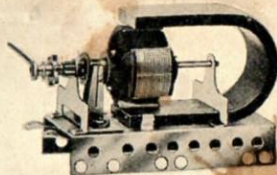




Book 3

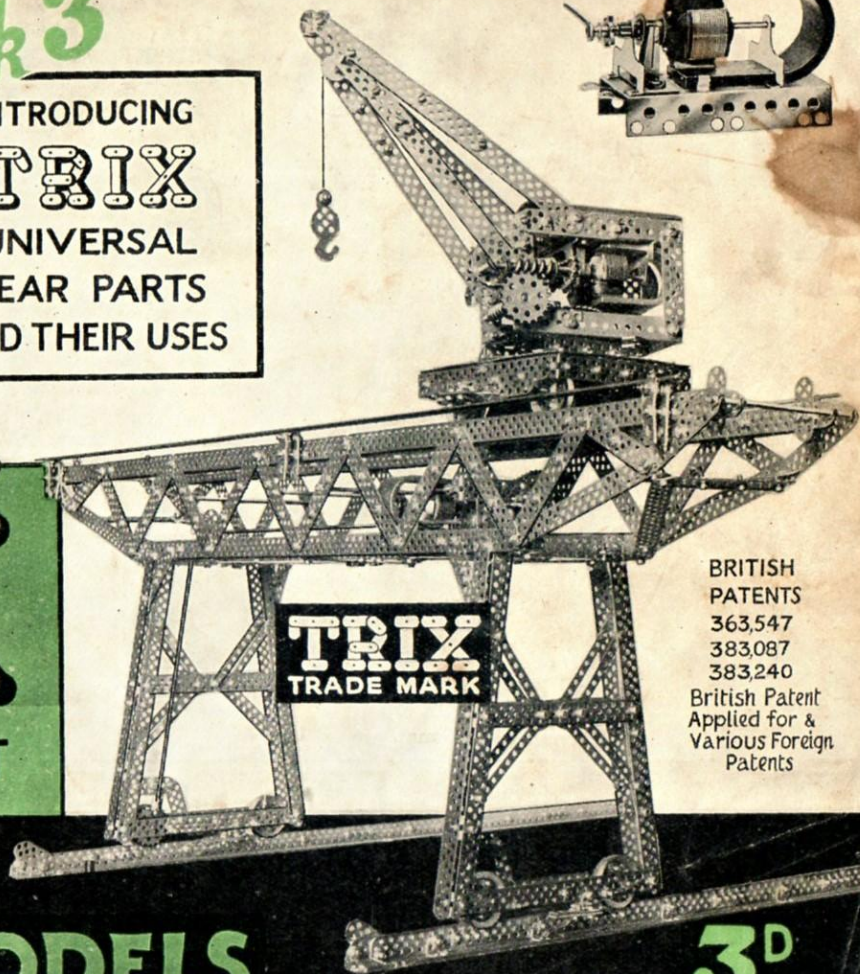
INTRODUCING
TRIX
UNIVERSAL
GEAR PARTS
AND THEIR USES



TRIX

CONSTRUCTIONAL SET

**THE BOOK
OF TRIX MODELS**



BRITISH
PATENTS
363,547
383,087
383,240

British Patent
Applied for &
Various Foreign
Patents

3^D

TRIX COMPONENT PARTS as in Sets Nos. 1, 1a and 2a. ACTUAL SIZE.



A 1
Angle Piece



N 1
Nut



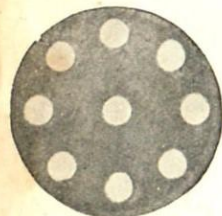
B 1
Bolt



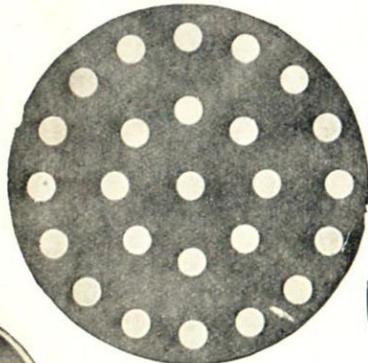
C 1
Crane
Hook



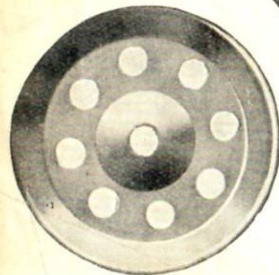
ER 1
Eccentric
Washer



P 29
Pierced Disc, 29 mm.



P 49
Pierced Disc, 49 mm.



V 35
Half of grooved (V) Pulley



W 10
Washer
10 mm.



W 16
Washer
16 mm.

FLAT
STRIPS
F 5 →
F 9 ↓



S 25



Screwed Spindle, 25 mm. long

S 55



Screwed Spindle, 55 mm. long



S 87 Plain Shaft with screwed ends, 87 mm. long



SU 1
Small
U piece



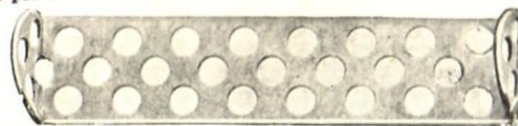
SU 2
U piece



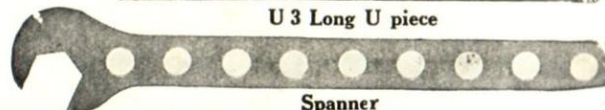
U 1
U piece



U 2
U piece



U 3 Long U piece



Spanner

FLAT STRIPS

No. denotes
number of
middle holes

F 17 →

F 13 ↓

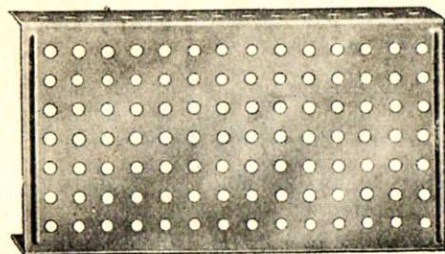


See also **TRIX** Books Nos. 1 and 2 for Models made with these parts.

COMPONENT PARTS OF TRIX GEAR SET.

TRIX

Scale half actual size.

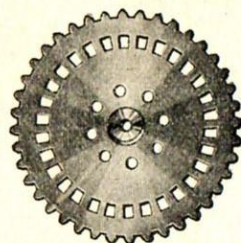


Base.

E 1.



Screwed Spindle, 120 mm. long.
S 120.



Gear or Sprocket Wheel.
40 teeth, with boss. GB 40.



Threaded Coupling.
N 2.



Gear or Sprocket Wheel, 20 teeth.
without boss. G 20.



with boss.
GB 20.



Gear or Sprocket Wheel,
10 teeth,
without boss. G 10.



with boss.
GB 10.



Grub Screws.
B 2.

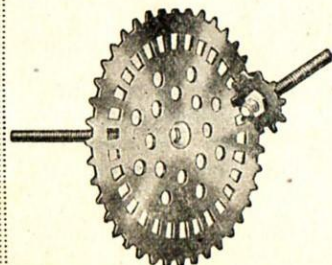


Worm.
WM.



Chain, 24 ins. long.

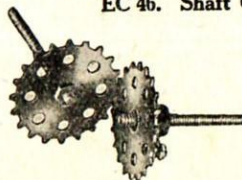
SOME APPLICATIONS OF TRIX GEAR SET.



Angle Drive.



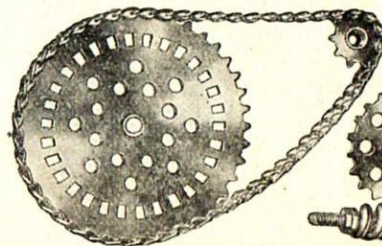
EC 46. Shaft Coupling.



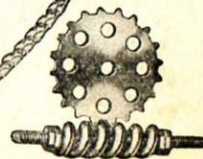
Angle Drive.



Gear Drive.



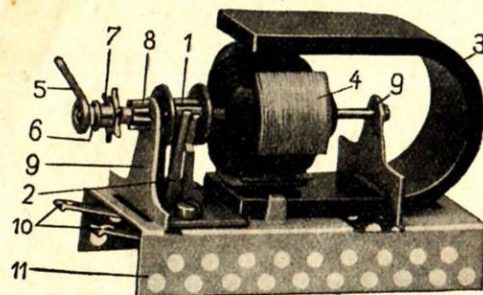
Chain Drive.



Worm Drive.

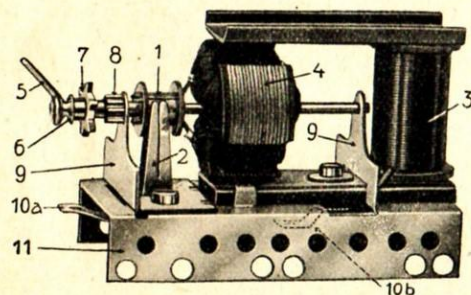
TRIX

TRIX ELECTRIC MOTORS ARE IDEAL FOR DRIVING MODELS.



Motor No. 2051.

For use with pocket lamp batteries or 4-8 volt accumulators.



Motor No. 2161.

For use with 8-12 volt Transformer or 6-8 volt accumulators.

These productions are accurately built with tremendous power in a small machine. They drive TRIX models and any other constructional set models.

Motor No. 2051 (see illustration) is suitable for driving both stationary models and automobiles. This type only can be used as a lighting dynamo but will not run on the alternating current of a Transformer.

Motor No. 2161 (see illustration) is more suitable for stationary models. It will run well with a Transformer.

WARNING! These motors must **never** be connected direct to the main lighting circuit.

Description of the component parts :

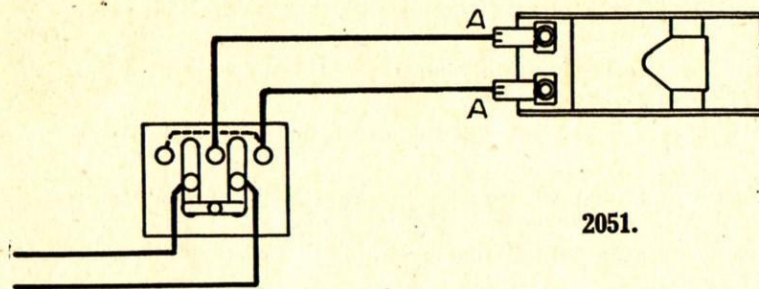
- | | | |
|------------------|---|---|
| 1. Commutator. | 7. Chain Sprocket Wheel, used as chain driving wheel in all constructional sets and also as angle, gear and worm drives in TRIX sets. | 9. Bearings. |
| 2. Brushes. | 8. Small Gear Wheel, suitable for gear driving other constructional sets. | 10. Terminals. |
| 3. Magnet. | | 11. Base with bolt holes, suitable for attaching to TRIX and other constructional sets. |
| 4. Armature. | | |
| 5. Driver. | | |
| 6. Pulley Wheel. | | |

Important.—The shaft bearings and the contact brushes should from time to time be oiled with good sewing machine oil. Before oiling the brushes, the adhering black deposit should be carefully cleaned from the commutator. Use paraffin for this. Do not bend the contact brushes.

Spare Brushes and instructions for fitting them are included with each motor.

TRIX

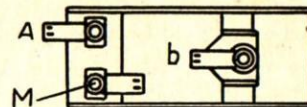
HOW TO REVERSE THE MOTORS.



2051.

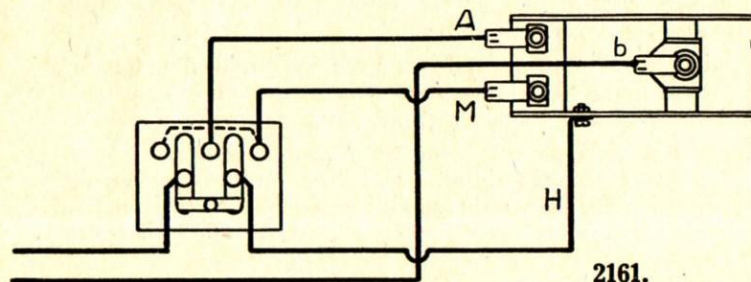
Motor No. 2051.

It is sufficient here to change over the two battery leads. This is best explained by switch No. 203 on page 5 and in the accompanying Switch sketch 2051.



Motor No. 2161.

(From underneath).



2161.

Motor No. 2161.

Here changing over the leads makes no difference to the direction of rotation. Instead the terminal A and the brush M must be changed over in the circuit.

As this method is inconvenient, we make use of Switch No. 203, but beforehand we must take out terminal M, by loosening the nut, and fix it so that it lies alongside A. We need also an extra lead H which is placed in the circuit as shown: i.e., fixed under a bolt in a side hole of the base.

TRIX

GENERAL RULES.

In using the gears you should note the following points :—

1. The teeth of the wheels should not mesh into each other so deeply that they bind. This causes great friction and loss of power.
2. The teeth of the wheels should not mesh too shallowly as they are then liable to get out of gear and not drive. This instruction also applies to the worm drive.
3. In angle drives, the shafts should always lie in a level plane, but the angle can be varied to greater or smaller than 90 degrees.
4. Chain wheel shafts must always be set parallel to one another and the wheels must track properly, that is, lie in one plane; otherwise the chain will run unevenly and jump off.
5. Chain drive transmission can only be arranged with vertical running wheels; but the chain must not be too tight or there will be loss of power.
6. Care must be taken not to tighten up the worm too much with nuts when fixing it to a screwed spindle, as if this is done the worm may be compressed and bent.
7. Where suitable use the ordinary TRIx bolt to fasten the sprocket wheel in position on the shaft, but if this bolt takes up too much space use the grub screw instead.
8. The worm is always used for driving purposes and cannot be driven itself by turning the sprocket wheel meshed into it. One turn of the worm moves the sprocket wheel in mesh with it one tooth. Thus the worm must be turned 20 times to move a 20-tooth wheel one complete revolution.
9. The speed resulting from a number of wheels in gear depends upon the proportion of their number of teeth; e.g. if the driving wheel has 40 teeth and the driven wheel 10 teeth then the smaller wheel runs 4 times faster, as the larger wheel has four times the number of teeth. If the position is reversed and the driving wheel has 10 teeth it must make four revolutions before turning the 40-tooth wheel once.
10. Each driven wheel which is directly geared with the driving wheel runs in the opposite direction. If however a chain is used both wheels move in the same direction. Similarly, if an intermediate cog wheel is used the wheels rotate in the same direction.

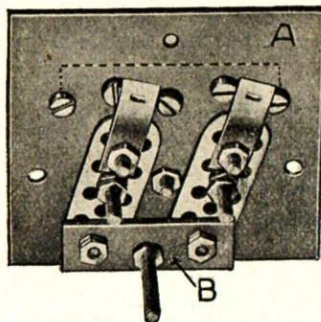
TRIX

No. 203. REVERSING SWITCH.

Parts E 2 to E 13 are contained
in TRICY TRIX Set.

Parts Required :

B 1.....	10
E 6.....	2
F 5.....	2
N 1.....	29
S 25.....	3



Instructions :

To reverse the rotation of a motor, we make a reversing switch of a piece of strong cardboard or thin wood A, pattern page 71. In the five holes near to one another we place bolts and hold them firmly with nuts. Their heads form the contacts of the switch. The two outside ones are connected on the under side with a piece of copper wire, see dotted line.

One of the leads of the motor is attached to one of these bolts and the other to the middle bolt. The second and fourth bolts are the "off" position and help to bridge the contacts from the outside studs. In the middle hole, still free in the pattern, a bolt is placed with the bolt head on the under side. This forms a stop for the switch. In the two remaining holes we fix firmly two S 25's. The leads from the source of current are connected underneath to these S 25's. On the upper ends we place F 5's on which we have bolted contact springs, E 6's, to one end, and a piece of cardboard or wood B to the other. In this cardboard B we fasten a handle—either an S 25 as illustrated or a magnet core, E 4.

The holes in the base of the switch for fastening purposes are bored as required.

TRIX

No. 204. MOTOR POWER HAMMER.

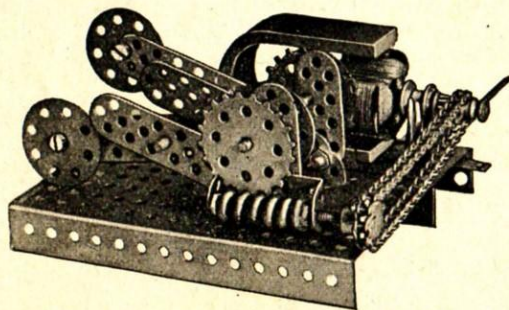
Made with 1 each of Sets Nos. 1 and Trix Gear Set and 1 Motor.

Parts Required :

B 1..... 8	F 9..... 4	GB 20..... 1	S 55..... 3
Chain 1	G 10..... 1	N 1.....18	U 2..... 2
E 1..... 1	GB 10..... 1	N 2..... 1	W 16..... 2
F 5..... 2	G 20..... 1	P 29..... 4	WM 1

Description :

The power of the motor is transmitted by chain and sprocket wheel to the worm shaft. The worm is in gear with another sprocket wheel with cams on its shaft, which alternately raise and lower the hammers.



Instructions :

One bolt is sufficient to fix the motor to the base. F 5's are fixed to the feet of a U 2 which is bolted to the base and, at the same time, slanting F 9's are fastened. These F 9's are bearings for the shaft, S 55, on which the hammers, each made of an F 9 and P 29, work between locknuts. The cam discs are P 29's with one bolt in each as cam. The G 20 at the back, as shown in illustration, is placed loosely on the shaft to space the cam disc and bearing.

No. 205. HAND POWER WINCH.

TRIX

Made with two Sets No. 1 and one Trix Gear Set

Parts Required :

B 1 16	F 5 2	GB 10.... 1	N 2.... 1	S 120.... 1
Chain ... 1	F 9 8	GB 40.... 1	P 29.... 8	W 10.... 2
E 1 1	G 10.... 1	N 1.... 32	S 55.... 4	W 16.... 3

Description :

A Winch is used for many purposes, including raising building materials, such as building stones, bricks, etc., and is usually worked by two cranks. The double gearing makes it possible for great loads to be lifted with relatively little power.

Instructions :

The two hand-cranks are fixed to the driving shaft, S 120. From this shaft we chain drive to the GB 40, which is fixed on a shaft, consisting of two S 55's coupled with an N 2. At the other end a GB 10 carries the power transmission to a GB 20. Here again the shaft is made of two S 55's, coupled as shown in Fig. 2. This coupling at the same time builds the winding drum.

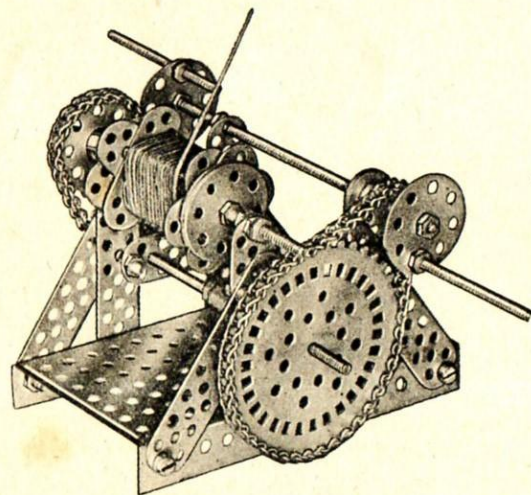


Fig. 1.

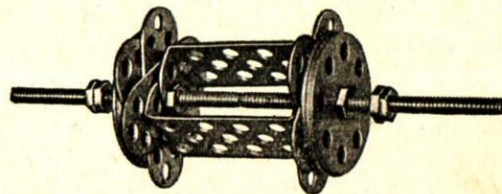


Fig. 2. The Winding Drum.

TRIX

No. 206. F A N

Made with one each of Sets Nos. 1, 1a and Trix Gear Set.

Parts Required ·

A 1..... 4	G 20..... 1	S 55..... 2
B 1.....22	GB 20..... 1	S 120..... 1
E 1..... 1	GB 40..... 1	U 1..... 2
F 5..... 1	N 1.....32	U 2..... 2
F 9..... 4	N 2..... 1	W 10..... 1
F 17..... 4	P 29..... 3	
GB 10..... 1	S 25..... 1	

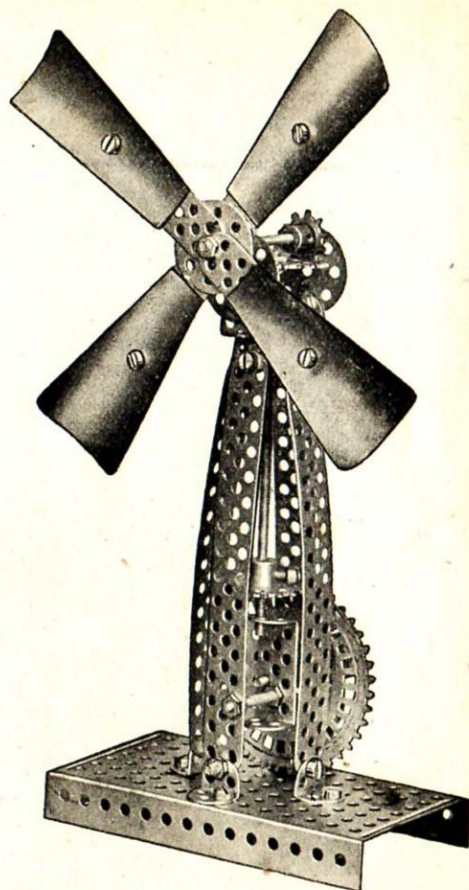
Description ·

The GB 40 is turned by the hand-crank on the end of the driving shaft, and the blades rotate swiftly propelling a strong current of air.

Instructions ·

Four F 17's are fixed vertically by A 1's to the base, E 1. They are fastened at the top by crossed U 1's with down-turned feet. At the same time, a U 2, with upturned feet, to which P 29's are fixed, is bolted to the backs of the U 1's. This U 2 forms the bearings for the fan shaft, S 55. The blades of the fan are F 9's with cardboard attached. The bearings of the driving shaft, (with crank as in EC 14, TRIX Book 1) can be made in different ways.

In the illustration, a U 2 is fixed vertically to the front F 17 by an S 25 and acts as bearings for both horizontal and vertical shafts. But instead of this, the horizontal shaft can run right across and then a U 2 fixed horizontally between the F 17's forms the bearing for the vertical shaft. Cardboard pattern, page 71.



No. 207. CLEANING AND POLISHING MACHINE.

TRIX

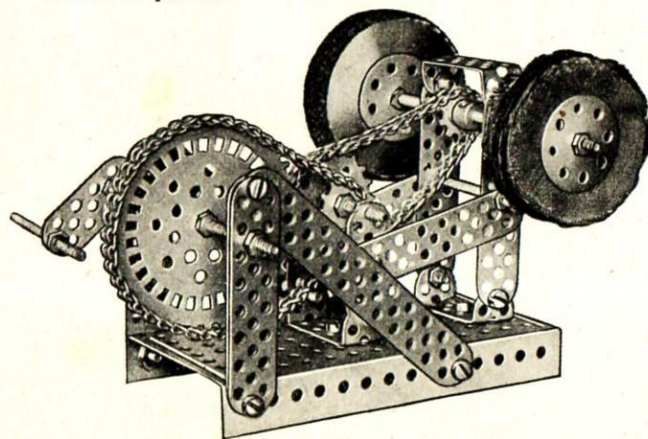
Made with two Sets o No. 1 and one Trix Gear Set.

Parts Required :

B 1.....16	G 10..... 1	P 29..... 8
Chain 1	GB 10..... 1	S 55..... 5
E 1..... 1	G 20..... 1	S 120..... 1
F 5..... 5	GB 40..... 1	U 2..... 3
F 9..... 8	N 1.....38	W 10..... 4
F 13..... 4	N 2..... 1	

Description :

This machine is used for cleaning and polishing metal articles. For cleaning purposes, a felt wheel, pasted with emery, is generally used and this is fixed on one of the shaft ends. For a polisher, a polishing head made of muslin, etc., is fastened on the other shaft end. These machines are usually driven at a high speed from any source of power.



Instructions :

The driving shaft consists of two S 55's coupled as in EC 46 by an N 2. A GB 40 and hand-crank, made as in EC 14, Book No. 1, are fixed on the shaft. From the GB 40 the drive is transmitted to a G 10 which is fastened next to a G 20 on the same shaft. The bearings of this shaft consist of two F 5's bolted to a U 2. These F 5's are connected by two F 9's to the bearings of the shaft with the cleaning and polishing heads. The cleaning head consists of two 2 in. cardboard discs, which are fastened at a distance of about $\frac{1}{2}$ in. apart on the shaft and encircled with emery cloth. The polishing head is made from material cut into 2 in. diameter circles.

TRIX

No. 208. KNIFE CLEANER.

Made with two Sets of No. 1 and one Trix Gear Set.

