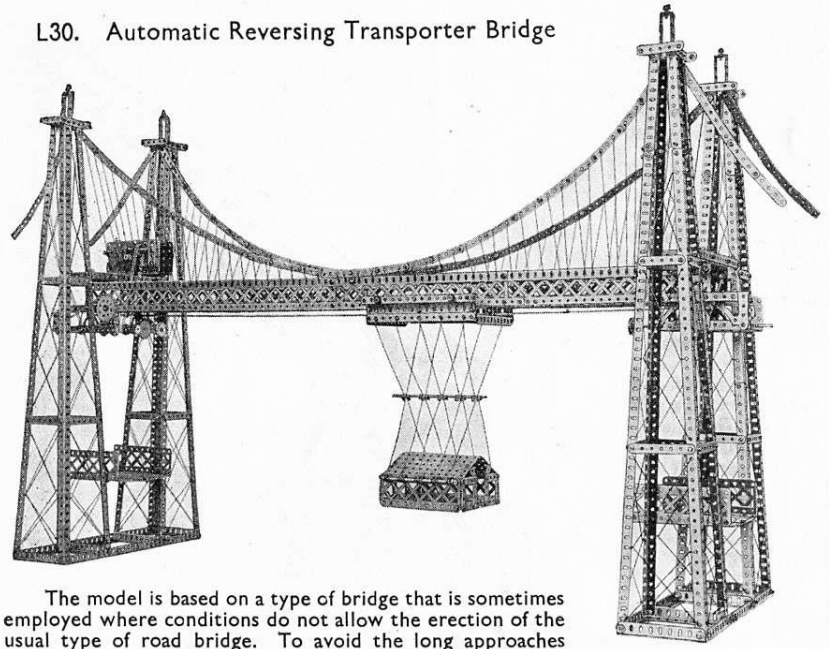
Complete instructions for building the model are contained in Instruction Leaflet No. 30.

L29. Loom

The Meccano Loom is considered by many to be the greatest Meccano achievement. The process of weaving is entirely mechanical and the model operates exactly like a real loom, the shedding motion of the heald frames, the rocking of the slay and reed, the oscillation of the picking sticks and the "taking up" motion by which the woven material is wound on to a roller, all taking place with perfect accuracy when a hand wheel is rotated. The material produced by the model is of excellent quality and can be used for practical purposes such as hatbands, neckties, etc. Complete instructions for building this model are contained in Instruction Leaflet No. 16a.



L30. Automatic Reversing Transporter Bridge

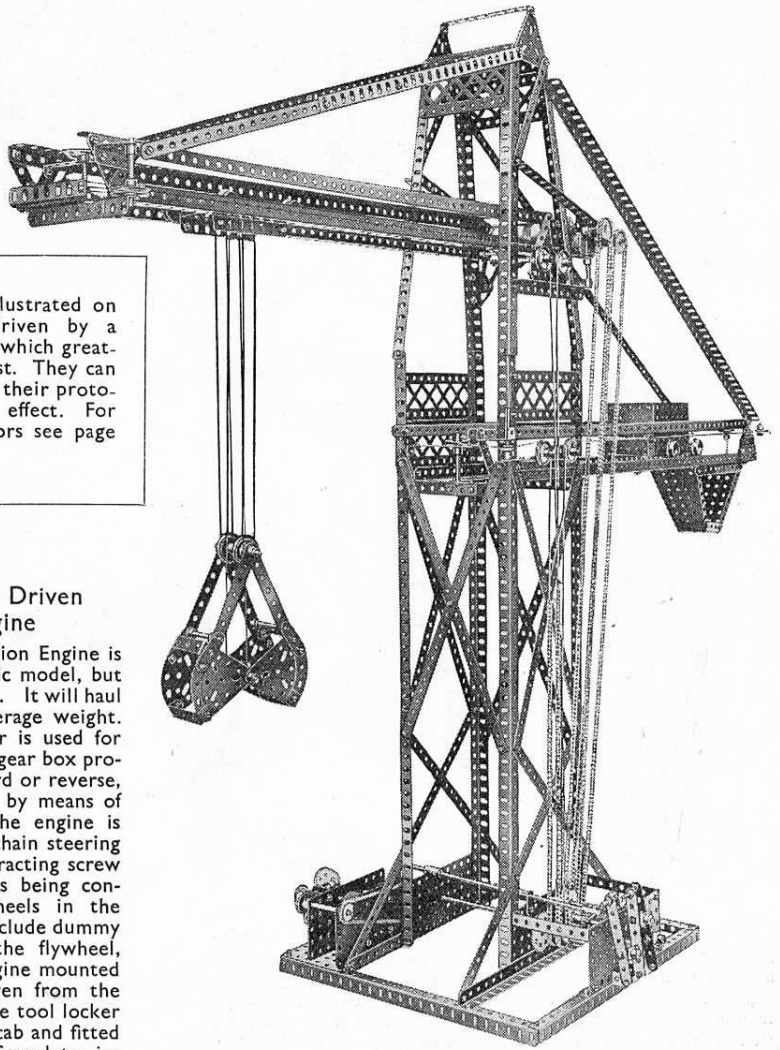


The model is based on a type of bridge that is sometimes employed where conditions do not allow the erection of the usual type of road bridge. To avoid the long approaches necessary to provide sufficient head room under the bridge, a travelling car is suspended from the bridge girders and plies to and fro along the bridge, taking vehicles and passengers to the other side of the river. The model is of the suspension type of bridge similar to the famous bridge that spans the River Mersey between Widnes and Runcorn. Complete instructions for building this model are contained in Instruction Leaflet No. 21.

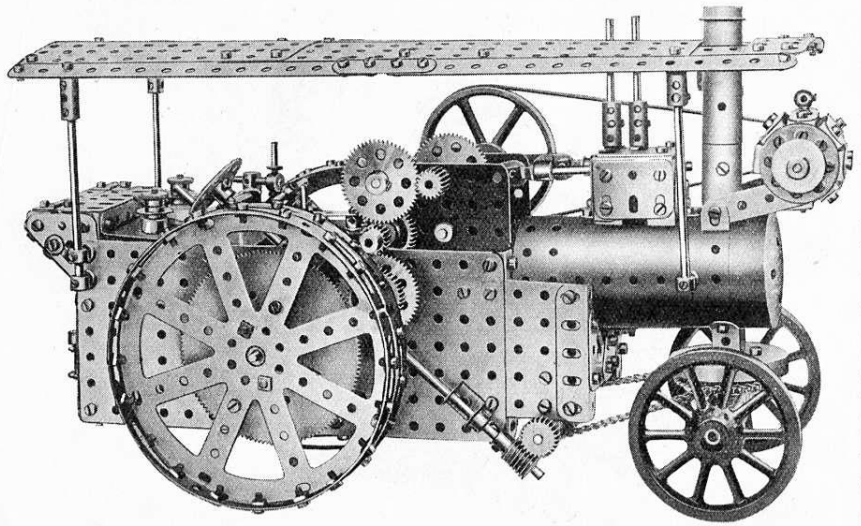
L31 Ship Coaler

This model will appeal to most boys who are interested in shipping, for it shows the manner by which ships can be coaled quickly. It represents a modern coaling plant that is built up on a floating pontoon so that it can be moored alongside ships in different parts of a harbour or dock system. The coal is unloaded from barges by means of a grab and conveyed into the hold of the vessel being coaled.

The model is provided with a grab suspended from a travelling trolley, and a truck that is loaded from the grab, automatically discharges its contents down a chute situated over the bunker of the "ship." Complete instructions for building the model are contained in Instruction Leaflet No. 2.



