

# New Outfit Models

## Using the All-Enclosed Electric Motors

THIS month we are describing three fine models, two of which are driven by the new Meccano all-enclosed Electric Motors types E06 and E020. These Motors are very compact, and their design makes them specially suitable for building into models constructed from the smaller Outfits. The two models in which they are used are a fine motor-cycle combination, which can be assembled from the parts in Outfit No. 4, and an interesting scientific toy made from Outfit No. 2 that will provide hours of good fun when completed. The other model described in this article is a fine hammerhead crane designed for Outfit No. 6.

The hammerhead crane is illustrated in Fig. 1. The tower is constructed as shown, and a 3" Pulley 3 is bolted to it. The main members 1 of the rotating boom each consists of two 12½" Angle Girders overlapped three holes, and they are connected at one end by a 3½" × ½" Double Angle Strip, and at the other end by a 3½" × 2½" Flanged Plate. A 2½" × ½" Double Angle Strip is then bolted to the first Double Angle Strip, and to its lugs are fastened 12½" Strips, their free ends being attached by Double Brackets to the girders 1.

The girders 1 are now connected with the lower members of the boom, which consist of 12½" Strips extended by 2½" and 5½" Strips. The latter are connected to the 3½" × 2½" Flanged Plate, and are joined also to the 2½" Strips by further 5½" Strips. The latter parts in turn are connected to the girders 1 by 5½" Strips as shown. The lower members of the jib are joined by 3½" Strips that support also a 5½" × 2½" Flanged Plate 2, to which is fastened a 3" Pulley.

The No. 1a Clockwork Motor 4 is mounted on the Flanged Plate 2 by means of Double Brackets, and to its brake lever is pivoted a 5" Rod by means of Collar 10. In a similar manner an 11½" Rod 9 is pivotally attached to the reverse lever of the Motor. Both Rods protrude through the 3½" × 2½" Flanged Plate at the rear end of the jib and are each fitted with a 1" Pulley.

The sides of the control cabin consist of 5½" × 2½" Flexible Plates, which are joined at the rear by a 3½" × ½" Double Angle Strip and two 2½" × 2½" Flexible Plates.

The roof consists of two 5½" × 2½" Flexible Plates, and is supported by four 2½" Strips. The jib is pivoted on a 3½" Rod locked in the boss of the upper 3" Pulley and retained in position by a Spring Clip below Pulley 3.

The hoisting trolley is a 2½" × 1½" Flanged Plate, to each flange of which is bolted a 1½" × ½" Double Angle Strip. The latter provide bearings for the 3½" Rods that carry the 1¼" Discs forming the wheels. Trunnions bolted to the Flanged Plate carry a 2" Rod, on which are two 1" loose Pulleys.

The Crank Handle 7 controls the traversing movement of the hoisting trolley. Cord 8 is tied to the rear of the trolley, then wound a few times round Crank Handle 7 and led around a 3½" Rod journalled at the front end of the jib. It is then tied to the front

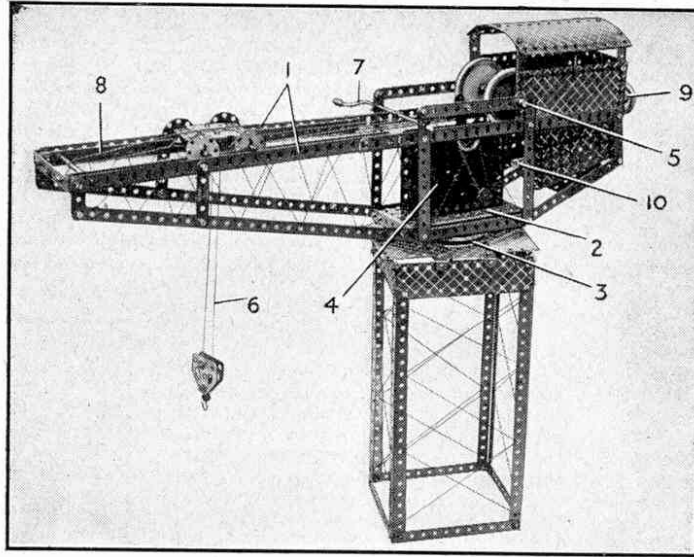


Fig. 1. This model hammerhead crane is built from the contents of Outfit No. 6, and is operated by a No. 1a Clockwork Motor controlled from the driver's cab.

of the trolley.

