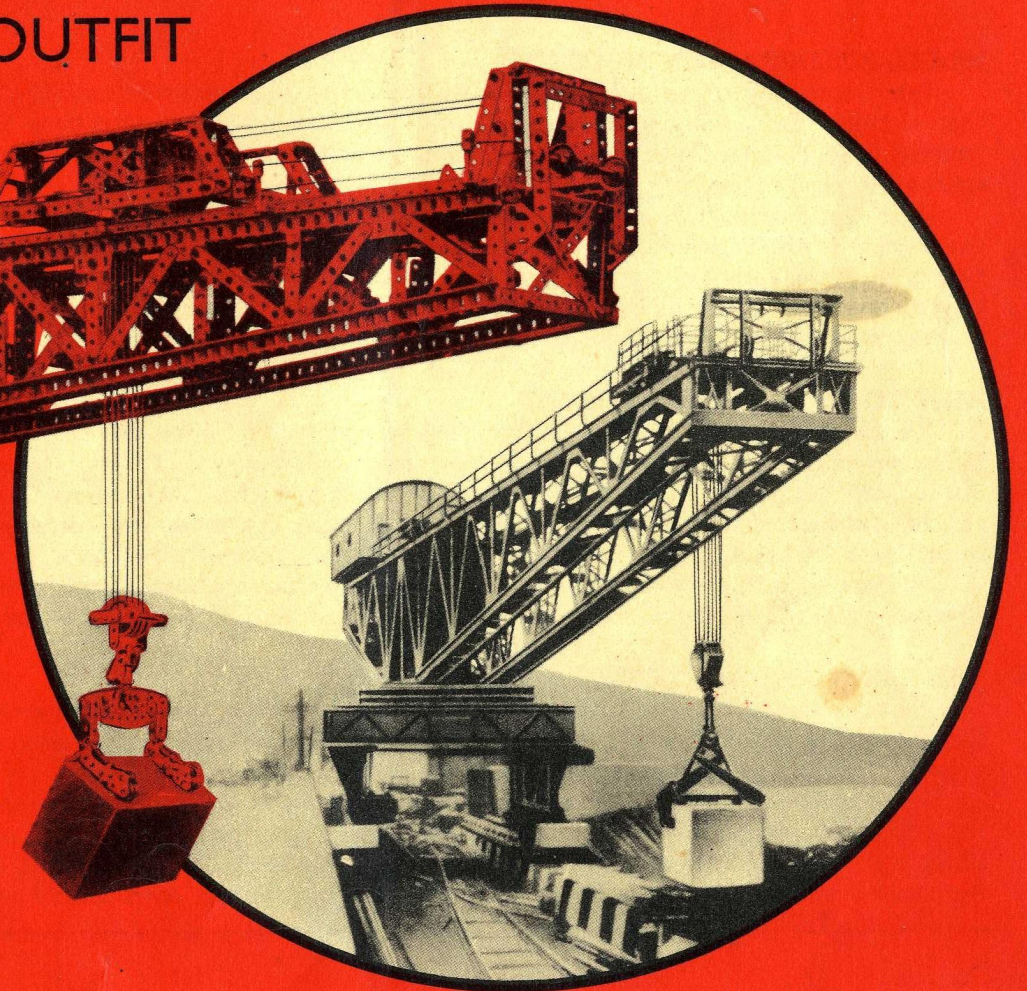
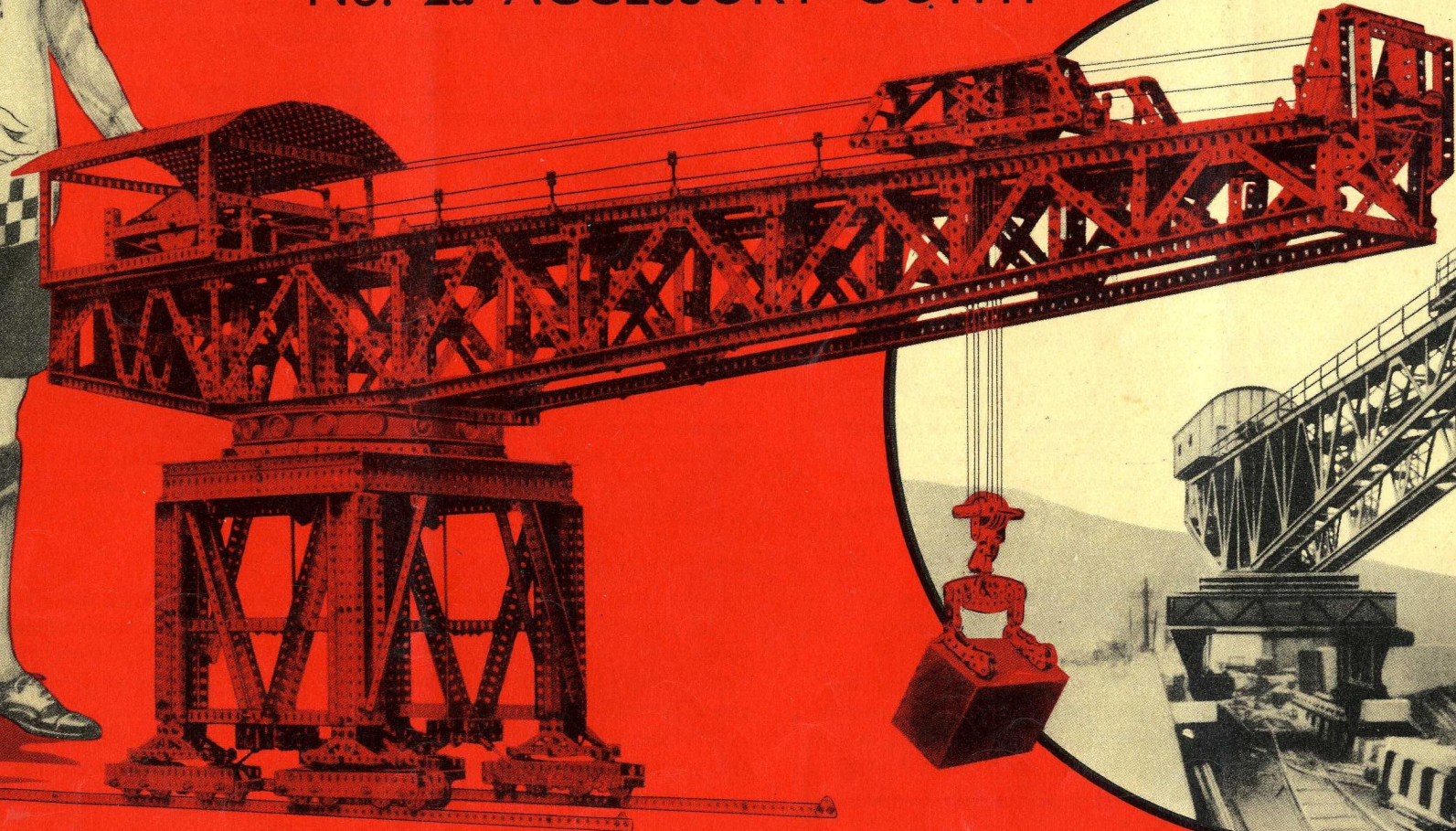
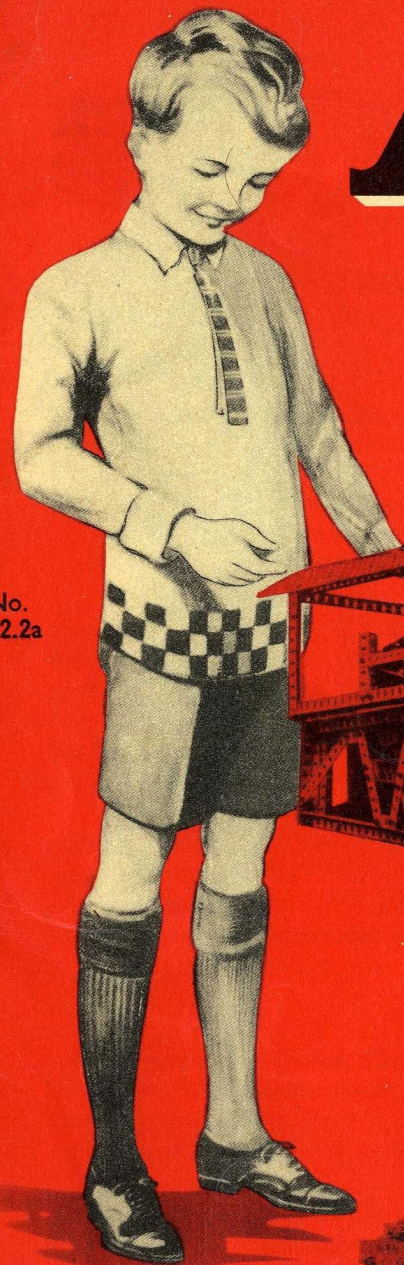
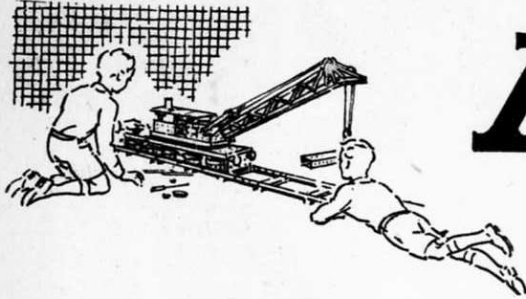


# MECCANO

INSTRUCTIONS FOR  
No. 2a ACCESSORY OUTFIT

No.  
52.2a





# MECCANO

*Real Engineering in Miniature*



## MODEL-BUILDING WITH MECCANO

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

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

## HOW TO BUILD UP YOUR OUTFIT

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

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

## THE "MECCANO MAGAZINE"

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

There are model-building competitions specially planned to give an equal chance to the owners of small and large Outfits. In addition, there are splendid articles on such subjects as Railways, Famous Engineers and Inventors, Electricity, Bridges, Cranes and Aeroplanes, and special sections dealing with the latest Engineering, Aviation, Motoring

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

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

## THE MECCANO GUILD

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

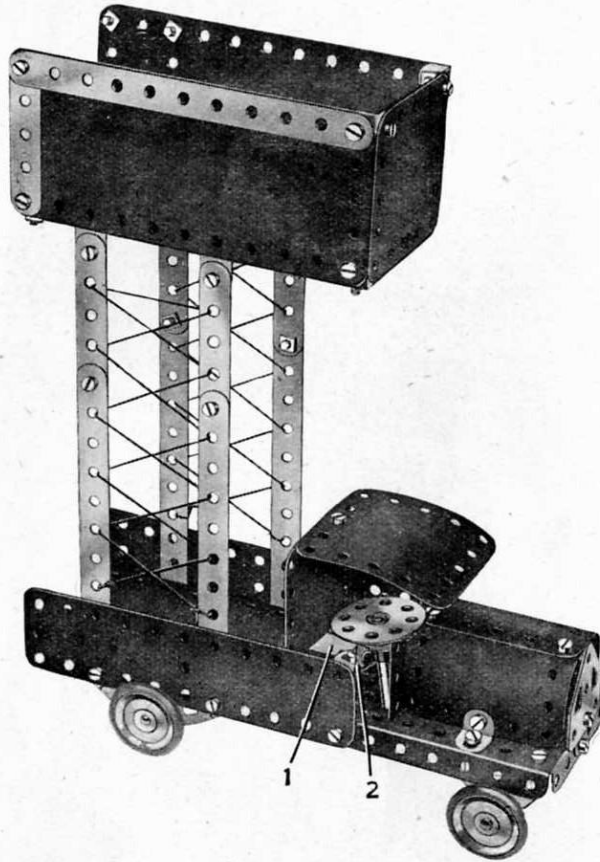
Clubs founded and established under the guidance of the Guild Secretary provide Meccano boys with opportunities of enjoying to the utmost the fun of model-building. Each has its Leader, Secretary, Treasurer and other officials. With the exception of the Leader, all the officials are boys, and as far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

## MECCANO SERVICE

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

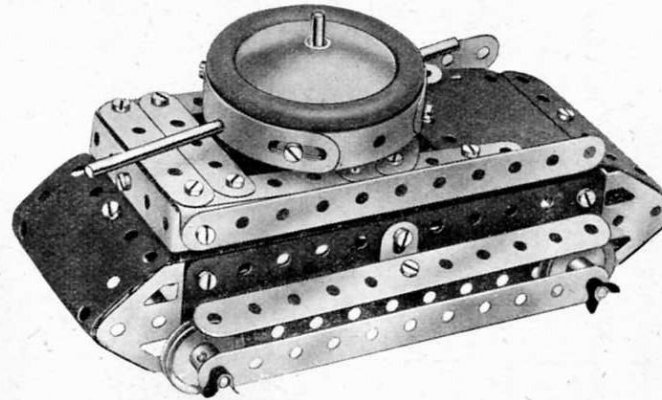
Whatever your problem may be, write to us about it. We shall be delighted to help you in any way possible. Address your letters to **Information Service**.