The three models illustrated on this page are each driven by a Meccano Electric Motor which greatly increases their interest. They can be set to work just like their prototypes, with fascinating effect. For details of Meccano Motors see page 113

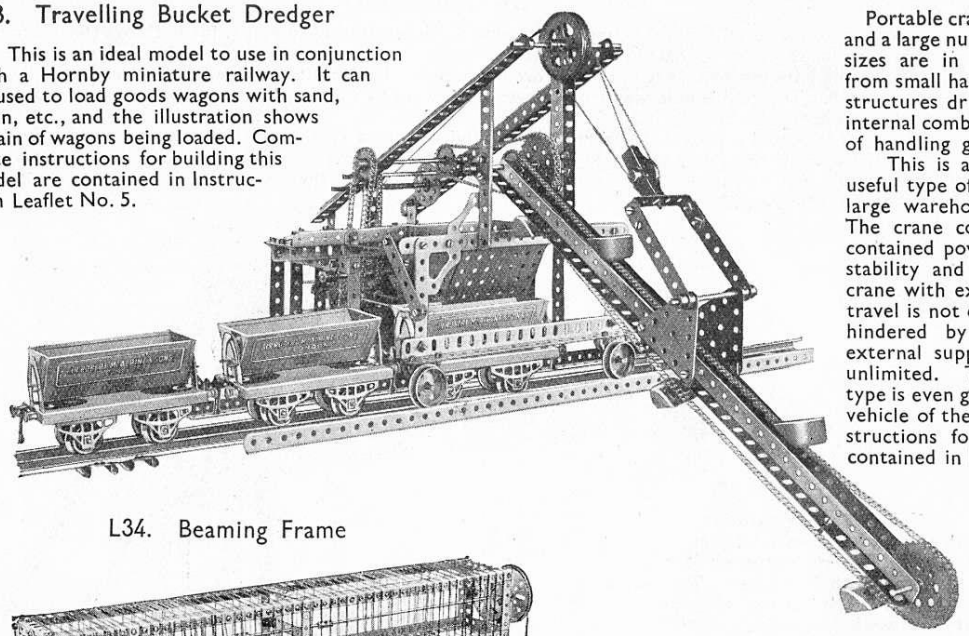


L32. Electrically Driven Traction Engine

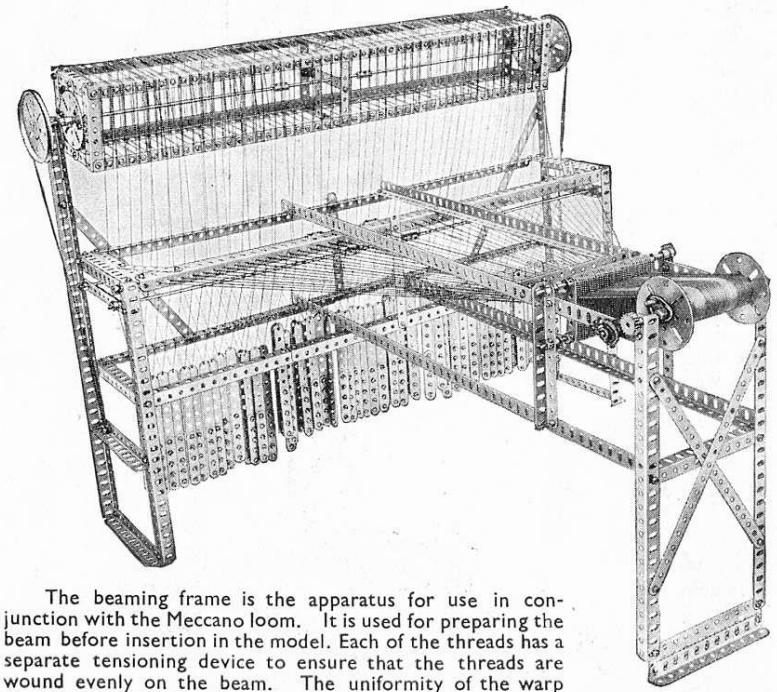
The Meccano Traction Engine is not only a most realistic model, but it is extremely powerful. It will haul with ease a boy of average weight. A 6-volt Electric Motor is used for the power unit and the gear box provides two speeds forward or reverse, reverse being obtained by means of the Motor control. The engine is fitted with worm and chain steering gear, and external contracting screw brake, both movements being controlled from hand wheels in the driver's cab. Details include dummy dynamo driven from the flywheel, and a dummy steam engine mounted on the boiler and driven from the crankshaft. A miniature tool locker is mounted behind the cab and fitted with a hinged lid. Complete instructions for building the Traction Engine are contained in Instruction Leaflet No. 22.

L33. Travelling Bucket Dredger

This is an ideal model to use in conjunction with a Hornby miniature railway. It can be used to load goods wagons with sand, grain, etc., and the illustration shows a train of wagons being loaded. Complete instructions for building this model are contained in Instruction Leaflet No. 5.



L34. Beaming Frame

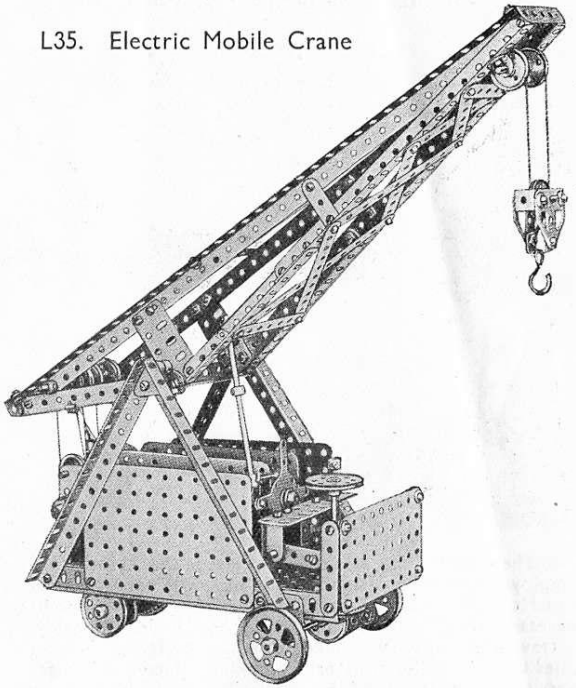


The beaming frame is the apparatus for use in conjunction with the Meccano loom. It is used for preparing the beam before insertion in the model. Each of the threads has a separate tensioning device to ensure that the threads are wound evenly on the beam. The uniformity of the warp threads is very important if good work is to be produced on the loom. Complete instructions for building this model are included in Leaflet No. 16a which describes the construction of the Meccano Loom (see page 110).

Portable cranes have many varied uses, and a large number of different types and sizes are in general use. They range from small hand-operated hoists to large structures driven by electric motors or internal combustion engines, and capable of handling great loads.

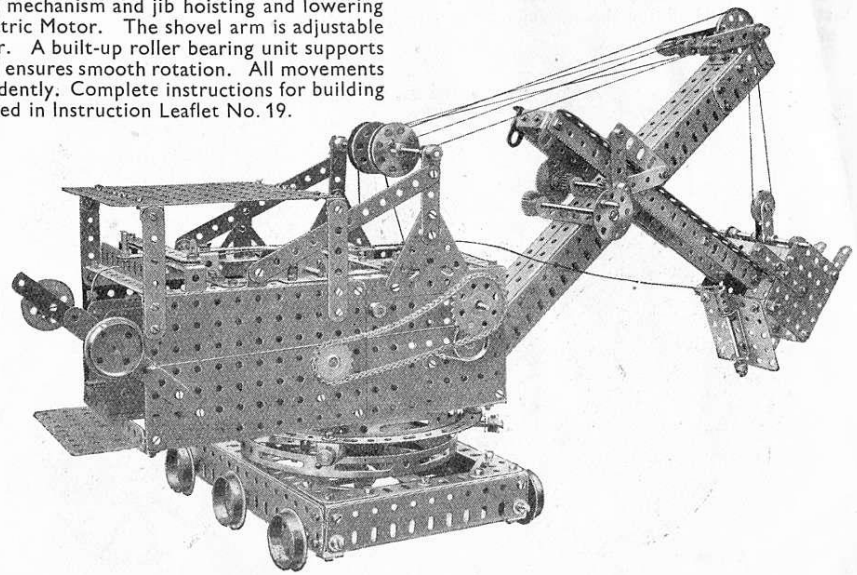
This is a very realistic model of a useful type of crane that is invaluable in large warehouses, railway sidings, etc. The crane comprises an entirely self-contained power unit and combines the stability and efficiency of a stationary crane with extreme mobility, and as its travel is not confined to a set of rails or hindered by trailing cables from an external supply, its range of utility is unlimited. The mobility of its prototype is even greater than that of a motor vehicle of the same size. Complete instructions for building this model are contained in Instruction Leaflet No. 20.