Parts Required :

B 1.....11	G 10..... 1	N 1.....40	S 120..... 1
E 1..... 1	GB 10..... 1	N 2..... 1	U 2..... 4
F 5..... 6	G 20..... 1	P 29..... 8	W 10..... 4
F 9..... 8	GB 20..... 1	S 55..... 6	W 16..... 4

Description :

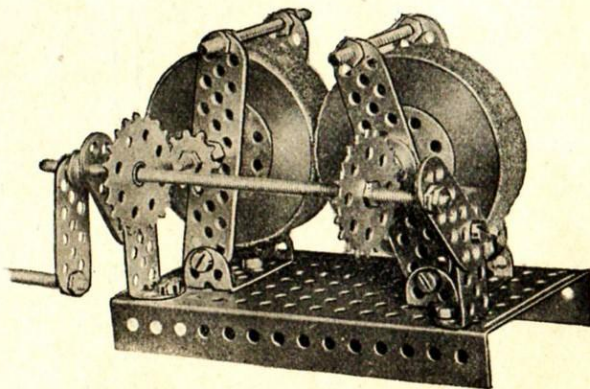
As the name implies, this machine is used for cleaning cutlery. The knives and forks are held between the revolving wheels and brightly polished with cleaning powder.

Instructions :

We cut out a few wooden discs, diameter $2\frac{1}{4}$ ins. with a fret saw, and fasten them on two shafts, S 55's, between P 29's. The bearings for these shafts are F 9's, joined at the top by S 55's and fixed to a base E 1 by U 2's. On one of these shafts a G 10 is tightened between an N 2 and an N 1. On the other shaft a GB 10 is fixed after inserting four W 16's. Two U 2's are bolted to the base and support two F 5's in a slanting position. These are bearings for a shaft, S 120. On this shaft two gear wheels are fastened (a G 20 and a GB 20) and these are meshed with the gear wheels on the roller shafts. Locknuts and W 10's prevent this shaft from moving out of position.

On the other side, we build a support (to prevent the cutlery from slipping through) made of a vertical S 55 with a horizontal F 5 fixed at a suitable height. With the exception of the crank handle and support, all the flat strips are used double to add strength to the model.

To give the polishing wheels a realistic appearance they can be pasted with strips of emery cloth, and you can really use the machine for polishing.



No. 269. DIFFERENTIAL GEAR.

TRIX

Made with one each of Sets Nos. 1, 2a and Trix Gear Set, two Model Rubber Tyres and one Motor.

	B 1.....20	F 9..... 2	GB20..... 1	S 55..... 3	V 35..... 4
Parts	Chain 1	G 10..... 1	GB40..... 1	SU 2..... 2	W 10..... 1
Required :	E 1..... 1	GB10..... 1	N 1.....44	U 2..... 2	W 16..... 2
	F 5..... 2	G 20..... 1	P 29..... 1	U 3..... 2	

Description :

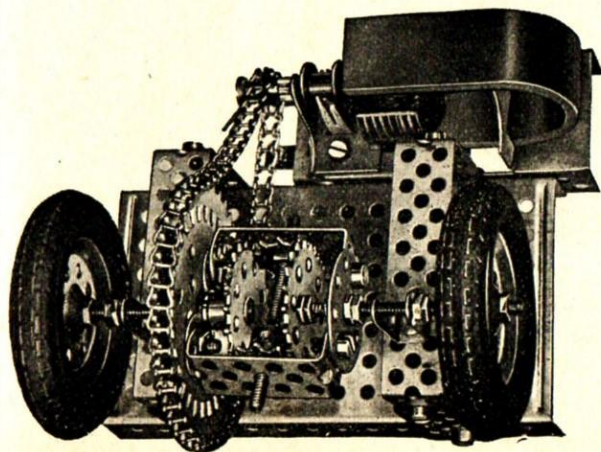
This gearing is used principally in motor vehicles. It operates between the rear driving wheels (and in recent times the front wheels too) and transmits the motive power to these. Its application makes it possible for the particular wheel which takes the outside curve and longest way, to turn faster than the inner wheel. We can observe this in the model if we brake either of the rotating wheels.

Instructions :

The shaft bearings, SU 2's, are fixed on two supports, each composed of two F 5's and one U 3. The shaft ends, S 55's, run in these SU 2's and a frame, composed of two U 2's and a P 29, is fastened between them.

A GB 40 is bolted to the left side of the frame. The right side of the frame runs between locknuts on the shaft. Inside this frame on the right shaft a G 20 is fixed and on the other side—after inserting a W 10—a GB 20. A shaft, S 55, with a G 10 fixed to it by two nuts, runs through the middle holes of the U 2's. This gears into the GB 20 and the G 20, while a GB 10, placed loosely on the shaft at the other end, gears in a similar way. In order to keep the gear wheels in mesh one or two W 10's are inserted at the back of the GB 10.

The two wheels are made as in EC 40, TRIX Book No. 2 and are fixed to the ends of the shaft as shown in illustration. The motor is fastened to the model base by two bolts and a W 10 is inserted between the bases on the driving side.



TRIX

No. 210. A GOVERNOR. DEMONSTRATING CENTRIFUGAL FORCE.

Made with one each of Sets Nos. 1, 1a, 2a and Trix Gear Set.

Parts Required:

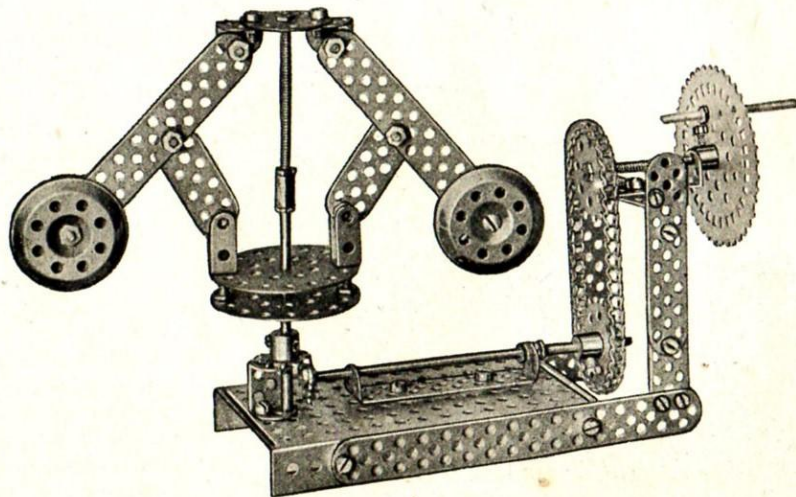
A 1..... 2	F 17..... 4	N 2..... 1	SU 2..... 2
B 1.....28	G 10..... 1	P 29..... 3	U 1..... 1
Chain 1	GB10..... 1	P 49..... 2	U 2..... 1
E 1..... 1	G 20..... 1	S 25..... 2	U 3..... 2
F 5..... 4	GB20..... 1	S 55..... 3	V 35..... 4
F 9..... 4	GB40..... 1	S 87..... 1	
F 13..... 2	N 1.....56	S 120..... 1	

Description :

The power exerted on the hand-crank is transmitted by the chain and gear drives to the vertical shaft. The two weights are bolted to this shaft and turn with it. Centrifugal force moves them outwards as the speed of the shaft increases. In this way, the two P 49's are drawn upwards on the vertical shaft.

Instructions :

A U 2 makes a bearing for the driving shaft with handcrank and is fastened by two bolts to a U 3 at right angles. A U 1 bearing is used for the vertical shaft, which consists of an S 87 and S 55 coupled with an N 2. The two P 49's on the vertical shaft are set at a distance of $\frac{1}{2}$ in. by two S 25's, on to which are fixed SU 2's as hinges for the arms, F 5's.



TRIX

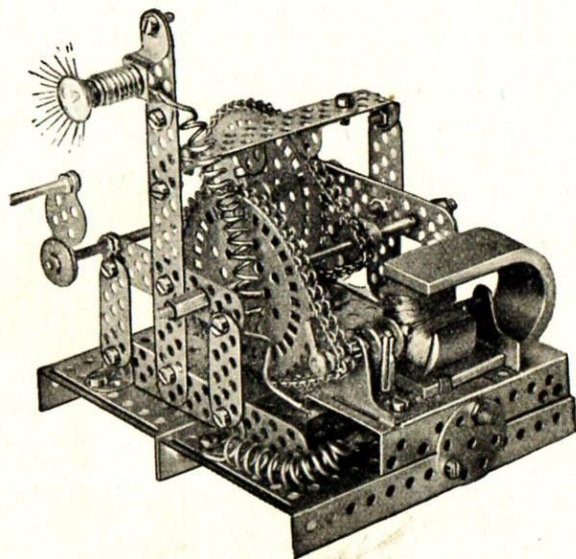
No. 211. ELECTRICITY GENERATING SET.

Made with one Set each of Nos. 1 and 1a, two Trix Gear Sets and one Motor No. 2051.

(In this case Motor No. 2161 is unsuitable).

Parts Required

A	1.... 4	F 13.... 1	S 25.... 1
B	1.... 24	F 17.... 1	S 55.... 1
C	1.... 1	GB10.... 1	S 120.... 2
Chain	.... 2	GB40.... 2	U 1.... 1
E	1.... 2	N 1.... 36	U 2.... 2
F	5.... 4	N 2.... 2	W 16.... 2
F	9.... 4	P 29.... 1	



Description :

An electric current is induced in the windings on the armature by its swift rotation between the poles of the permanent magnet, and this current is carried by the brushes and the leads to light up a pocket lamp bulb. On account of the double gearing, one turn of the hand-crank drives the armature $26\frac{2}{3}$ times.

Instructions :

The base of the motor is fixed to the model base by an S 55 fixed at the front by a P 29 and at the back by a U 1. A miniature screw type lamp-holder can be obtained very cheaply to hold the 2 volt, 0.2 amperes lamp and the current is conducted from one of the terminals of the dynamo to the centre contact of the lamp. The second terminal is connected to the frame under any suitable bolt head.

TRIX

No. 213. MOTOR DRIVEN DRILLING MACHINE.

Made with one each of Set Nos. 1, 1a, 2a and Trix Gear Set and one Motor.

Parts Required :

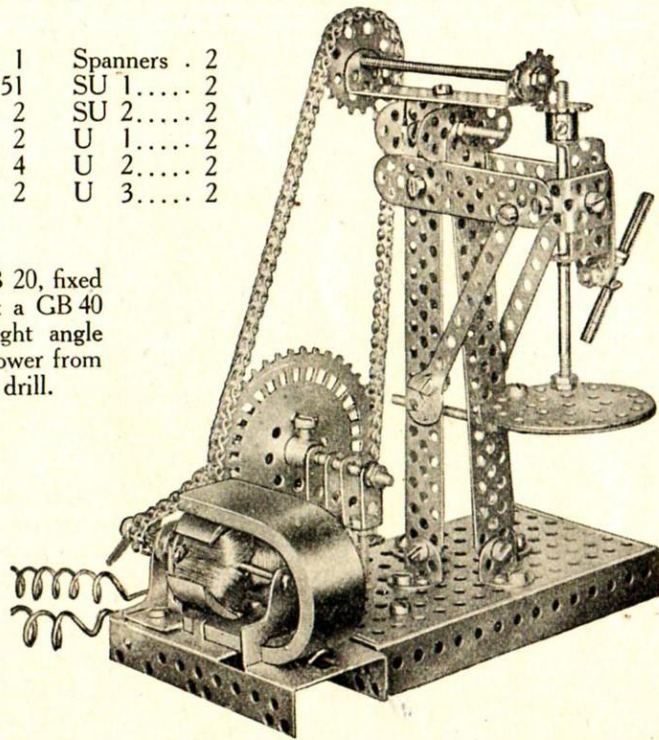
A 1..... 4	F 9..... 2	GB40..... 1	Spanners . 2
B 1.....27	F 17..... 4	N 1.....51	SU 1..... 2
Chain 1	G 10..... 1	P 49..... 2	SU 2..... 2
E 1..... 1	GB10..... 1	S 25..... 2	U 1..... 2
ER 1..... 1	G 20..... 1	S 55..... 4	U 2..... 2
F 5..... 4	GB20..... 1	S 87..... 2	U 3..... 2

Description :

The motor drives by chain a sprocket wheel, GB 20, fixed on an intermediate shaft. On the same shaft a GB 40 is fastened and drives a G 20 by chain. A right angle drive, of a G 10 and a GB 10, transmits the power from the horizontal shaft to the vertical shaft of the drill.

Instructions :

A U 3 is fixed with two bolts to the long side of an E 1, so that the base of the motor can be fixed to it. The motor is also bolted to a U 2 which is fixed to the under side of the E 1. Two of the F 17's forming the vertical column are joined at the top by a U 1. The other F 17's are fixed on an S 55 with two F 5's. The intermediate shaft runs in two SU 2's fastened to the base by S 25's.



No. 215. **SPEEDOMETER.****TRIX**

Made with two Sets of No. 1, one each of Sets Nos. 1a, 2a and Trix Gear Set and one packet of nuts and bolts.

Parts Required :

A 1..... 4	F 5..... 8	G 20..... 1	P 29..... 8	S 120..... 1	U 3..... 2
B 1..... 37	F 9..... 7	GB20..... 1	P 49..... 2	SU 1..... 2	V 35..... 4
Chain 1	F 13..... 1	GB40..... 1	S 25..... 2	SU 2..... 2	W 10..... 4
E 1..... 1	F 17..... 2	N 1..... 76	S 55..... 3	U 1..... 2	
ER 1..... 2	G 10..... 1	N 2..... 1	S 87..... 2	U 2..... 4	

Description :

Instruments of this type are used to measure the speed of wheels and shafts. A governor is operated by the varying centrifugal force, created by the rising and falling in revolution speed. These variations are shown by a pointer which moves in front of a scale.

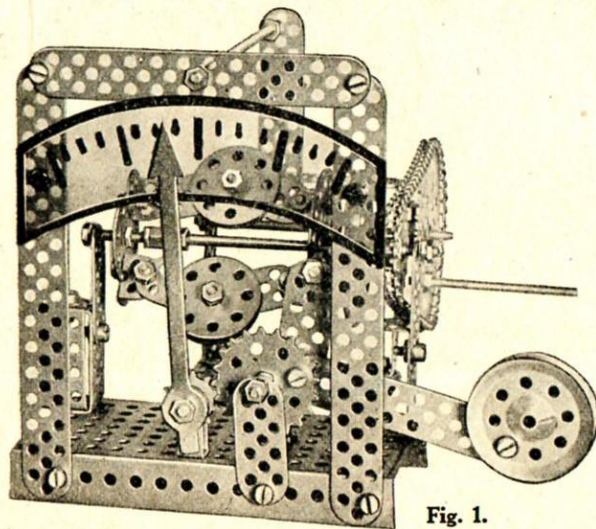


Fig. 1.

Instructions :

We bolt three F 9's to the long side of a base (Fig. 2) and fasten the ends with another F 9. Two U 3's pointing inwards are bolted to this and an F 9 is bolted on top to strengthen the structure. So that this rectangular frame stands firmly, we bolt two U 1's as feet underneath. The frame forms a bearing for an S 87, and a GB 40, with an S 55 as hand-crank, is fixed to one end. Now we build the governor, which is fixed horizontally. An S 87 and S 25 are coupled as in EC 46. On the S 25 we fasten a P 29 between nuts, and bolt two A 1's to this. On each of these an F 5 is loosely fixed. Two weights, P 29's, and another F 5 are attached carefully to the other end of each F 5. The second pair of F 5's are fastened by A 1's to a P 49. Parallel to this P 49, another P 49 is fastened by an SU 2 with spacing washers, W 10's inserted on one side.

Under the bolt heads (if they are on the outside of the P 49) an ER 1 must be placed otherwise the bolts will foul each other. Now if the governor weights

TRIX

No. 215. SPEEDOMETER

Instructions—Continued.

are drawn apart, the P 49's must move along easily, and when released, fall back into their original position. When this has been tested, a GB 20 is fixed on tightly and the shaft is placed in the bearings formed by upright U 2's to which F 5's are bolted (Fig. 1). The bearing on the right (see Fig. 2) is further strengthened by another U 2.

We now build the angle lever, composed of an F 9 and an F 5 fixed to a G 20, as shown in (Fig. 1). The shaft, on which this G 20 is fixed, is an S 55 supported at one end by an F 5 and at the other by a U 1 fastened to the base by an S 25.

An S 25 is fixed in the top of the angle lever, F 5, and an SU 1 swivels between nuts on the end of this. This SU 1 is placed between the P 49's so that when they are pushed along, the arm moves with them, automatically turning the sprocket wheel. This G 20 is in gear with a G 10 fastened to an S 25, which runs in an SU 2 bolted to the base. A cardboard pointer is fixed to the end of the S 25.

Now we erect the front of the model. This is strengthened by a support, made of a U 2 and F 9, at the back and an S 120. The counter weight seen in Fig. 1 right, draws the governor and pointer back to the original position when the rotation has stopped.

Scale pattern, page 71.

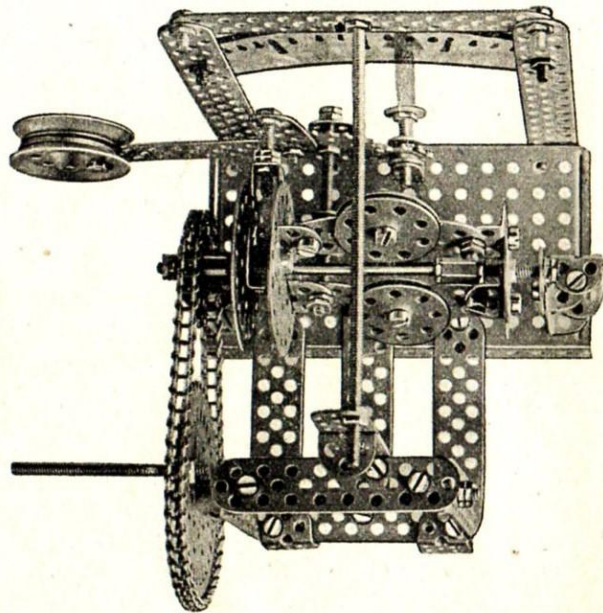


Fig. 2.

Back view from above.

No. 216. TRACTOR.

TRIX

Made with two each of Sets Nos. 1 and 2a, one each of Sets No. 1a and Trix Gear Set,
four Model Rubber Tyres and one Motor.

Parts	A 1.....	3	F 17.....	2	P 29.....	6	S 120.....	1	U 2.....	4
Required :	B 1.....	50	G 20.....	1	P 49.....	4	SU 1.....	3	U 3.....	3
	Chain	1	GB 20.....	1	S 25.....	2	SU 2.....	1	V 35.....	4
	F 5.....	3	N 1.....	98	S 55.....	5	Spanner ...	1	W 16.....	2
	F 9.....	6	N 2.....	1	S 87.....	1	U 1.....	2	WM	1

Description :

These machines are for pulling vehicles in place of animals generally used for this purpose. Mostly, an internal combustion engine is built in over the front wheels and the machine is controlled from the driving seat, in front of which is the steering-wheel. Our model has as driving unit a TRIX Motor, which operates by means of a chain and worm drive. This latter is meshed with the gear wheel fixed on the shaft of the two back wheels. The lever placed at the side of the steering enables the motor to be thrown in or out of action.

Instructions :

The chassis of the tractor is built of two F 17's, which are connected by a U 2 in the fifth middle hole in front and at the back by another U 2 fixed the other way up. On this U 2, a U 3 with feet downwards is fastened and is lengthened backwards by two F 9's which are joined at the ends by a second U 3. P 29's on the steering column, S 55, represent the steering wheel. This S 55 is held in a U 2 which is fastened with its back to a U 1 placed across it. An S 55 is firmly fixed to the brackets of the U 1 and held in the chassis of the Tractor by two nuts tightened to one side. An SU 1 is fixed to the end of the steering column, S 55, as EC 28, Book No. 2, and an S 55 is fastened at right angles.

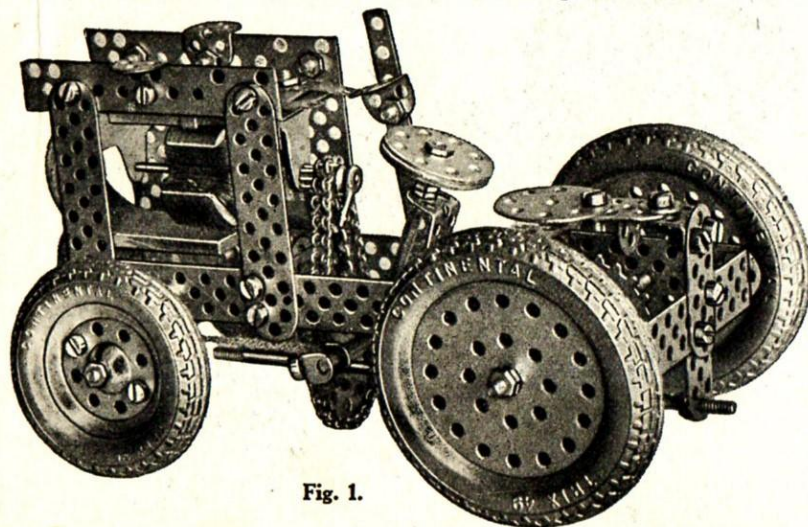


Fig. 1.

TRIX

No. 216. TRACTOR

Instructions—Continued.

The steering cord is attached to each end of this S 55 by an SU 1 as in EC 24, Book No. 2. The front wheels, made as in EC 39, Book No. 2, run on S 25's fixed firmly to the feet of a U 3 (see Fig. 2). The back wheel shaft is an S 120 on which a G 20 is fastened between nuts. The rear wheels are made as in EC 42. An F 5 is bolted to the U 3 at the back. This forms the support for the driving seat and is also a bearing for the worm shaft, which consists of an S 87 and an S 55 coupled together. The second bearing of the worm shaft is also an F 5 which is bolted to a U 2 fixed between the F 17's of the chassis. Between the bearings is a GB 20 fastened to the S 87. The motor is fixed with the base upwards and is supported by four F 9's.

To the right of the steering wheel a lever is fixed for starting the motor, and an A 1 is bolted to it so that when it is pushed forward it makes contact with one of the motor terminals. On this terminal there is no wire lead but the other terminal is connected to one pole of the battery. The second pole of the battery is connected to the frame.

If you wish to improve the appearance of the model and make it more realistic you can fasten a roof made of cardboard over the motor and arrange a cover in a semi-circular shape between the rear wheels. A head-lamp can be attached to the front as in Fig. 2 (2 of W 16 bolted on an SU 2).

Pattern of roof, see page 71.

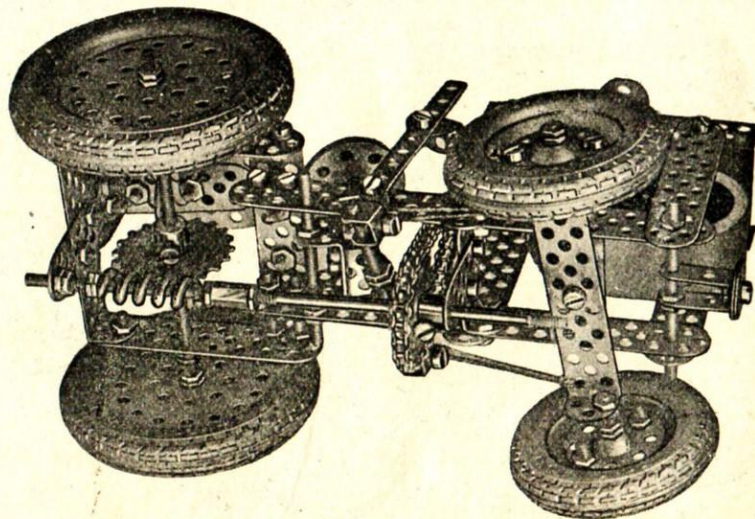


Fig. 2. From underneath.

TRIX

No. 217. A CONVEYOR.

Made with two Sets of No. 1, four Sets of No. 1a,
one Trix Gear Set and one Motor.

Parts Required :

A 1..16	F 9.. 8	GB 20.. 1	S 25.. 7	W 10.. 2
B 1..72	F 13.. 4	GB 40.. 1	S 55.. 5	W 16.. 4
Chain .. 1	F 17..16	N 1..104	S 120.. 1	WM .. 1
E 1.. 1	G 10.. 1	N 2.. 1	U 1.. 8	
F 5.. 7	G 20.. 1	P 29.. 8	U 2.. 3	

Description :

The belt in front is set in motion by the motor, and four scoops fixed to it at regular intervals draw the goods to be conveyed (peas, lentils, rice, etc.) upwards from the container underneath and throw them into the upper chute where they are guided into a vehicle ready for transport.

Instructions :

An E 1 forms the base and an F 9, on which the vertical F 17's are built is fixed to the back to lengthen each side (see Fig. 2). An F 13 is bolted to each side of the front and a slanting F 17 to the middle of each side. The four vertical F 17's on each side are joined at the top by an F 9. At the same time A 1's are inserted, which support two curved F 9's on which the roof rests. The container underneath is made of cardboard bent to shape and is fixed by an F 5 and A 1's. Cardboard is also used for the upper chute.