## 3.1 TOWER WAGON



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

## 3.2 TANK



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

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

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

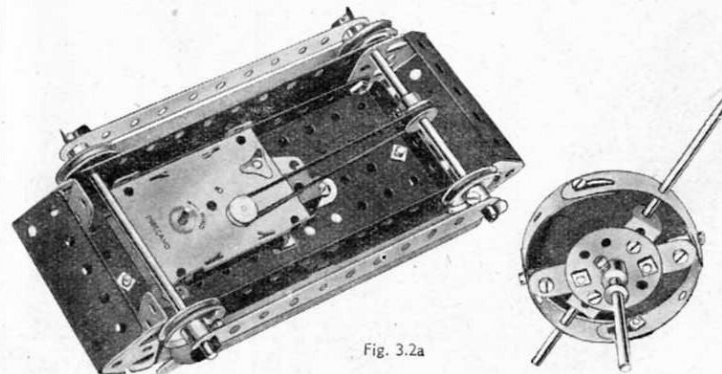


Fig. 3.2a

## 3.3 PORTABLE GARAGE CRANE

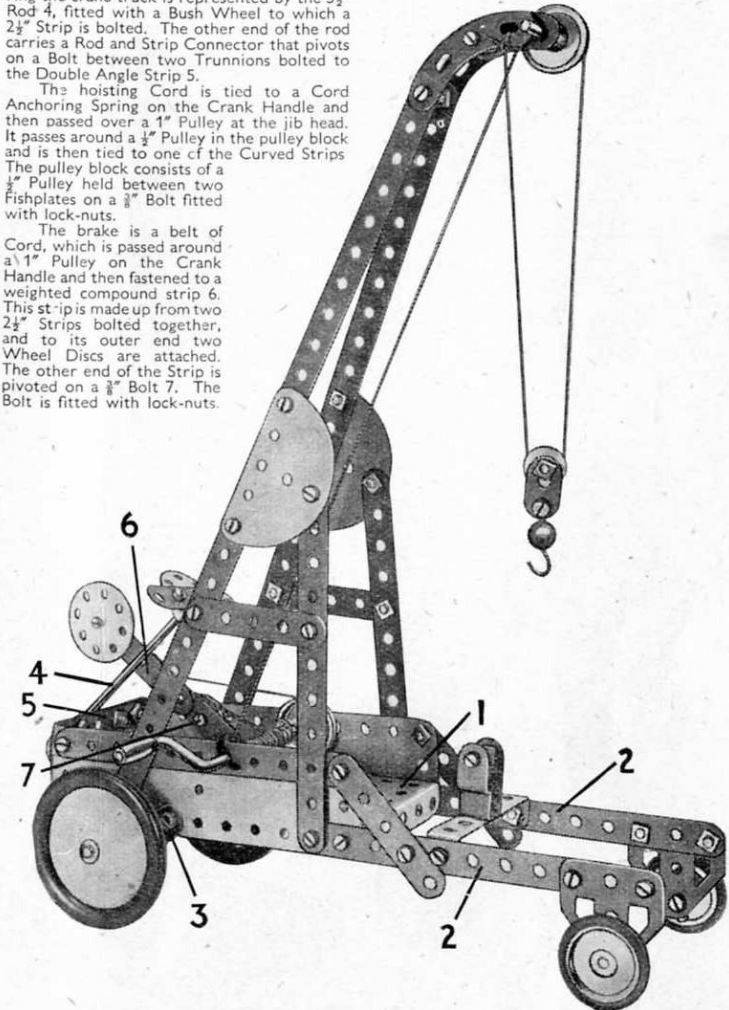
A Flanged Plate 1 is extended on each side by  $5\frac{1}{2}$ " Strips 2. The Road Wheels are locked on a  $3\frac{1}{2}$ " Rod supported in  $2\frac{1}{2}$ " Curved Strips 3 on each side of the model. The 1" Pulleys rotate on 1" Bolts passed through Flat Trunnions.

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

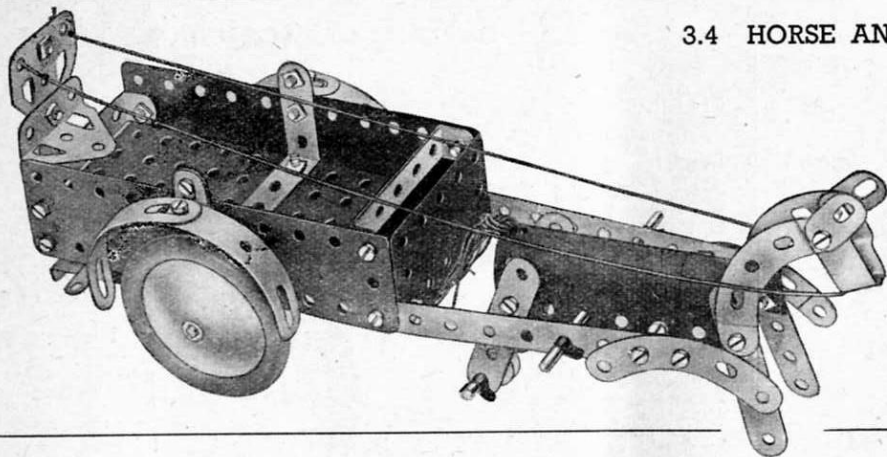
The handle used for hauling and manoeuvring the crane truck is represented by the  $3\frac{1}{2}$ " Rod 4, fitted with a Bush Wheel to which a  $2\frac{1}{2}$ " Strip is bolted. The other end of the rod carries a Rod and Strip Connector that pivots on a Bolt between two Trunnions bolted to the Double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

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

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

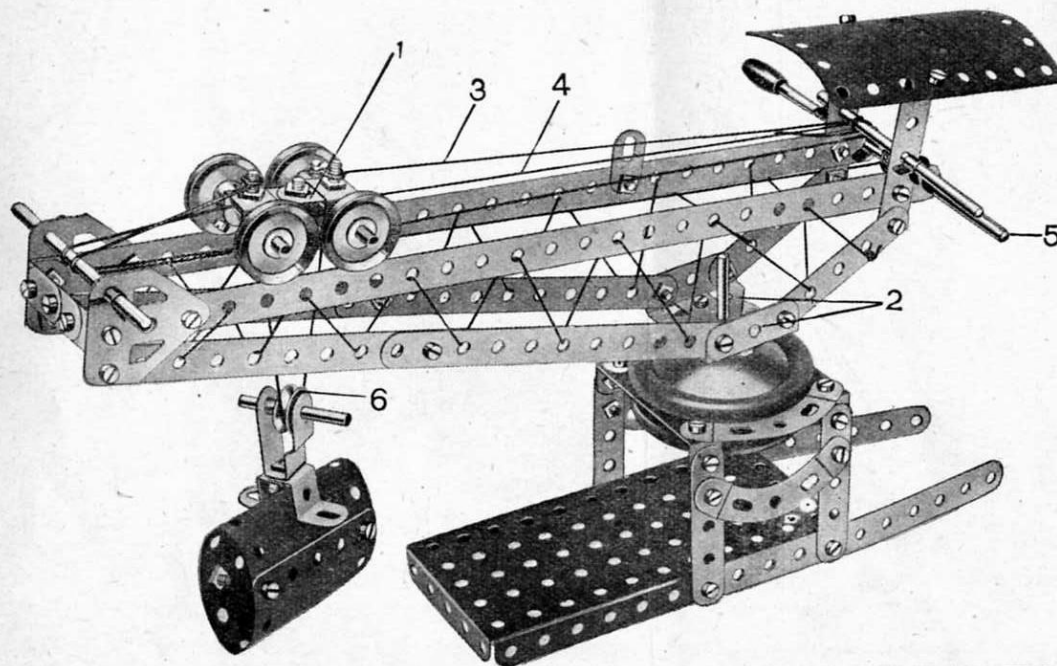


## 3.4 HORSE AND CART



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

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

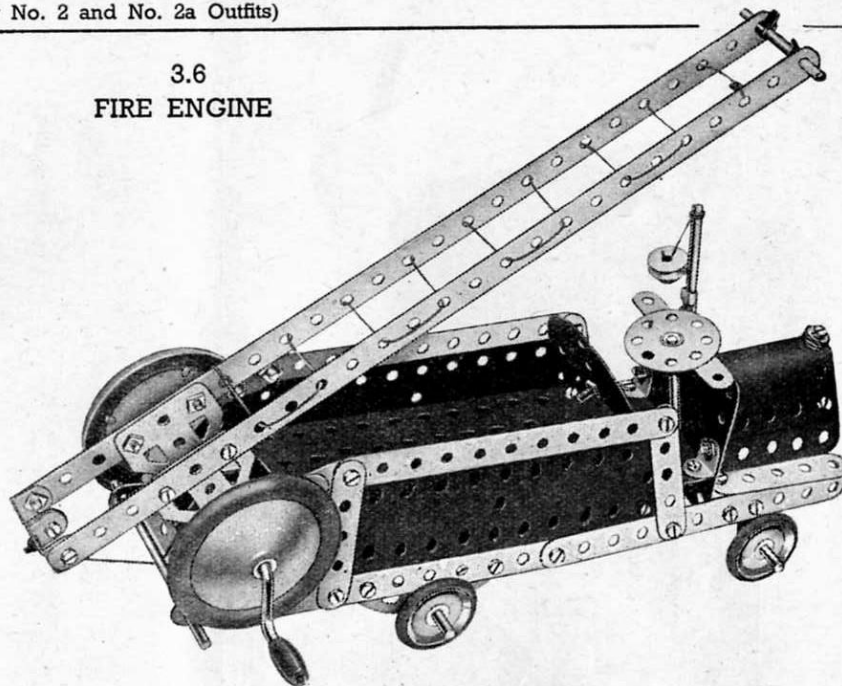
3.5  
BLOCK-SETTING  
CRANE

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

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

Cord 3 is first fastened to the  $\frac{3}{8}$ " Bolt at the rear end of the travelling bogie, and then wound three times around the Crank Handle 5. It is then led around the Rod journaled in the Flat Trunnions at the front end of the jib and brought back and tied to another  $\frac{3}{8}$ " Bolt at the front of the bogie.

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

3.6  
FIRE ENGINE

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

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

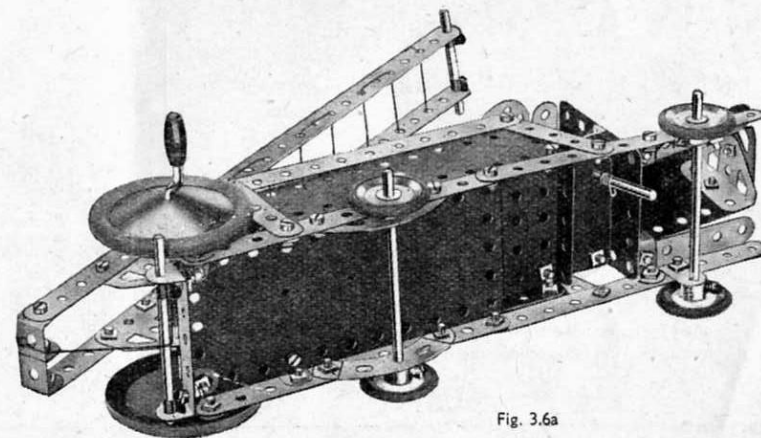


Fig. 3.6a

## 3.7 SIMPLE HAND LOOM

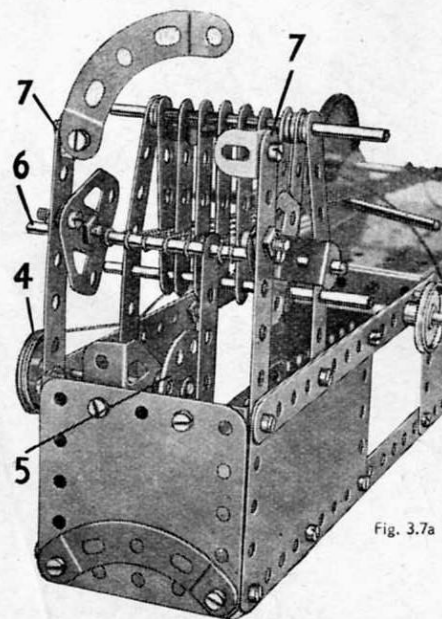
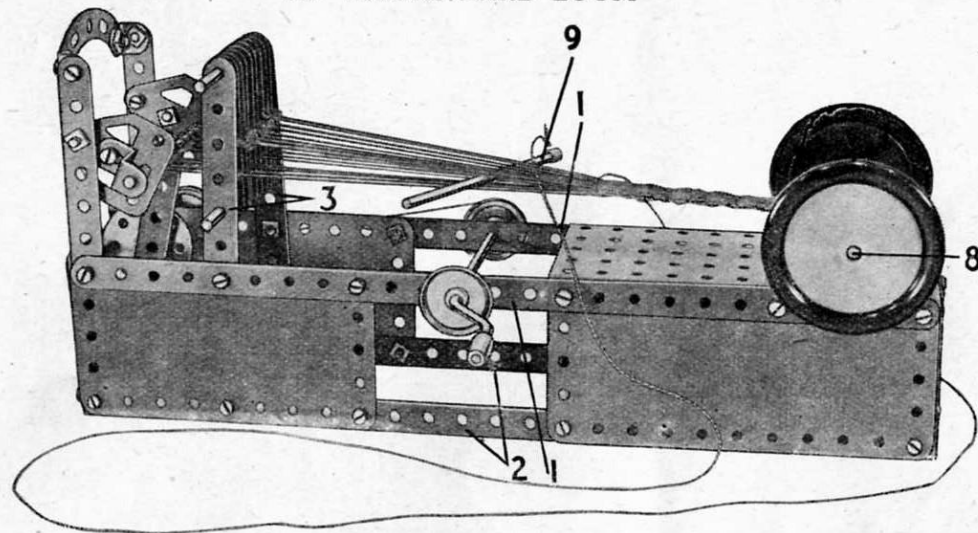


Fig. 3.7a

This interesting model is designed to demonstrate the principles of hand weaving. The base is formed by two 12 1/2" Strips 1 bolted to a Flanged Plate at one end and joined by a 2 1/2" x 1/2" Double Angle Strip at the other. Two 5 1/2" x 2 1/2" and two 4 1/2" x 2 1/2" Flexible Plates are bolted to the Strips and joined at their lower edges by the 5 1/2" Strips 2.