L35. Electric Mobile Crane

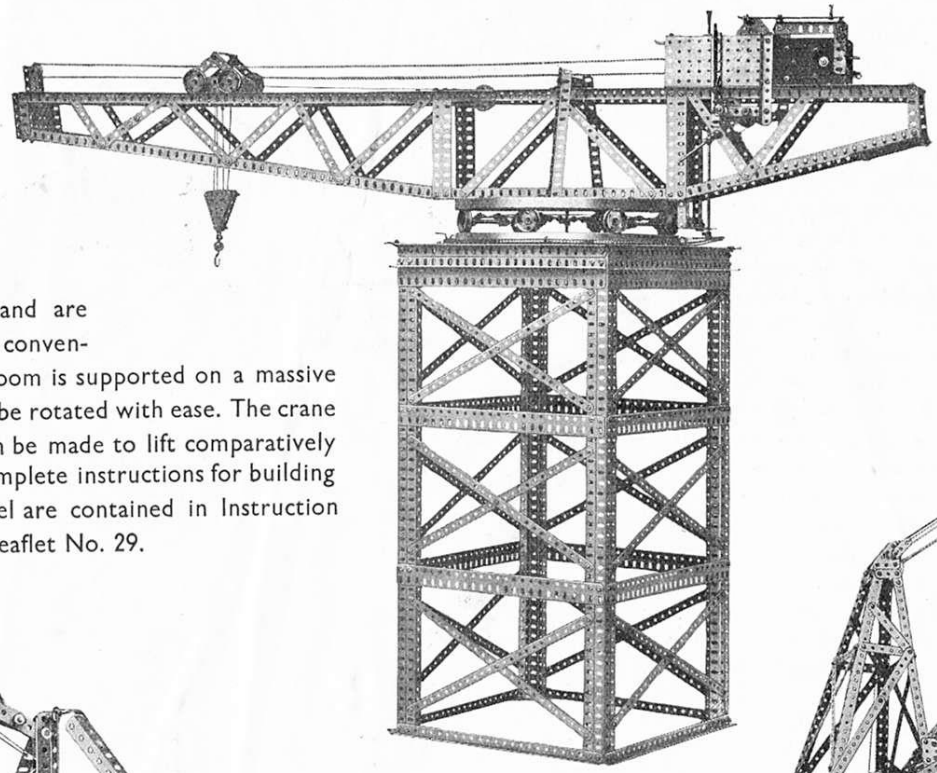


L36. Steam Shovel

This interesting model will carry out all the operations performed by an actual steam navvy. The model embodies travelling and slewing mechanism and jib hoisting and lowering gear driven by an Electric Motor. The shovel arm is adjustable by rack and pinion gear. A built-up roller bearing unit supports the superstructure and ensures smooth rotation. All movements are controlled independently. Complete instructions for building this model are contained in Instruction Leaflet No. 19.

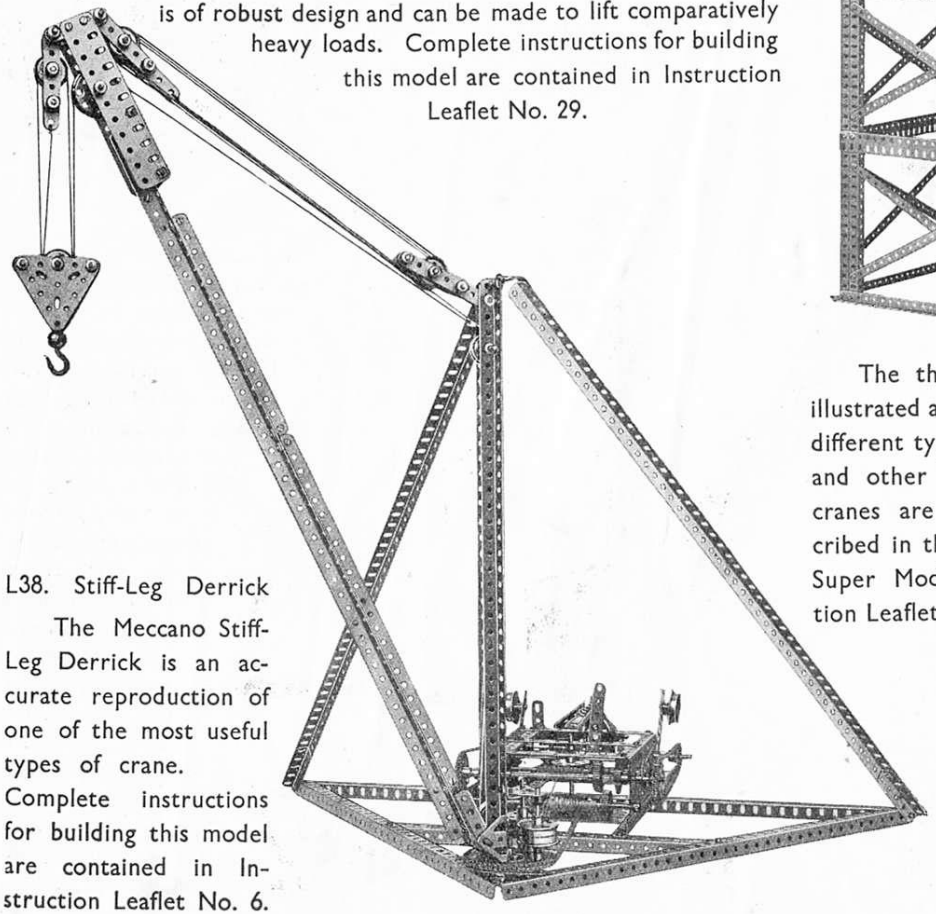


READ THE MECCANO MAGAZINE



L37. Hammerhead Crane

The different movements of this model comprise hoisting and lowering, slewing and the traversing of the trolley along the boom. All movements are operated by a 6-volt Electric Motor and are controlled separately by hand levers conveniently situated on the gear-box. The boom is supported on a massive built-up roller bearing that enables it to be rotated with ease. The crane is of robust design and can be made to lift comparatively heavy loads. Complete instructions for building this model are contained in Instruction Leaflet No. 29.