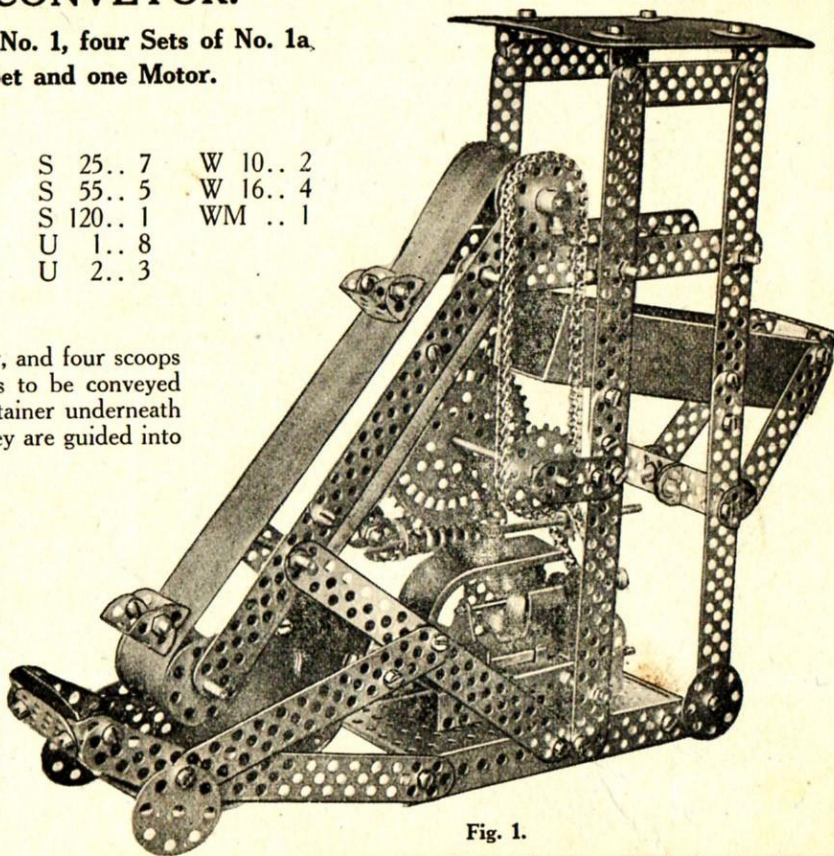


Fig. 1.

TRIX

No. 217. A CONVEYOR.

Instructions—Continued.

The frame supporting the two rollers is made of two strips, each consisting of two F 17's overlapped 9 holes which are fixed parallel at a distance of about $1\frac{1}{4}$ ins. by two S 55's. The roller shafts, S 55's, run in the end holes of this frame. The rollers can be made of empty cotton reels, spools or cardboard cylinders with a roll of paper glued inside. These rollers should be approximately 1 in. in diameter. They are fixed tightly between P 29's on the shafts, S 55's.

The motor is fastened between the two upright supports by S 25's. The four scoops are each made of two U 1's and stitched on to a linen band. It is most important that the chain and worm drives should be arranged as in Fig. 2. The drive from the motor is transmitted by chain to the worm shaft, S 120. The bearings for this shaft are A 1's, one of which is fixed to the vertical F 17 and the other to a horizontal bar made of two F 5's overlapped two holes. A GB 40 is in gear with the worm and is fixed on an S 55 which is coupled with an S 25 as in EC 46. A G 20 is fastened on the same shaft and drives by chain a GB 20 fixed on the upper roller shaft.

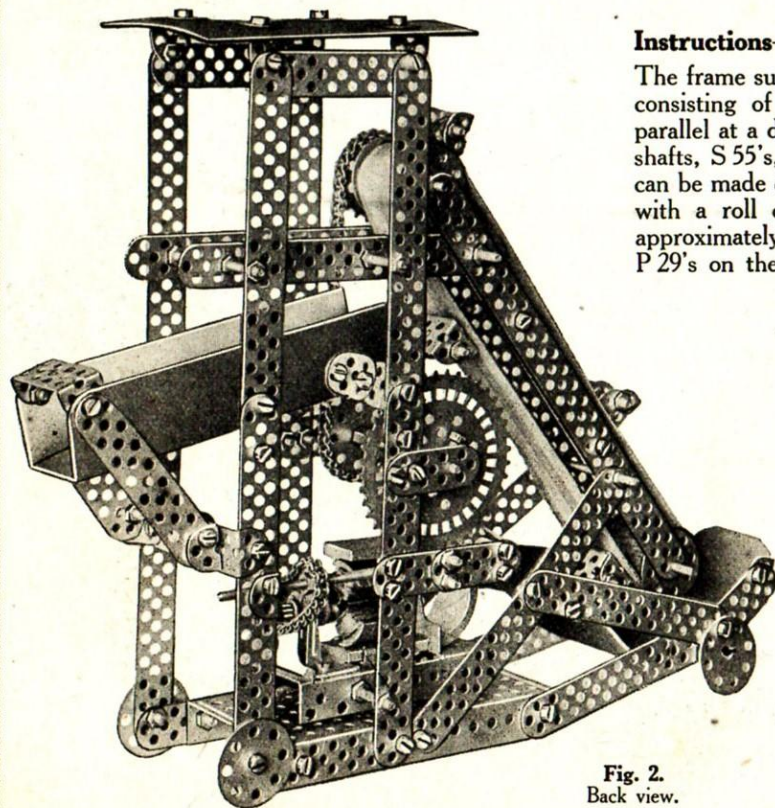


Fig. 2.
Back view.

Cardboard patterns, page 71.

No. 219. MAGIC WHEEL.

TRIX

Made with three Sets of No. 1, two Sets No. 1a, two Trix Gear Sets, one packet of nuts and bolts, and one Motor.

Parts Required :	A 1..... 8	F 9.....11	GB20..... 1	S 25..... 4	W 10..... 2
	B 1.....59	F 13..... 6	GB40..... 2	S 55..... 3	W 16..... 4
	Chain 2	F 17..... 8	N 1.....97	S 120..... 1	
	E 1..... 2	G 10..... 2	N 2..... 2	U 1..... 4	
	F 5.....12	GB10..... 2	P 29..... 2	U 2..... 4	

Description :

The four groups of small cardboard wheels, shown in Fig. 1 all rotate simultaneously while the large disc revolves. This causes the patterns of different colours to give the effect of a many pointed star.

Instructions :

Two E 1's are joined up to make a base, which supports the framework of F 17's fixed diagonally. They are joined by F 13's at the top in the form of a trapezium and strengthened by cross struts. The middle hole of the F 13's are bearings for the centre shaft. It is prevented from moving out of position by locknuts at each end. On one end a GB 40 is fixed and on the other end the frame for the cardboard disc, 8½ ins. diameter. A second GB 40 is fixed on the shaft between the wheel and the bearing so that it turns loosely between nuts. This GB 40, however, must be fixed tightly to the framework by an S 55 fastened to the F 13 and GB 40.

The four groups of coloured discs are each made of three F 5's in the form of a triangle fixed tightly to an S 25. Two groups are fastened between nuts on the shafts, whilst the two others are each fixed by a bolt tightened into an N 2 to which the S 25 is fastened. After inserting a W 16, the shafts are pushed through the bearings in the wheel.

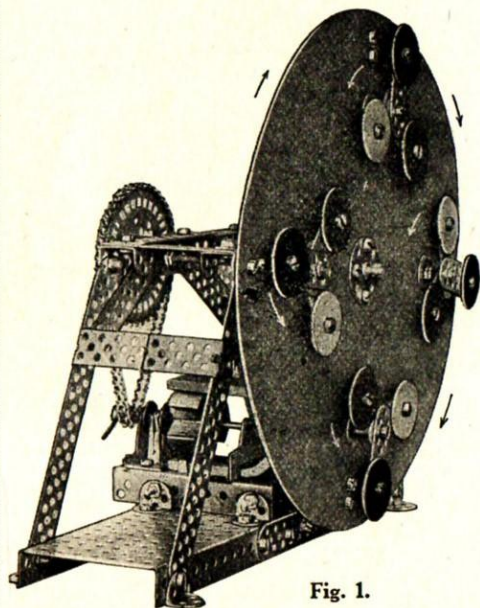


Fig. 1.

TRIX

No. 219. MAGIC WHEEL

Instructions—Continued.

On the other side of the wheel, a W 10 is placed on each of the two shafts with an N 2 on the front and they are fastened in position by locknuts. On each of the other shafts, S 25, a GB 10 is fixed. G 10's are fixed on the S 25's (with N 2's on the front side) so that they are in line with the GB 10's. A length of chain is joined round and encircles these small sprocket wheels. On the end of one of these S 25's a GB 20 is fastened.

A chain runs over this GB 20 and the GB 40 in the centre. Fig. 2 shows this chain slipped off the sprocket wheels and hanging loosely from the shaft. To fix the motor, two S 55's must be pushed through the base and fastened to the model with A 1's.

So that the star pattern is distinct, care should be taken when putting the chain over the sprocket wheels that the similar coloured discs in each group form the corners of three squares as shown clearly in Fig. 1.

If you do not wish to use a motor, the model can easily be hand driven if an S 55 is fastened to the GB 40.

Cardboard patterns, page 72.

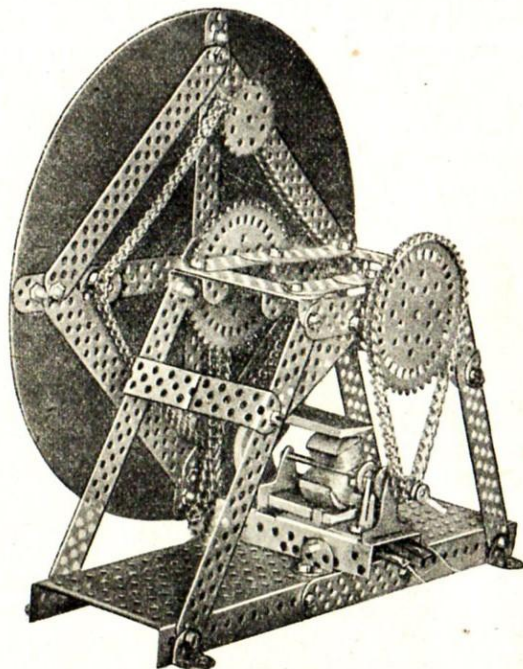


Fig. 2.
Back view.

No. 221. PENDULUM CLOCK. **TRIX**

Made with two each of Sets Nos. 1 and 1a, one Set of No. 2a, three Trix Gear Sets and one packet of nuts and bolts.

Parts Required :

A 1... 8	F 5... 5	GB10... 3	N 2... 2	S 87... 1	U 2... 2
B 1... 44	F 9... 5	G 20... 1	P 29... 8	S 120... 3	U 3... 2
C 1... 1	F 13... 4	GB20... 1	P 49... 2	SU 1... 1	W 10... 1
Chain .. 3	F 17... 8	GB40... 3	S 25... 3	SU 2... 1	W 16... 2
E 1... 1	G 10... 3	N 1...110	S 55... 8	U 1... 4	

Description :

This is a model of a clock, which does not actually keep time but illustrates the principle of a clock and its escapement.

Instructions :

First, we build the front frame (Fig. 2), and bolt it to the long side of an E 1. The back is made exactly the same and they are joined by two U 3's at the bottom. To strengthen the structure, we can fix a strut, consisting of two U 2's bolted together, to each side. The escapement, 5 (Fig. 3), is constructed of two F 5's, which are joined together by two U 1's in the form of a rectangle. It should be carefully noted that the bolts are in the upper holes, so that they do not catch and foul the escapement wheel, 1. The shaft is composed of an S 55 and S 25 fastened in the middle holes of these F 5's. At the other end of the S 55 the escapement rod, 6, consists of an F 13 with a U 1 bolted to it. The escapement wheel is made of a P 49, with eight A 1's carefully set and bolted on. It is fastened to a GB 20 which is tightened on the shaft S 87. On the same shaft, two GB 10's are fixed together and set so that their teeth correspond. At the other end, an SU 1 is fastened to prevent the shaft moving out of position. These GB 10's are meshed with a second gear wheel, 2, which is fastened to the shaft made of an S 55 and S 25 coupled by an N 2. On the S 55 (between wheel, 2 and the N 2) a GB 10 and G 10 are fixed so that the teeth are together as before. The boss of the GB 10 must be set so that it touches the nut locking the N 2 to the shaft.

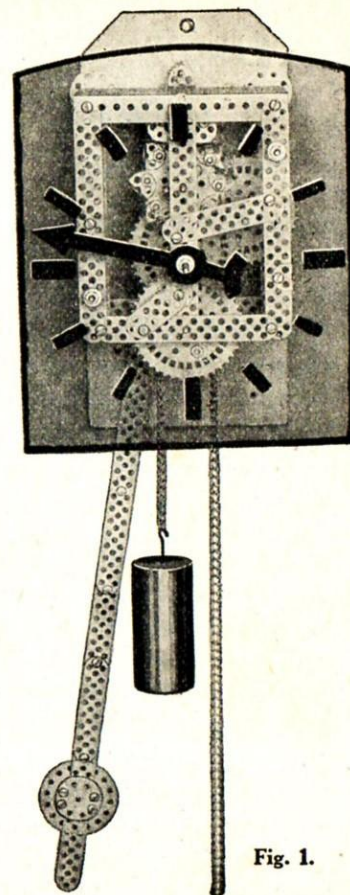


Fig. 1.

TRIX

No. 221. PENDULUM CLOCK

Instructions—Continued.

These small wheels are put in gear with another wheel, 3, which is fixed to a spindle S 120. Two G 10's are fastened to this shaft and are geared with the wheel, 4, (GB 40) which is placed loosely on an S 55 coupled with an S 25. An SU 2 is fixed by the end hole to the inner side of wheel 4 (see Fig. 2), as a catch. The end of this SU 2 grips into the teeth of the wheel G 20, which is fixed tightly to the shaft next to wheel 4. This SU 2 is held in contact with the G 20 by a rubber band from the end hole of the SU 2 to the wheel, 4.

Further along this shaft, a GB 20 is fastened, on which the chain and weight are placed. We can test whether the gear wheels are properly in mesh by moving the escapement out of position and turning wheel 4. To prevent the wheels slipping round on the shaft a second bolt can be inserted in the boss. The model must now be mounted on a board and hung on the wall. If we attach about a two pound weight (bag of sand, vessel of water, etc.) on the chain, the wheels will be driven very quickly. Now we replace the escapement and adjust the position of the clock until the escapement rod swings regularly from left to right.

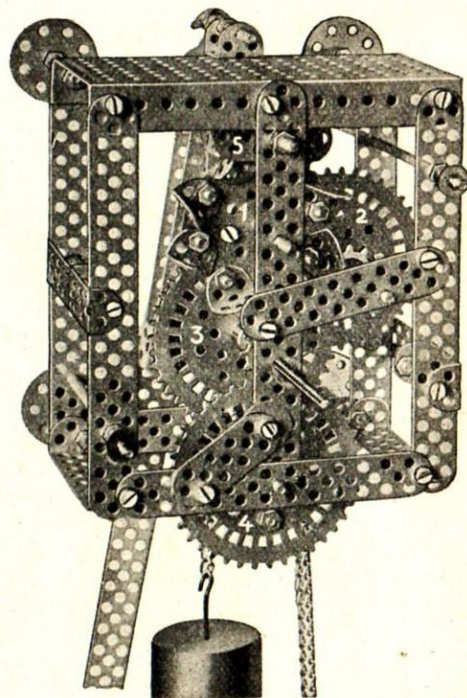


Fig. 2.
With dial and hand removed.

TRIX

No. 221 PENDULUM CLOCK.

Instructions—Continued.

If the model does not work, the trouble lies in the escapement, for perhaps the back of one of the U 1's of the escapement is not quite straight, or one of the A 1's on the escapement wheel, 1, is in the wrong position. If you have patience and watch closely you will soon have the clock going. We make the pendulum with a few F 17's and F 9's that are left. It is suspended by a C 1 and the weight discs, P 49's and P 29's, are attached to the other end. It is hung up on an S 55 fixed in a U 1 as in Fig. 3. The pendulum is placed between the brackets of the U 1 of the pendulum rod, so that it swings to and fro with it.

The dial is fixed by two S 120's fastened to the frame. In the illustration the dial is made of celluloid but cardboard can be used instead. On the S 120 in the centre we fix a cardboard hand, and our clock is finished. Although there is only one hand it is possible to tell the time if we regulate the length of the pendulum so that one complete turn of the hand takes two, three or five minutes.

Cardboard patterns, page 72.

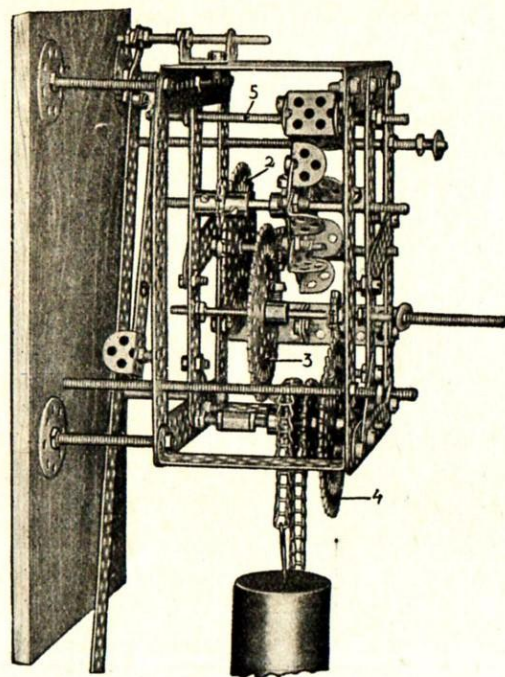


Fig. 3.
Side view.

TRIX

No. 226. TRICK RAILWAY.

Made with five Sets of No. 1, four Sets of No. 1a, one Set of No. 2a, one Trix Gear Set and one Motor.

Parts Required :

A 1.....12	F 17.....16	N 1....181	S 120..... 1	V 35..... 4
B 1.....93	G 10..... 1	P 29.....20	Spanners . 4	W 16..... 6
Chain 1	GB10..... 1	S 55.....16	U 2.....10	WM..... 1
F 5.....12	G 20..... 1			
F 9.....18	GB20..... 1			
F 13.....10	GB40..... 1			

Description :

The truck rolls down an inclined plane built in the form of an oval. At the lowest part it comes in contact with a transport chain, which it links into and is pulled up to the highest point, where it is released and starts its journey around the oval again.

Instructions :

First of all we build the two curves of the railway, which are both made in the same way. Each rail is made of three

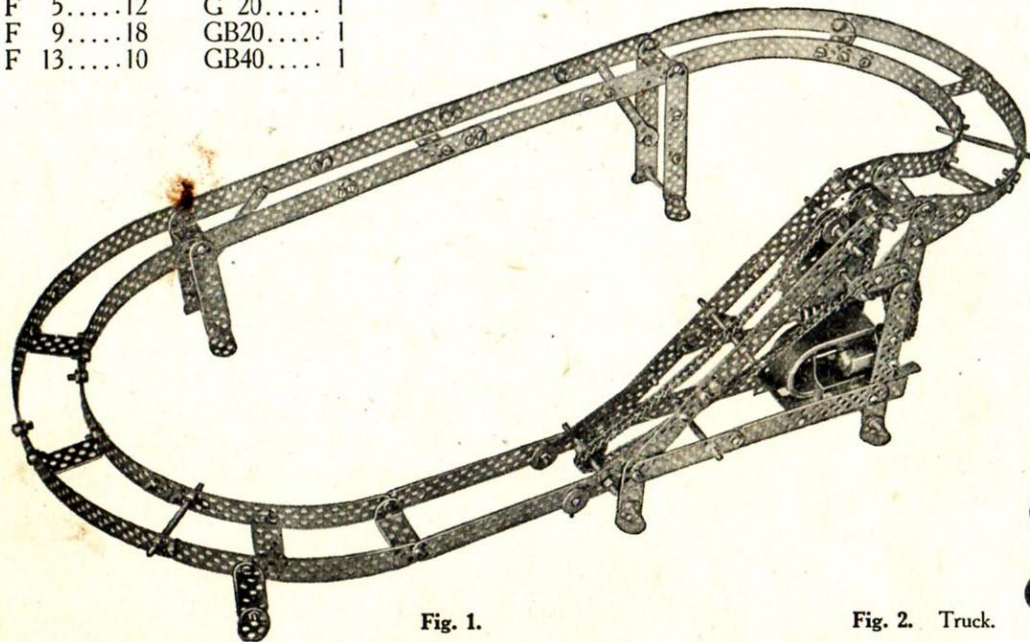


Fig. 1.

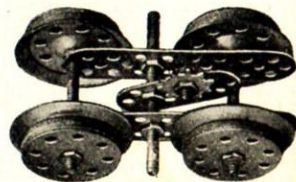


Fig. 2. Truck.

No. 226. TRICK RAILWAY.

TRIX

Instructions—Continued.

F.17's, with three holes overlapped on the inside and with one hole overlapped on the outside. An F 13 is bolted to the outside rail with three holes overlapped. One S55 and two U2's are used to space each curve. The straight rail, which slopes down from the upper to the lower curve, consists of two strips, each made of three F 13's overlapped two holes with an F 9 at the end overlapped three holes. These strips are joined up by three U2's and bolted to the curves. The supports are built as shown in Fig. 1. The left ones at the back are F 9's and the right ones are F 9's overlapped five holes. The straight rails in the front are each made of an F 17, F 9 and F 13, and the two slanting ones, each of an F 17 and F 9. Two spanners form a slope between the horizontal rails and the steep slanting rails.

The motor is fastened between the straight rails, which are extended as shown in Fig. 3. The driving power is transmitted by chain to a sprocket wheel, G 20, which is fixed to the worm shaft. The bearings for this shaft are A1's. A GB 40 is in gear with the worm and is fastened to an S55. F5's form the bearings for this shaft. Also on the S55 is a GB 20 which drives the transport chain. This chain is carried over a sprocket wheel, GB 10, seen to the left of the motor (Fig. 1). From this the chain is led over two guiding rollers. These are each made of two W 10's fixed tightly between nuts on a shaft S55 so that the chain runs on the nuts between the washers.

The truck (Fig. 2) is made of two F 9's fixed parallel by an S 55. The wheels made as in EC 41, Book No. 2, are fastened on S55's which run in the F 9's.

So that the truck can be carried to the top by the chain, an F5 is fastened to the centre of the S 55 as in Fig. 2. On one of the outside holes of the F5 is bolted a G 10. We regulate the F 5 so that the G 10 hooks into the chain when the truck reaches the bottom.

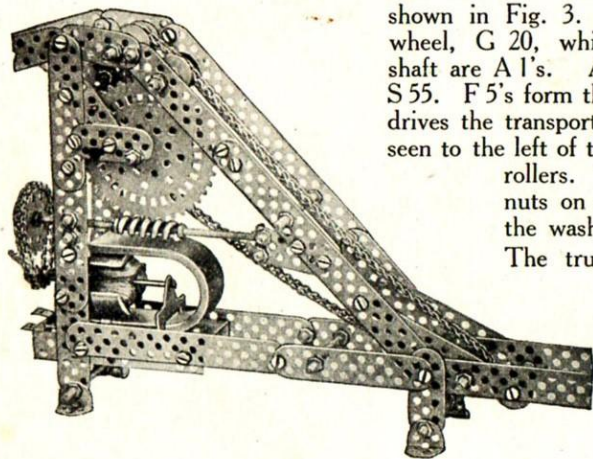


Fig. 3.
Showing how the Motor is Fixed.

TRIX

No. 227. TRAVELLING BELT CONVEYOR.

Made with four each of Sets Nos. 1 and 1a, two Sets No. 2a, one Trix Gear Set, four Model Rubber Tyres and one Motor.

Parts Required :

B 1 ...65	F 9.... 7	GB10.... 1	N 2.... 1	S 55....10	SU 1.... 2	V 35.... 6
Chain ... 1	F 13.... 4	G 20.... 1	P 29.... 4	S 87.... 4	U 1.... 2	W 10.... 4
ER 1.... 4	F 17....16	GB20.... 1	P 49.... 4	S 120.... 1	U 2.... 4	WM.... 1
F 5.... 7	G 10.... 1	N 1....99	S 25.... 7	Spanners 6	U 3.... 4	

Description :

These machines are used in modern building operations to remove the debris by motor power from the base of the building pit, where it is shovelled on to the belt and conveyed to the lorries which take it away. In our model, an endless belt runs over two rollers, one of which is driven by the electric motor.