The 5 1/2" Strips 3 form a support for the heald frame, which consists of eight 2 1/2" Strips held by two 3 1/2" rods. The Strips are separated by Spring Clips and Washers as shown, these parts being placed between the Strips on the upper Rod.

The warp separating movement is operated from a Crank Handle. A 1" Pulley on this is connected by a belt of Cord to a similar Pulley 4, which is locked on a 2" Rod that carries also the Bush Wheel 5. A 2 1/2" Strip lock-nutted to the Bush Wheel links it with the Rod 6. This Rod is mounted in two Flat Trunnions, each fitted with a Reversed Angle Bracket. The Trunnions are free to turn on the shanks of 1/2" Bolts fastened in the Strips 7.

A 4" Rod 8 fitted with two Road Wheels passes through two Semi-Circular Plates bolted to the sides of the Flanged Plates.

A length of Cord taken from each of the 2 1/2" Strips forming the healds is tied to the Rod 8. A second set of similar Cords is taken from the Rod 8, passed between the healds and fastened to Rod 6.

To operate the model the two sets of warp threads are separated by turning the Crank Handle slightly. A length of Cord is then passed between the layers by means of the 3 1/2" Rod 9. The Crank Handle is then again turned slightly, thus changing the positions of the warp layers, and the Rod 9 is again passed through.

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

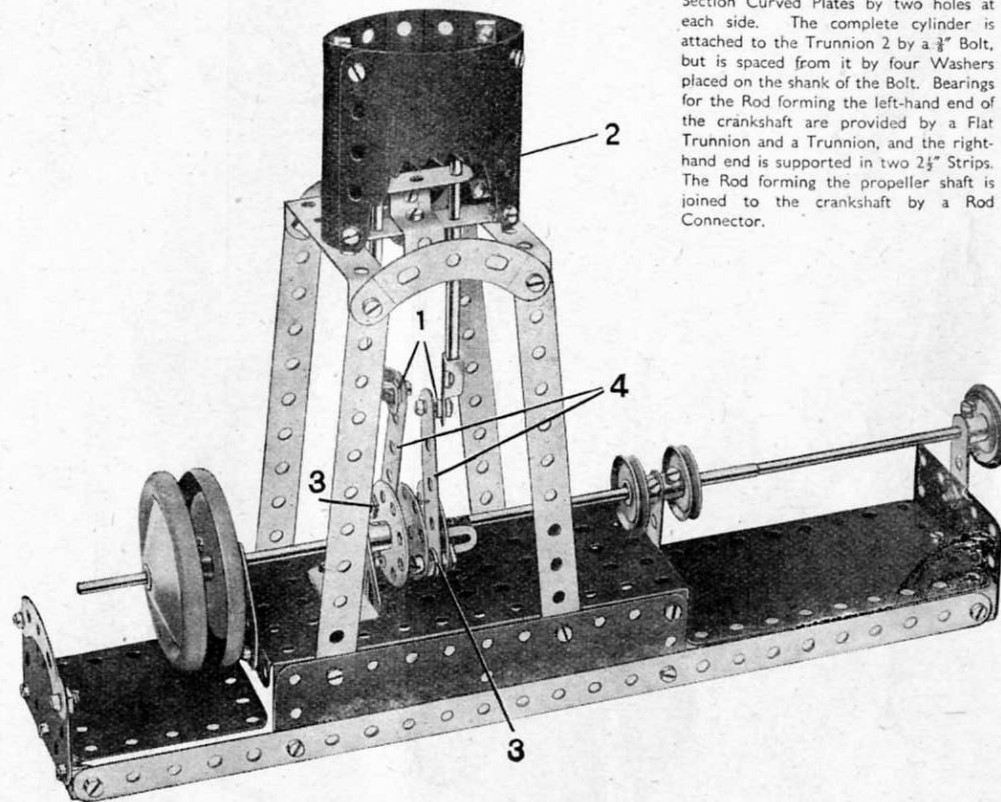
## 3.8 MARINE ENGINE

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

The piston rod is held by two Spring Clips, one at each side of the Angle Bracket pivotally fastened by one of the Bolts 1. Inside the cylinder the Rods slide through holes in a 2 1/2" Strip and a Trunnion 2. In order to show the construction clearly, part of the cylinder has been cut away in the illustration.

The rod carrying two 1" Pulleys passes through the centre hole in the outer Wheel Disc. A 1/2" x 1/2" Angle Bracket is bolted to the Disc in such a position that when the Disc is turned the Angle Bracket engages with a Spring Clip on the Rod. It is important that all nuts and bolts are made quite secure with the spanner and screw-driver.

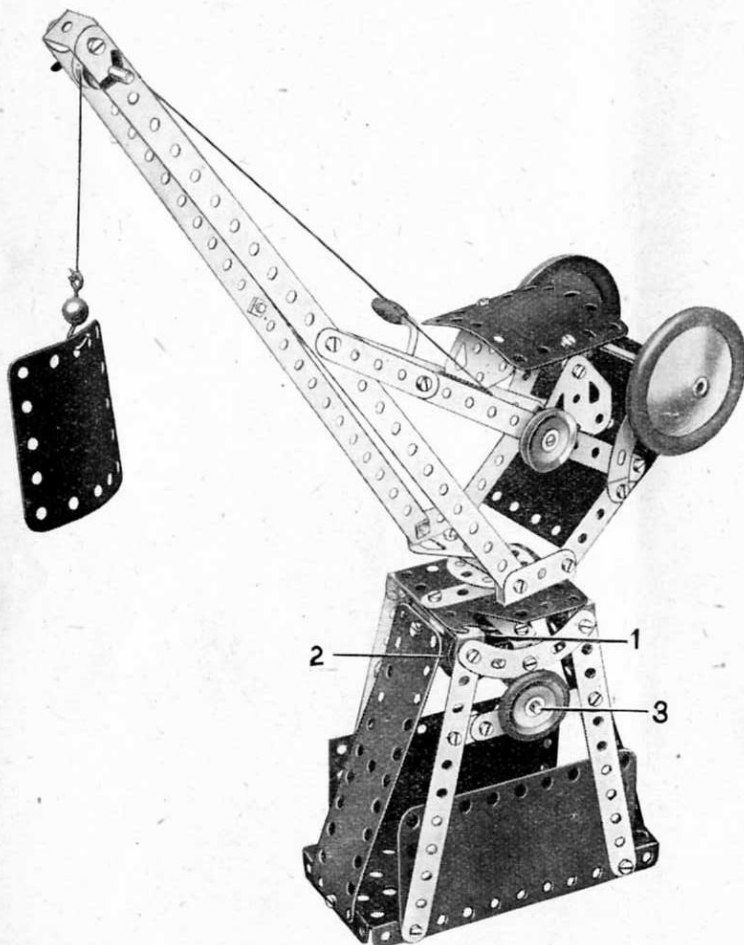
The cylinder consists of two U-Section Curved Plates, and two 1 1/8" radius Curved Plates, the latter overlapping the U-Section Curved Plates by two holes at each side. The complete cylinder is attached to the Trunnion 2 by a 3/8" Bolt, but is spaced from it by four Washers placed on the shank of the Bolt. Bearings for the Rod forming the left-hand end of the crankshaft are provided by a Flat Trunnion and a Trunnion, and the right-hand end is supported in two 2 1/2" Strips. The Rod forming the propeller shaft is joined to the crankshaft by a Rod Connector.



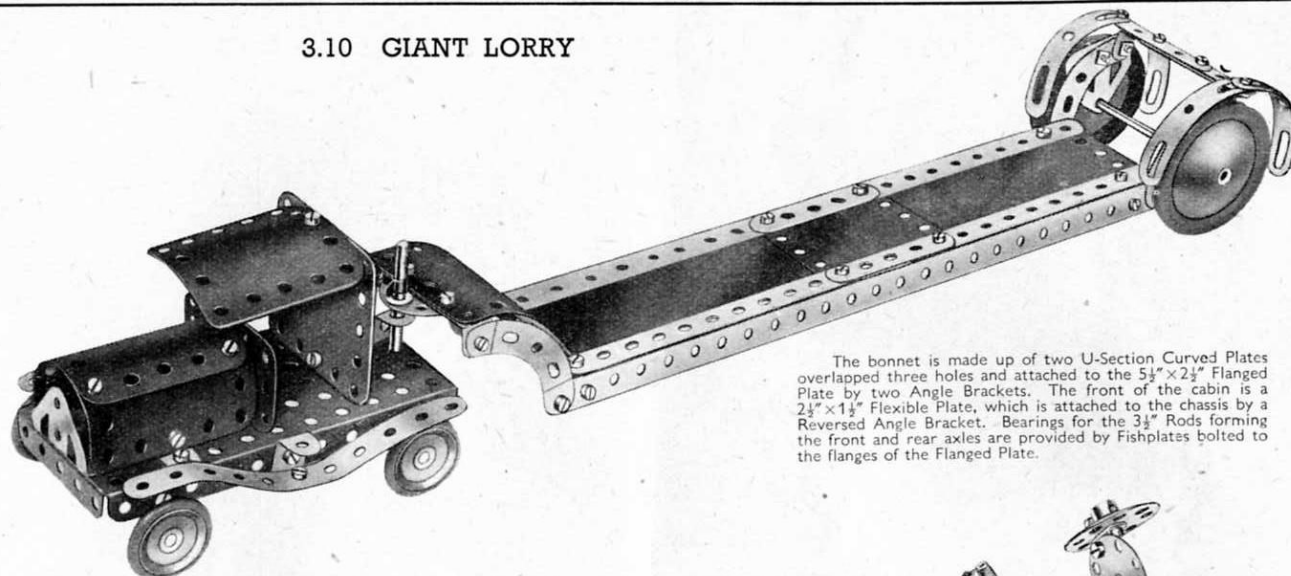
### 3.9 SWIVELLING JIB CRANE

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

The top of the tower consists of two 2½"×1½" Flexible Plates, strengthened along the join at the centre by a 2½" Strip.



### 3.10 GIANT LORRY



The bonnet is made up of two U-Section Curved Plates overlapped three holes and attached to the 5½"×2½" Flanged Plate by two Angle Brackets. The front of the cabin is a 2½"×1½" Flexible Plate, which is attached to the chassis by a Reversed Angle Bracket. Bearings for the 3½" Rods forming the front and rear axles are provided by Fishplates bolted to the flanges of the Flanged Plate.

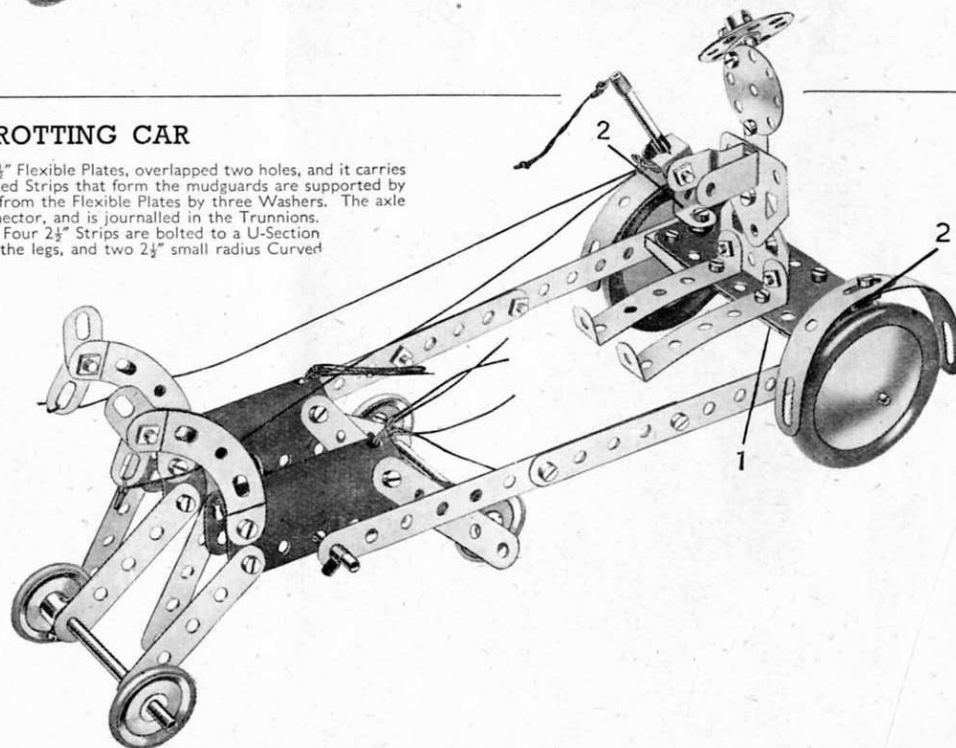
### 3.11 TROTTING CAR

The seat of the car consists of two 2½"×1½" Flexible Plates, overlapped two holes, and it carries at each end a Trunnion. The 3" Formed Slotted Strips that form the mudguards are supported by Reversed Angle Brackets 2, which are spaced from the Flexible Plates by three Washers. The axle consists of two 2" Rods joined by a Rod Connector, and is journaled in the Trunnions.