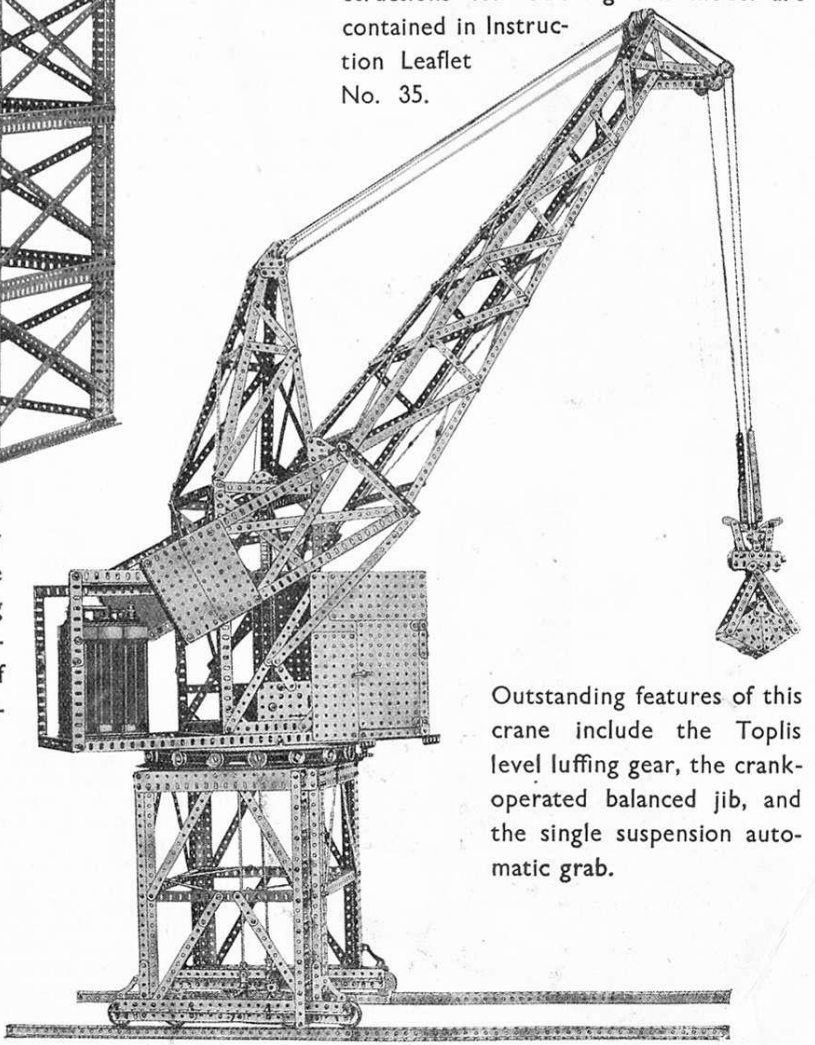
L38. Stiff-Leg Derrick

The Meccano Stiff-Leg Derrick is an accurate reproduction of one of the most useful types of crane. Complete instructions for building this model are contained in Instruction Leaflet No. 6.

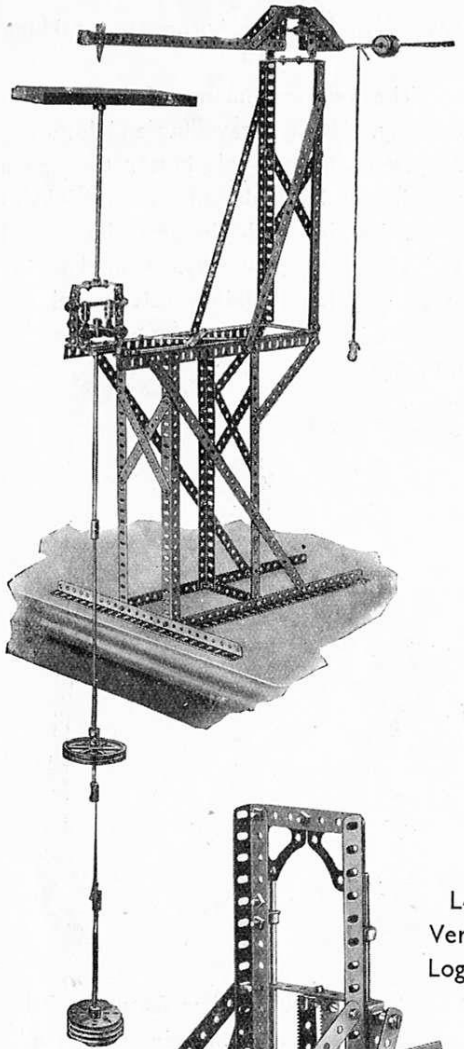
The three cranes illustrated are of vastly different types. These and other interesting cranes are fully described in the series of Super Model Instruction Leaflets.

L39. Level-Luffing Automatic Grabbing Crane

The four movements of this model—hoisting, slewing, travelling and luffing—are driven by a 6-volt Motor through a gear-box of simple design. The model also is fitted with a grab that may be opened and closed automatically. Complete instructions for building this model are contained in Instruction Leaflet No. 35.

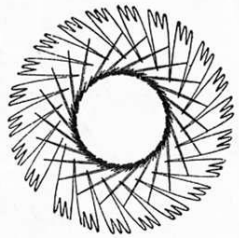


Outstanding features of this crane include the Toplis level luffing gear, the crank-operated balanced jib, and the single suspension automatic grab.



L40. Twin-Elliptic Harmonograph

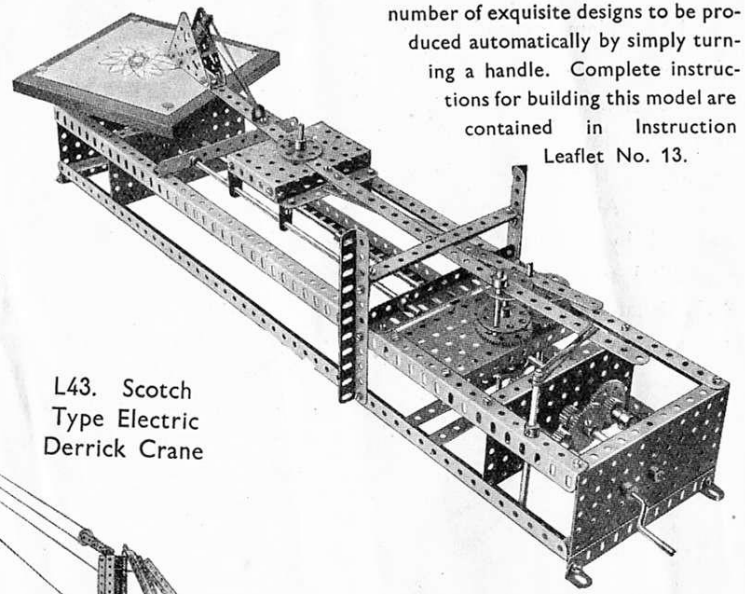
The Twin-elliptic Harmonograph is a model of very great interest. If the pendulum is caused to swing from side to side, or to describe a circular movement, the pencil executes a beautiful design on a sheet of paper. This design varies according to the manner in which the weight is swung and an innumerable variety of new designs are made by different movements of the pendulum. The model has a scientific interest in that it produces permanent records of harmonic motions. Such records are useful for studying the laws of vibration. Complete instructions for building this model are contained in Instruction Leaflet No. 26.



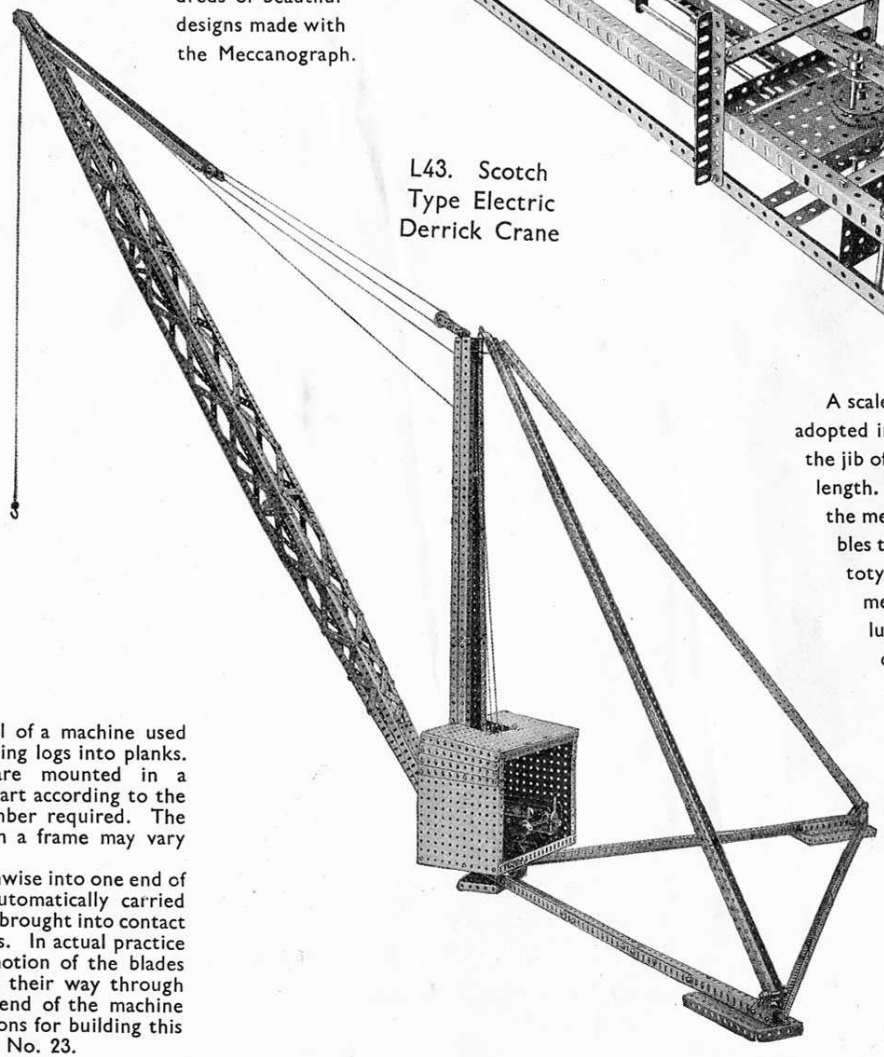
One of the hundreds of beautiful designs made with the Meccanograph.