The hoisting drum is a 4½" Rod 5, and is driven in the following manner. A ½" Pulley on the driving shaft of the Motor is connected by a Driving Band to a 1" Pulley fastened on a 2" Rod journalled in the side plates of the Motor. A second Driving Band connects the 2" Rod to a 1" Pulley on Rod 5.

The hoisting Cord 6 is tied to a Cord Anchoring Spring on Rod 5 and is led over one of the 1" loose Pulleys in the hoisting trolley. It is then passed around the ½" Pulley in the hoisting block and led over the second 1" loose Pulley in the hoisting trolley. Finally it is tied to the front end of the boom.

Parts required to build the model hammerhead crane: 12 of No. 1; 14 of No. 2; 4 of No. 3; 2 of No. 4; 8 of No. 5; 2 of No. 6a; 4 of No. 8; 4 of No. 11; 16 of No. 12; 4 of No. 12c; 1 of No. 13; 1 of No. 15; 1 of No. 15a; 4 of No. 16; 2 of No. 17; 2 of No. 19b; 1 of No. 19h; 4 of No. 22; 2 of No. 22a; 1 of No. 23; 1 of No. 23a; 14 of No. 35; 105 of No. 37; 5 of No. 37a; 12 of No. 38; 2 of No. 40; 2 of No. 48; 1 of No. 48a; 2 of No. 48b; 1 of No. 51; 1 of No. 52; 2 of No. 53; 2 of No. 54a; 1 of No. 57c; 4 of No. 59; 2 of No. 111; 1 of No. 111a; 2 of No. 111c; 2 of No. 125; 2 of No. 126; 2 of No. 126a; 1 of No. 147b; 2 of No. 155a; 2 of No. 186; 2 of No. 187; 4 of No. 189; 4 of No. 190; 4 of No. 192; 1 of No. 198; 4 of No. 217a; 1 No. 1a Clockwork Motor (not included in Outfit).

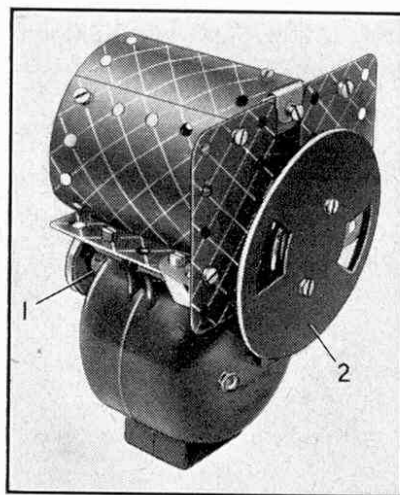


Fig. 2. An interesting toy operated by one of the new all-enclosed Electric Motors.

The model shown in Fig. 2 is a very interesting toy based on the ingenious instrument known as the stroboscope, which is used for observing the behaviour of gears, shafts and other parts of machinery while actually in motion. When viewed through the stroboscope these appear to be at rest, an effect that is attained by observing them through a slit placed in front of a rapidly revolving shutter, the speed of which can be varied at will. If the

shutter is made to rotate at the same speed as the wheel or other moving object it is desired to examine, the eye receives a succession of glimpses of the mechanism at the same point in its rotation. Owing to the persistence of the image formed in the eye, this series of glimpses blends into a continuous steady image.

Many fascinating experiments can be carried out with the model. For example a word written on a piece of paper pasted on a rapidly revolving disc of cardboard can be read quite easily when viewed through the stroboscope.