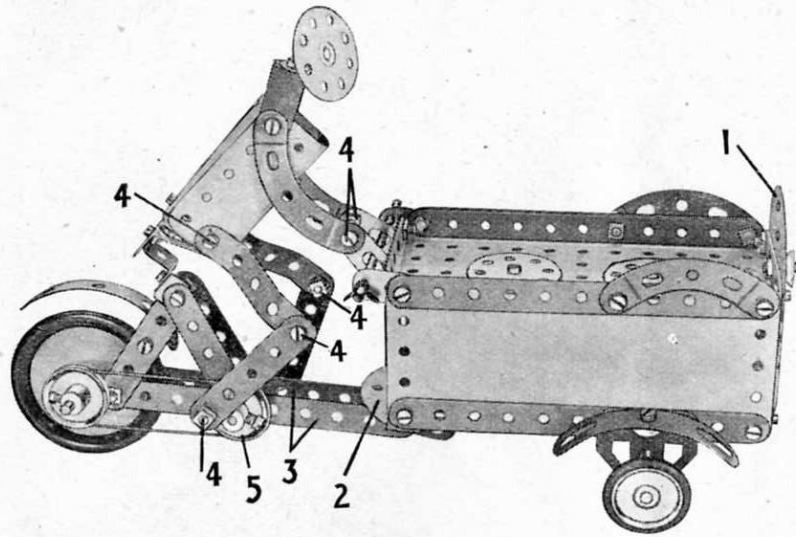
Each of the horses is built up as follows. Four 2½" Strips are bolted to a U-Section Curved Plate in the positions shown to form the legs, and two 2½" small radius Curved Strips represent the neck. A rod is pushed through the centre holes of the U-Section Curved Plates and is supported in the end holes of the shafts. Two 3½" Rods carrying 1" Pulleys at each of their ends are journaled in the end holes of two of the forelegs and two of the hind-legs of the horses, as shown.

The drivers body is made from two Flat Trunnions, which are bolted together and then fitted with 2½"×½" Double Angle Strips to represent legs. The Bolt that fixes the Stepped Bent Strip to the body holds also a Fishplate that supports a Wheel Disc representing the head. An Angle Bracket bolted to the Disc secures a Bush Wheel that has a ½" Bolt fixed in its boss by its screw.

The whip is a 1½" Rod held by Spring Clips in a Double Bracket, and the lash is attached to it by a Cord Anchoring Spring. The reins are fastened to the Fishplates that form the horses heads, and also to the Double Bracket to which the whip is fixed. Short lengths of Cord fastened to the U-Section Curved Plates represent the horses' tails.



## 3.12 ICE CREAM VENDOR AND VAN



The carrier box of the tricycle is made by bolting two  $5\frac{1}{2}'' \times 2\frac{1}{2}''$  and two  $2\frac{1}{2}'' \times 2\frac{1}{2}''$  Flexible Plates to a Flanged Plate. The wheels are made fast to a  $3\frac{1}{2}''$  Rod that rotates in Flat Trunnions. A Semi-Circular Plate 1 is attached to the front of the carrier, and a similar part 2 is bolted to a Double Angle Strip that spans the sides of the carrier.

The  $5\frac{1}{2}''$  Strips 3 are secured to a Double Bracket pivotally attached to the Semi-Circular Plate 2. The supports for the saddle consist of four  $2\frac{1}{2}''$  Strips, and a Trunnion is attached to these by a Reversed Angle Bracket and an Angle Bracket.

The body of the rider is formed by two U-Section Curved Plates, and is attached to the Trunnion by an Angle Bracket. His legs are made from four  $2\frac{1}{2}''$  Strips. It is important to note that all the Bolts numbered 4 are lock-nutted so that the parts they hold are free to pivot.

The rear wheel is fixed on a 2" Rod fitted with a 1" Pulley. This Pulley is connected by a belt of Cord to a second Pulley 5 on a  $1\frac{1}{2}''$  Rod. An Angle Bracket is bolted to the boss of Pulley 5 and attached to one of the rider's legs, see Fig. 3.12a. The other leg is attached to a Reversed Angle Bracket. The slotted hole of the Bracket is fitted with a nut and bolt, and is then pushed on to the  $1\frac{1}{2}''$  Rod. The effect of this is that the nut presses against the Rod and locks the Bracket firmly so that it rotates with the Rod.

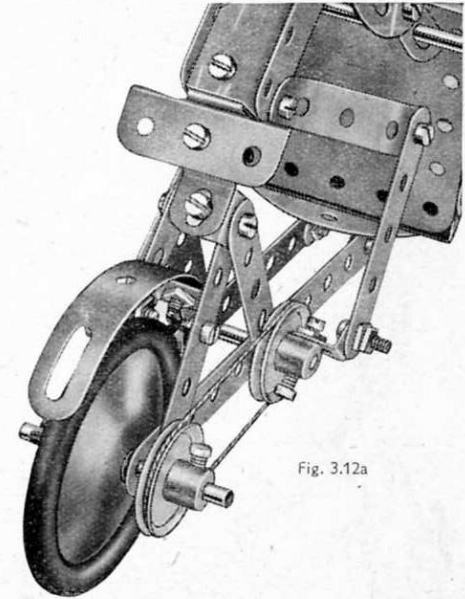
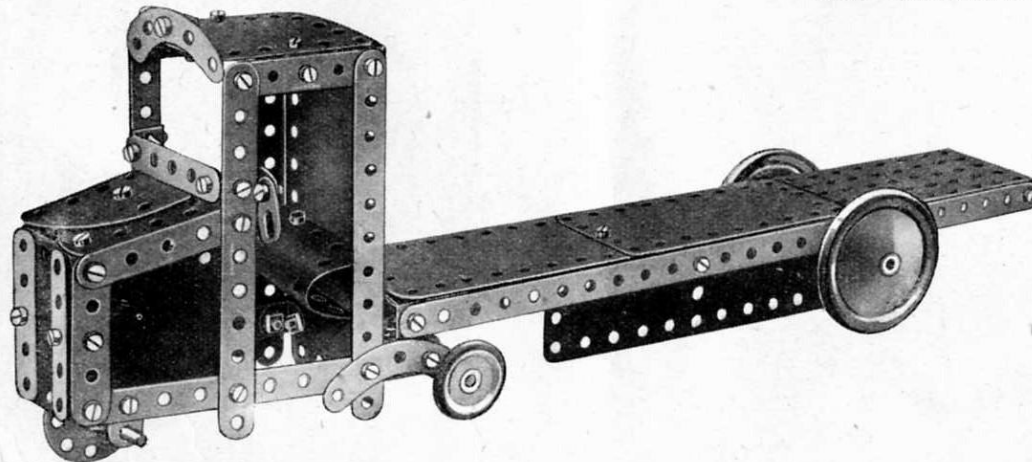


Fig. 3.12a

## 3.13 MECHANICAL HORSE AND TRAILER



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

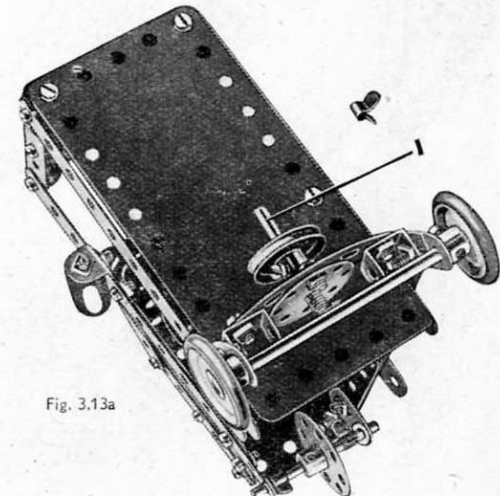
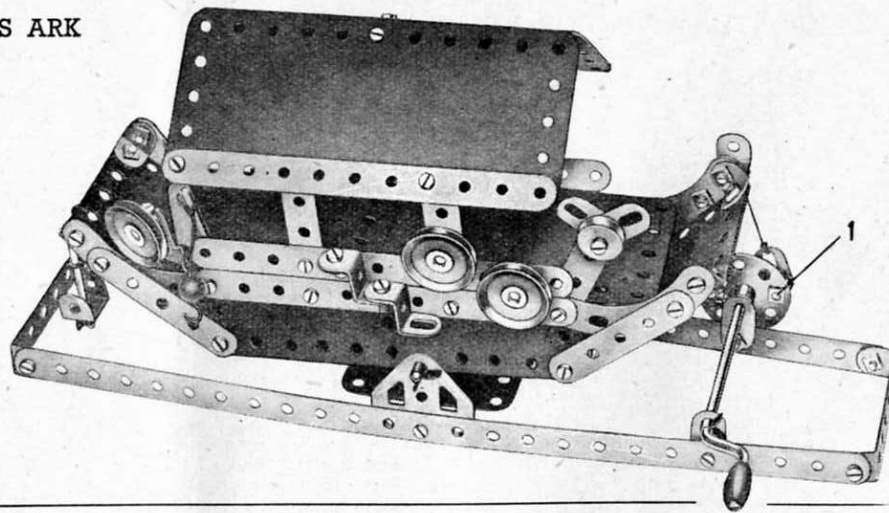


Fig. 3.13a

### 3.14 NOAH'S ARK

A  $5\frac{1}{2}" \times 2\frac{1}{2}"$  Flanged Plate is used for the bottom of the ark and  $5\frac{1}{2}" \times 1\frac{1}{2}"$  Flexible Plates and  $5\frac{1}{2}"$  Strips form the sides. The deck is fastened to the sides by  $\frac{1}{2}" \times \frac{1}{2}"$  Angle Brackets.

The ark is pivoted on a  $3\frac{1}{2}"$  Rod journalled in Flat Trunnions, the Rod passing through the flanges of the baseplate at the fifth hole from the end near the Crank Handle. The Crank Handle carries a Bush Wheel, and to this a Fishplate is lock-nutted at 1. A length of Cord is attached to the free hole of the Fishplate and is then tied to a Double Bracket bolted to the side of the ark. When the Crank Handle is rotated, the downward motion of the Fishplate causes one end of the ark to be pulled down, but as the Fishplate rises again, the ark returns to its original position.



### 3.15 ELECTRIC CRANE TRUCK

The electric truck is built up first by bolting a  $2\frac{1}{2}" \times 1\frac{1}{2}"$  and two  $5\frac{1}{2}" \times 1\frac{1}{2}"$  Flexible Plates to the flanges of a Flanged Plate. At their lower edges the Flexible Plates are strengthened by  $5\frac{1}{2}"$  strips and two  $2\frac{1}{2}" \times \frac{1}{2}"$  Double Angle Strips. The platform consists of two  $5\frac{1}{2}" \times 2\frac{1}{2}"$  and two  $4\frac{1}{2}" \times 2\frac{1}{2}"$  Flexible Plates overlapped, and these are extended by a Semi-Circular Plate 1.

Two  $2\frac{1}{2}" \times 2\frac{1}{2}"$  Flexible Plates 2, overlapped three holes, are bolted to the front end of a Flanged Plate, and a U-Section Curved Plate 3 is attached to these by a Double Bracket. A Semi-Circular Plate 4 is attached to the Flanged Plate by Angle Brackets.

The crane jib is supported by Flat Trunnions, which are attached to a Wheel Disc 5 by Angle Brackets. The Wheel Disc is lock-nutted through its centre hole to an Angle Bracket held by the Bolt 6.

The  $5\frac{1}{2}"$  Strips forming the jib pivot on a  $2"$  Rod 10 passed through holes in the flat Trunnions, and the jib is held at the required angle by a length of Cord. This Cord is tied to the Rod 11 and then passed through the Fishplates at the jib head, finally being tied again to the Rod 11.

The Trunnions 7, which form part of the steering device, are free to turn on  $\frac{1}{2}"$  Bolts secured to the Semi-Circular Plate 4, and they carry  $\frac{1}{2}"$  Bolts that form stub axles for the  $1"$  Pulleys. The  $2\frac{1}{2}"$  Strip 8, seen in the underneath view of the model, is bolted to a Bush Wheel, and is connected to each Trunnion by Cord as shown. The Bush Wheel is fixed on a  $3\frac{1}{2}"$  Rod passed through the Flanged Plate and an Angle Bracket 9.