L42. Meccanograph

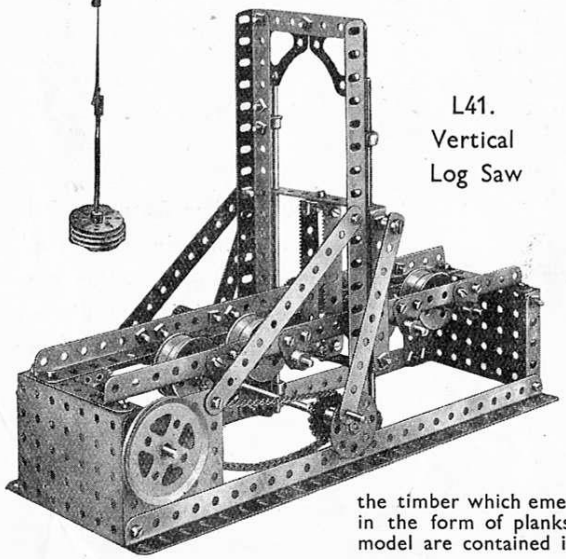
The Meccanograph enables an endless number of exquisite designs to be produced automatically by simply turning a handle. Complete instructions for building this model are contained in Instruction Leaflet No. 13.



L43. Scotch Type Electric Derrick Crane



A scale of $\frac{3}{4}$" to 1ft. has been adopted in designing this model, the jib of which measures 6ft. in length. The arrangement of the mechanism mostly resembles that adopted in the prototype, and the three movements, namely, hoisting luffing and slewing are driven from a gear-box of simple design. The model is capable of level luffing, and a safety interlocking device controls the pawl and ratchet gear on the luffing barrel. Complete instructions for building this interesting model are contained in Instruction Leaflet No. 36.



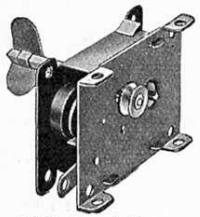
L41. Vertical Log Saw

This is a model of a machine used in sawmills for sawing logs into planks. The saw blades are mounted in a frame and spaced apart according to the thickness of the timber required. The number of blades in a frame may vary from two to forty.

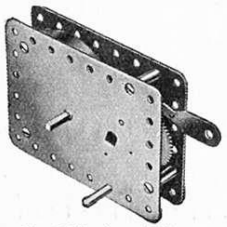
Logs, fed lengthwise into one end of the machine, are automatically carried along on rollers and brought into contact with the saw blades. In actual practice the reciprocating motion of the blades enables them to cut their way through the timber which emerges from the other end of the machine in the form of planks. Complete instructions for building this model are contained in Instruction Leaflet No. 23.

MECCANO

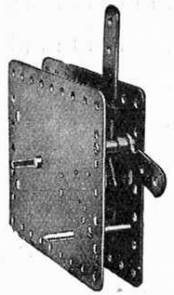
POWER UNITS FOR OPERATING MECCANO MODELS



X Clockwork Motor



No. 1 Clockwork Motor



No. 2 Clockwork Motor

Resistance Controller

6-volt 20-amp. hr. Accumulator

If you want to obtain the fullest enjoyment from the Meccano hobby you should operate your models by means of one of the Meccano power units described on this page. You push over the control lever of the clockwork or electric motor and immediately your Crane, Motor Car, Ship Coaler or Windmill commences to work in exactly the same manner as its prototype in real life.

The side plates and bases of each motor are pierced with the standard Meccano equidistant holes, which enables the motor to be built into any Meccano model in the exact position required.

Meccano Clockwork Motors

These are the finest clockwork Motors obtainable for driving models. They have exceptional power and length of run and their gears are cut with such precision as to make them perfectly smooth and steady in operation.

X SERIES CLOCKWORK MOTOR. A fine Motor specially designed to drive with ease any of the X Series models. It is non-reversing.

No. 1 CLOCKWORK MOTOR. An efficient and long-running Motor fitted with a brake lever. It is non-reversing.

No. 1a. CLOCKWORK MOTOR. This Motor is more powerful than the No. 1 Motor and is fitted with reversing motion. It has start, stop and reverse levers.

No. 2 CLOCKWORK MOTOR. This is a Motor of super quality. Brake and reverse levers enable the Motor to be started stopped or reversed as required.

Meccano Electric Motors

The five Meccano Electric Motors detailed below provide smooth-running power units for the operation of Meccano models. The 6-volt Motors may be operated either from a 6-volt Accumulator, or through a Transformer direct from the mains providing that the supply is alternating current. They cannot be run satisfactorily from dry cells. The 20-volt Motors are most conveniently operated through a 20-volt Transformer from alternating current supply mains.

No. E1 Electric Motor (6-volt). Non-reversing
No. E6 Electric Motor (6-volt). Reversing.
No. E120 Electric Motor (20-volt). Non-reversing.
No. E20A Electric Motor (20-volt). Non-reversing.
No. E20B Electric Motor (20-volt). Reversing.

Meccano Transformers

A Meccano Transformer provides a convenient and safe means of driving a Meccano Electric Motor from the mains supply where this is alternating current.

There are six Transformers in the series, all of which are available for the following A.C. supplies :—100/110 volts, 50 cycles ; 200/225 volts, 50 cycles ; 225/250 volts, 50 cycles. Any of the Transformers can be specially wound for supplies other than these at a small extra charge. When ordering a Transformer the voltage and frequency of the supply must always be stated.

No. T6 Transformer (Output 25 VA at 9 volts) for 6-volt Electric Motors. Fitted with speed regulator.

No. T6M Transformer (Output 25 VA at 9 volts) for 6-volt Electric Motors. This is similar to No. T6, but is not fitted with a speed regulator.

No. T6A Transformer (Output 40 VA at 9/3½ volts) for 6-volt Electric Motors. Fitted with speed regulator and separate circuit for supplying current for eighteen 3½-volt lamps.

No. T20 Transformer (Output 20 VA at 20 volts) for 20-volt Electric Motors. Fitted with 5-stud speed regulator.

No. T20M Transformer (Output 20 VA at 20 volts) for 20-volt Electric Motors. This is similar to No. T20, but is not fitted with speed regulator.

No. T20A Transformer (Output 35 VA at 20/3½ volts) for 20-volt Electric Motors. Fitted with speed regulator and output sockets for lighting lamps.

Accumulators

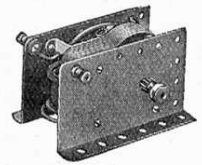
The 6-volt 20-amp. hr. Accumulator is specially suitable for running Meccano 6-volt Motors and Hornby 6-volt Electric Trains.

The 2-volt 20-amp. hr. Meccano Accumulator is supplied for converting 4-volt Accumulators to 6-volt.

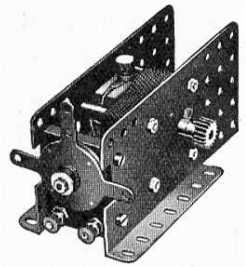
Resistance Controllers (6-volt and 20-volt)

These Controllers enable the speed of Meccano 6-volt and 20-volt Motors and Hornby 6-volt and 20-volt Electric Trains to be regulated as desired.