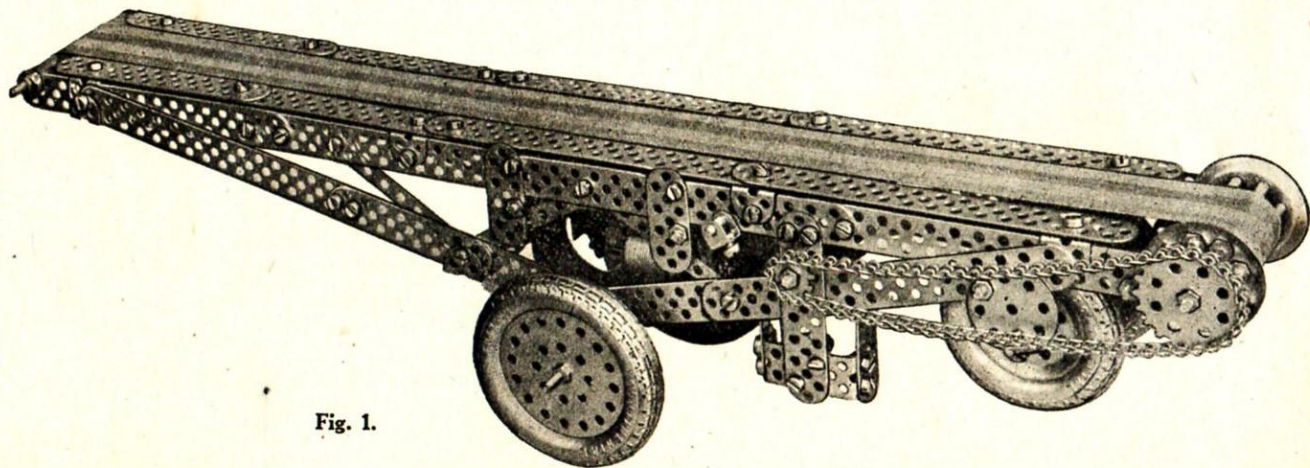


Fig. 1.

No. 227. TRAVELLING BELT CONVEYOR.

Description—Continued.

These machines are also used to load quantities of goods to be dispatched, such as small crates of lentils, rice, etc., which are carried by the belt upwards and feed into containers placed underneath.

Instructions :

The framework supporting the rollers consists of two side strips each made of four F 17's overlapped three holes and joined in the 6th, 19th, 36th and 55th holes from the right (i.e., from the driving roller end) by U 3's. On these U 3's two strips are bolted, each made of two F 17's and two F 13's. Diagonal supports, each made of one F 17 and one F 9 two holes overlapped, are bolted in the sixth holes of the side strips; in the 55th holes, supports are fixed, each composed of an F 17 and two F 9's. A P 29 is bolted to the ends of these supports on both sides and the lowest holes form the bearings for the shaft S 120. In a similar way P 29's are the bearings for the rear wheel shaft, S 87. To strengthen this structure three spanners are fixed to each side. The front supports are strengthened by two U 2's, bolted

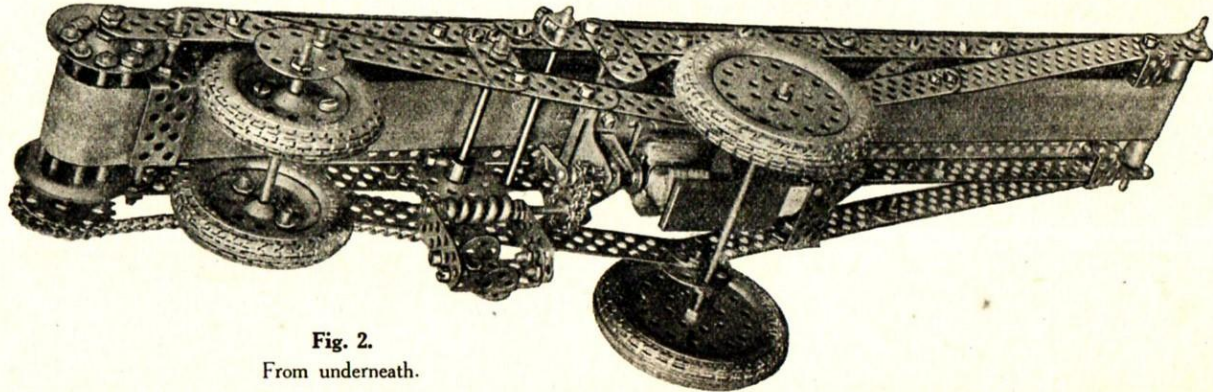


Fig. 2.
From underneath.

TRIX

No. 227. TRAVELLING BELT CONVEYOR

Instructions—Continued.

together, and fixed where the two F9's join, on the outside. The belt driving roller is made of two V35's joined by eight S55's at a distance of about $1\frac{3}{4}$ ins. The shaft is made of an S55 and S25 coupled by an N2. The diameter of the upper roller is $\frac{3}{8}$ in. and it is $2\frac{3}{8}$ ins. long. It can be made of wood, cardboard or a strip of paper rolled and glued. The shaft is an S87. The belt is guided underneath by a U2 fixed to the sides by two S25's; at the top it runs between two U1's bolted to the sides (Fig. 2). The motor is fitted with the base upwards and in each of the outside holes, S25's are fastened. These S25's are held in F5's attached to both sides of the framework. From the motor the power is transmitted by chain to the sprocket wheel, G20, which is tightened between nuts on a shaft S55. On the same shaft the worm is also fixed. The worm is in gear with a GB20 which is placed on a shaft S87. On the same shaft a G10 is fastened between nuts outside the bearing, and from this the sprocket wheel, G20, on the roller is driven by chain. The wheels in the centre are built as in EC42, Book No. 2, and the back wheels as in EC47.

The belt must not be more than $1\frac{1}{4}$ ins. wide and $34\frac{1}{2}$ ins. long and is stitched or glued together to make it endless. So that the belt does not foul the base of the motor an S87 is fixed through the side frame and is kept in position by SU1's.

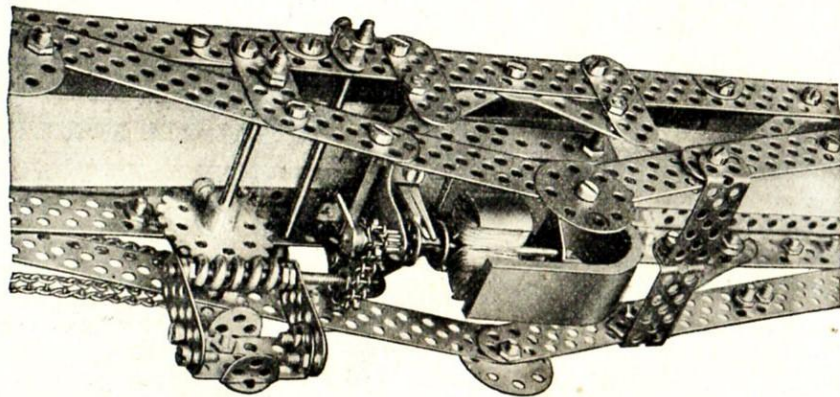


Fig. 3.

From underneath. The wheels are removed.

No. 228. ELECTRIC TROLLEY

TRIX

Made with Five Sets of No. 1, two each of Sets Nos. 1a and 2a, one Trix Gear Set, one TRICY TRIX, 1 packet of Nuts and Bolts, four small Rubber Tyres and one Motor No. 2051.

Parts Required:

A 1... 10	E 4... 2	E 8... 1	F 17... 8	GB20... 1	S 55... 5	SU 2... 1	U 3... 3
B 1... 78	E 5... 1	F 5... 11	G 10... 1	N 1... 162	S 87... 1	Spanner 1	V 35... 8
Chain... 1	E 6... 1	F 9... 15	GB10... 1	N 2... 1	S 120... 1	U 1... 4	W 16... 4
E 3... 1	E 7... 1	F 13... 8	G 20... 1	S 25... 4	SU 1... 1	U 2... 10	WM... 1

Description:

The Electric Trolley is built with a low chassis and is driven with an electric motor. The motor is supplied with current by an accumulator, which is re-charged from time to time as necessary.

For our model, we use two pocket lamp batteries connected in series (i.e., the long contact of one battery to the short one of the other—giving 8 volts). These are laid on the vehicle as luggage would be placed. To give a more realistic appearance, the batteries can be placed in a container which looks like a travelling trunk. The driving control in front of the switch box starts the motor and also switches it forward and in reverse. A contact fixed on the front platform operates a buzzer.

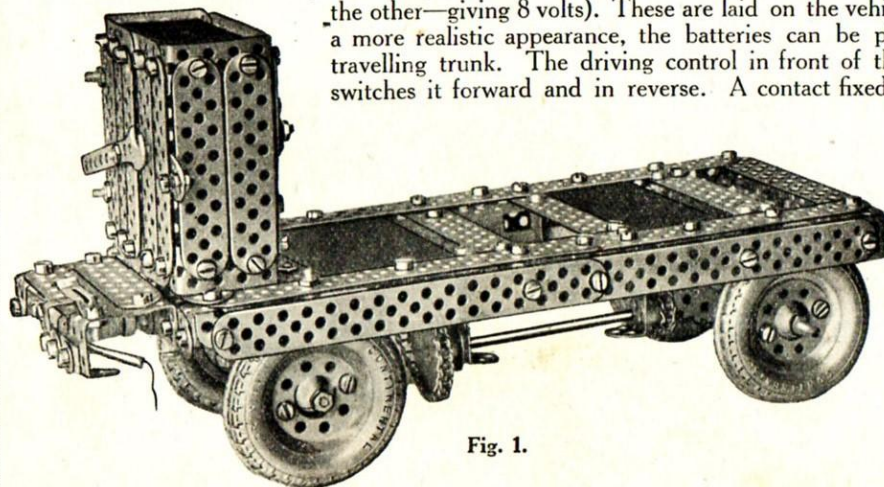


Fig. 1.

Instructions:

We build the two sides of F 17's overlapped four holes with A 1's at the ends and in the middle. At the back U 3's are bolted inside and an F 13 is fastened to the end. In the front an F 13 is fixed to the sides by two A 1's. In the 5th, 14th, 19th and 26th holes from left to right (Fig. 1) cross struts, F 13's, are bolted to strengthen the frame.

TRIX

No. 228. ELECTRIC TROLLEY.

Instructions—Continued.

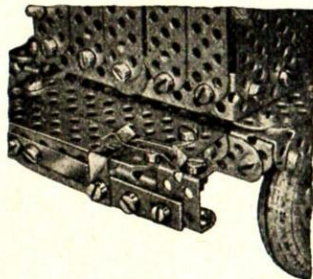


Fig. 4. Showing driving platform.

and is bolted to the end F 13. Underneath this driving platform is housed the buzzer. The bobbin, E 3, and the bobbin core, E 4, are attached to the middle hole of the F 13 after inserting four F 5's. The trembler consists of two F 5's bolted on a contact strip, E 5, and is bolted to the bracket of the U 2 on the right of the driving platform. On the other U 2, an insulator, E 8, is bolted in the middle hole. At one end of it a U 1 is fixed with an E 7 bolted to the top as shown in Fig. 4. This U 1 and E 7 are insulated from the frame. On the other end of the insulator an E 6 is bolted and bent as shown in Fig. 4 (this may also be made of copper wire bent in this form).

The switch box on the driving platform is made of two frames, each consisting of two U 2's joined by two F 9's in the form of a rectangle. The two frames are joined by vertical F 9's and fastened to the platform by two A 1's (Fig. 3). The front wheels run on S 25's and are made as EC 39, Book No. 2. The S 25's are fixed on U 2's. These U 2's swivel on vertical S 55's (Fig. 2). F 5's are used as steering arms and are coupled by an F 9. On the left side the F 5 is joined to the F 9 by an S 55, instead of a bolt, and the steering gear, described later, is fixed on this S 55. The bearings for the back wheels are F 5's fixed to the cross strut, F 13, by U 1's. The back axle is an S 120, and the wheels, as in EC 40, are placed on it between nuts. A gear wheel, G 20, is fastened on the S 120 and is in mesh with the worm. The worm shaft runs in a U 3 and is driven from the GB 10 on the intermediate shaft, S 87, by chain to the G 10, fixed outside its bearing.

One side of the motor base is bolted to the cross struts, F 13's. The driving platform is fixed in front of the switch box. It is made of two U 2's joined together by two F 9's

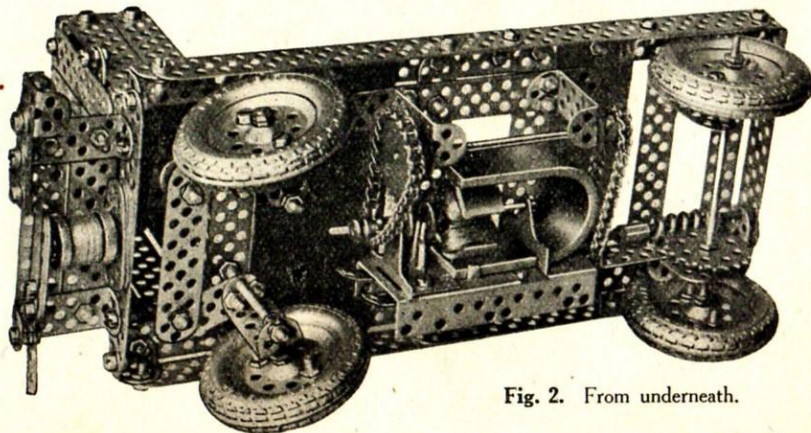


Fig. 2. From underneath.

No. 228. ELECTRIC TROLLEY.

Instructions—Continued.

One end of the bobbin is connected to the frame of the model and the other leads to one pole of the battery. The second pole of the battery is connected to the E7 already mentioned. If we press the E7 down to make contact with the E6 the circuit is completed and the buzzer will work as explained in the TRICY TRIX Book, Model No. 5. The motor drive and intermediate shaft are shown clearly in Fig. 2. The worm shaft, made of an S25 and S55 coupled as in EC 46, runs in a U3 held to the cross strut F13 by a U1. One of the back wheels moves freely on the shaft and the other is fixed tightly.

Fig. 3 shows the arrangement of the steering. In the illustration Fig. 5, one side is taken off. We see an F5 fixed to a U1 by two B1's. At right angles to the F5, a lever is bolted to the other side of the U1. These parts move freely on an S55. An S25 is fixed to the end of the F5 and supports a hinge, which is made of an SU1 and SU2 bolted together. The SU2 is placed on the S55, which has already been fixed to the F9 on the front wheels. In this way the front wheels are moved to left and

right by the lever at the side of the switch box. In front of the switch box a spanner is attached to the S55 as driving control lever. This lever operates the switch arm, Fig. 5a, which is fastened between W16's on the shaft, after the side has been replaced. The switch arm is fixed on the shaft so that it is at right angles to the lever. By moving the control lever in front the contact bolts in the switch arm connect with the E6's. The leads of the battery are attached from the inside to the two bolts holding the E6's. The two other leads, from the terminals of the motor, are connected to the two bolts in the switch arm and must be made of flexible wire. The roof of switch box and loading platform are made of strong cardboard. Patterns, page 72.

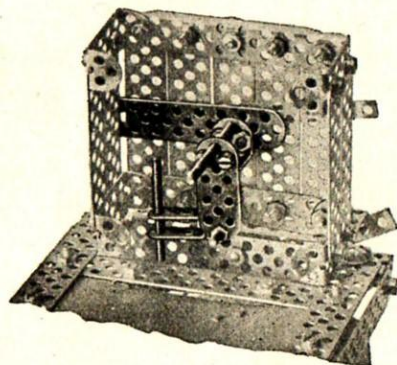


Fig. 3. Back view of switch box,
with side removed.

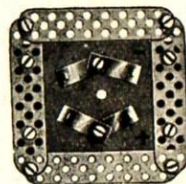


Fig. 5.



Fig. 5a.

TRIX

No. 230.

ELECTRIC WINDMILL.

Made with five Sets of No. 1, six Sets of No. 1a, two Sets of No. 2a, one Trix Gear Set and one Motor.

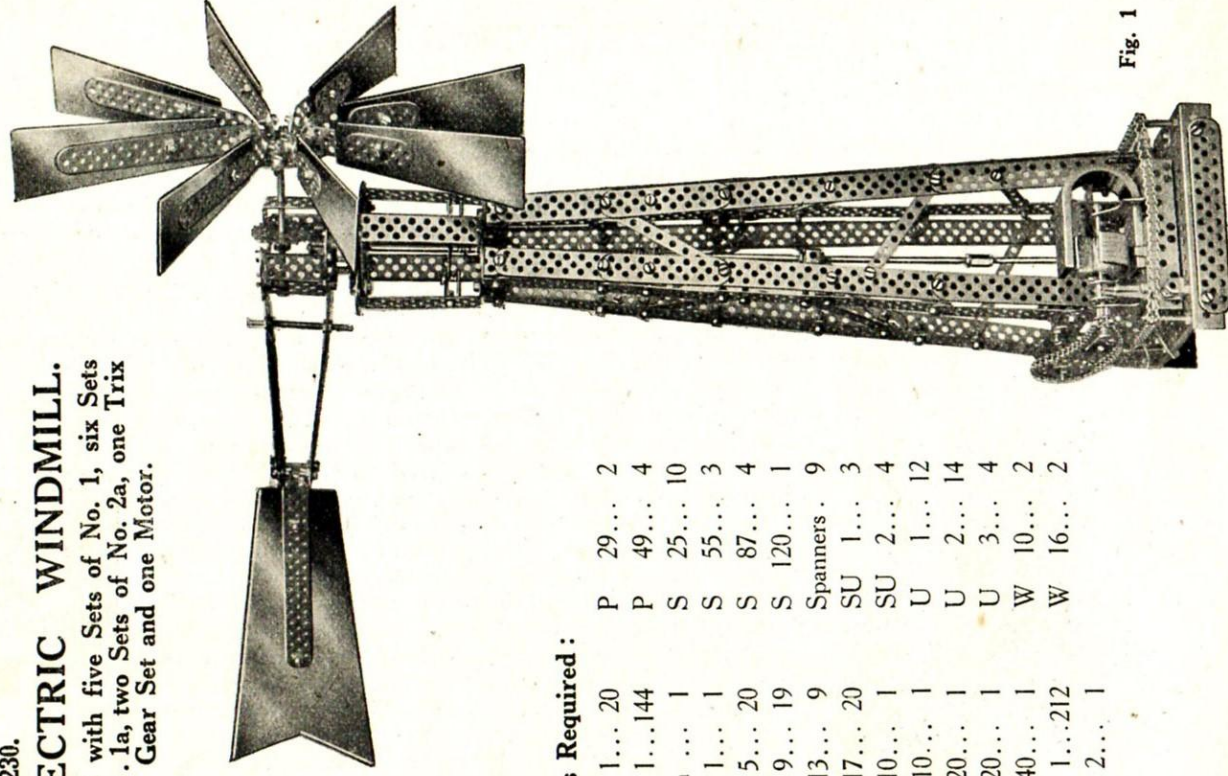


Fig. 1

Parts Required :

A	1... 20	P	29...	2
B	1...144	P	49...	4
Chain	...	S	25...	10
E	1... 1	S	55...	3
F	5... 20	S	87...	4
F	9... 19	S	120...	1
F	13... 9	Spanners	.	9
F	17... 20	SU	1... 3	3
G	10... 1	SU	2... 4	4
GB	10... 1	U	1... 12	12
G	20... 1	U	2... 14	14
GB	20... 1	U	3... 4	4
GB	40... 1	W	10...	2
N	1...212	W	16...	2
N	2... 1			

No. 230. ELECTRIC WINDMILL.

TRIX

Description :

This type of Mill is used for generating electricity. The driving force of the wind sets the large sails in motion and these drive a dynamo, which produces the current. The sails are automatically placed in the right direction towards the wind by means of the tail vane at the back. In our model, however, the motor does the work and sets the sails in motion.

Instructions :

The corner columns of the tower are each made of four F17's and four F9's overlapped two holes. At the points where they overlap they are joined by A1's. The bottom corners are joined with two U2's, so that the backs of the U2's are bolted to the strips and the feet are fastened together (Fig. 3). The four corner columns are bolted together on three sides by F9's in the inside holes of the F17's. Ten spanners are used to strengthen the tower. An E1 is fixed to the fourth side of the tower base. The top of the tower is completed with four F5's and U1's. On the top, a further structure is built consisting of four U3's and four U1's bolted together and fixed to the F5's (with feet inwards). A P49 is fastened to the feet of the U3's.

The vertical shaft which runs down the centre of the tower is made of three S87's, one S55 and one S120 coupled with an N2 and three SU1's. The lowest bearing for this shaft is made of two U2's and one U1 bolted together and fixed to the F9's at the base of the tower by F5's. Inside the four U3's at the top is built another bearing consisting of a P29 with four SU2's bolted to it in the form of a cross (Fig. 2). After placing on it a GB40, the centre shaft is inserted in the bearings so that the upper end projects above the framework.

The revolving head, in which the horizontal sails shaft runs, is built on a P49. Under this a second P49 is fixed by four S25's. The S25's

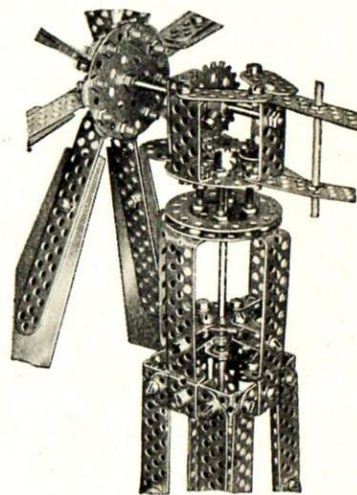


Fig. 2.
Upper construction.

TRIX

No. 230. ELECTRIC WINDMILL.

Instructions—Continued.

must not be extended under this P 49. Four U 2's are fixed with two bolts to the outside circle of holes on the upper P 49. Under one of these U 2's is bolted an F 17 and under the opposite one a P 29. Above the first F 17 are fixed a second F 17 and two F 5's which are bolted at the other end to the U 2's (see Fig. 2). The sails shaft is an S 87 on which a GB 20 is placed. This gear wheel is driven at right angles by a GB 10 on the vertical shaft. The sails consist of a P 49 with eight A 1's attached to it. To these A 1's are fixed F 13's and cardboard vanes. The tail vane is also made of cardboard and bolted between two F 17's. It is fastened to the F 17's already attached to the head by two U 1's bolted back to back.

Now we place the revolving head on the vertical shaft and fasten the GB 10 in position.

The motor is bolted to the E 1 and the remainder of the chain is fixed on to S 25's to form a rail. The motor drives a G 20 which is fastened to an S 55. The first bearing for this shaft is made of three F 5's joined together and attached to the sides of the tower. The second bearing is an F 5 fitted by S 25's to the first bearing, but in the upper holes. Between the bearings is a G 10 which transmits the power to the vertical shaft by an angle drive to a GB 40.

When we start up the motor, the sails revolve no matter in what direction the tail vane is set.

Cardboard patterns, page 72.

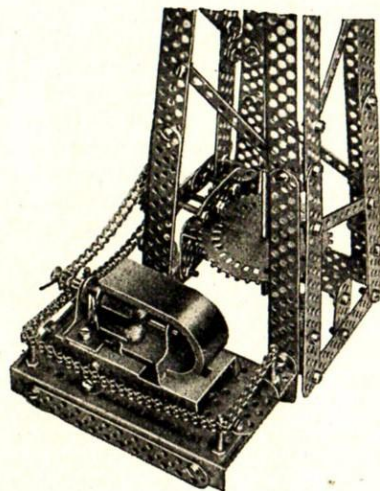


Fig. 3.

Showing how the Motor is fixed.

No. 231. MOTOR FIRE ESCAPE

TRIX

Made with six Sets of No. 1, four Sets of No. 1a, two Sets of No. 2a, two Trix Gear Sets, two large Rubber Tyres, two small Rubber Tyres and one Motor.

Parts Required:

A 1.... 8	F 5.... 6	G 10....2	N 1....154	S 25.... 7	SU 1.... 4	V 35.... 6
B 1.... 91	F 9....18	GB10....2	N 2.... 2	S 55.... 21	U 1.... 5	W 10.... 6
Chain ... 1	F 13....12	G 20....2	P 29.... 22	S 87.... 4	U 2.... 6	W 16.... 8
ER 1.... 2	F 17....16	GB20....2	P 49.... 4	S120.... 2	U 3.... 4	WM.... 2

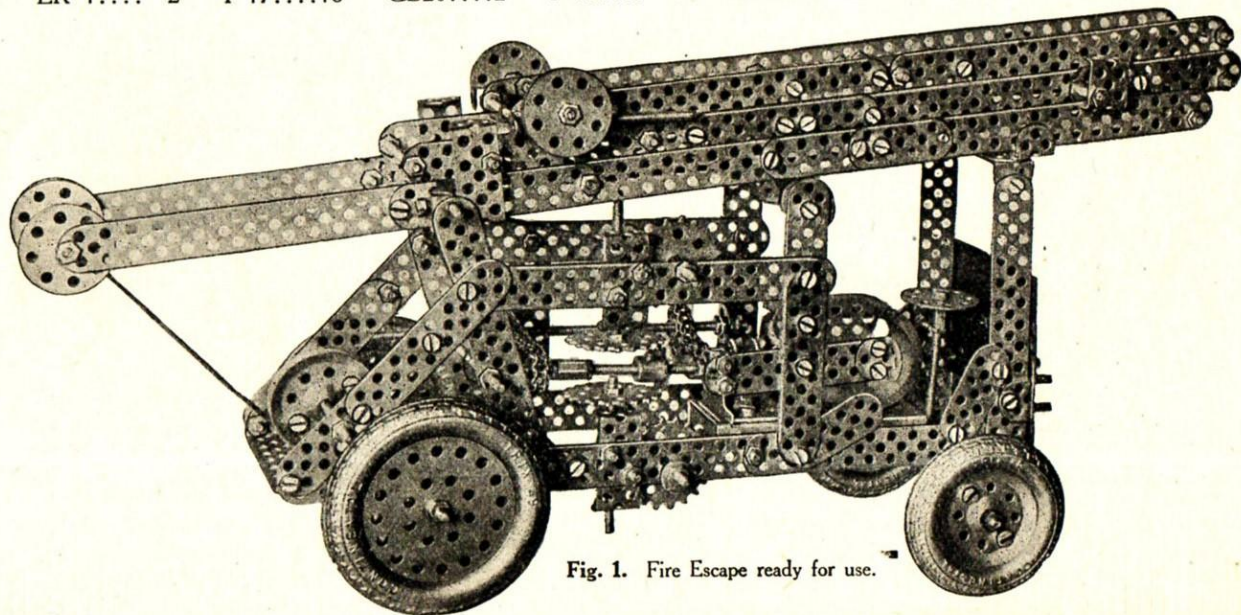


Fig. 1. Fire Escape ready for use.