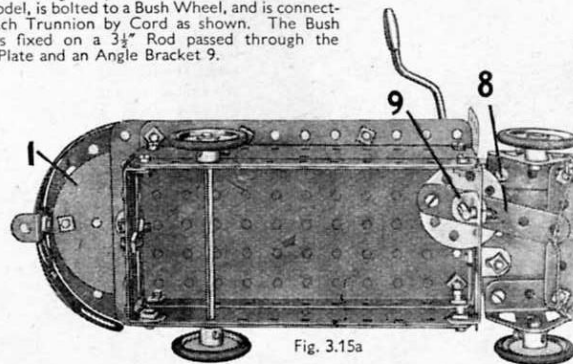
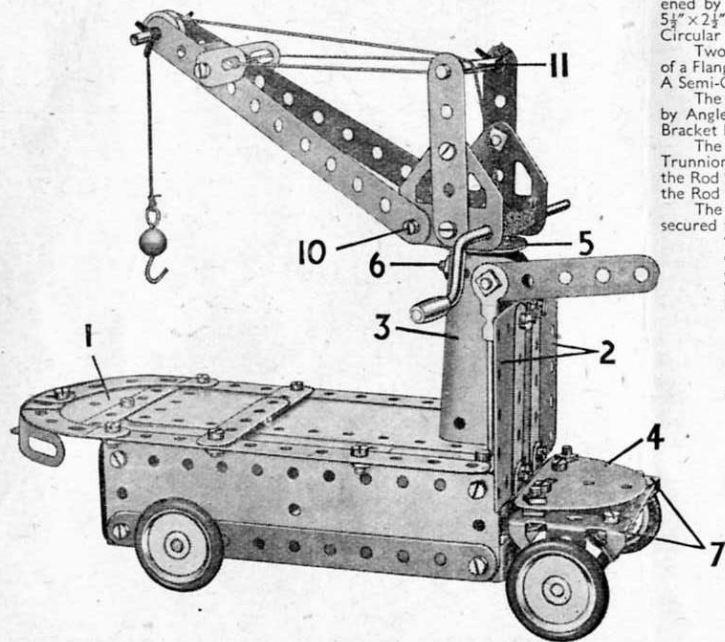


Fig. 3.15a

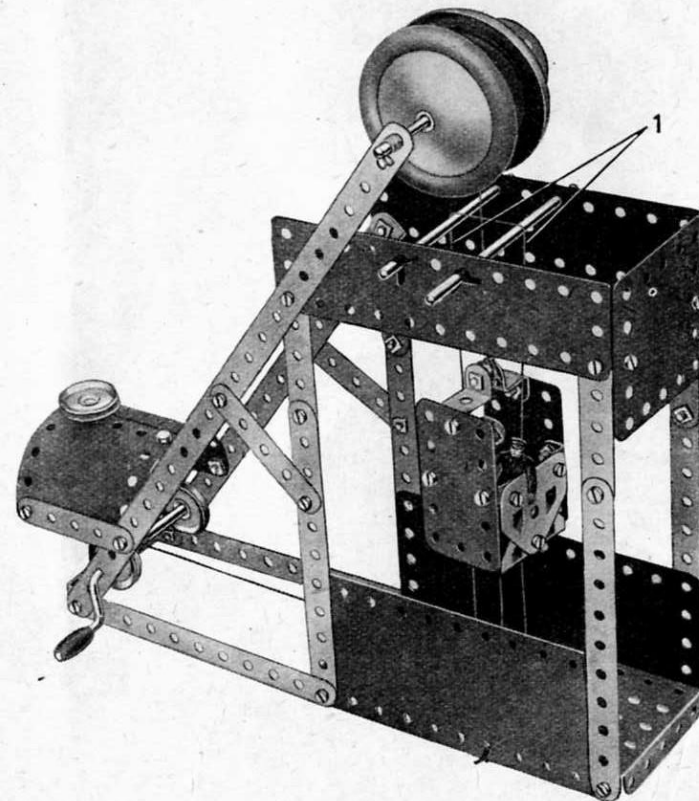
### 3.16 PITHEAD GEAR

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

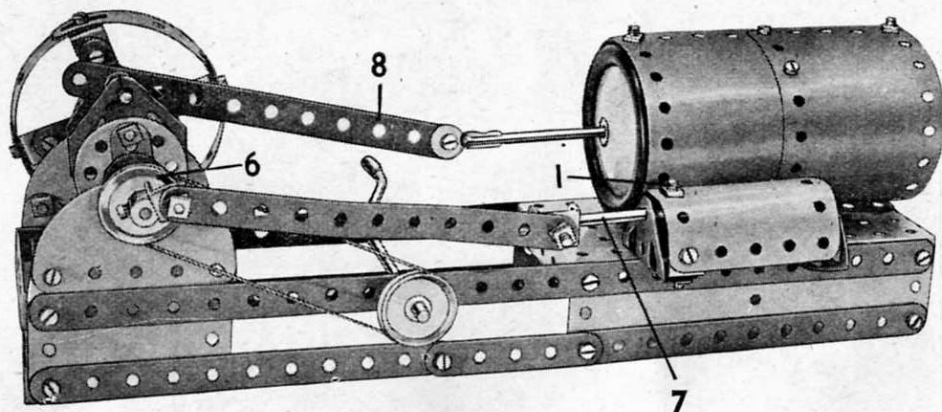
A  $\frac{1}{2}"$  Bolt is passed through the holes of Reversed Angle Brackets bolted to the top of the cage, and Washers are placed on its shank for spacing purposes.

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

The Cord used for elevating the cage is wound round the Crank Handle, and one end is passed over the  $3\frac{1}{2}"$  Rod and tied to the top of the cage. The other end of the Cord is passed through a hole in the Flanged Plate and tied to the underneath of the cage.



## 3.17 MILL ENGINE



The bed of the engine is built first. For this two 12 1/2" Strips are bolted one to each side of a Flanged Plate. A 5 1/2" x 1 1/2" Flexible Plate also is attached to each side of the Flanged Plate, and to the lower edges of the Flexible Plates are bolted built-up strips, each consisting of two 5 1/2" and one 2 1/2" Strip. At the front end of the model the 12 1/2" Strips are connected by a 2 1/2" x 1 1/2" Double Angle Strip, and a similar part is used to connect the ends of the built-up strips. At the front end of the bed a 2 1/2" x 1 1/2" Flexible Plate is bolted to each side. A Semi-Circular Plate is attached to each Flexible Plate by a Fishplate. The Semi-Circular Plates provide the bearings for the crankshaft.

The cylinder is made from two 5 1/2" x 2 1/2" and two 4 1/2" x 2 1/2" Flexible Plates bolted together and curved around the rims of two Road Wheels. The cylinder is bolted to the Flanged Plate.

The valve chamber is represented by a U-Section Curved Plate and two Trunnions. The Curved Plate is attached to one of the Trunnions by an Angle Bracket, and a second Angle Bracket held by the Bolt 1 provides a guide for the valve rod.

The crankshaft is built up from two 2" Rods, one of which is fitted with a Bush Wheel 2 and two 1" Pulleys. These

Pulleys grip the flywheel, which is built up from four Formed Slotted Strips attached to 2 1/2" Strips by Angle Brackets. A Flat Trunnion is bolted to the Bush Wheel as shown. The other 2" Rod carries a Wheel Disc 3, similarly fitted with a Flat Trunnion and also an Angle Bracket 4 held by the same bolt. A Spring Clip is placed on the Rod so that its lugs press against the Angle Bracket 4, thus locking the Wheel Disc to the Rod.

The connecting rod is a 5 1/2" Strip which is free to turn on a 1 1/2" Rod 5 held by Spring Clips in the Flat Trunnions.

The valve gear is operated by an Angle Bracket bolted to the boss of a 1" Pulley 6. A 5 1/2" Strip is attached loosely by a lock-nutted bolt to this Angle Bracket, and also to a Double Bracket on the Rod 7. A Cord Anchoring Spring is placed on this Rod inside the Double Bracket.

The connecting rod 8 is lock-nutted to a Rod and Strip Connector on a 4" Rod representing the piston rod.

The engine is set in motion by a belt of Cord running around a 1" Pulley on the Crank Handle and the Pulley 6.

Fig. 3.17a

## 3.18 SHOVEL EXCAVATOR

The tractor unit is made by bolting two 5 1/2" x 1 1/2" and two 2 1/2" x 1 1/2" Flexible Plates to the sides of a 5 1/2" x 2 1/2" Flanged Plate. It is fitted with wheels consisting of 1" Pulleys fixed on 3 1/2" Rods, and a belt of cord is passed around each pair of these to represent creeper tracks.

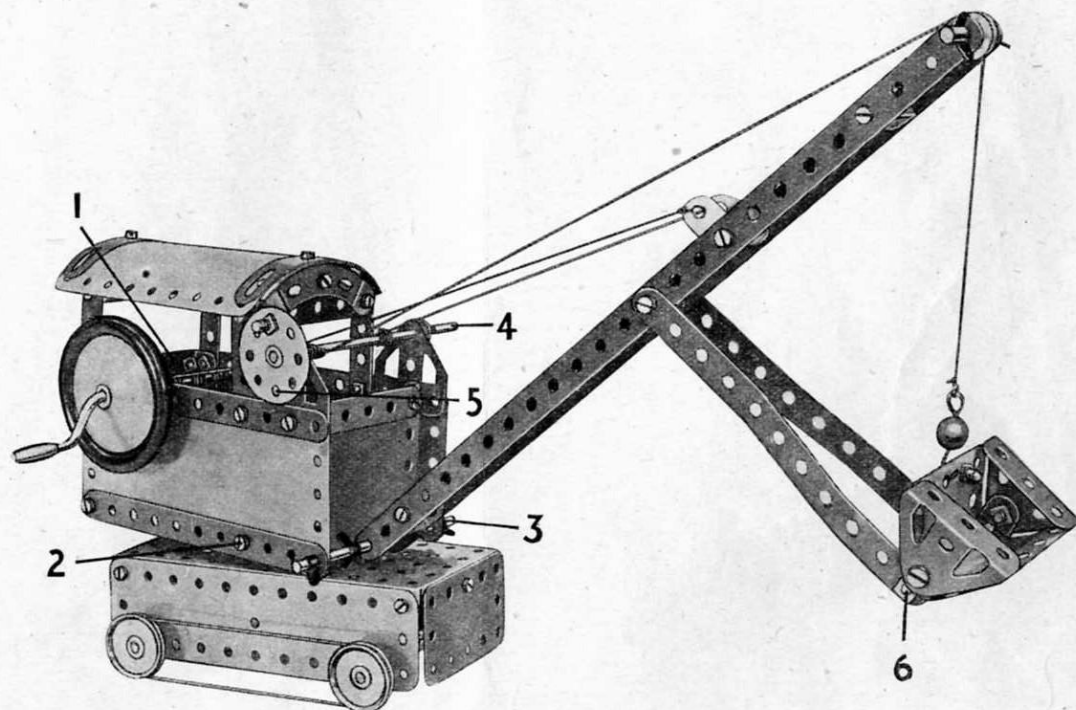
The cab sides consist of two 5 1/2" x 2 1/2" Flexible Plates edged with 5 1/2" Strips. These are joined by a Double Angle Strip 1 and a similar Double Angle Strip held by a Bolt 2 on each side of the cab. A 3/8" Bolt passed through this Double Angle Strip is used to attach the cab to the tractor unit, two Wheel Discs being used for spacing purposes. The 3/8" Bolt is lock-nutted. The back of the cab is a 2 1/2" x 2 1/2" Flexible Plate bolted to the Double Angle Strip 1.

The roof is made from two 4 1/2" x 2 1/2" Flexible Plates, and is attached at each end to a Curved Strip by an Angle Bracket. The Curved Strips are connected by Angle Brackets to four 2 1/2" Strips that support the roof.

The jib consists of two 12 1/2" Strips joined by Double Brackets. It pivots about a 3 1/2" Rod 3, and is luffed by two Cords extending from a Rod 4 to the Fishplates bolted to the 12 1/2" Strips. This Rod is fitted with a Bush Wheel and can be prevented from rotating by engaging a 3/8" Bolt 5 in one of the holes in the Bush Wheel. By this means it is possible to maintain the jib at any desired angle.

Two 5 1/2" Strips lock-nutted to the jib form the arm that carries the shovel. The shovel consists of a U-Section Curved Plate, and the 5 1/2" Strips are attached to it by two Reversed Angle Brackets, one of which can be seen at 6. The sides of the shovel are formed by two Trunnions.

The shovel arm is raised or lowered by a length of Cord, which extends from the Loaded Hook attached to the shovel, over a 1/2" Pulley at the jib and is then fastened to the Crank Handle.

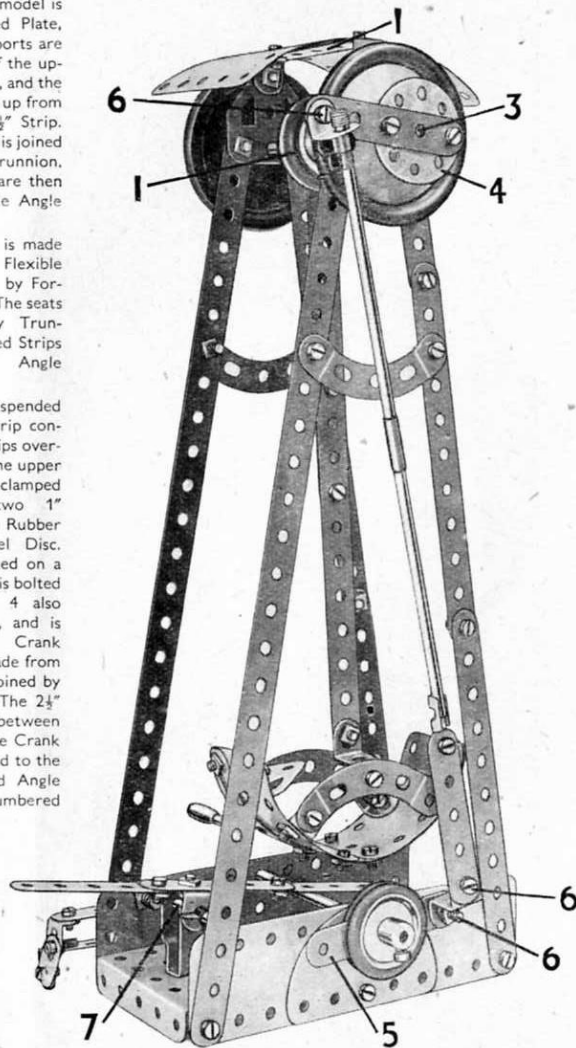


## 3.19 SWING BOAT

The base of the model is formed by a Flanged Plate, and the upright supports are bolted to it. Two of the uprights are  $12\frac{1}{2}$ " Strips, and the others are each built up from two  $5\frac{1}{2}$ " and one  $2\frac{1}{2}$ " Strip. Each pair of supports is joined at the top to a Flat Trunnion. The two Trunnions are then connected by Double Angle Strip 1.