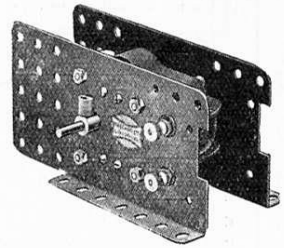
Ask your dealer for a complete price list



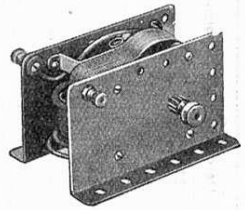
No. E1 Electric Motor (6-volt)



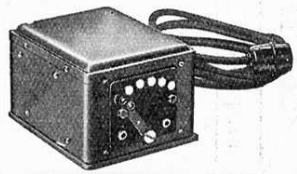
No. E6 Electric Motor (6-volt)



No. E20a Electric Motor (20-volt)



No. E1/20 Electric Motor (20-volt)



No. T20 Transformer

CONTENTS OF OUTFITS AND COMPLETE LIST OF MECCANO PARTS

No.	Description.	A	Aa	B	Ba	C	Ca	D	Da	E	Ea	F	Fa	G	Ga	H	Ha	K	Ka	L
1	Perforated Strips, 12½"	—	2	2	2	4	6	10	—	10	—	10	—	10	6	16	14	30	8	38
1a	" " 9½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	6	10	16
1b	" " 7½"	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	8	10	3	13
2	" " 5½"	4	2	6	2	8	6	14	—	14	4	18	3	21	5	26	2	28	12	40
2a	" " 4½"	—	—	—	—	—	—	—	—	—	—	—	2	2	2	4	—	4	8	12
3	" " 3½"	—	—	—	1	1	1	2	2	4	2	6	—	6	6	12	12	24	—	24
4	" " 3"	—	—	—	—	—	—	—	2	2	—	2	4	6	2	8	4	12	12	24
5	" " 2½"	6	3	9	—	9	3	12	—	12	—	12	6	18	18	36	—	36	84	120
6	" " 2"	—	—	—	—	—	—	—	—	—	—	—	—	—	4	4	20	24	6	30
6a	" " 1½"	—	—	—	—	—	2	2	—	2	—	2	—	2	4	6	8	14	—	14
7	Angle Girders, 24½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	12
7a	" " 18½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	6
8	" " 12½"	—	—	—	—	—	4	4	—	4	4	8	1	9	5	14	12	26	—	26
8a	" " 9½"	—	—	—	—	—	—	—	—	—	—	—	—	—	4	4	4	8	9	17
8b	" " 7½"	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	—	2	6	8
9	" " 5½"	—	—	—	—	—	—	—	—	—	—	—	4	4	—	4	14	18	6	24
9a	" " 4½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	13	15
9b	" " 3½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	5	7
9c	" " 3"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	3
9d	" " 2½"	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	5	6	1	7
9e	" " 2"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
9f	" " 1½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	4	—	4
10	Flat Brackets	4	1	5	—	5	3	8	—	8	—	8	1	9	3	12	4	16	14	30
11	Double Brackets	—	2	2	—	2	2	4	—	4	—	4	1	5	3	8	—	8	4	12
12	Angle Brackets, ½"×½"	8	—	8	—	8	4	12	—	12	2	14	8	22	14	36	12	48	28	76
12a	" " 1"×1"	—	—	—	—	—	2	2	1	3	1	4	2	6	—	6	—	6	6	12
12b	" " 1"×½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	4	12	16
12c	Obtuse Angle Brackets, ½"×½"	—	—	—	4	4	—	4	—	4	—	4	—	4	—	4	—	4	—	4
13	Axle Rods, 11½"	—	—	—	—	—	—	—	1	1	—	1	1	2	—	2	1	3	5	8
13a	" " 8"	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1	3	4	3	7
14	" " 6½"	—	—	—	—	—	—	—	—	—	—	—	3	3	—	3	3	6	7	13
15	" " 5"	—	—	—	—	—	2	2	—	2	—	2	2	4	—	4	—	4	2	6
15a	" " 4½"	—	—	—	—	—	1	1	—	1	2	3	2	5	—	5	1	6	—	6
15b	" " 4"	—	1	1	1	2	—	2	—	2	—	2	—	2	—	2	—	2	—	2
16	" " 3½"	2	—	2	1	3	1	4	—	4	—	4	1	5	—	5	2	7	5	12
16a	" " 2½"	—	—	—	—	—	—	—	—	—	—	—	—	—	3	3	4	7	6	13
16b	" " 3"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	3	5
17	" " 2"	2	—	2	—	2	—	2	—	2	—	2	3	5	—	5	4	9	3	12
18a	" " 1½"	—	—	—	2	2	2	4	—	4	—	4	—	4	—	4	—	4	5	9
18b	" " 1"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	5	7
19	Crank Handles, 5" Shaft	—	—	—	—	—	—	—	1	1	—	1	—	1	—	1	2	3	—	3
19s	" " 3½" "	1	—	1	—	1	—	1	—	1	—	1	—	1	—	1	—	1	—	1
19a	Wheels, 3", with set screws	—	—	—	—	—	—	—	—	—	—	—	—	—	4	4	—	4	—	4
19b	Pulley Wheels, 3" with set screws	—	—	—	2	2	—	2	—	2	—	2	—	2	—	2	—	2	2	4
19c	" " 6" " " "	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20	Flanged Wheels, 1⅛" diam.	—	—	—	—	—	—	—	—	—	—	—	4	4	—	4	4	8	4	12
20a	Pulley Wheels, 2" with set screws	—	—	—	—	—	—	—	—	—	2	2	2	4	—	4	—	4	—	4
20b	Flanged Wheels, ¾" diam.	—	—	—	—	—	—	—	4	4	—	4	—	4	—	4	—	4	6	10
21	Pulley Wheels, 1½" with set screws	—	—	—	—	—	—	—	—	—	1	1	—	1	1	2	—	2	2	4
22	" " 1" " " "	4	—	4	—	4	—	4	—	4	—	4	—	4	—	4	2	6	4	10
22a	" " 1" without "	—	—	—	—	—	2	2	—	2	—	2	1	3	—	3	1	4	11	15
23	" " ½" " " "	—	1	1	—	1	—	1	—	1	—	1	2	3	—	3	1	4	2	6
23a	" " ½" with " "	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1	—	1	3	4
24	Bush Wheels	1	—	1	—	1	—	1	—	1	—	1	1	2	—	2	3	5	3	8
25	Pinion Wheels, ¾" diam., ¼" wide	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	3	5
25a	" " ¾" " ½" "	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
25b	" " ¾" " ¾" "	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
26	" " 1" " ¼" "	—	—	—	—	—	—	—	—	—	2	2	—	2	1	3	2	5	4	9
26a	" " ½" " ½" "	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
26b	" " ½" " ¾" "	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
27	Gear Wheels, 50 teeth	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	3	5
27a	" " 57 "	—	—	—	—	—	—	—	—	—	—	1	1	2	—	2	1	3	4	7
27b	" " 133 " 3½" diam.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
27c	" " 95 " 2½" "	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
28	Contrate Wheels, 1¾" diam.	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1	1	2	—	2
29	" " ¾" "	—	—	—	—	—	—	—	—	—	—	—	2	2	—	2	—	2	—	2
30	Bevel Gears, ⅞", 26 teeth	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	4
30a	" " 1", 16 "	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
30c	" " 1½", 48 "	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
31	Gear Wheels, 1", 38 "	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	4
32	Worms	—	—	—	—	—	—	—	—	—	1	1	1	2	—	2	—	2	—	2
34	Spanners	1	—	1	—	1	—	1	—	1	—	1	1	2	—	2	—	2	—	2
34b	Box Spanners	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
35	Spring Clips	4	2	6	2	8	6	14	—	14	—	14	5	19	—	19	5	24	12	36
36	Screwdrivers	1	—	1	—	1	—	1	—	1	—	1	—	1	—	1	—	1	—	1
36a	" extra long	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
36b	" Special	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1	—	1	—	1
37	Nuts and Bolts, 7/32"	36	—	36	30	66	—	66	24	90	34	124	32	156	44	200	144	344	280	624
37a	Nuts	4	2	6	—	6	—	6	—	6	—	6	—	6	—	6	—	6	—	6
37b	Bolts, 7/32"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
38	Washers	—	6	6	2	8	6	14	—	14	—	14	10	24	—	24	12	36	164	200
40	Hanks of Cord	1	—	1	—	1	—	1	1	2	1	3	1	4	2	6	—	6	—	6
41	Propeller Blades	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	2	4	—	4
43	Springs	—	—	—	—	—	—	—	—	—	1	1	—	1	—	1	1	2	7	9
44	Cranked Bent Strips	1	—	1	—	1	—	1	—	1	—	1	—	1	—	1	1	2	1	3
45	Double Bent Strips	—	—	—	—	—	1	1	—	1	1	2	1	3	—	3	3	6	—	6
46	Double Angle Strips, 2½"×1"	—	—	—	—	—	—	—	—	—	1	1	1	2	2	4	—	4	—	4
47	" " " 2½"×1½"	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	1	2	—	2
47a	" " " 3"×1½"	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	—	2	—	2
48	" " " 1½"×1"	—	—	—	1	1	—	1	—	1	1	2	—	2	—	2	2	4	4	8
48a	" " " 2½"×1"	2	—	2	4	6	2	8	—	8	2	10	—	10	—	10	4	14	4	18
48b	" " " 3½"×½"	—	—	—	—	—	—	—	1	1	1	2	4	6	—	6	1	7	5	12
48c	" " " 4½"×½"	—	—	—	—	—	—	—	—	—	—	—	—	—	3	3	1	4	—	4
48d	" " " 5½"×½"	—	—	—	—	—	—	—	—	—	—	2	2	4	—	4	1	5	—	5
50a	Eye Pieces with Boss	—	—	—	—	—	—	—	—	—	—	—	—	1	1	1	2	—	2	2
51	Perforated Flanged Plates, 2½"×1½"	—	—	—	1	1	—	1	—	1	—	1	—	1	—	1	—	1	—	1
52	" " 5½"×2½"	1	—	1	—	1	—	1	—	1	1	2	—	2	2	4	3	7	—	7
52a	" Flat Plates, 5½"×3½"	—	—	—	—	—	—	—	—	—	—	—	—	—	4	4	—	4	7	11
53	" Flanged Plates, 3½"×2½"	—	—	—	—	—	—	—	2	2	1	3	2	5	—	5	2	7	—	7
53a	" Flat Plates, 4½"×2½"	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	2	4	2	6
54	" Flanged Sector Plate, 4"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
54a	" " " " 4½"	—	2	2	—	2	—	2	—	2	—	2	—	2	—	2	—	2	2	4
55	" Strips, Slotted, 5½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
55a	" " " 2"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
57	Hooks	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
57a	" Scientific	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
57b	" Loaded	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1
57c	" " Small	1	—	1	—	1	—	1	—	1	—	1	—	1	1	2	4	6	8	14
58	Spring Cord	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1
58a	Coupling Screws for Spring Cord	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	12
58b	Coupling Hooks " " "	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
59	Collars with Set Screws	—	—	—	—	—	—	—	4	4	—	4	6	10	9	19	10	29	34	63