TRIX

No. 231. MOTOR FIRE ESCAPE.

Description :

The three ladders lying one above the other are raised to a slanting position with cords driven by the built-in motor. When the required position is reached the intermediate shaft is put out of gear and the ladders are elevated. To place them in position again we reverse the motor by using the switch No. 203, which is fixed to the model. Steering control is fitted to the front wheels.

Instructions :

First of all we build the chassis (Fig. 3a). Two long strips, each made of three F13's overlapped three holes, are joined together by three U3's to make a frame. A fourth strut, made of two U2's bolted together, is fixed to the front of this frame and supports the reversing switch made as shown on page 5. Figs. 3 and 3a show clearly how the sides are erected. Both sides are made alike, except that the vertical F9 is omitted on the right side. On this F9, and also the F13 to the left of it, A1's are bolted as bearings for the spindle, S120. A cross strut, made of an F9 and two U1's, strengthens the F13's as shown in Fig. 3.

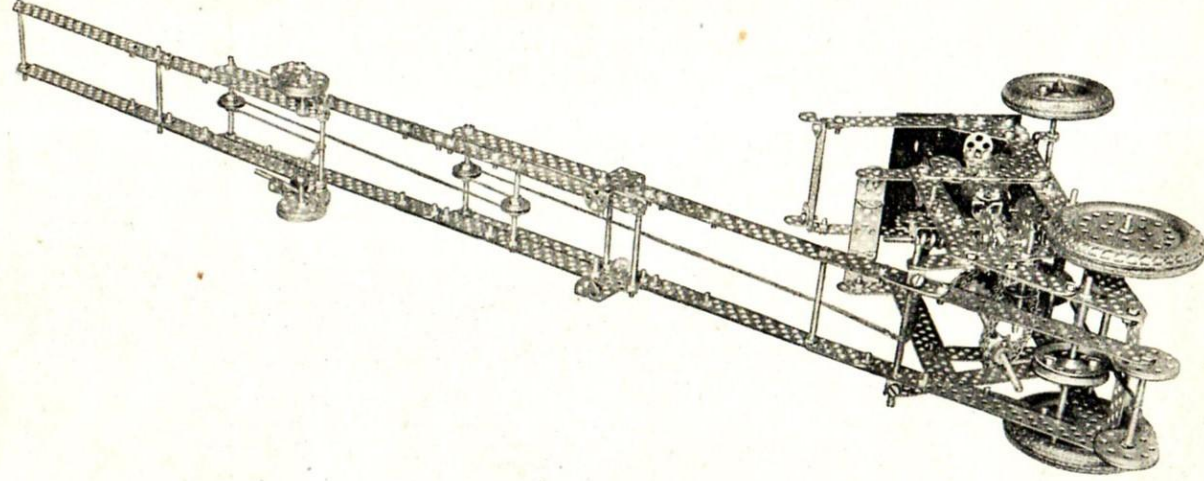


Fig. 2. Fire Escape with ladders erected.

No. 231. MOTOR FIRE ESCAPE.

Instructions—Continued.

In a similar way, an F 9 and two A 1's strengthen the front pair of vertical F 13's. The back pair of F 13's are arranged in a sloping position and are bearings for an S 87 in the top hole. The S 87 is kept in place by two SU 1's on the inside of the bearings (see EC 24, Book No. 2.)

The motor is attached to the chassis frame by two S 55's fixed through the base of the motor.

Fig. 3 shows how the back wheels are arranged on the chassis. The wheels are made as in EC 42, Book No. 2. The front steering wheels are constructed as in EC 39, and run on S 55's fastened to a U 3. An S 55 is secured in the middle hole of this U 3. After inserting a W 10 this S 55 is fastened with locknuts in the middle hole of the front U 3 of the chassis so that it moves freely.

The steering wheel is a P 29 (Fig. 1).

The motor transmits its power by chain to a sprocket wheel, GB 10, on the intermediate shaft, S 120. Further along this shaft is another sprocket wheel, G 10, which drives another G 10 by chain. This G 10 is attached to a shaft made of an S 25 and S 55 coupled as in EC 46. On the S 55 is fastened a GB 10 (Fig. 1). The rear end of this shaft runs in the middle hole of a U 1 which is tightened by one of its feet to an S 55 fixed to the slanting F 13 of the chassis. The front end of the shaft runs in an A 1 which is bolted with two B 1's to a lever, F 9. This lever which has an A 1 as handle on its end, swivels on a

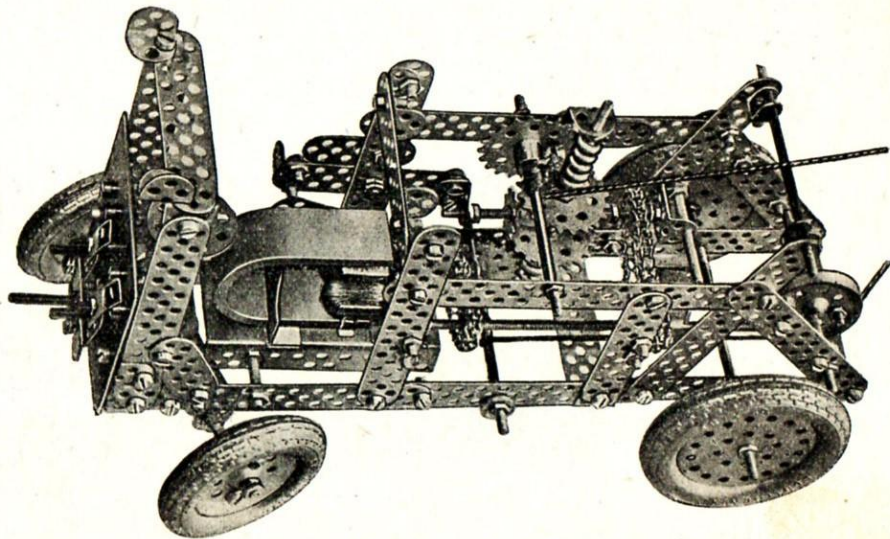


Fig. 3. Fire Escape with ladders removed.

TRIX

No. 231. MOTOR FIRE ESCAPE.

Instructions—Continued.

bolt in the middle hole. It is placed between the vertical supports, F 13 and F 9, which have an F 5 as spacer fastened above parallel to it. Locknuts are tightened inside the bearings, A 1 and U 1, to prevent the shaft slipping out of position.

By moving the lever up and down the GB 10 is raised or lowered to make contact with gear wheels, G 20's, on the worm shafts above and below. These worm shafts, S 55's, run in U 2's which are fixed to the right side of the model. The worm is fastened inside the U 2 in each case. To bring these worm shafts into the right position, we insert behind the U 2's any TRIX parts that are left over, such as W 10's, U 1's, U 2's, A 1's, etc. Fig 3 shows how an F 5 has been placed behind the top worm shaft bearing. The lower worm is meshed with a GB 20 which is attached to a S 87. This lower shaft is for raising the three ladders together by a cord, which is wound on the S 87, to a slanting position. The upper shaft is for hoisting the ladders.

The lowest ladder (Fig. 4) consists of three F 17's and one overlapping F 9 on each side and joined by four S 55's. On the left end four P 29's are attached to the S 55 as counter weights. On the other end a cord roller is placed on the S 55 as in EC 11, Book No. 1.

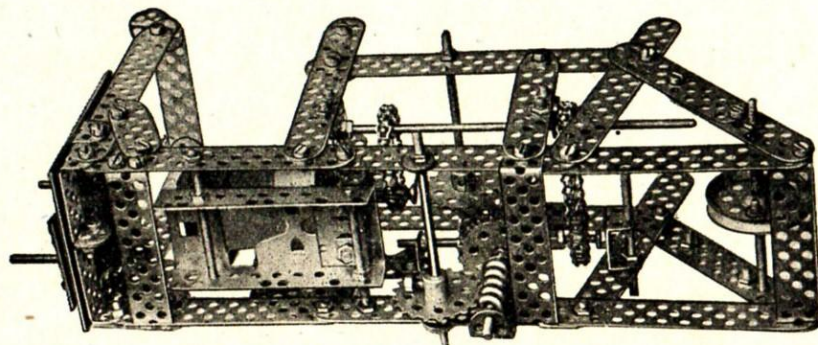


Fig. 3a. View of chassis from underneath.

No. 231. MOTOR FIRE ESCAPE.

Instructions—Continued.

This ladder is hinged on the S 87 at the back of the model and rests on the F 9 above the driving cab. The second ladder is made of two strips, each of two F 17's overlapped by an F 9 as in EC 5, Book No. 1. The strips are joined by three S 55's and the ladder is placed over the first one. Two of the S 55's have cord rollers similar to the first ladder. This ladder must slide inside the other ladder. On both sides U 2's are attached by S 25's which clasp ladder one and prevent the ladders toppling over when they are extended. The U 1's in front, also fastened by S 25's, hold the third ladder in a similar way. This third ladder consists of F 17's with F 9's overlapped. Its sides should fit inside those of ladder two. The lowest spindle, S 55, has an SU 1 on the outside of both sides tightened by two nuts. S 55's are attached to the feet of these SU 1's. When the third ladder is elevated the S 55's catch under the above mentioned U 1's so that ladder three does not over-balance. Six P 29's as counter weights are fastened to each side on S 25's. If the ladders are arranged very carefully so that they slide on to one another without fouling, we can tie a cord on ladder three as shown in Fig. 4. This leads over the front roller of ladder two, then over the back roller; next over the roller of ladder one to the shaft S 87, which is driven by the upper worm shaft. We fasten the end of the cord on the bolt holding the gear wheel to the shaft. The rungs of the ladders can be represented by string threaded through the sides. For the sake of clearness these are left out of the illustrations.

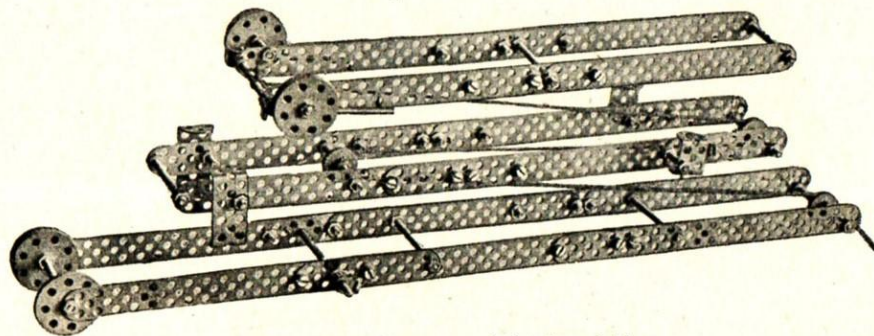


Fig. 4. Arrangement of the three ladders.

TRIX

No. 233. PORTABLE JIB CRANE.

Made with four Sets of No. 1, four Trix Gear Sets, seven Sets of No. 1a, two motors No. 2051 or No. 2161 and one packet of nuts and bolts.

Parts Required :

A	1.....	18	F	13.....	7
B	1.....	118	F	17.....	28
C	1.....	3	G	10.....	4
Chain	.....	1	GB	10.....	4
E	1.....	2	G	20.....	1
F	5.....	12	GB	40.....	1
F	9.....	8	N	1.....	216
			N	2.....	2
			P	29.....	3
			S	25.....	6
			S	55.....	11
			S	120.....	1
			Spanners	...	2
			U	1.....	14
			U	2.....	8
			W	10.....	12
			W	16.....	8
			WM	.....	4

Fig. 1.

No. 233. PORTABLE JIB CRANE.

TRIX

Description :

This is a portable type of crane, handy for shifting about from place to place. On account of its simple construction, it can be erected in a short time and easily dismantled. The crane jib turns through 180 degrees by motor control and can be raised and lowered by reversing gear. The second motor controls the ropes which carry the weight. The different operations are changed about by reversing the motor.

Instructions :

First of all we construct the base. Two angled struts, each made of two pairs of F 17's three holes overlapped are fastened together with three A1's in the middle and at the ends. (Fig. 2). These two struts

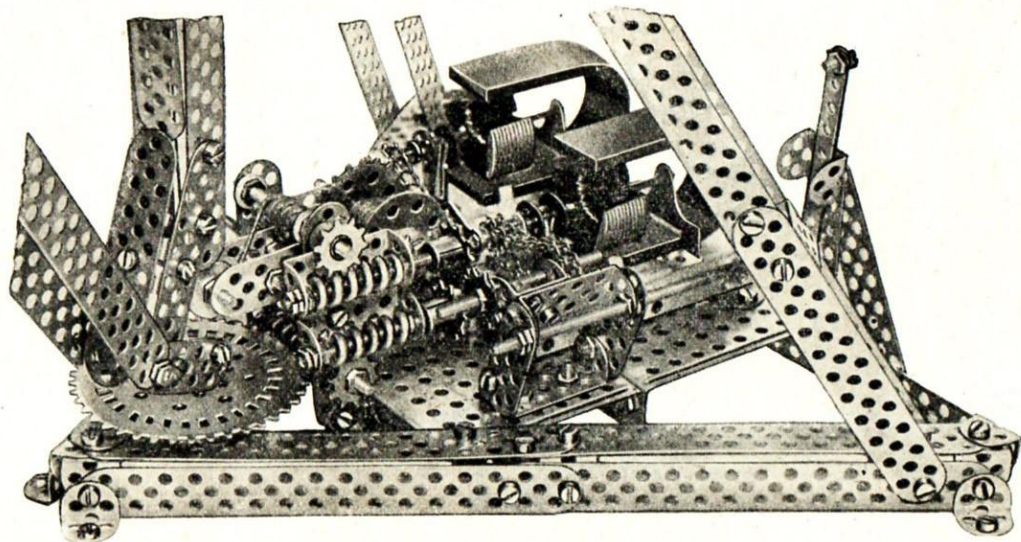


Fig. 2. View of driving gear from the left side.

TRIX

No. 233. PORTABLE JIB CRANE.

Instructions—Continued.

are attached together at one end in the middle holes of the A 1's and secured at an angle of 60 degrees. Their other ends are joined by A 1's to F 17's which are bolted with two B 1's to the long side of an E 1. We must be careful that these F 17's meet equally in the middle of the E 1. On the outside of this three-cornered base, A 1's are bolted to the ends of the angled sides and are used to fasten the model to a wooden base.

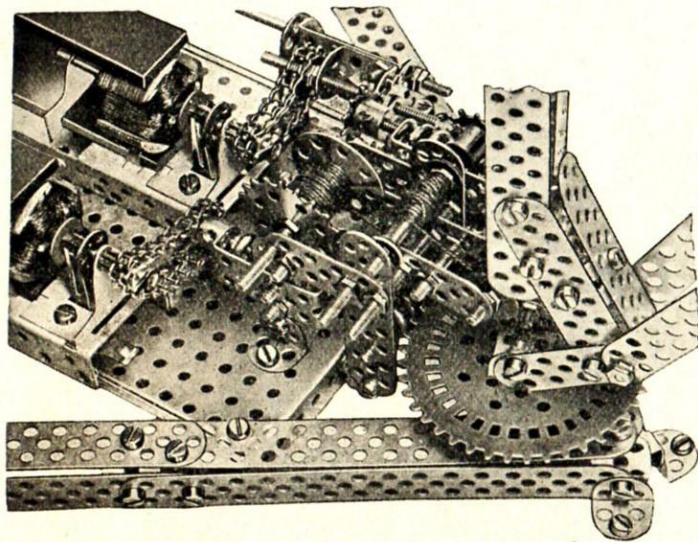


Fig. 3.

View of driving gear from the right side.

Now we build two slanting supports of double strips, each consisting of two F 17's and one F 13 with three holes overlapped. These strips are joined in pairs by U 1's where they overlap and also at one end. The other ends of each are bolted to U 1's which are inserted inside the angled sides near the A 1's. The upper ends of the supports are joined in the middle holes of the U 1's to an F 9 in its second and eighth holes so that the U 1's are at a similar angle (see Fig. 1). At the same time with the F 9 and U 1's, we fix F 5's by the end holes and join them at the other end by an S 25 in the form of a triangle. We fasten the S 25 (with lock nuts) so that it is allowed to turn.

Now we build the vertical supports. These consist of four F 17's and F 13's three holes overlapped, with U 1's bolted where they overlap, at the upper ends and in the tenth hole from the top so that the column is U-shaped.

No. 233. PORTABLE JIB CRANE.

Instructions—Continued.

An F 13 is placed on the back of two of these U 1's. At the lower end of the vertical column is bolted a slanting support (Figs. 2 and 3) which allows the underneath pulleys to be vertically in line with the upper ones. This support is composed of two F 9's on the sides joined by a U 1 in the middle hole. A third F 9 is bolted to the back of the U 1. The under part of this support is formed of two F 5's with a U 1 attached (in the middle holes of the brackets). The U 1 is held in the end holes of the upper rows. In the back of this U 1, an S 25 is tightened between two nuts so that it extends underneath. Then a GB 40 with boss downwards is placed on the S 25 and held in position with nuts and bolts. On the upper end of the supporting column an A 1 is fixed in the middle hole of the U 1 and is attached by the S 25 of the little triangle. Over both angled sides at the apex of the triangular base, an F 5 is bolted to the F 17's in the fourth of the inner row of holes. The F 5 is placed in such a position that its side holes are used. The vertical column turns on an S 25 in the middle hole of this F 5. It is made firm with locknuts underneath.

After we have finished the base with its three supporting columns, we come to the interesting erection of the power unit. This is mounted on an E 1 which is bolted alongside the E 1 already in position (Fig. 2). In the middle of the front long side of the E 1, a U 2 is fastened by two B 1's (with N 1's in between). An F 9 is bolted in an upright position to each side of the U 2 (Fig. 3) in the lower hole of the F 9 and the middle hole of the U 2 brackets. In the two outside holes of the F 9 (in the third holes from above) spindles, S 55's are fixed

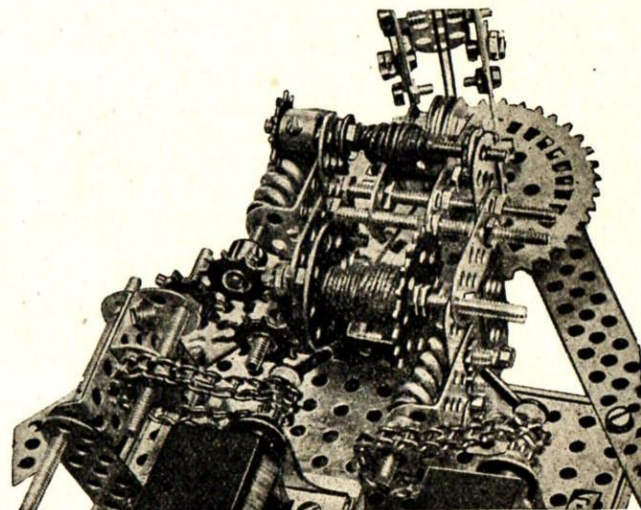


Fig. 4. Back view of driving gear from above.

TRIX

No. 233. PORTABLE JIB CRANE.

Instructions—Continued.

and at the same time F 5's are attached to them in the end holes (with a nut on both sides of each) so that they are inside the F 9's and point towards the vertical support. In the front these F 5's support a double cord pulley of three W 16's and four W 10's fixed to an S 25 between nuts. The two F 5's are held parallel by an S 25 tightened at the back of the double pulley. The two S 55's must also be carefully locked so that the frame is parallel.

On the outside of both the vertical F 9's, an F 5 is fastened over the S 55's. As seen in Fig. 3, the F 5 on the left, which points backwards, supports another F 5 which is placed downwards. On this, a U 2 is bolted and forms the bearings for a worm shaft S 55. This vertical F 5 is attached to the base, E 1, by an A 1.

On the opposite side, a U 2 is attached by its lower middle holes to the two S 55's. It is placed against the two nuts which hold the horizontal F 5 and fastened in position by nuts. We must be careful that the ends of the S 55's do not foul the worm which is to run inside this U 2. Parallel under this U 2 but slightly to the right (see Fig. 2) another U 2 is bolted to the fourth and fifth middle holes of the vertical F 9. It forms the bearings for a worm shaft S 55. A GB 10 is placed on each of these worm shafts. The lower one is fixed with the boss near to the bearing and the upper one lies in line with it. The shafts are held in position by locknuts at the other end.

In the third middle hole from underneath the F 9's are bearings for a fourth worm shaft S 55. The worm is in gear with the GB 40 at the base of the vertical column and in this way turns the crane jib. Outside the F 9, a G 10 is tightened on to the worm shaft and meshes with the worm above it.

An S 55 runs in the side holes of the vertical F 9's (see Fig. 3) and a GB 10 fastened at one end is in gear with the worm underneath it. This shaft is kept in position by two nuts with a W 10 in between fixed inside each F 9. The shaft acts as a winding drum for the rope which raises or lowers the jib.

A second winding drum, for raising and lowering the load runs in the end holes of the horizontal F 5's, which point backwards, see Fig. 4. This drum consists of an S 55 on which a P 29 and G 20 are secured by means of two N 2's on the inside and two N 1's on the outside. The shaft is kept in position at the P 29 end, by locknuts

No. 233. PORTABLE JIB CRANE.

Instructions—Continued.

at each side of the F 5. Care must be taken that the S 55 does not protrude and catch the GB 10 in front of it. It is advisable to make this frame up first and then bolt it to the base ; for this only three bolts are really necessary.

Both motors are attached so that the ends of their bases are in line with the end of the model base. The motor on the right is fixed by two angles. On the left side of the base the angle is placed forward with foot outwards but on the right side it is inserted under the motor base at the back. The side of this motor projects over the E 1. The A 1's must be bolted on the inner sides of the motor base.

The second motor is placed parallel to the first motor at a distance of $\frac{7}{8}$ in. apart and is fixed to the E 1 by two A 1's (with feet outwards) one forward on the right and the other at the back on the left side.

The motor on the right drives a GB 10 on one of the worm shafts S 55. The worm is in gear with the G 20 of the winding drum. The motor on the left drives on to an intermediate shaft arranged as shown in Fig. 2. It has as support a U 2 bolted to the base with an F 5 fastened to each bracket. On the right side an N 1 is inserted between the F 5 and the U 2. An S 120 is fixed through the top holes of the F 5's and on it is tightened (between nuts) a U 2 inside the bearings. A U 1 is bolted with two B 1's to the back of the U 2. This U 1 forms the bearings for the intermediate shaft, S 55. On one side of the S 55 is the G 10 driven from the motor and on the other side two G 10's are set with the teeth together. Two extra nuts are placed between the U 1 bearing and the G 10 to allow room for the chain. The end of the S 120 is supported in a vertical F 9 bolted to the back of the base and strengthened by a diagonal F 9. Two spanners as switch lever are fastened to the S 120. Two A 1's are bolted on the top of the F 9 and limit the movement of the lever. If the spanners are in the right position on the S 120, the two G 10's will be raised and lowered to make contact with the upper and lower GB 10's on the worm shafts. In this way, either the vertical support and crane jib (not yet constructed) will revolve or the jib will be raised or lowered. So that the lever does not move too freely we fasten locknuts on the S 120 each side of the front bearing.

Finally, we make the jib as shown in Fig. 1. It consists of four pairs of F 17's three holes overlapped. The two strips are held parallel by U 2's and S 55's. The upper end is tapered to an S 25. The two rope pulleys

TRIX

No. 233. PORTABLE JIB CRANE.

Instructions—Continued.

are made of P 29's with W 10's or W 16's in between. The other end of the jib is fastened to the base of the vertical support by two bolts and locknuts. A double pulley, made as before, runs in the upper part of the vertical column. The rope for raising and lowering the jib is controlled from the winding drum to which it is tied. From the drum it is led underneath the double pulley and upwards over the upper double pulley. It is then placed over the pulley in the jib and is fastened to the top of the vertical column. The rope must be long enough to allow the jib to be lowered right down. The other rope is led over the top jib pulley and several crane hooks, C 1's, are bolted together and fastened to the end of the rope. Here again, plenty of rope must be allowed.