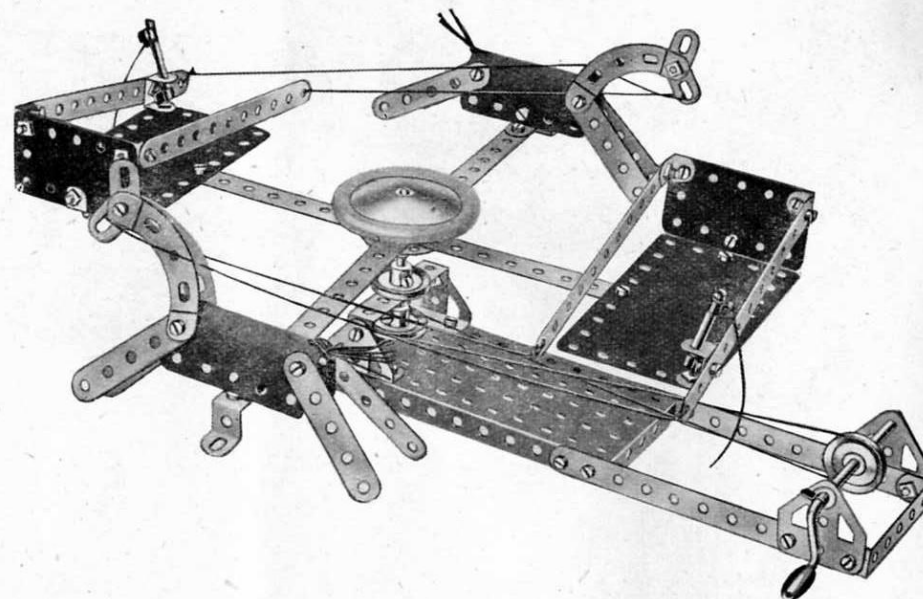
The swing boat is made from two  $2\frac{1}{2}$ "  $\times$   $1\frac{1}{2}$ " Flexible Plates, strengthened by Formed Slotted Strips. The seats are represented by Trunnions, and the Curved Strips are attached by Angle Brackets.

The swing is suspended from a compound strip consisting of two  $5\frac{1}{2}$ " Strips overlapped four holes. The upper end of this strip is clamped firmly between two 1" Pulleys 2 fitted with Rubber Rings and a Wheel Disc. The Pulleys are locked on a 4" Rod 3. A  $2\frac{1}{2}$ " Strip is bolted to a Bush Wheel 4 also locked on this Rod, and is connected to the Crank Handle by a lever made from a  $3\frac{1}{2}$ " and a 4" Rod joined by a Rod Connector. The  $2\frac{1}{2}$ " Strip 5 is clamped between two 1" Pulleys on the Crank Handle and is attached to the lever by a Reversed Angle Bracket. All Bolts numbered 6 are lock-nutted.



The brake for bringing the boat to rest is formed by three  $2\frac{1}{2}$ " Strips joined together, and is bolted to a Double Bracket held by the Rod 7.

## 3.20 ROUNDABOUT



The two horses and the two cars are each fixed to  $12\frac{1}{2}$ " Strips bolted at right angles to each other to a Bush Wheel that is fixed on a vertical  $3\frac{1}{2}$ " Rod. The Rod is passed through a  $2\frac{1}{2}$ "  $\times$   $\frac{1}{2}$ " Double Angle Strip and a hole in the Flanged Plate forming the base.

The model is driven by a belt of Cord passed around a 1" Pulley fixed on a Crank Handle supported in two Flat Trunnions bolted to the base and also around a further 1" Pulley fixed on the centre Rod of the roundabout.

Fig. 3.20a shows how the model roundabout can be fitted with a *Magic* Motor if this is available. The Motor is bolted to the  $5\frac{1}{2}$ " Strips of the base, and the drive is taken to a second 1" Pulley fastened on the Crank Handle and spaced from the Flat Trunnion by a Spring Clip and a Washer. This Pulley is removed from the end of the pivot rod of the roundabout underneath the  $5\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plate.

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

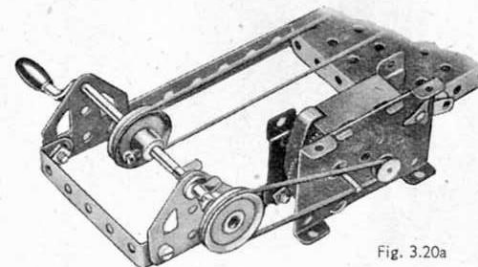
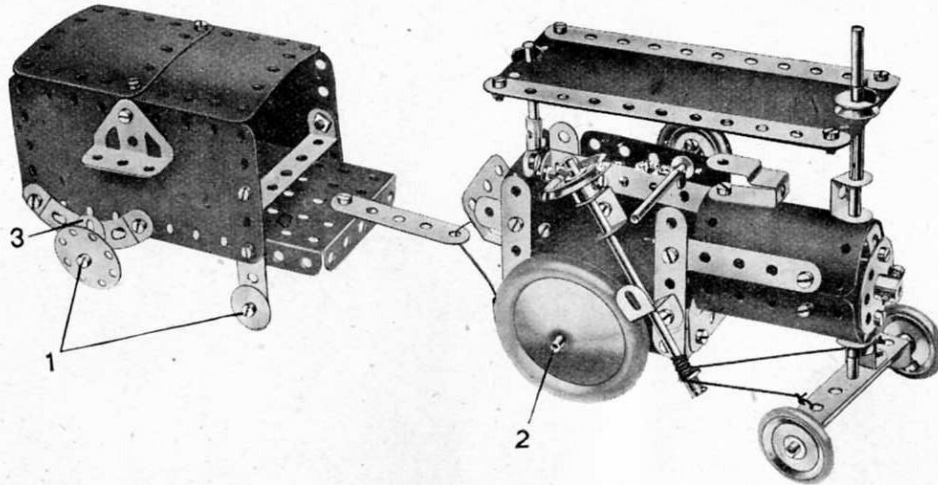


Fig. 3.20a

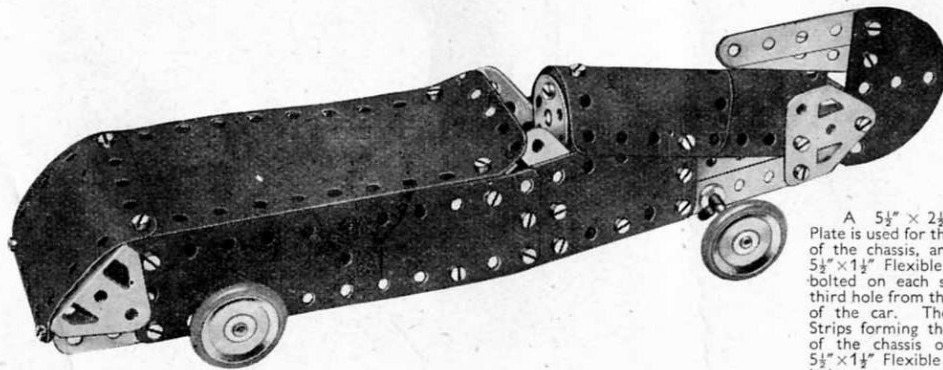
## 3.21 STEAM TRACTOR AND TRAILER



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

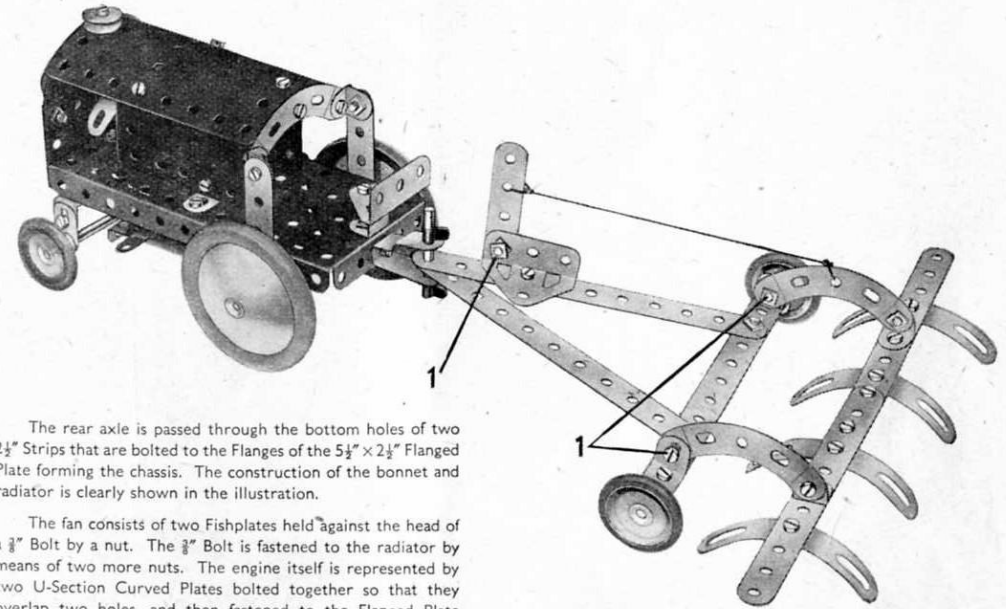
The Bush Wheel that forms the front of the Boiler has two Angle Brackets bolted to it and a Rod passes through the free holes of these Brackets to hold the Bush Wheel in position. This Rod is joined by a Rod Connector to a 2" Rod that forms the chimney. The roof of the cab consists of a  $5\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flexible Plate, and is held in position by Spring Clips placed on the two rods that pass through it. The Fishplates 3 are bolted in the centre holes of the  $2\frac{1}{2}$ " Curved Strips on each side of the model. The Bolts 1 are lock-nutted in position and the Wheel Discs and  $\frac{3}{8}$ " Washers turn freely on them.

## 3.22 RACING CAR



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

## 3.23 TRACTOR AND HARROW



The rear axle is passed through the bottom holes of two  $2\frac{1}{2}$ " Strips that are bolted to the Flanges of the  $5\frac{1}{2}$ "  $\times$   $2\frac{1}{2}$ " Flanged Plate forming the chassis. The construction of the bonnet and radiator is clearly shown in the illustration.

The fan consists of two Fishplates held against the head of a  $\frac{3}{8}$ " Bolt by a nut. The  $\frac{3}{8}$ " Bolt is fastened to the radiator by means of two more nuts. The engine itself is represented by two U-Section Curved Plates bolted together so that they overlap two holes, and then fastened to the Flanged Plate by two Angle Brackets.

The wheels of the harrow are held by  $\frac{3}{8}$ " Bolts in Reversed Angle Brackets at each end of a  $5\frac{1}{2}$ " Strip. Small radius Curved Strips are fastened to the Reversed Angle Brackets by lock-nutted bolts, and Cord is attached to the centre holes of one of these and also to the operating lever, which is held by lock-nuts to a Trunnion. By moving the lever forward the harrow may be raised from the ground when not in use.

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

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

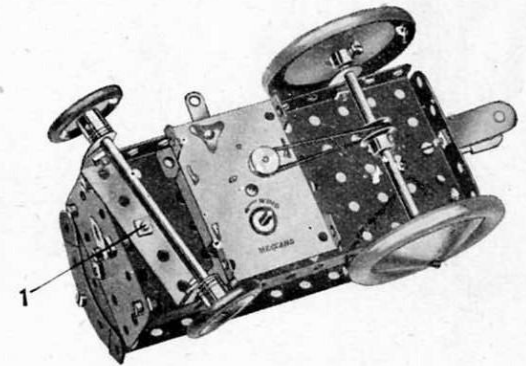


Fig. 3.23a

## 3.24 WINDMILL PUMP

Up and down motion of the pumping shaft is obtained from a crank fastened to the end of the Crank Handle. The crank is formed by securing an Angle Bracket to the boss of a 1" Pulley, two Washers being used between the Bracket and the boss. A 2½" Strip is pivoted to the Crank and the pumping beam, the other end of which is pivotally attached to a Double Bracket on the pump rod. The Bolts 1 are lock-nutted.

The 1" Pulley on the Crank Handle is connected by a belt of Cord to the shaft carrying the sails. The *Magic Motor* is bolted by its flanges to the baseplate, and the drive is taken from the pulley of the Motor to a ½" Pulley fixed on the shaft of the Crank Handle.

If a Motor is not available the model may be operated by hand.