To construct the model, a  $2\frac{1}{2}'' \times 2\frac{1}{2}''$  Flexible Plate is bolted to the perforated feet of either an E06 or E020 Electric Motor, using  $2\frac{1}{2}''$  Strips to strengthen the edges of the Plate. Two  $2\frac{1}{2}'' \times 1\frac{1}{2}''$  Flexible Plates are then fixed vertically to the Plate by means of Trunnions, with a space  $\frac{1}{2}''$  wide between their edges, and are connected at their upper edges by a  $2\frac{1}{2}''$  Strip. A  $2\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strip is bolted across the  $2\frac{1}{2}'' \times 2\frac{1}{2}''$  Flexible Plate and forms bearings for a  $3\frac{1}{2}''$  Rod, on one end of which is fastened a 1" Pulley 1. The Pulley is connected to the small pulley on the armature shaft of the Motor. The other end of the  $3\frac{1}{2}''$  Rod carries a disc 2, which is cut from a sheet of cardboard and bolted to a Bush Wheel. Two curved slots about  $\frac{1}{2}''$  long and  $\frac{1}{2}''$  wide are cut in the card diametrically opposite to each other, as shown in Fig. 2, and to complete the model it is only necessary to fit a viewing tube consisting of Curved Plates. A Hornby Resistance Controller is connected in series with the Electric Motor and Transformer, or accumulator, so that the speed of the disc can be adjusted as required.

The model is now ready for operation. In use it is held with the viewing tube pointing towards the object in motion that is to be examined and the latter is looked at through the slots in the disc.

Any regular motion, either circular or vibratory, is an interesting subject upon which the model stroboscope can be tried out. For example, the motion of miniature waves formed by a tap dripping rapidly into a bowl of water can be "frozen," or the wheels of motor cars or bicycles can be "stopped" although they are actually in motion.

Parts required to build the model stroboscope: 3 of No. 5; 1 of No. 12; 1 of No. 16; 1 of No. 22; 1 of No. 24; 20 of No. 37; 2 of No. 126; 1 of No. 186; 2 of No. 188; 1 of No. 190; 1 of No. 199; 2 of No. 200; 1 disc of cardboard; 1 E06 or E020 Electric Motor (not included in Outfit).

The remaining model to be described is the motor-cycle combination shown in Figs. 3 and 4. The all-enclosed Electric Motor is particularly suitable for incorporation in

a model of this type, as it can be built neatly into the structure.

Two  $5\frac{1}{2}''$  Strips 1 are extended by  $2\frac{1}{2}''$  Strips, the compound strips so formed being bent to the shape shown.

They are then bolted at their lower ends to the feet of the Motor and at their upper ends to the Trunnion 2, the bolts in the latter holding also Angle Brackets. The  $5\frac{1}{2}''$  Strips are further joined by the  $5\frac{1}{2}''$  Strips that connect the side-car to the motor-cycle, the bolts of the rear Strip carrying also a  $1\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strip.

The Trunnion 3 and the Flat Bracket, supported by an Angle Bracket, that is seen in Fig. 4, provide bearings for the rear axle, and are connected by two  $2\frac{1}{2}''$  Strips 4 to the  $1\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strip previously mentioned. The

bolts passing through the ends of the Double Angle Strips carry also Flat Brackets that form bearings for the  $3\frac{1}{2}''$  Rod 5. A 1" Pulley on this Rod is connected by a  $2\frac{1}{2}''$  Driving Band to the armature shaft of the Motor, and a second Driving Band is passed around the Rod and a 1" Pulley on the rear axle. The latter is a 2" Rod fitted with a 3" Pulley shod with a 3" Rubber Ring.

The  $2\frac{1}{2}''$  Strips 4 are connected by  $5\frac{1}{2}''$  Strips to the Angle Brackets bolted to Trunnion 2.

The steering gear is next fitted. The front forks consist of  $2\frac{1}{2}''$  Strips and  $2\frac{1}{2}''$  Curved Strips bolted to a Double Bracket. One of the lugs of a second Double Bracket 6 is inserted between the lugs of the first and is held there by a  $\frac{3}{8}''$  Bolt 7 and a nut. A Flat Bracket is then bolted to Trunnion 2, but is spaced from the Trunnion by a Washer. The  $\frac{3}{8}''$  Bolt 7 is inserted through holes in the Flat Bracket and Trunnion 2, and is retained in position by lock-nuts. Two  $2\frac{1}{2}''$  Curved Strips are then bolted to Double Bracket 6 to form the handle-bars.