For reversing the motors we use two Reversing Switches, Model No. 203.

No. 233a. PORTABLE JIB CRANE WITH ELECTRO MAGNET

If we wish to make this crane magnetic we make an electro magnet as shown in the illustration. The leads from the battery are carried alongside the ropes. They are fixed tightly under a washer to the vertical column and are led over the pulley shaft in the jib to the magnet hanging on the crane hook. A pulley block, with a weight hanging to it keeps the leads tight. The magnet consists of two bobbins, E 3, and two iron cores, E 4, which are held side by side with two F 5's and an S 25. In fixing these bobbins you must carefully see that the ends are connected correctly. They should be in series, with the end of one bobbin joined to the beginning of the other. By a simple switch in the circuit, the magnet can be put on or off.

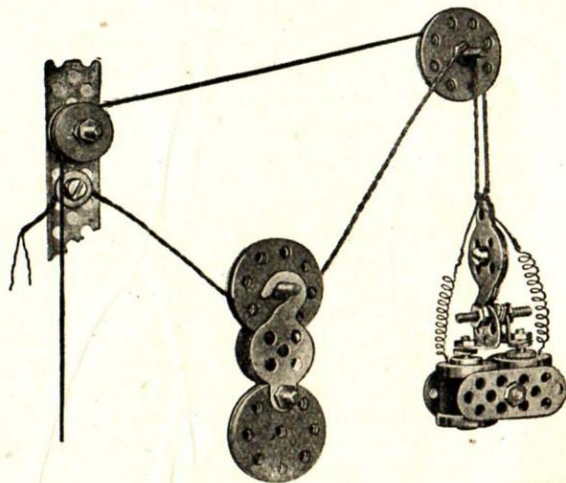


Fig. 5.

TRIX

No. 236. LOOPING THE LOOP RAILWAY.

Made with twelve Sets of No. 1, ten Sets of No. 1a, one Set of No. 2a, one Trix Gear Set and one Motor.

Parts Required :

A	1.... 38	GB	40.... 1	Spanners	9
B	1.... 161	N	1.... 385	SU	1.. 2
C	1.... 16	N	2.... 1	U	1.. 18
Chain	.... 1	P	29.... 40	U	2.. 19
E	1.... 1	P	49.... 2	U	3.. 2
F	5.... 38	S	25.... 8	V	35.. 4
F	9.... 40	S	55.... 34	W	10.. 9
F	13.... 24	S	87.... 2	W	16.. 18
F	17.... 40	S	120.... 1	WM	... 1
G	20.... 1				

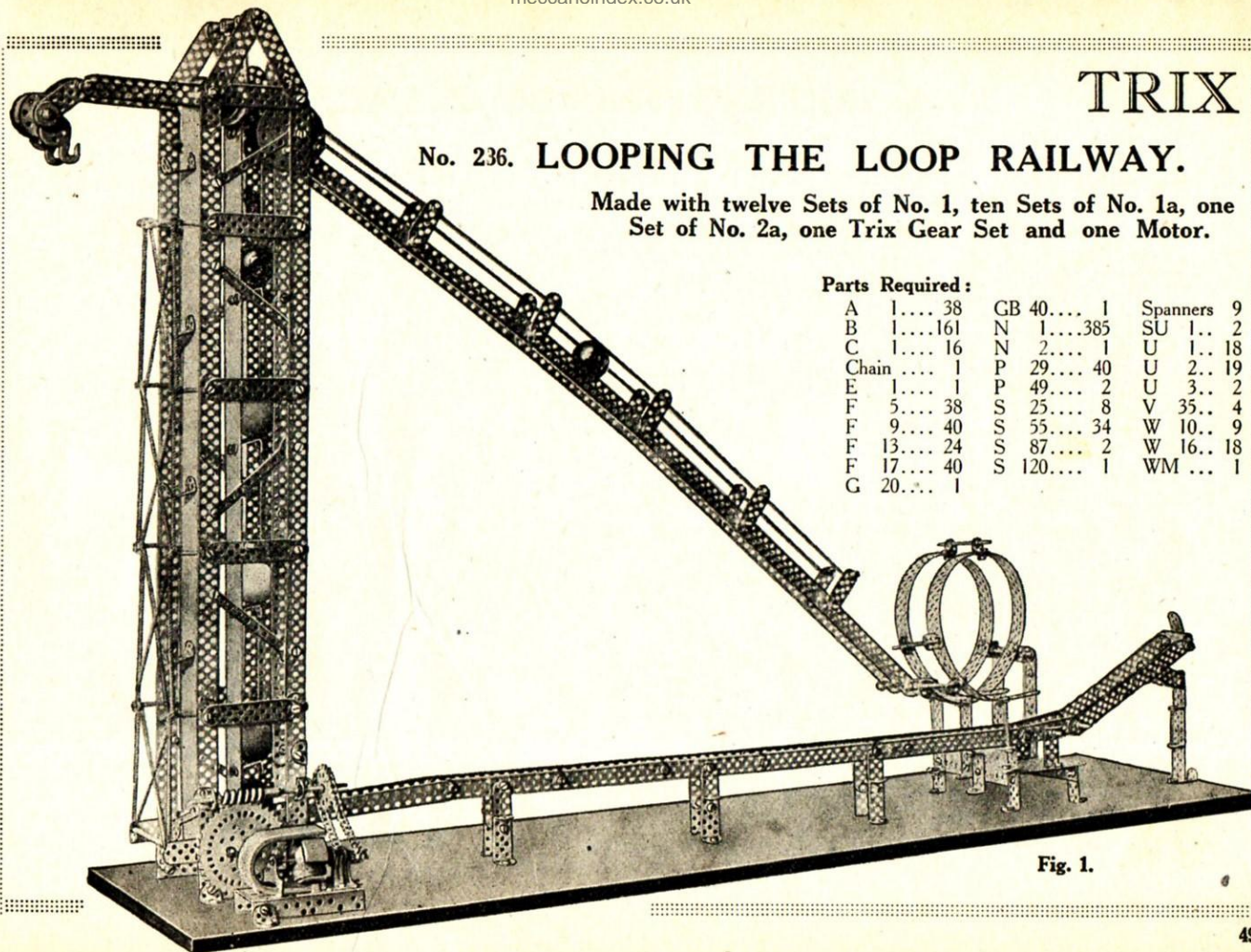


Fig. 1.

TRIX

No. 236. LOOPING THE LOOP RAILWAY.

Description :

This model gives a practical demonstration of Centrifugal Force. The balls, elevated by the transport band, roll down an inclined plane, looping the loop and returning back to the band. At exhibitions and carnivals feats of this sort, called "Death Loops," are performed by acrobats.

Instructions :

We commence by building the two gabled sides of the tower, which are both alike. (Fig. 1). Each side consists of two vertical strips joined by seven horizontal struts, F 9's, and four diagonal spanners. The vertical strips are each made of four F 17's and one F 13, all of which are three holes overlapped. Where they overlap are fastened A 1's which support F 9's by which the gabled sides are connected (Fig. 2).

It must be carefully noted that the A 1's on the left side of the tower are arranged inwards; as a result the F 9's which form the left side are placed the width of a strip inwards. The gable is strengthened by an S 87, which supports the two guide spindles, S 55's. These lead the ball from the transport band to the slanting rail (Fig. 2).

A second S 87 is used to strengthen the left upper side of the tower. The two drums over which the transport band is carried, are each made of ten P 29's fastened by alternating nuts to an S 55 or S 120. On both sides V 35's are fixed between nuts. These V 35's must allow room for a band about $1\frac{1}{4}$ ins. wide. The bearings for the upper drum shaft are the end holes of two F 13's which are joined by two S 55's (see Fig. 2 above, left).

At the other end of the F 13's, the spindle S 55 carries the

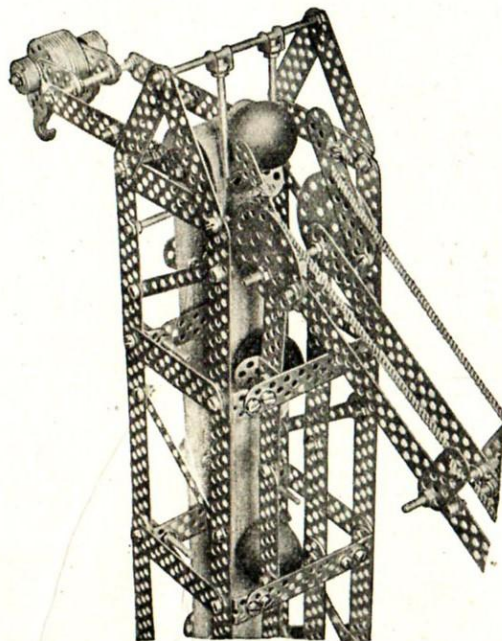


Fig. 2. Upper half of the tower.

No. 236. LOOPING THE LOOP RAILWAY.

TRIX

Instructions—Continued.

counter weight made of twenty P 29's with nine W 16's, five C 1's and three F 5's at each side. The counter weight is to keep the transport band at its proper tension.

So that this band is held taut, the frame is hinged in the third hole of the F 13's. S 25's form the supports and are used instead of bolts to hold to left corner of the gable (Figs. 1 and 2 above, left). The lower drum shaft, S 120, runs in F 9's approximately $1\frac{1}{2}$ ins. above the base. A GB 40 is placed on one end of the S 120 and gears with a worm fixed above. The bearings for the worm shaft are A 1's and the shaft consists of two S 55's coupled with an N 2. A G 20 on the worm shaft is driven from the motor. In the inner right side of the tower, rails are bolted to prevent the balls from rolling off the U 1's on the transport band.

The width of the rails must be narrower than the balls used. So that a number of balls can be raised at the same time, eight or ten U 1's, with feet downwards in front, can be sewn to the band at regular intervals. We fix the completed tower to a base about 39 ins. long. On this base, we attach the horizontal rail, made of one pair of F 9's, three pairs of F 13's and one pair of F 17's. These are overlapped two holes and held parallel by S 25's.

A rail, consisting of a pair of F 17's and F 9's (two holes overlapped), is fastened to the end of the horizontal rail by overlapping F 5's (Fig. 4). On the end of this a slanting rail, made of short strips, is attached.

This slows down the ball after it comes through the loop and sends it down again to the band.

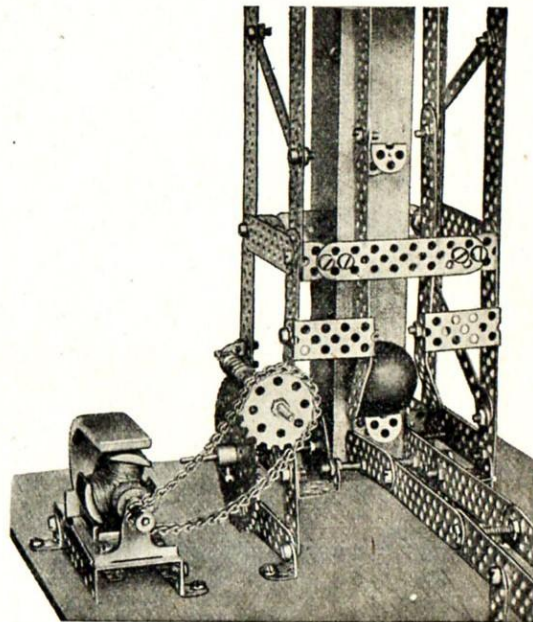


Fig. 3. Base of tower.

TRIX

No. 236. LOOPING THE LOOP RAILWAY.

Instructions—Continued.

The slanting rail is made of F17's, five pairs two holes overlapped and one pair four holes overlapped and held in position by six S55's and one S25. F5's are bolted to the outside of the rail, and railings made of string are fastened to them to prevent the balls from jumping out. String is also used to decorate the left side of the tower but may be left out if not desired. The loop is made of four pairs of F17's bent to a circle and fitted as shown in Figs. 1 and 4. An E1 is fixed under the loop with U2's on

three of the corners. On the fourth corner, a U1 and U3, bolted together, form the foot and the U3 is connected to one of the rails of the loop. A U3, fastened to the side of the base, supports the other rail of the loop. On the other side of the base four F5's are used to secure the loop.

The remaining details can be seen from the illustrations.

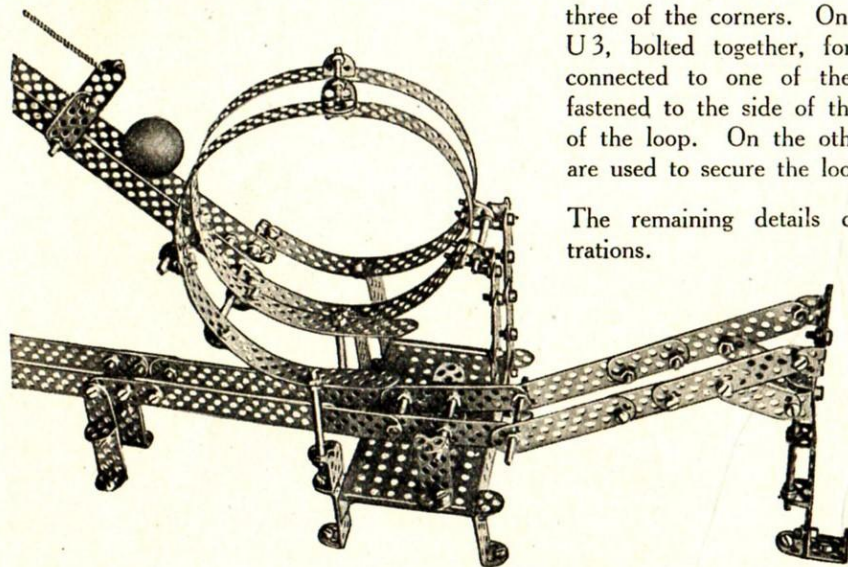


Fig. 4. How the loop is made.

The balls, which should be $\frac{7}{8}$ in. diameter, must not sink too deeply between the rails or their speed will be slackened. This can be avoided by altering the width between the rails. Balls with a rough surface are better than the smooth ones as the latter have a tendency to slide instead of roll.

No. 237. BIG WHEEL. (Height 19 inches.) **TRIX**

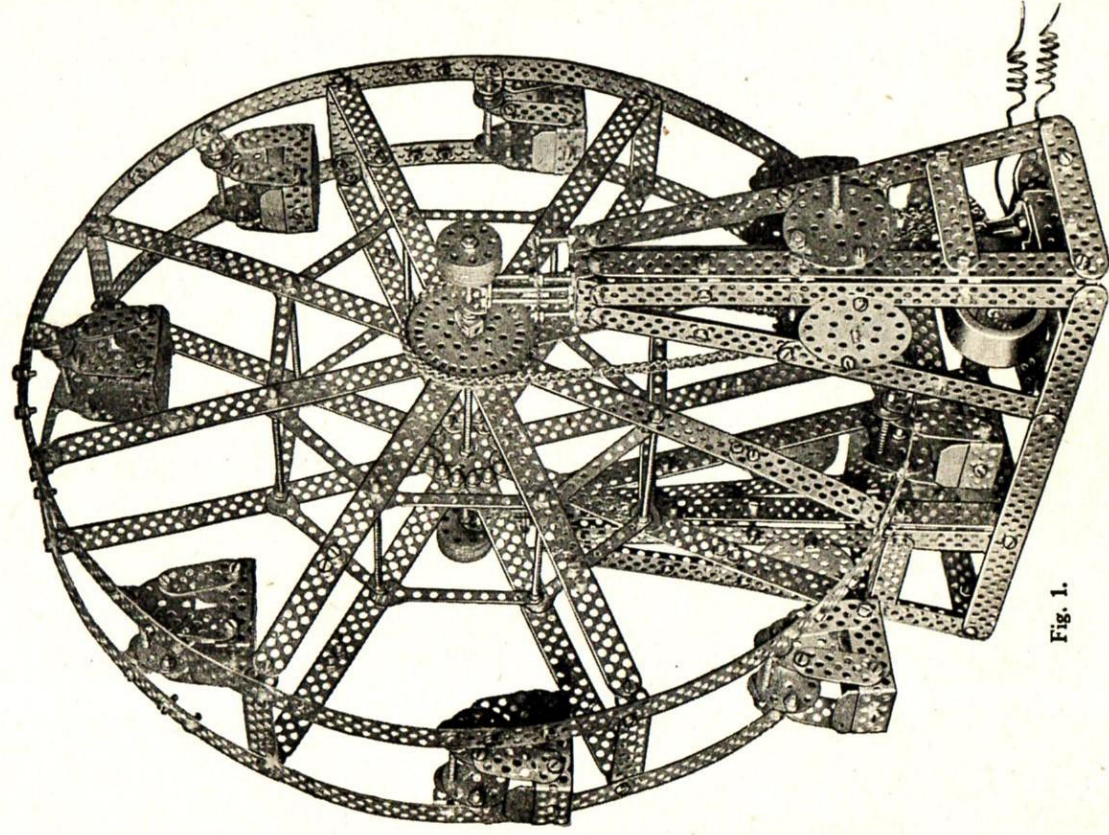


Fig. 1.

TRIX

No. 237. BIG WHEEL (Continued.)

Made with twelve each of Sets Nos. 1 and 1a, four Sets of No. 2a, one Trix Gear Set, one Packet of Nuts and Bolts and one Motor.

Parts Required :

A 1... 42	F 13... 22	GB40... 1	S 25... 11	SU 1... 6
B 1... 319	F 17... 48	N 1... 527	S 55... 22	U 1... 24
Chain .. 1	C 10... 1	N 2... 1	S 87... 8	U 2... 24
F 5... 48	GB10... 1	P 29... 48	S 120... 1	U 3... 8
F 9... 47	GB20... 1	P 49... 8	Spanners 16	W 16... 16
				WM.... 1

Description :

The motor drives by chain a sprocket wheel, GB 10, which is fastened on a worm shaft. The worm is in gear with a GB 20, and a C 10 is attached to the same shaft. As a result of this gearing, the large wheel turns only once while the motor rotates 133 times.

Instructions :

The towers are built first; they are both made alike, and have square bases which taper towards the top. Each corner column is made of two F17's and two F13's, two holes overlapped, and joined by A1's. The columns are held together at the base by F13's or overlapped F9's. The eight corners are joined up by six U1's and two A1's. The top of each tower is formed of two U2's arranged parallel with two other U2's fixed by four S25's over them. The bearings for the wheel axle are U1's fixed on four S55's each side. The towers are joined at the base by two F13's.

The wheel is made as follows :—Eight spokes, each made of an F17 and F9 two holes overlapped, are bolted with two B1's to the outside holes of a P49. The spokes of each side are connected by U3's. The wheel is strengthened by S87's fastened (in the 11th hole counting from the inside) to the spokes and spanners are inserted inside at the same time. The circumference of each wheel is made of F17's and F9's bolted together and attached to the U3's. At intervals on these wheel rims, between the U3's, A1's are fixed as bearings for the cabin axles S55's (see Fig. 2). An S120 forms the main wheel shaft and S55's are added to each end, as in EC27, Book No. 2. A GB40 is fastened to the axle, which is held in position by locknuts. The motor is attached to the base of the tower by S55's. Parallel above this the worm shaft runs in P49's. It consists of an S55 and S25 coupled by an N2 with a GB10 placed on the end of the shaft. The GB20, in gear with the worm, is fixed to a shaft, made of an S55 and S25 coupled as in EC27, with a C10 fastened. One of the bearings (P49) for this shaft moves up and down and an S25 as gear handle is attached to it. A bolt and locknuts on the left side hold this P49 in position and an S25 on the right side prevents the GB20 pushing too far in mesh. By this arrangement of the bearing it is possible to move the GB20 out of gear with the worm and to turn the wheel without using the motor. Cardboard pattern, page 73.

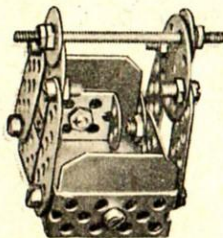
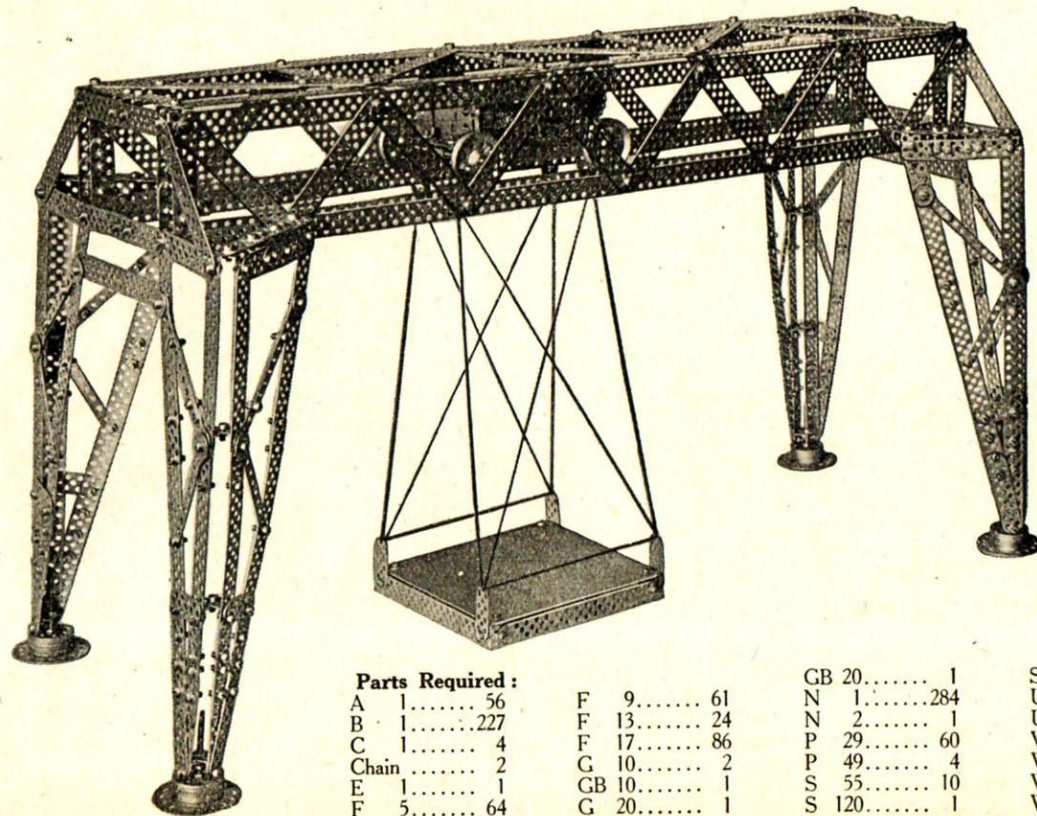


Fig. 2. Cabin.

No. 238. TRANSPORT BRIDGE.

TRIX



Made with sixteen Sets of No. 1, twenty-two Sets of No. 1a, two Sets of No. 2a, two TRIX Gear Sets and one Motor, No. 2051.

Description :
Similar to Book 1, Model No. 96.

Fig. 1.

Parts Required :

A 1..... 56	F 9..... 61	GB 20..... 1	Spanners 24
B 1..... 227	F 13..... 24	N 1..... 284	U 1..... 18
C 1..... 4	F 17..... 86	N 2..... 1	U 2..... 5
Chain 2	G 10..... 2	P 29..... 60	V 35..... 8
E 1..... 1	GB 10..... 1	P 49..... 4	W 10..... 4
F 5..... 64	G 20..... 1	S 55..... 10	W 16..... 16
		S 120..... 1	WM..... 1

TRIX

No. 238. TRANSPORT BRIDGE—*Continued.*

Instructions :

The sides of the superstructure are constructed first. The lower span is made of flat strips one hole overlapped in the following order:—one F 9, four F 17's, one F 9. The upper span is built of five F 17's one hole overlapped. Each side is joined to a rectangle by an F 10 (made of three F 5's) each end, and the framework is strengthened by ten diagonal F 13's. On the inside of each lower span, (where the diagonal F 13's and F 10's are bolted), seven U 1's are attached and a rail is supported by the other end

of these U 1's. Each of these rails consists of one F 17 joined to a second F 17 with an overlapping F 9, then two F 17's overlapping two holes and one F 17 connected to the end by an F 9 overlapped. F 10's (made of three F 5's) form the ends as before. They are held parallel to the F 10's of the side by U 1's. An F 15 (of two F 9's) is bolted to these U 1's at each end. Further, two F 15's, with A 1's and F 13's at the ends, are bolted to this framework as in Fig. 3. There are two long strips of five F 17's and five diagonal struts, 22 holes long, bolted on the top as shown in illustrations. This lattice



Fig. 2. Foot.