No.	Description.	A	Aa	B	Ba	C	Ca	D	Da	E	Ea	F	Fa	G	Ga	H	Ha	K	Ka	L
61	Windmill Sails	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
62	Cranks	—	—	—	—	—	2	2	—	2	—	2	—	2	—	2	2	4	10	14
62a	Cranks, Threaded	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	—	2
62b	Double Arm Cranks	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	—	2	4	6
63	Couplings	—	—	—	—	—	—	—	1	1	—	1	5	6	—	6	3	9	4	13
63a	,, Octagonal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
63b	,, Strip	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	—	2
63c	,, Threaded	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
64	Threaded Bosses	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	3	1	4
65	Centre Forks	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1	1	2	4	6
66	Weights, 50-gramme	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
67	,, 25 ,,	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
68	Woodscrews, ½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
69	Set Screws	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
69a	Grub Screws, 5/32"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
69b	,, ,, 7/32"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
70	Perforated Flat Plates, 5½"×2½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
72	,, ,, ,, 2½"×2½"	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	5	6	1	7
73	,, ,, ,, 3"×1½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	2	4
76	,, Triangular Plates, 2½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
77	,, ,, ,, 1"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	6	8
78	Screwed Rods, 11½"	—	—	—	—	—	—	—	—	—	—	—	2	2	—	2	2	4	6	10
79	,, ,, 8"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
79a	,, ,, 6"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
80	,, ,, 5"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
80a	,, ,, 3½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
80b	,, ,, 4½"	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1	1	2	—	2
81	,, ,, 2"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	—	2
82	,, ,, 1"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	1	2
89	Curved Strips, 5½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	8
89a	,, ,, 3" Cranked	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	6	—	6
89b	,, ,, 4"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
90	,, ,, 2½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
90a	,, ,, 2½" Cranked	2	2	4	—	4	—	4	2	2	—	4	2	4	2	6	10	16	—	16
94	Sprocket Chain	—	—	—	—	—	—	—	—	4	—	4	2	4	—	4	4	8	2	10
95	Sprocket Wheels, 2"	—	—	—	—	—	—	—	—	—	—	—	40"	40"	—	40"	5'	8'	12'	20'
95a	,, ,, 1½"	—	—	—	—	—	—	—	—	—	—	—	2	2	—	2	1	3	—	3
95b	,, ,, 3"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	3	4
96	,, ,, 1"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
96a	,, ,, ⅜"	—	—	—	—	—	—	—	—	—	—	—	2	2	—	2	2	4	6	10
97	Braced Girders, 3½" long	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1	3	4	1	5
97a	,, ,, 3" ,,	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
98	,, ,, 2½" ,,	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
99	,, ,, 12½" ,,	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
99a	,, ,, 9½" ,,	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
99b	,, ,, 7½" ,,	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
100	,, ,, 5½" ,,	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
100a	,, ,, 4½" ,,	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
101	Healds for Looms	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
102	Single Bent Strips	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	60	60
103	Flat Girders, 5½"	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	1	2	2	4
103a	,, ,, 9½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	7
103b	,, ,, 12½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	2	4
103c	,, ,, 4½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12	12
103d	,, ,, 3½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	4
103e	,, ,, 3"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	5
103f	,, ,, 2½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	6
103g	,, ,, 2"	—	—	—	—	—	—	—	—	—	—	—	2	2	2	4	3	7	—	7
103h	,, ,, 1½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
103k	,, ,, 7½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	5	6
104	Shuttles for Looms	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
105	Reed Hooks	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
106	Rollers for Looms, Wood	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
106a	,, ,, ,, Sand	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
107	Tables for Designing Machines	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
108	Architraves	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
109	Face Plates, 2½" diam.	—	—	—	—	—	—	—	—	—	—	—	2	2	—	2	2	4	2	6
110	Rack Strips, 3½"	—	—	—	—	—	—	—	—	—	—	—	1	1	1	2	2	4	7	11
110a	,, 6½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	2	4
111	Bolts, ¾"	—	—	—	—	—	—	—	1	1	1	2	1	3	—	3	6	9	9	18
111a	,, ½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	7	17	24
111c	,, ⅜"	4	2	6	—	6	—	6	—	6	—	6	—	6	—	6	—	6	6	12
113	Girder Frames	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
114	Hinges	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
115	Threaded Pins	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
116	Fork Pieces, Large	—	—	—	—	—	1	1	—	1	1	2	—	2	—	2	—	2	7	9
116a	,, ,, Small	—	—	—	—	—	—	—	—	—	1	1	—	1	—	1	1	2	—	2
117	Steel Balls, ⅜" diam.	—	—	—	—	—	—	—	—	—	1	1	—	1	—	1	—	1	3	4
118	Hub Discs, 5½" diam.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
119	Channel Segments (8 to circle) 11½" diam.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	3	4
120	Buffers	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	8	8	16
120a	Spring Buffers	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
120b	Compression Springs	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	6
121	Train Couplings	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	2	4
122	Miniature Loaded Sacks	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
123	Cone Pulleys	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
124	Reversed Angle Brackets, 1"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
125	,, ,, ,, ½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	4	—	4
126	Trunnions	1	1	2	—	2	2	4	—	4	—	4	—	4	—	4	—	4	5	9
126a	Flat Trunnions	2	—	2	—	2	—	2	—	2	—	2	2	4	—	4	—	4	—	4
127	Simple Bell Cranks	2	—	2	—	2	—	2	—	2	—	2	2	4	1	5	—	5	3	8
128	Boss Bell Cranks	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
129	Rack Segments, 3" diam.	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	1	2	—	2
130	Triple Throw Eccentrics	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	4
131	Dredger Buckets	—	—	—	—	—	—	—	—	—	—	—	2	2	—	2	—	2	—	2
132	Flywheels, 2¾" diam.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	5
133	Corner Brackets, 1½"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
133a	,, ,, 1"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	8	—	8
134	Crank Shafts, 1" stroke	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
135	Theodolite Protractors	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
136	Handrail Supports	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1
136a	,, Coupling	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	4	4	8
137	Wheel Flanges	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
138	Ship's Funnels	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	4	6	10
138a-z	,, ,, Raked	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
139	Flanged Brackets, Right	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
139a	,, ,, Left	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
140	Universal Couplings	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
141	Wire Lines (for clock-weights)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
142	Rubber Rings, 3"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	3
142a	Motor Tyres, 2"	—	—	—	—	—	—	—	—	—	—	—	4	4	—	4	—	4	—	4
142b	,, ,, 3"	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	4