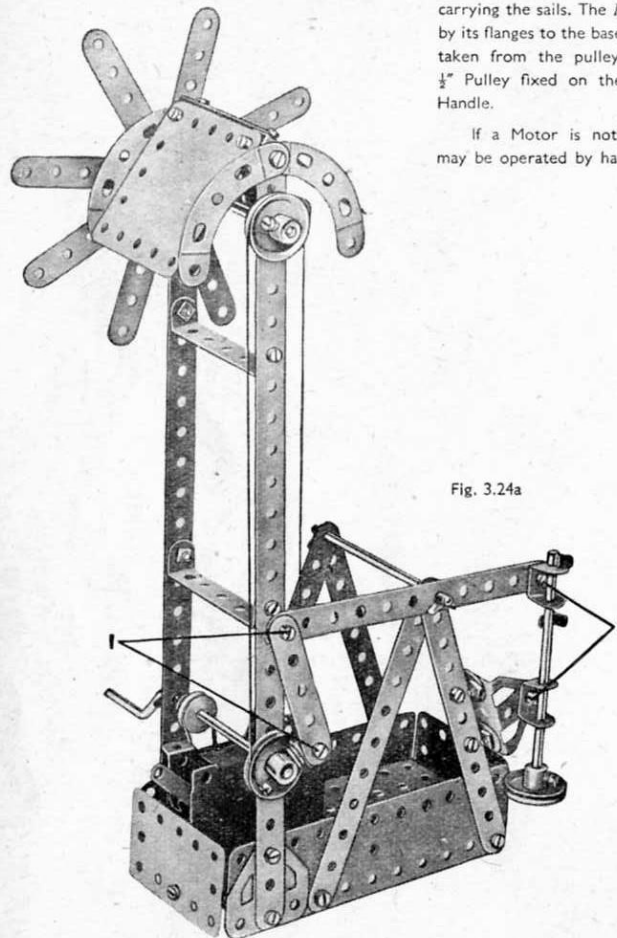
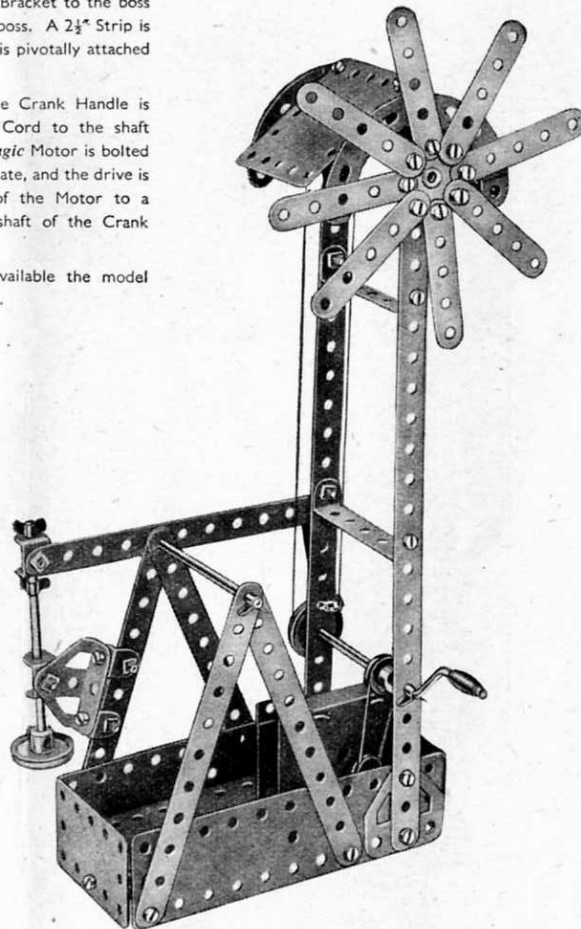


Fig. 3.24a

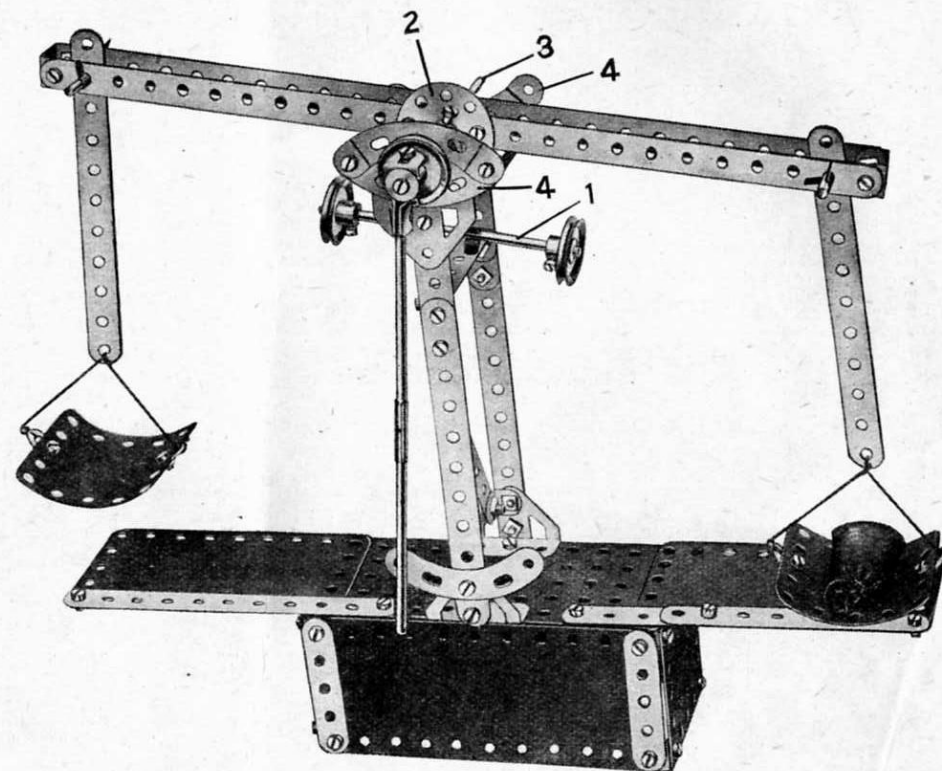


*Note:* The Motor used in this model is not included in the Outfit.

## 3.25 BALANCE

One of the 12½" Strips that form the beam of the balance is bolted across a Bush Wheel 2. The 3½" Rod 3 that is locked in the boss of the Bush Wheel rests on the two Curved Strips 4.

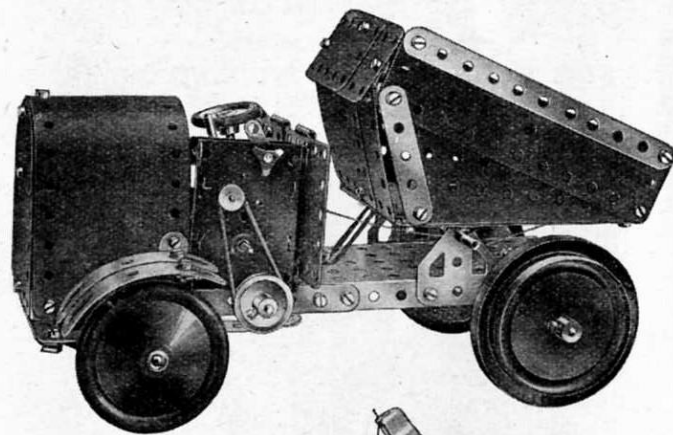
The Rod 1, by which the balance is adjusted, is pushed through the two holes of a Stepped Bent Strip fastened to the Bush Wheel 2 by a Reversed Angle Bracket. The 5½" Strips from which the scale pans are suspended are pivoted at their upper ends on 2" Rods, which are passed through holes in the 12½" Strips of the beam.



**BUILD BIGGER AND BETTER MODELS**

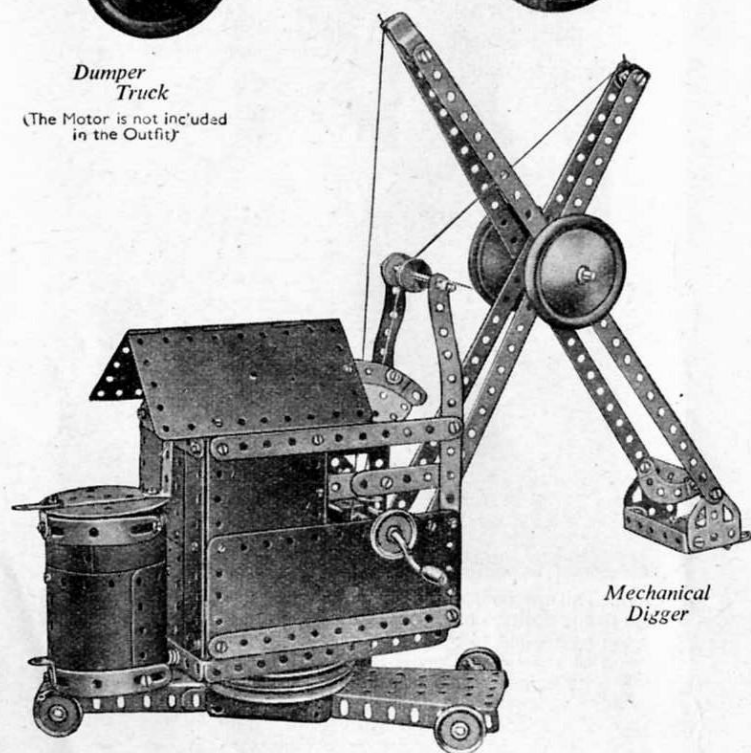
When you have built all the models shown in this Book of Instructions, you will be keen to build bigger and more elaborate models. Your next step is to purchase a Meccano No. 3a Accessory Outfit containing all the parts required to convert your No. 3 into a No. 4 Outfit. You will then be able to build the full range of No. 4 Outfit models, a selection of which is illustrated on this page.

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

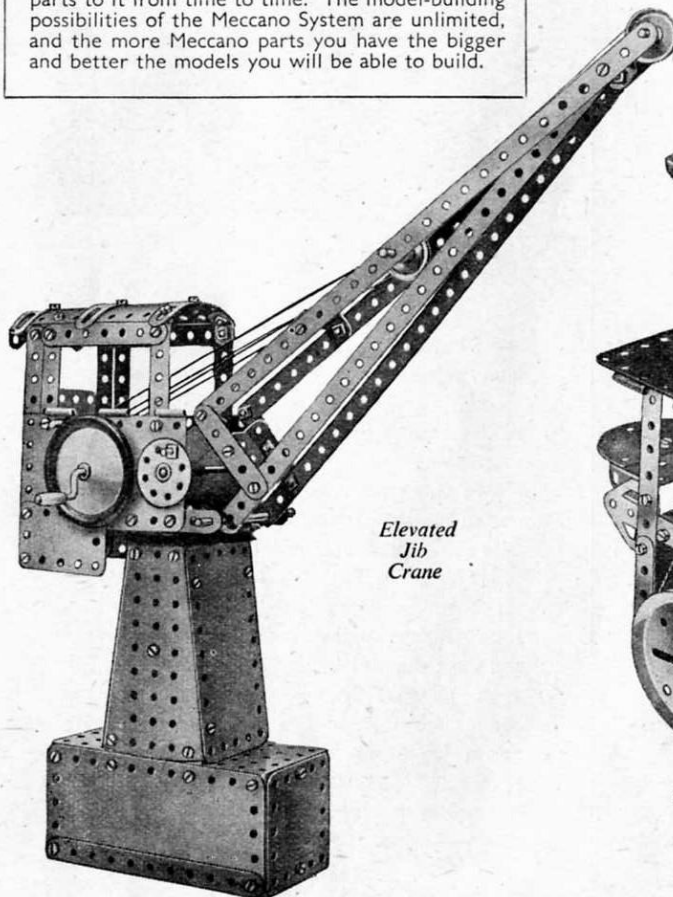


*Dumper  
Truck*

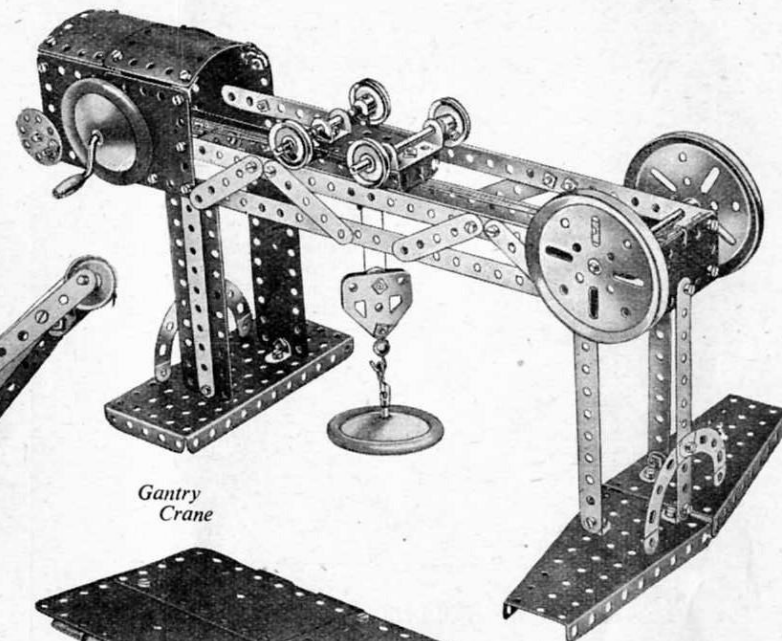
(The Motor is not included  
in the Outfit)



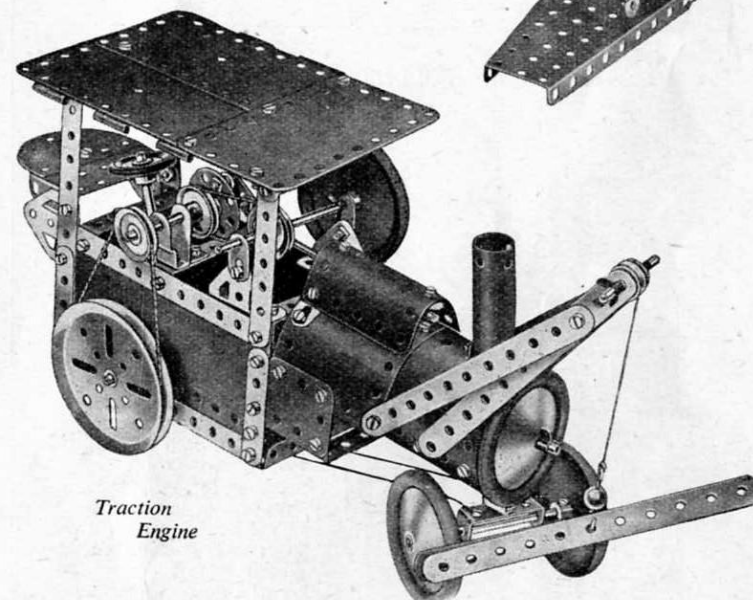
*Mechanical  
Digger*



*Elevated  
Jib  
Crane*



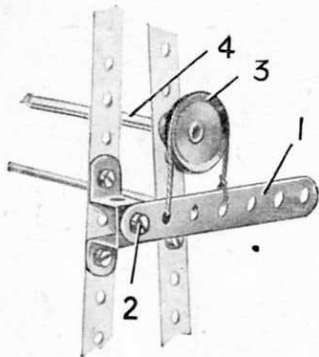
*Gantry  
Crane*



*Traction  
Engine*

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

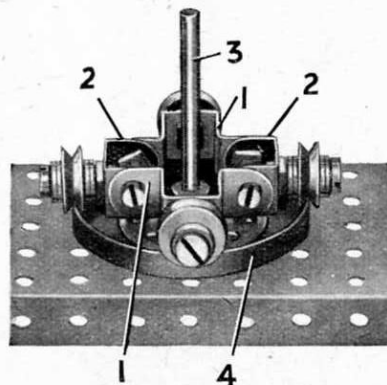
### USEFUL BAND BRAKE



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

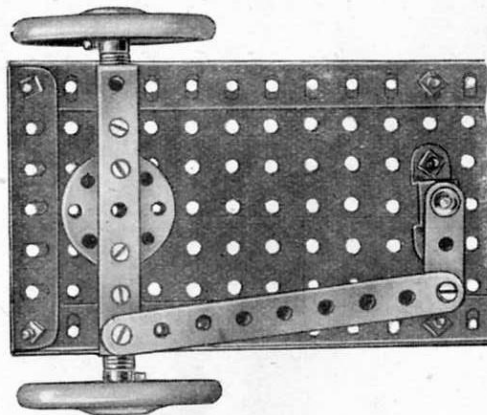
If increased braking effect is desired a larger Pulley may be used in place of the 1" fast Pulley 3, the brake lever 1 being attached in a lower position if necessary. Alternatively a weight can be hung from the end of the brake lever.