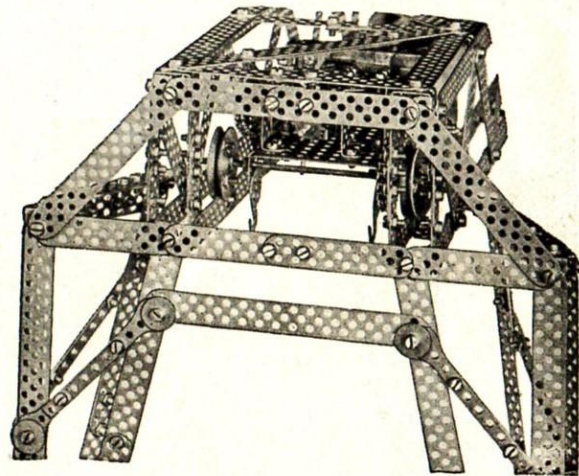


Fig. 3. One end of the bridge.

TRIX

No. 238. TRANSPORT BRIDGE.

Instructions—Continued.

framework is held in position by A 1's and F 15's, made of two F 9's. Two F 9's lengthen the lower F 15 at each end and are joined to the diagonal F 13's from the upper cross strut (Fig. 3). This completes the bridge framework. The four supports for the bridge are built next (Figs. 2 and 4). The vertical

angled legs are each made of two F 13's overlapped four holes with an F 9 connected to the end by a second over-lapping F 9. The strips are joined by eight A 1's (as shown in Figs. 2 and 4). The two other slanting supports are made of flat strips, 40 holes long at the end and 41 holes long at the side. An A 1 is bolted to each of the side

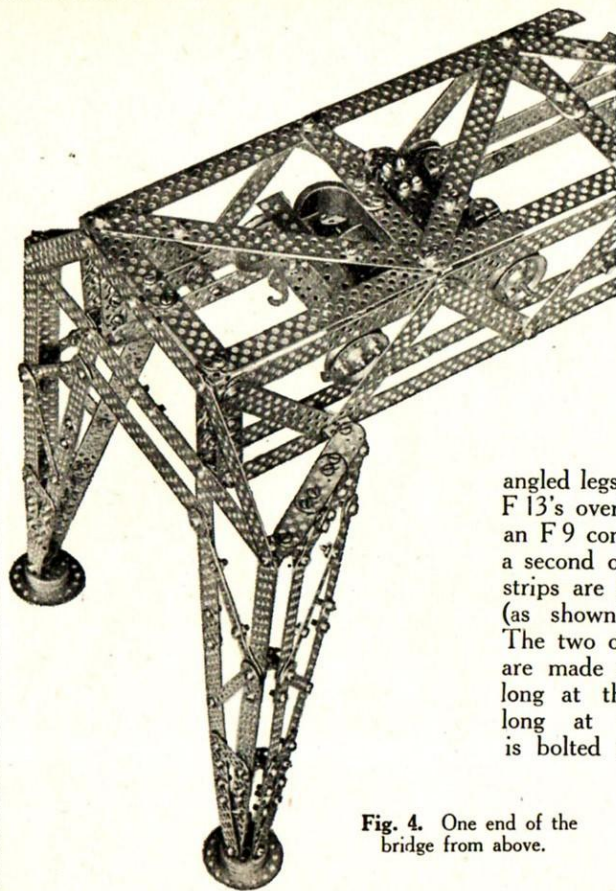


Fig. 4. One end of the bridge from above.

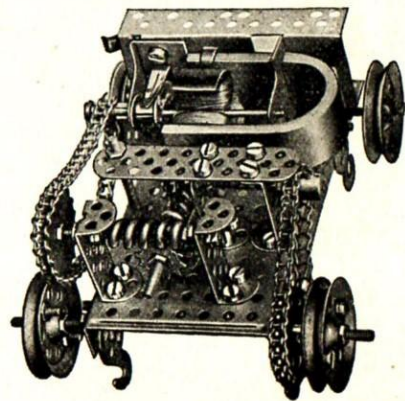


Fig. 5. The trolley.

TRIX

No. 238. TRANSPORT BRIDGE.

Instructions—Continued.

strips and it is joined by a second A1 to the diagonal F13's of the bridge. At the upper end these bridge supports are strengthened by F11's (made of three F5's), arranged at an angle to the bridge. The feet of these supports are each made of 15 P29's and a P49 fastened by an S55 (Fig. 2). The supports are further strengthened by spanners and F5's.

After the bridge structure is completed, the trolley (Fig. 5) is made. The motor is bolted to a base, E1, by two B1's so that the ends of the bases are in line. The motor drives by chain a G20 on a worm shaft, which runs in a U2. This U2 is bolted to the back of one of the upright U2's. These two upright U2's are held by an F9 on top. The other end of the F9 is attached to the base by an S55 (Fig. 5 left). The two U2's are bearings for a shaft S55 with a G10 fastened to the left end. The G10 is in gear with the worm below. On the other end of the shaft is a GB10 which drives by chain a GB20 on the back wheel shaft, S120. The second wheel axle is made of two S55's coupled as in EC46. Locknuts prevent these wheel axles from slipping out of position.

The wheels of the trolley are made as EC40, Book No. 2—the bolts shown in Fig. 5 are not essential. If the trolley is first placed on the rails with the wheels loose they can then be adjusted and made to the correct gauge. In the second holes of the base sides, C1's are bolted to suspend the travelling platform. A lead, made of flexible wire, from one terminal of the motor is connected to one side of the switch, No. 203. The second terminal of the motor makes contact with the frame. The other side of the reversing switch is likewise connected to the frame. When the switch is supplied from the source of current the trolley can be moved backwards and forwards along the rails by reversing the motor.

The platform, made of four F17's joined up by A1's, is suspended by string.

Cardboard pattern, page 73.

TRIX

No. 240. ELECTRIC TRAVELLING GANTRY CRANE.

Height .. 23½ inches.
Length .. 32¼ inches.

Made with :

- 17 Sets of No. 1.
- 27 Sets of No. 1a.
- 4 Sets of No. 2a.
- 6 Trix Gear Sets.
- 4 Motors No. 2051.

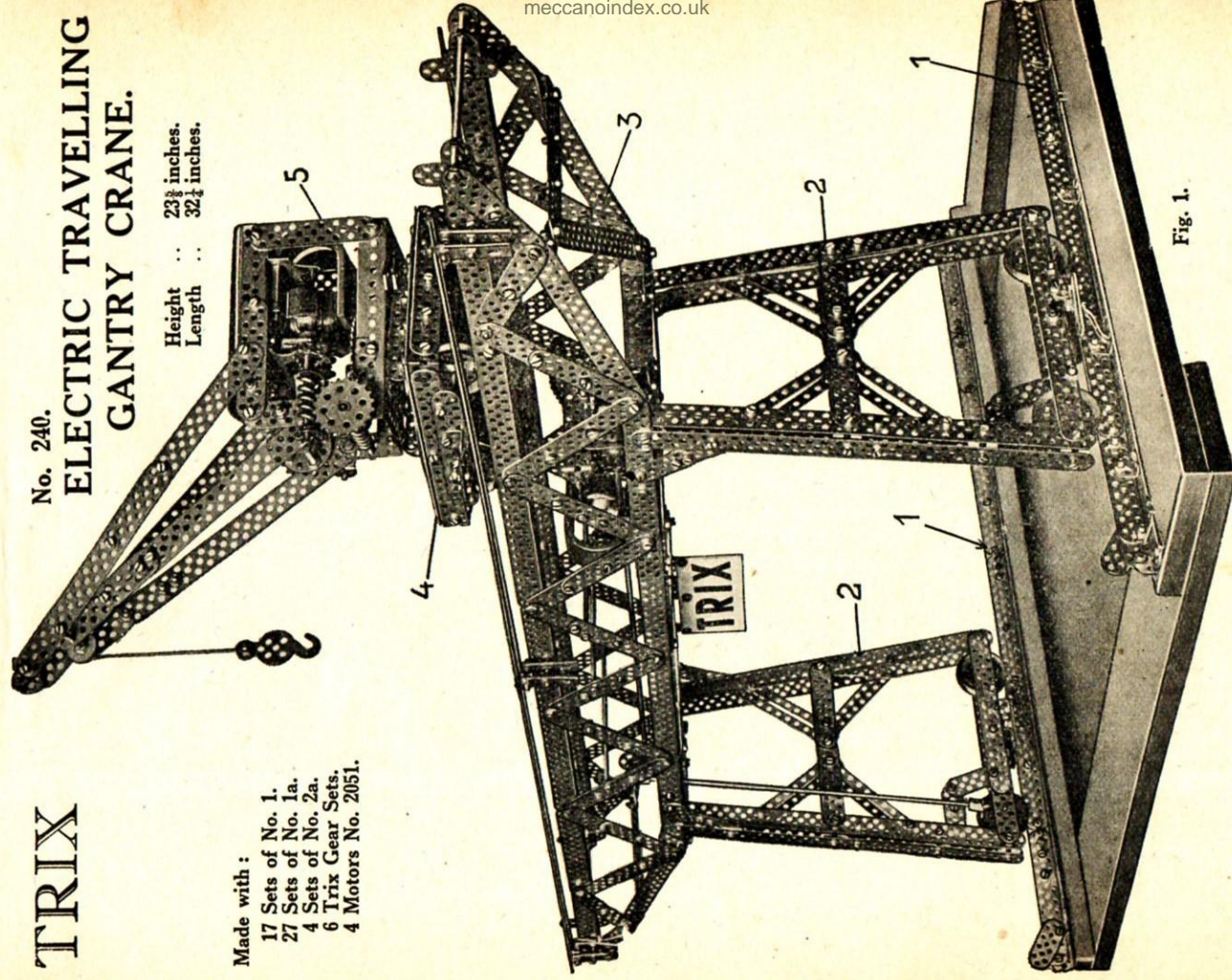


Fig. 1.

TRIX No. 240. ELECTRIC TRAVELLING GANTRY CRANE—Continued.

Parts Required :

A 1..... 63	E 7..... 9	F 17.....105	GB 40..... 1	S 55..... 11	U 3..... 6
B 1.....520	E 8..... 24	G 10..... 3	N 1.....780	S 120..... 7	V 35..... 16
C 1..... 3	F 5..... 51	GB 10..... 4	N 2..... 2	Spanners 16	W 10..... 7
Chain 3	F 9..... 67	C 20..... 6	P 29..... 10	U 1..... 28	W 16..... 11
E 1..... 1	F 13..... 33	GB 20..... 5	S 25..... 30	U 2..... 3	WM..... 5

Description :

This type of crane covers a very extended area and provides for raising and lowering goods in any part of that area. As in the original, the motor house and jib of our model revolve and can also travel on the gantry bridge from one end to the other. The gantry itself moves backwards and forwards. These movements can be operated singly or all together, so that, for example, the whole gantry and crane can move along the rails while the motor house and jib travel to the other end of the gantry bridge; the crane can lift a load and turn sideways at the same time, etc. But what is best of all—while the crane stands in one part of the room, all these movements can be controlled at a distance from the model; and the following building instructions will show you how to do it.

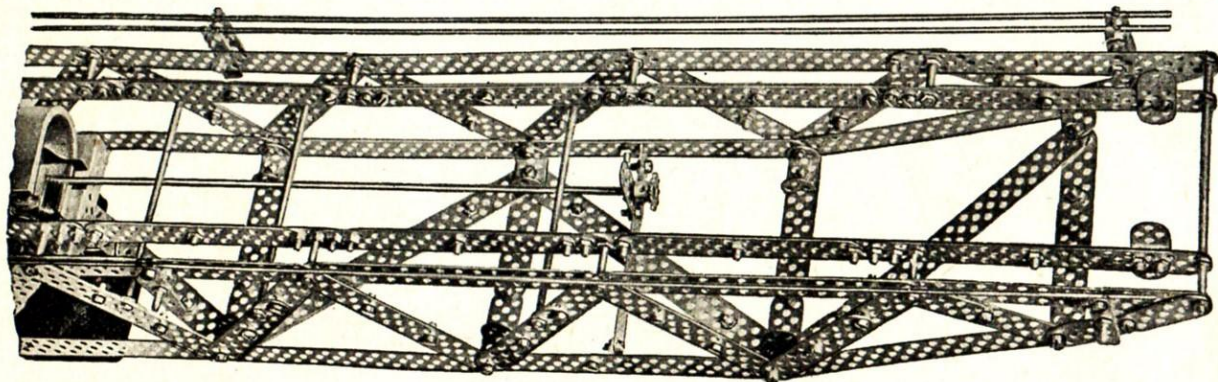


Fig. 2. Showing the construction of one half of the gantry bridge.

TRIX

No. 240. ELECTRIC TRAVELLING GANTRY CRANE—*Continued.*

Instructions :

Obtain a board as level as possible about $27\frac{1}{2}$ inches by 20 inches (this may be made of four wood battens as in Fig. 1) and fasten on this the rail track 1 with eight A 1's. The exact distance between the rail centres must be $17\frac{1}{4}$ inches. Each rail consists of flats placed with the ends meeting in the following order :—two F 13's, one F 17, one F 13, one F 17 and one F 13

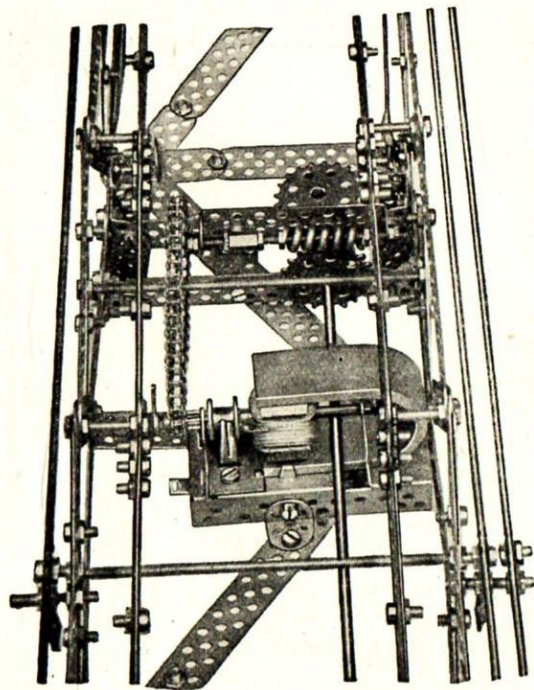


Fig. 2a. Bridge from above viewed from the left (Fig. 1).

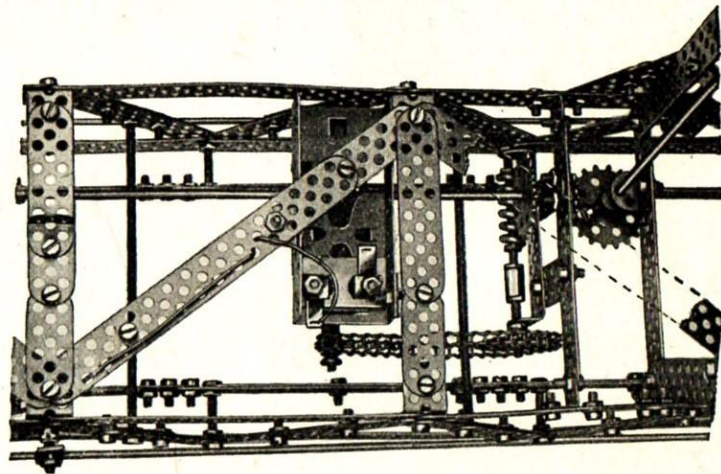


Fig. 2b. Bridge, from underneath. The right foot (Fig. 1) is in position. The diagonal support on the right is deleted to show the worm drive.

TRIX

No. 240. ELECTRIC TRAVELLING GANTRY CRANE.

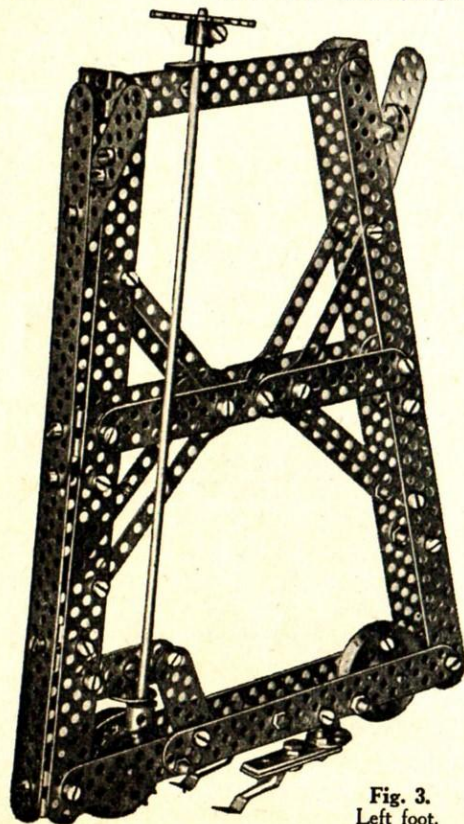


Fig. 3.
Left foot.

Instructions—Continued.

joined up by parts overlapping the first line as follows:—F 9, F 17, F 13, F 17, F 13 and F 17. Both groups of flat pieces of each rail are moved up three holes respectively so that the gaps between the ends of the flats are always bridged over by the adjoining strips. On the ends of the rails slanting F 5's are bolted to prevent the crane travelling over the end.

Cardboard patterns, page 73.

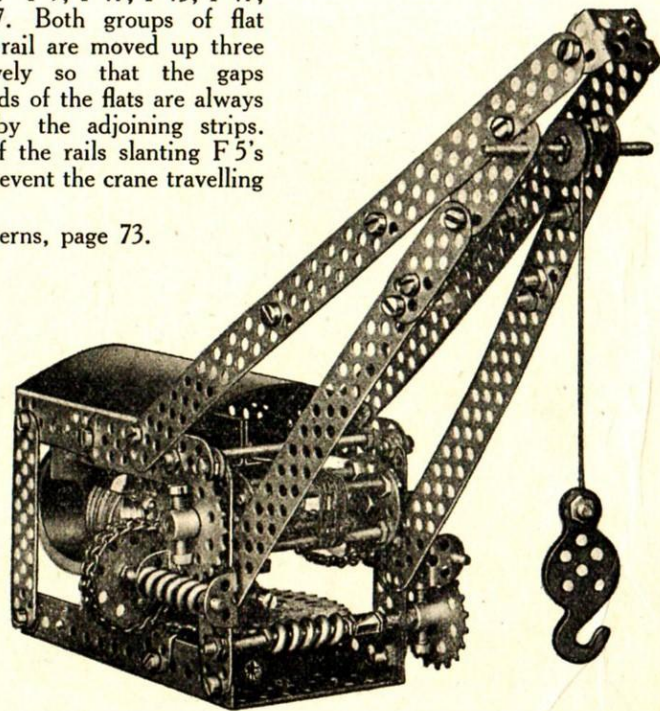


Fig. 4. Motor house, with jib.

No. 240. ELECTRIC TRAVELLING GANTRY CRANE. **TRIX**

Instructions—Continued.

The construction of the rails can be simplified if ordinary strip iron, about $\frac{5}{8}$ in. wide and $\frac{1}{16}$ thick, is bolted to the angles. Angle iron may be used as a rail—thereby saving the bolted up construction of TRIX parts. If we use angle iron we must not forget to drill a few holes to screw it to the base.

On each side of both the rails, at a distance of $\frac{9}{16}$ in. from the centre is fixed a length of stout, polished copper wire. The contact brushes which are attached to the feet of the bridge pick up the current for driving the four motors from the copper wire. These lengths of copper wire are straightened out and screwed down to the base at each end. It is important that these wires should be insulated from one another and not make contact with the rails. The rails are connected to one pole of the battery and carry the return current from all the motors.

The two feet of the bridge (2) are made next. They each have two sides which are joined together by four U 1's. On the back of these U 1's are fastened strips, each consisting of two F 17's, three holes overlapped. The horizontal

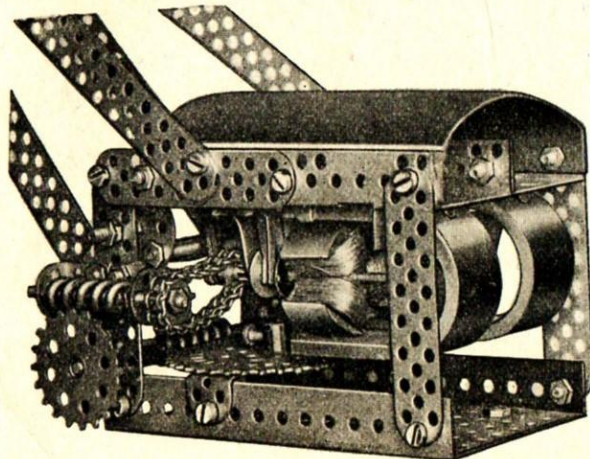


Fig. 5. Motor House, left side.

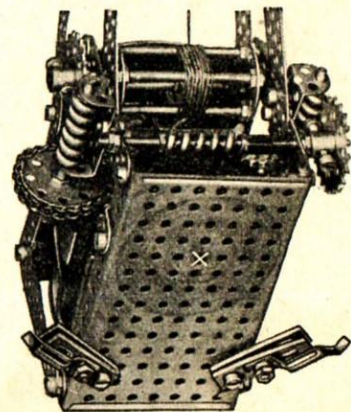


Fig. 6. Motor House, from underneath.

TRIX

No. 240. ELECTRIC TRAVELLING GANTRY CRANE.

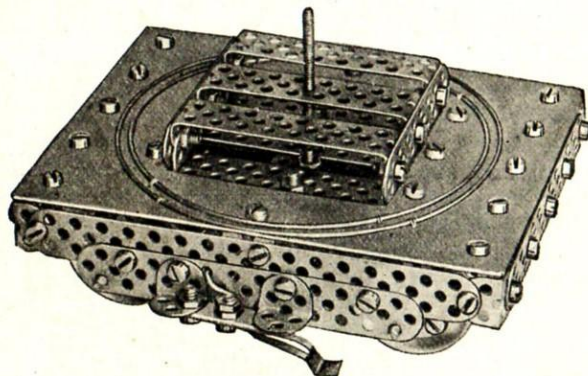


Fig. 7. Crane Carriage.

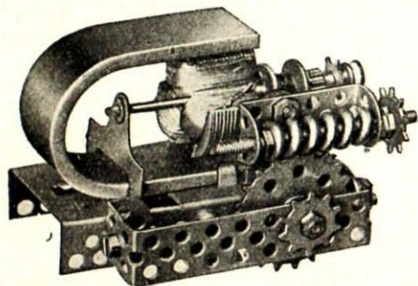


Fig. 7a. Motor in Crane Carriage.

Instructions—Continued.

base members F 22's (of two F 17's) are held in the middle holes by an S 25. These F 22's are bearings for the wheel axles S 25's. The wheels are made as in EC 40, Book No. 2 with P 29's in between.

Bolts are used to true up the wheels, and N 1's hold the shaft in position. G 20's are fastened on the two front

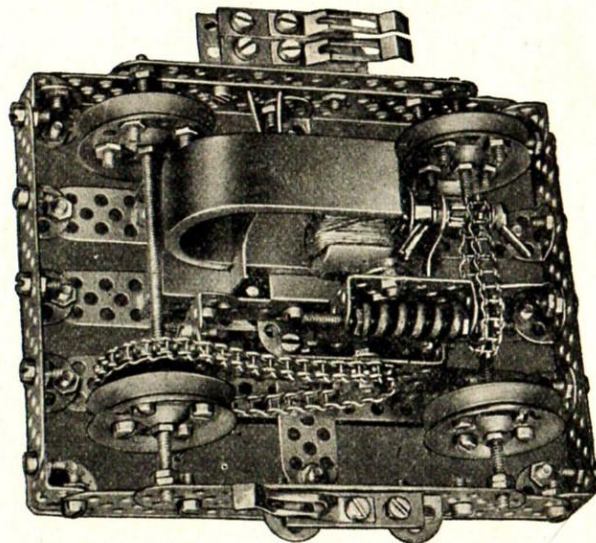


Fig. 8. View of Crane Carriage, from underneath.

TRIX

No. 240. ELECTRIC TRAVELLING GANTRY CRANE.

Instructions—Continued.

wheel axles and are angle driven by GB 10's. These small gear wheels are attached to long shafts made of a $9\frac{1}{2}$ in. length of $\frac{1}{8}$ in. mild steel. These shafts could be made of S 120's and N 2's but we have used

this method instead to make the construction clearer. The same applies to the 16 in. shaft in the bridge 3. These shafts can easily be obtained at a small sum from an ironmonger. E 8's with contact brushes, E 7's, attached, are fixed by angles to the horizontal base member. From these contact brushes leads of insulated flexible wire are carried to one of terminals of the motor on the gantry bridge and to each of the three contact rods which run alongside the bridge. These leads should be placed neatly inside the foot 2 and bridge 3.

The gantry bridge 3 consists of two latticed sides which support on the inside the rails along which the crane carriage runs. The sides are connected by parallel flat parts and S 120's. The upper spans of the sides are each made of seven F 17's with one hole overlapped on the four inner connections and three holes overlapped on the two outer ones.