No.	Description.	A	Aa	B	Ba	C	Ca	D	Da	E	Ea	F	Fa	G	Ga	H	Ha	K	Ka	L
142c	Motor Tyres 1″	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
142d	,, ,, 1½″	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
143	Circular Girders, 5½″ diam.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1
144	Dog Clutches	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1
145	Circular Strips, 7″ diam.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
146	,, Plates, 6″ diam.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
146a	,, ,, 4″ ,,	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
147	Pawls with pivot bolt and nuts	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
147a	Pawls	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1	1	2	2	4
147b	Pivot Bolt with 2 Nuts	—	—	—	—	—	—	—	—	—	1	1	—	1	—	1	1	2	6	8
147c	Pawl, without Boss	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
148	Ratchet Wheels	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1	1	2	—	2
149	Collector Shoes for Locos	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
150	Crane Grabs	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
151	Pulley Blocks, 1 Sheave	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
152	,, ,, 2 Sheaves	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
153	,, ,, 3 ,,	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
154a	Corner Angle Brackets, ½″ R.H.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
154b	,, ,, ,, ½″ L.H.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
155	Rubber Rings' ⅝″	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
156	Pointers, 2½″, with boss	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
157	Fans 2″ diam.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
158a	Signal Arms, Home	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
158b	,, ,, Distant	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
160	Channel Bearings, 1½″×1″×½″	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1	—	1	—	1
161	Girder Brackets, 2″×1″×½″	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
162	Boiler with ends, complete	—	—	—	—	—	—	—	—	—	1	1	—	1	—	1	—	1	—	1
162a	Boiler Ends	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
162b	Boilers without Ends	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
163	Sleeve Pieces	—	—	—	—	—	—	—	—	—	2	2	—	2	—	2	—	2	1	3
164	Chimney Adaptors	—	—	—	—	—	—	—	—	—	1	1	—	1	—	1	—	1	1	2
165	Swivel Bearings	—	—	—	—	—	—	—	—	—	1	1	1	2	—	2	—	2	—	2
166	End Bearings	—	—	—	—	—	—	—	—	—	1	1	—	1	—	1	2	3	3	6
167	Geared Roller Bearings	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
167a	Roller Races, Geared, 192 teeth	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
167b	Ring Frames for Rollers	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
167c	Pinions	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
168	Ball Bearings, 4″ diam.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
168a	Ball Races, Flanged Disc	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
168b	,, ,, Toothed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
168c	Ball Casings complete with Balls	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
169	Digger Buckets	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
170	Eccentrics ¾″ throw	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
171	Socket Couplings	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
172	Pendulum Connections	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
173	Rail Adaptors	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
174	Grease Cups	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
175	Flexible Coupling Units	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
176	Anchoring Springs for Cord	1	—	1	—	1	—	1	—	1	—	1	—	1	—	1	—	1	—	1
177	Shafting Standard, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
178	,, ,, Small	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
179	Rod Socket	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
180	Gear Ring 3½″	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
181	Bobbins	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2
182	Insulating Bushes	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	8
183	Lamp Holders	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
184a	Lamps, 2½ volt	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
184b	,, 3½ ,,	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
184c	,, 6 ,,	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
184d	,, 10 ,,	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
184e	,, 20 ,,	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
185	Steering Wheel, 1¾″ diam.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
186	Driving Bands	1	—	1	—	1	—	1	—	1	—	1	—	1	—	1	—	1	—	1
187	Road Wheels	1	1	2	2	4	—	4	—	4	—	4	—	4	—	4	—	4	—	4
188	Flexible Plates, 2½″×1½″	2	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
189	,, ,, 5½″×1½″	2	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
190	,, ,, 2½″×2½″	2	—	2	2	4	—	4	—	4	—	4	—	4	—	4	—	4	—	4
191	,, ,, 4½″×2½″	—	2	2	—	2	—	2	—	2	—	2	—	2	—	2	—	2	—	2
192	,, ,, 5½″×2½″	—	—	—	2	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
193	Strip ,, 2½″×2½″	—	—	—	—	—	—	—	—	—	1	1	—	1	—	1	3	4	—	4
194	,, ,, 3½″×2½″	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	4	—	4
195	,, ,, 5½″×2½″	—	—	—	—	—	2	2	—	2	—	2	4	6	—	6	2	8	8	16
196	,, ,, 9½″×2½″	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	—	2
197	,, ,, 12½″×2½″	—	—	—	—	—	—	—	2	2	—	2	2	4	—	4	4	8	10	18
198	Hinged Flat Plates, 4½″×2½″	—	—	—	1	—	—	1	—	1	—	1	—	1	—	1	—	1	—	1
1563	Terminals	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	3
1570	Washers, insulating	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	8
1575	6 B.A. Screws	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9	9
1583	6 B.A. Nuts	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	15	15
	Clockwork Motor No. 2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	Electric Motor No. E6 (6 volt)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	Special Instruction Leaflets																			
	No. 1—Motor Chassis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 2—High-speed Ship-Coaler	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 5—Dredger	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 6—Stiff Leg Derrick	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 7—Platform Scales	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1
	,, 9—Bagatelle Table	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1
	,, 10—Log Saw	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1
	,, 11—Horizontal Steam Engine	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1
	,, 12—Stone-sawing Machine	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1
	,, 13—Meccanograph	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 14a—New Grandfather Clock	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 16a—New Loom	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 17—Planing Machine	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 18—Revolving Crane	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 19—Steam Shovel	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 20—Electric Mobile Crane	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 21—Transporter Bridge	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 22—Traction Engine	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 23—Vertical Log Saw	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 24—Travelling Gantry Crane	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 25—Hydraulic Crane	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 26—Twin-elliptic Harmonograph	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 28—Pontoon Crane	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 29—Hammerhead Crane	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 30—Breakdown Crane	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 31—Warehouse	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 35—Automatic Grabbing Crane	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 36—Electric Derrick Crane	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
	,, 37—Howitzer Limber and Tractor	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1

LIST OF MODELS ILLUSTRATED IN THIS MANUAL

MECCANO PARTS & ACCESSORIES