### BUILT UP ROLLER BEARING



S.M.136. The spider frame is built up from Double Bent Strips 1 connected together by two Double Brackets 2. The four wheels used are represented by  $\frac{1}{2}$ " loose Pulleys 4 journalled on Pivot Bolts secured to the outer ends of the four arms of the frame. Four Washers, two on each side of the Pulleys are passed on to the shank of each of the Pivot Bolts that are attached to the Double Brackets 2. In the case of the other two Pivot Bolts, two Washers are placed against the external side only of the Pulley.

### SIMPLE STEERING GEAR



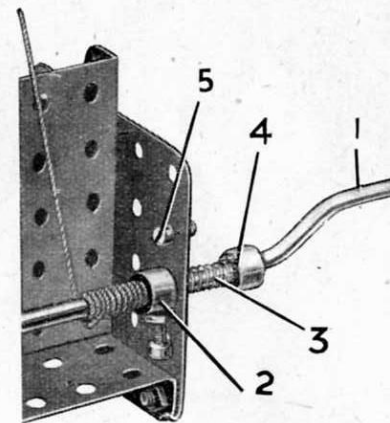
S.M.162. The simple steering gear will be found suitable for most small model vehicles.

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

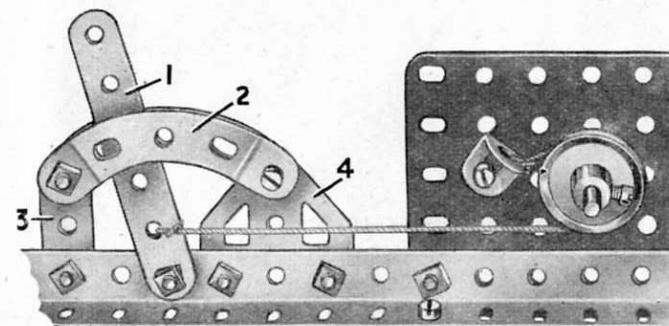
The front axle, a  $3\frac{1}{2}$ " x  $\frac{1}{2}$ " Double Angle Strip, is pivotally mounted at its centre on a Bush Wheel and short Rod. It is fitted,  $\frac{1}{2}$ " from each end, with a  $\frac{1}{2}$ " x  $\frac{1}{2}$ " Angle Bracket, this forming the inner bearing for its respective stub axle.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

### SAFETY CATCH FOR CRANE WINDING GEAR

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



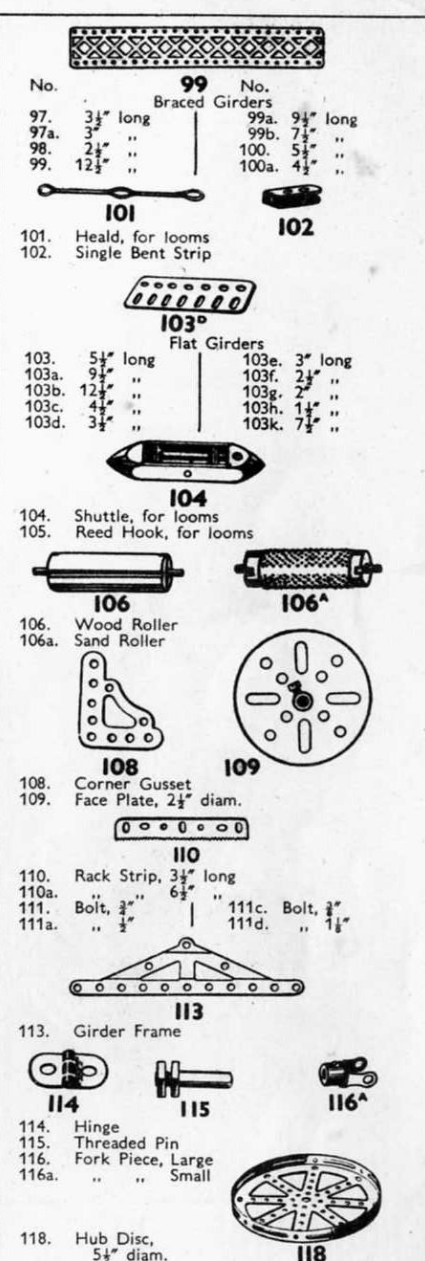
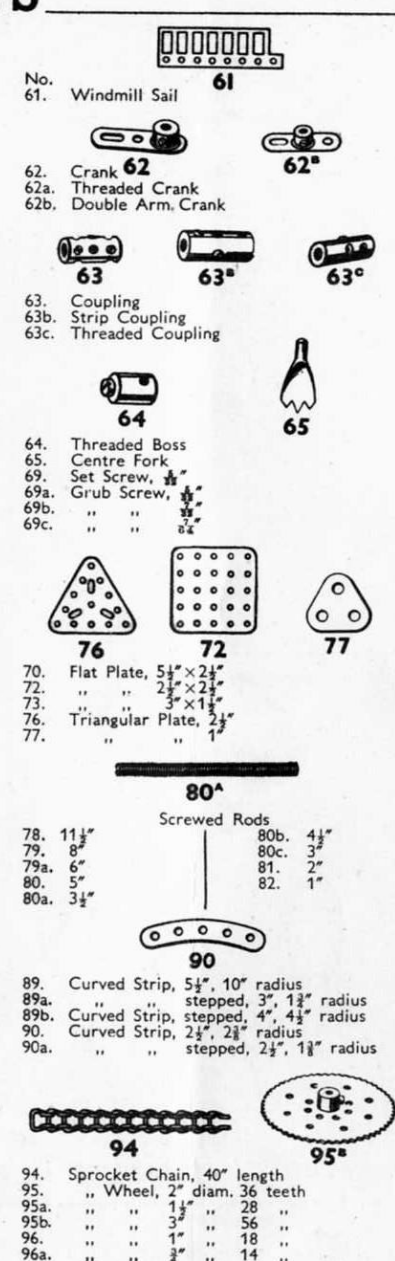
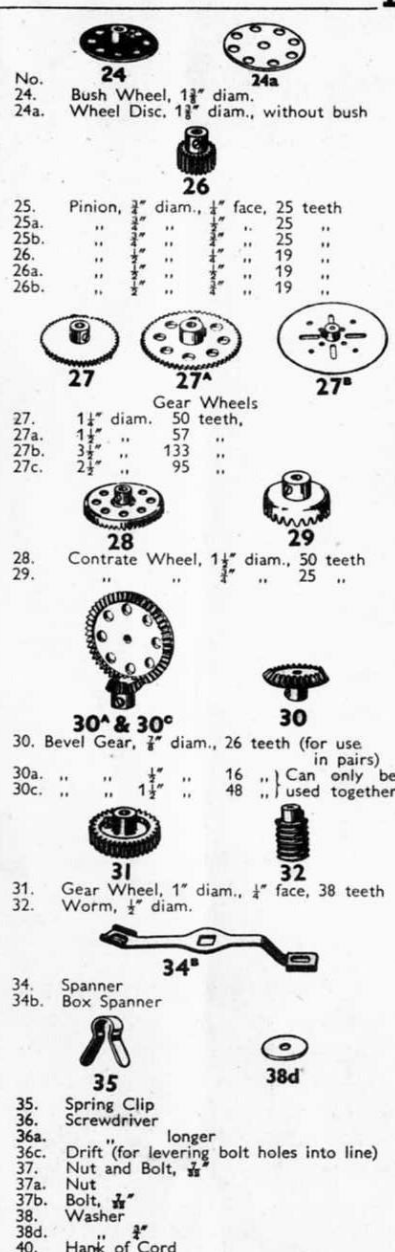
### BRAKE LEVER and QUADRANT



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

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

## MECCANO PARTS



## MECCANO PARTS

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



122. Miniature Loaded Sack



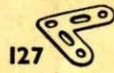
123. Cone Pulley,  $1\frac{1}{2}$ ", 1" and  $\frac{3}{4}$ " diam.  
124. Reversed Angle Bracket, 1"  
125. " " " "



126. Trunnion 126a. Flat Trunnion



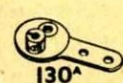
127. Bell Crank  
128. Bell Crank, with Boss



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



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



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



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



- No. 134. Crank Shaft, 1" stroke



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



- 138a. Ship's Funnel



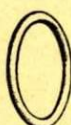
139. Flanged Bracket (right)  
139a. " " (left)



140. Universal Coupling



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



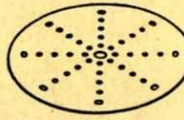
143. Circular Girder,  $5\frac{1}{2}$ " diam.



- No. 144. Dog Clutch



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



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



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



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



- 154a. Corner Angle Bracket,  $\frac{1}{2}$ " (right-hand)  
154b. Corner Angle Bracket,  $\frac{1}{2}$ " (left-hand)  
155. Rubber Ring (for 1" Pulleys)



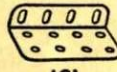
- 154a. Corner Angle Bracket,  $\frac{1}{2}$ " (right-hand)  
154b. Corner Angle Bracket,  $\frac{1}{2}$ " (left-hand)  
155. Rubber Ring (for 1" Pulleys)



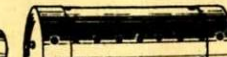
157. Fan, 2" diam.



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



163. Boiler, complete, 5" long x  $2\frac{1}{2}$ " diam.  
162a. " Ends,  $2\frac{1}{2}$ " diam. x  $\frac{1}{2}$ "  
162b. " without ends,  $4\frac{1}{2}$ " long x  $2\frac{1}{2}$ " diam.  
163. Sleeve Piece,  $1\frac{1}{2}$ " long x  $\frac{1}{2}$ " diam.  
164. Chimney Adaptor,  $\frac{1}{2}$ " diam. x  $\frac{1}{2}$ " high



165. Swivel Bearing  
166. End  
167b. Flanged Ring,  $9\frac{1}{2}$ " diam.



168. Ball Thrust Bearing, 4" diam.  
168a. " " Race, flanged disc,  $3\frac{1}{2}$ " diam.  
168b. " " toothed, 4" diam.  
168c. " Cage,  $3\frac{1}{2}$ " diam., complete with balls.  
168d. Ball,  $\frac{3}{8}$ " diam.



171. Socket Coupling



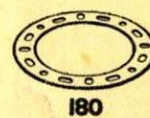
175. Flexible Coupling Unit



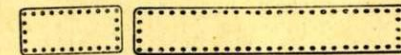
176. Anchoring Spring for Cord



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

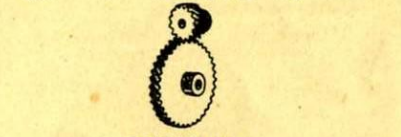


- No. 185. Steering Wheel,  $1\frac{1}{2}$ " diam.  
186. Driving Band,  $2\frac{1}{2}$ " (Light)  
186a. " " 6"  
186b. " " 10"  
186c. " " 10" (Heavy)  
186d. " " 15"  
186e. " " 20"  
187. Road Wheel,  $2\frac{1}{2}$ " diam.  
187a. Conical Disc,  $1\frac{1}{2}$ " diam.



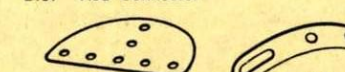
192. Flexible Plates.  
188.  $2\frac{1}{2}$ " x  $1\frac{1}{2}$ "  
189.  $5\frac{1}{2}$ " x  $1\frac{1}{2}$ "  
190.  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ "  
190a.  $3\frac{1}{2}$ " x  $2\frac{1}{2}$ "  
191.  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ "  
192.  $5\frac{1}{2}$ " x  $2\frac{1}{2}$ "  
196. 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

198. Hinged Flat Plate,  $4\frac{1}{2}$ " x  $2\frac{1}{2}$ "  
199. Curved Plate, U-Section  
200. " "  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " x  $\frac{1}{8}$ " radius  
200. " "  $2\frac{1}{2}$ " x  $2\frac{1}{2}$ " x  $1\frac{1}{8}$ " radius



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

212. Rod and Strip Connector  
213. Rod Connector



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



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