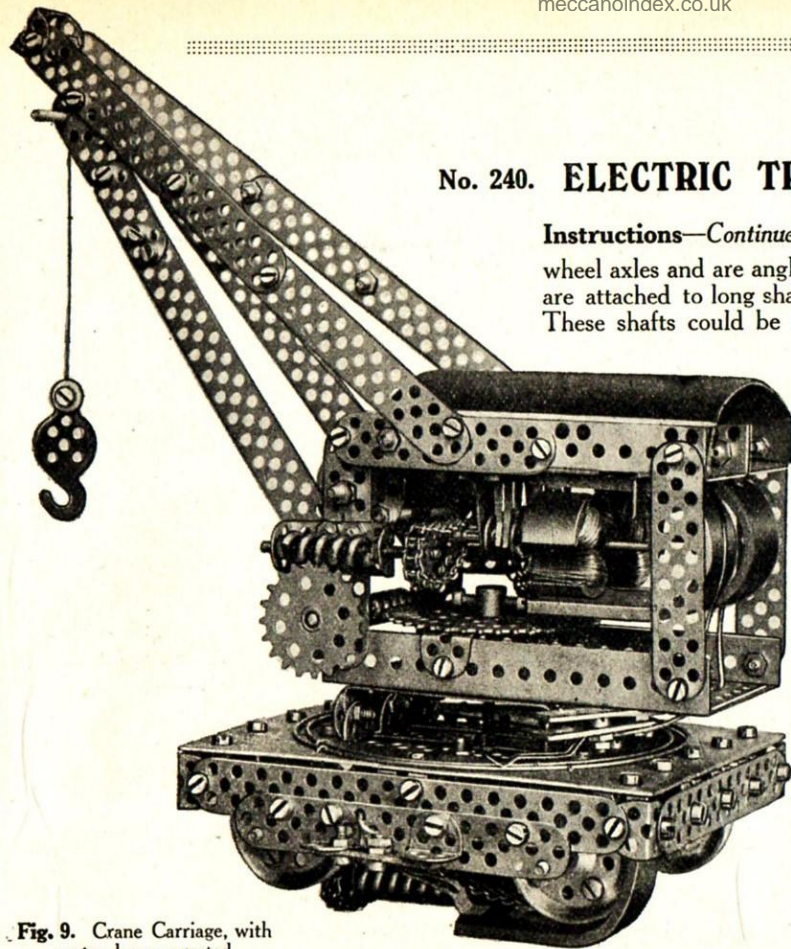


Fig. 9. Crane Carriage, with motor house erected.

TRIX

No. 240. ELECTRIC TRAVELLING GANTRY CRANE.

Instructions—Continued.

S 25's are used to fasten them where they overlap. These S 25's hold, at the same time, ten diagonal supports F 13's (of two overlapped F 9's) and two F 9's (of two F 5's).

The lower spans are each built of four F 17's, one hole overlapped, and slanting F 17's are attached to both ends. These F 17's are joined up to the diagonal F 13's (of two F 9's) in the end holes. On each end a further F 9 (of two F 5's) is attached and this is connected to the upper span by an S 120. The gantry bridge rails are each made of double flats similar to rails 1. Inside, beginning from the right the order of the parts is F 17, F 17, F 13, F 17, F 13, F 17 and F 13. On the outside, beginning from the same side the parts are as follows:—F 17, F 13, F 17, F 13, F 17, F 13 and F 17 and they are placed with the ends touching so that, as in the rails 1, there are no gaps at the joining places.

The sides of the gantry bridge are connected parallel by six S 120's (Fig. 2). On the lower spans of the sides, U 1's are bolted where the diagonal strips meet at a point. These are joined by five transverse F 13's (of an F 9 and F 5) Fig. 2b. To the points of the short diagonals (near the ends of the latticed sides) are fixed A 1's. On these are bolted a transverse F 13 (of two F 9's) and a diagonal support, 21 holes long (of an F 17 and an F 5).

Motor No. 1 is held in position by two A 1's (see Figs. 2a and 2b). To the right of this motor, a bearing, U 3, is attached to the bridge by two F 5's in the second and sixth lower holes. These F 5's are bolted to an F 13 which is attached between the lower spans by A 1's (Fig. 2b). The motor drives by chain a G 20 and with it a worm attached to the same shaft. This worm is in gear with a GB 20 (which is fastened

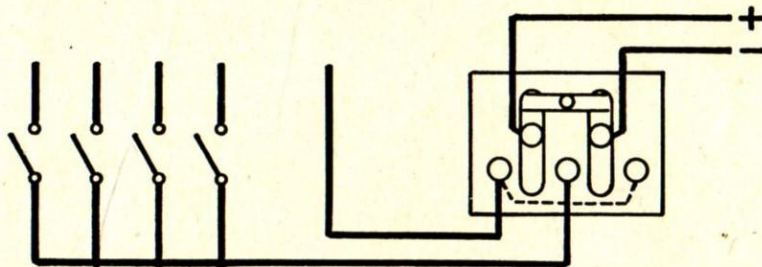


Fig. 10. Switch plan for operating the motors, showing reversing switch No. 203 and four single pole switches.

No. 240. ELECTRIC TRAVELLING GANTRY CRANE.

Instructions—Continued.

to a shaft about 16 ins. long and $\frac{1}{8}$ ins. thick mentioned on page 65). This shaft runs in the third holes of F 5's, which are bolted with two B 1's to transverse F 13's attached to the lower bridge span by angles, (Fig. 2).

On the ends of the shaft are GB 10's which mesh with GB 20's at the top of the shaft attached to the feet. In fixing the feet to the bridge the transverse F 13 must be loosened as it must be placed above the diagonal support, 21 holes long. The feet are fixed by two bolts in the top holes of their sides and in the fourth and fifth lower holes of the horizontal bridge span. Diagonal supports of two F 5's (two holes overlapped) strengthen the joint.

To the ends of the gantry bridge rails F 5's are bolted to prevent the crane running over the edge.

Along the upper edges of the bridge, stout, polished copper wire is arranged from which the contact brushes of the crane carriage pick up the current for driving the motors. One wire is attached one side and two the other, according to the contact brushes on the carriage. These must be carefully insulated and set at the correct distance for the contact brushes (1 inch and $1\frac{3}{8}$ ins. from the rail). They must be placed $\frac{1}{2}$ in. above the upper edge of the bridge. These wires may be fastened in various ways. In the model illustrated insulating strips, E 8's, have been used. They are held between nuts on S 25's which are fastened to the sides of the bridge. On the end of the E 8's we secure the $\frac{1}{16}$ in. thick wire by small loops of tin, etc., bent round and bolted on. Instead of E 8's, cardboard or wood may be used and instead of tin loops, fine gauge copper wire. It is not essential that the contact wires should be exactly $\frac{1}{16}$ in. thick. The important point is that they must not come in contact with each other or the frame. The contact wires are each connected to one of the flexible wire leads at one end. After the leads are completed we test them and if everything is in order we proceed with the erection of the carriage 4.

This carriage consists of a rectangular frame with F 17's on the long side joined up by A 1's and F 13's. On the inside of the F 13's A 1's are bolted in the 4th, 7th and 10th holes (Fig. 8) and then F 17's are fastened to these from one side to the other. The long sides are connected in a similar way by an F 13. This F 13 is placed under the F 17's which it crosses and it is bolted by B 1's to the first and third, while it is connected to the centre F 17 by an S 55.

TRIX

No. 240. ELECTRIC TRAVELLING GANTRY CRANE.

Instructions—Continued.

Special care should be taken that this S 55 is tightened up and locked with extra nuts as this spindle is used as the king pin. In fixing the A 1, which carries the transverse F 13, to the side of the carriage one of the upper holes must be used (Fig. 7 centre).

Over the king pin is placed another framework made of three U 3's connected by F 9's. This is secured to the carriage by six A 1's.

Now the cardboard pattern, page 73, is fitted to the carriage and also the contact rings. The size of these rings is shown on page 73 and the wire is carefully bent to shape and held in position by fine gauge wire. This fine wire is looped over the ring and threaded through the cardboard and then the ends are twisted together on the under side. Care must be taken that the inner and outer circles do not make contact in any way.

Now the twelve outer bolts and the six centre ones are taken out and the floor is bolted in position.

A 1's are bolted to the centre holes of the base of Motor No. 2. On this motor is built the drive, as shown in Fig. 7a. A U 3 is attached by A 1's to the base in the upper holes. In the second upper hole a vertical F 5 is bolted with an N 1 between it and the base. A U 2 is attached by two bolts to the top of this F 5. So that the bolts do not foul the worm which is placed inside this U 2, nuts are arranged as spacers. The G 20 in gear with the worm is fastened between nuts on a shaft S 25. This shaft runs in the second middle hole of the F 5 and (after inserting a W 10) in the upper hole of the U 3. Locknuts near the F 5 keep the shaft in position. A G 10 is fastened on the shaft between nuts. A G 10 is also fixed to the worm shaft S 55. The motor is attached by the angles to the F 13 in the 5th and 11th holes on the left side (Fig. 8).

The wheels are made as in EC 40, Book No. 2 with a P 29 inserted between each (two bolts may be used instead of four as shown in Fig. 8) and set at the correct distance apart on the S 120's. The bearings for the wheel axles are F 13's bolted to the sides of the carriage as in Fig. 7. On one side of the carriage two A 1's are secured to support the insulating strip and contact brush. The other side carries a similar arrangement with two insulators and two contact brushes bolted to a U 1. An A 1 forms a rest for the insulators.

A G 20 is attached to one of the wheel axles and is driven by a chain.

The single contact brush, E 7, is connected by well insulated wire to the outer contact ring. The inner contact

TRIX

No. 240. ELECTRIC TRAVELLING GANTRY CRANE.

Instructions—Continued.

brush on the other side is connected to the inner contact ring, and the outer brush is wired up to the nearest motor terminal. The second terminal of the motor makes contact with the frame. The simplest way to do this is to turn the terminal inwards to touch the motor base. When both chains are joined up round the sprocket wheels the carriage is complete. The model can now be tested out to see if all connections are correct.

If one pole of the source of current is touched on to the outer of the two contact brushes on one side of the carriage (the other pole being on the framework) the motor should run. If so this circuit is in order. The other two contact brushes must be tested for short circuits and continuity. This is done by laying one pole of the battery on one of the contact rings and the other on the contact brush belonging to it, with a pocket lamp bulb in the circuit. If the lamp lights the leads are satisfactory. The lamp must not light if the poles are connected to the two contact rings or with the frame and one of the contact rings.

We now build the motor house and jib, which move around the king pin.

The base is an E 1 with the angled sides arranged upwards. To each side two vertical F 9's are bolted (see Fig. 5). At the back an N 1 is inserted between each of the F 9's and the E 1. In the roof, two motors are arranged with their bases bolted together and lengthened on the outside by F 9's. An N 1 and a W 10 are inserted between each of these F 9's and the vertical F 9's. In the third holes of the horizontal F 9's is placed an S 120 (in our model this is cut to 3 ins. length) to strengthen the structure.

A shaft, made of an S 55 and S 25 coupled as in EC 46, is placed in the second front holes of the vertical F 9's. It is kept in position by locknuts and carries a GB 20. This gear wheel is in mesh with a worm which runs between a U 2. This U 2 is attached by its upper holes to the vertical F 9 (with N 1's placed between) see Fig. 5. On the worm shaft S 55 is a G 10 which is driven by chain from motor No. 3.

The winding drum for the crane hook is made of two P 29's and four S 55's. The shaft for this drum is made of S 25's which run in third middle upper holes of the vertical F 9's. Lock-nuts hold the shaft in position and a G 20 is fastened to one end. This is geared into a worm which is placed between a U 2. The U 2 is attached to the vertical F 9 in the fourth middle hole by one bolt only (Fig. 6). A W 10 must be inserted between the U 2 and F 9 so that the bolt clears the worm. On this worm shaft a G 10 is fastened and is driven by chain from Motor No. 4.

TRIX

No. 240. ELECTRIC TRAVELLING GANTRY CRANE.

Instructions—Continued.

Both sides of the jib are alike and are constructed as in Figs. 4 and 9. Its lower supports are attached to the vertical F 9's; the right one is fixed in the second of its upper side holes as shown in Fig. 4 and the left support is secured in the end hole by the bolt which holds the U 2 in position.

Near the end of the jib a pulley (of two W 10's and two W 16's) is placed on a spindle S 55 and held in position by locknuts.

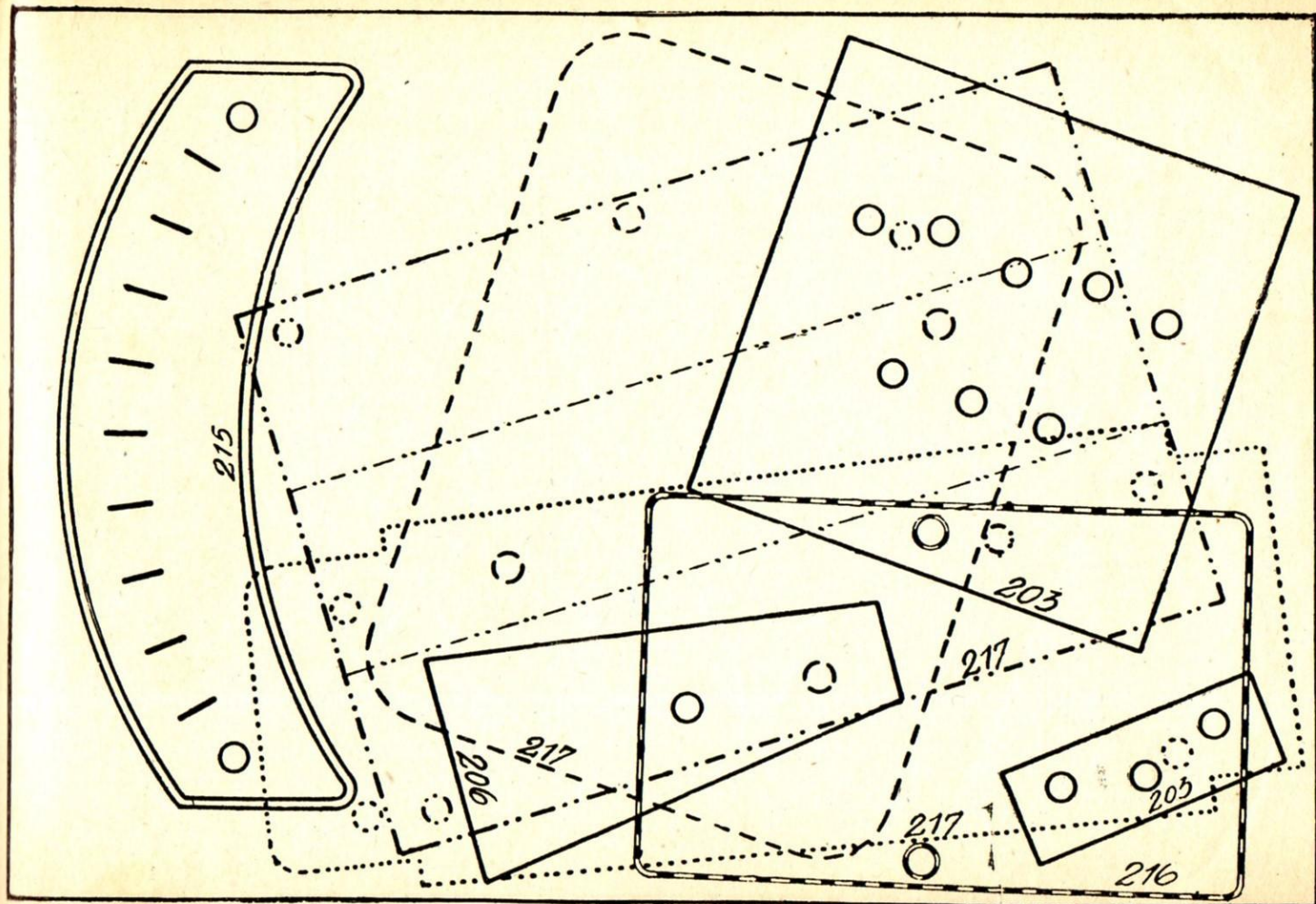
Under the base E 1 are the contact brushes which pick up the current from the contact rings of the carriage. As shown in Fig. 6 the contact brushes are placed in the middle holes of the E 8's and bolts are placed in the end holes. On each of these bolts another E 8 is set against the N 1, thus insulating the head of the bolt holding the brush. Leads of well insulated wire are connected from these contact brushes to one terminal of each of the motors, Nos. 3 and 4. The second motor terminals are each pressed on the frame.

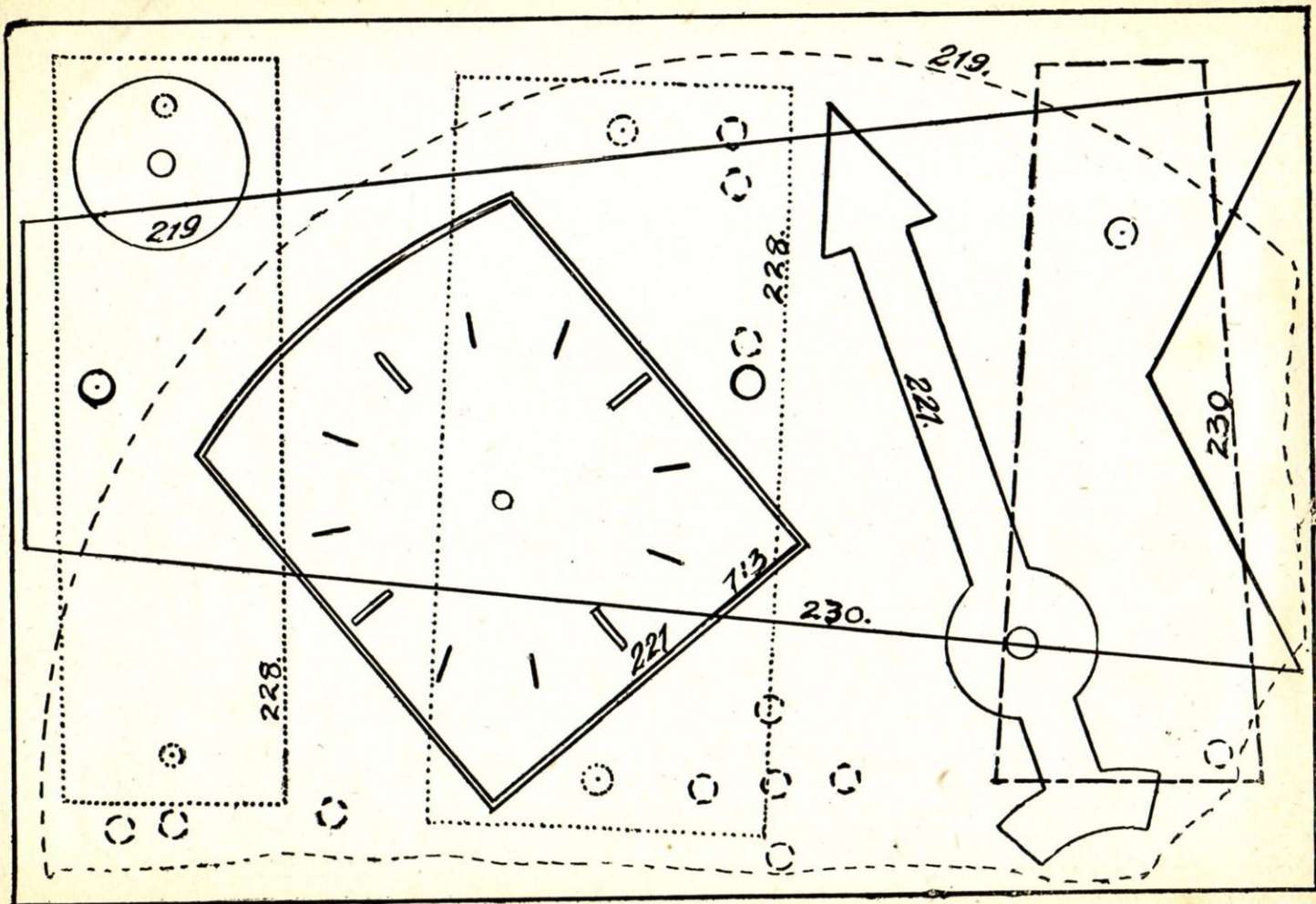
Before placing the crane on the king pin, the leads must be tested. When the poles of the source of current are connected to one of the brushes and the frame, one of the motors should run. When both motors have been tested the crane can be erected. To make a second bearing for the king pin, a U 3 is bolted to the base E 1 over the hole marked with a cross in Fig. 6. This at the same time makes a base for the GB 40 which is made fast to the king pin after structure 5 is in position. This fixed GB 40 is in gear with a worm in front (Fig. 4) so that when the worm revolves it moves the structure 5 around the GB 40.

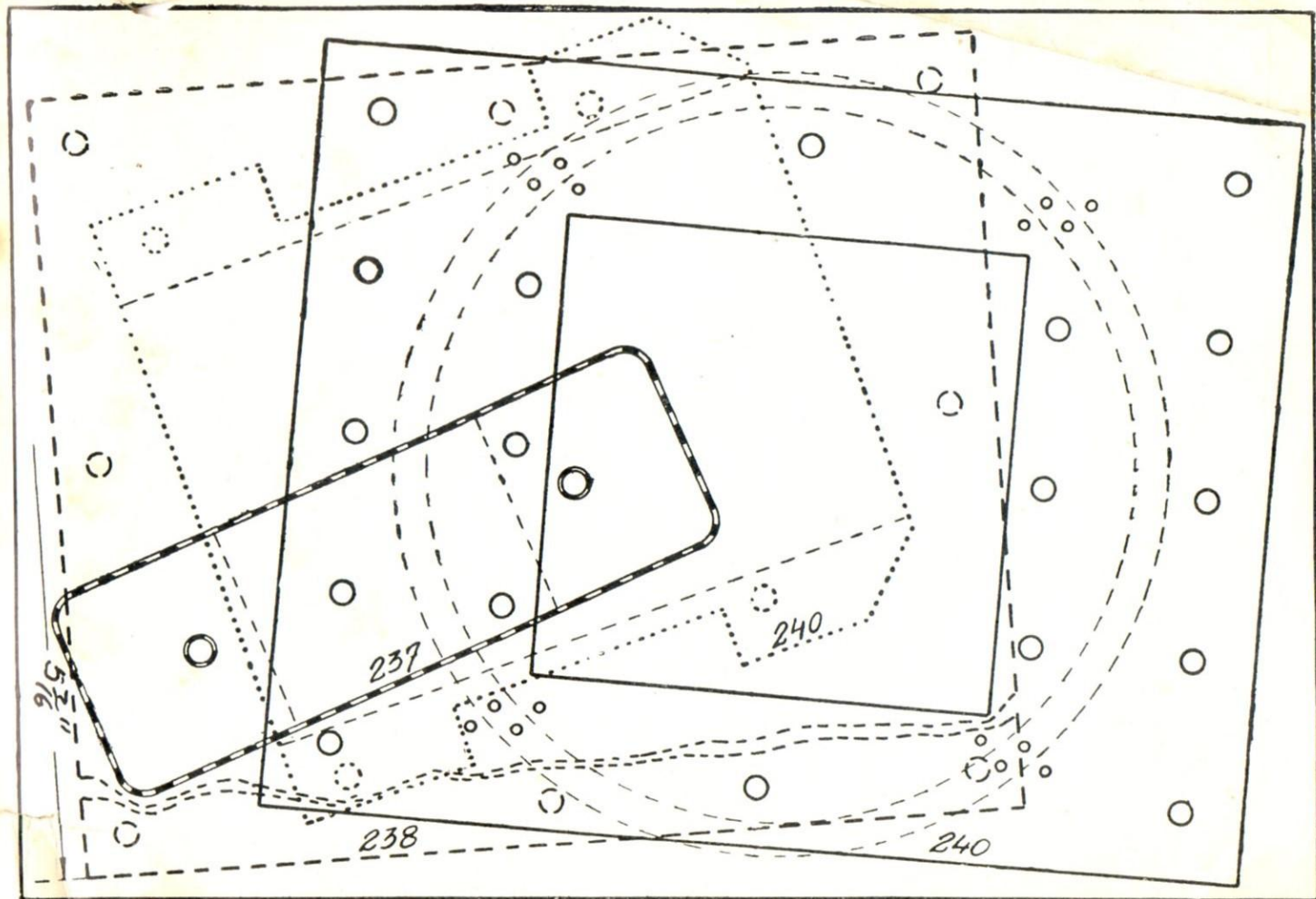
When all the parts have been built correctly in turn, the crane can be assembled. Leads of a suitable length are connected to each of the four contact wires running alongside the rails and the ends of these leads are fastened to a board at a distance of about an inch. If one pole of the battery is joined to the rail 1 and the second pole is touched on any of the leads the motor in question will be set in motion and do its work. If the movement is to be reversed all that is necessary is to reverse the poles.

However, the crane will be operated quicker and better if the switch arrangement shown in Fig. 10 is used. From the pocket battery or accumulator two wires, positive and negative, lead to the switch No. 203. From one side of the switch a lead is connected to rail 1 and from the other side to the four single pole switches as shown.

NOTE.—Where insulators are called for in these models strong cardboard or thin wood may be used. Contact brushes can be made of thin brass or copper strips or even bare copper wire flattened.







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