The side-car is built up on a  $5\frac{1}{2}'' \times 2\frac{1}{2}''$  Flanged Plate, to which are bolted two Flanged Sector Plates and a  $5\frac{1}{2}'' \times 2\frac{1}{2}''$  Flexible Plate that is extended by a  $2\frac{1}{2}'' \times 2\frac{1}{2}''$  Flexible Plate to form the front and top. The sides are extended to the rear by  $2\frac{1}{2}'' \times 1\frac{1}{2}''$  Flexible Plates, to each of which is bolted a  $2\frac{1}{2}''$  Semi-Circular Plate. A second  $5\frac{1}{2}'' \times 2\frac{1}{2}''$  Flexible Plate, supported by  $2\frac{1}{2}'' \times \frac{1}{2}''$  Double Angle Strips, is curved round to form the back.

Parts required to build the model motor-cycle and side-car: 8 of No. 2; 2 of No. 3; 9 of No. 5; 4 of No. 10; 2 of No. 11; 7 of No. 12; 2 of No. 16; 1 of No. 17; 1 of No. 18a; 2 of No. 19b; 3 of No. 22; 5 of No. 35; 68 of No. 37; 4 of No. 37a; 14 of No. 38; 1 of No. 48; 2 of No. 48a; 1 of No. 51; 1 of No. 52; 2 of No. 54a; 4 of No. 90a; 2 of No. 126; 2 of No. 126a; 2 of No. 186; 1 of No. 187; 2 of No. 188; 2 of No. 190; 2 of No. 192; 2 of No. 214; 4 of No. 215; 2 of No. 217a; 2-3" Rubber Rings; 1 E06 or E020 Electric Motor (not included in Outfit).

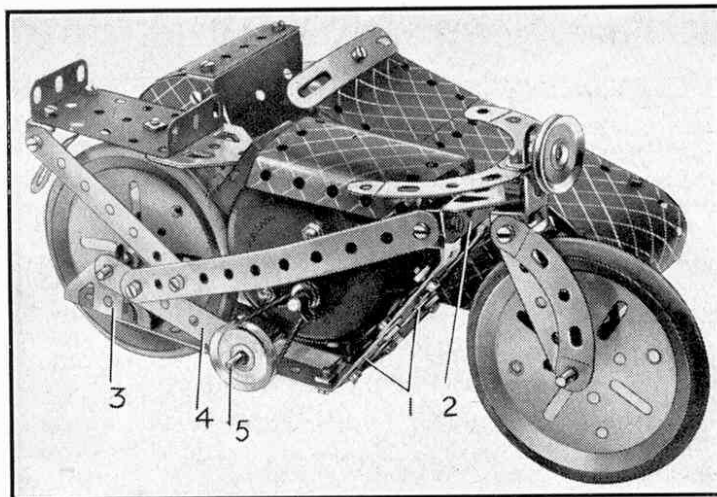


Fig. 3. The design of the new all-enclosed Electric Motors makes them ideal power units for models such as the motor-cycle combination shown here.

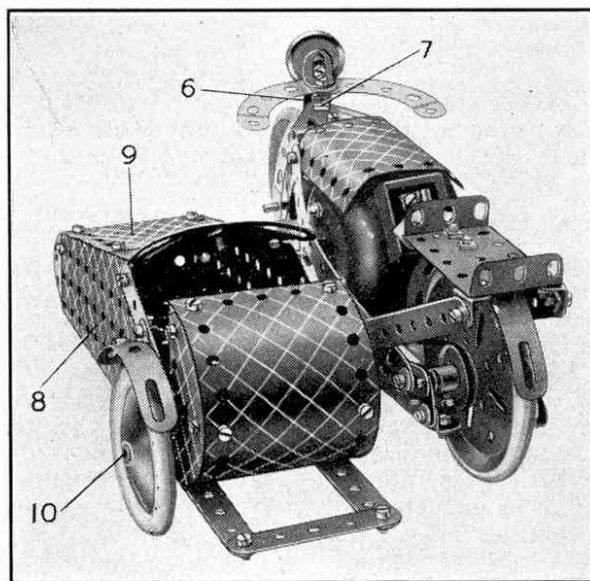


Fig. 4. A rear view of the motor-cycle combination, showing details of the drive to the rear wheel and the construction of the side-car.