New Outfit Models

Speed in the Air, on Land and on Water

SPEED and mobility are the outstanding features of the four models described in this article. The first is a representation of the Hawker "Super-Fury," a special development of the "Fury" single-seater fighter. When this machine was produced in 1933, its officially recorded speed was 250 m.p.h. and it was recognised as the fastest military aeroplane in the world. The model well suggests the high speed and clean appearance of its original. The remaining models include an unusual hydroplane, the prototype of which skims along on the surface of the water, a finely built racing motor car and a mobile crane.

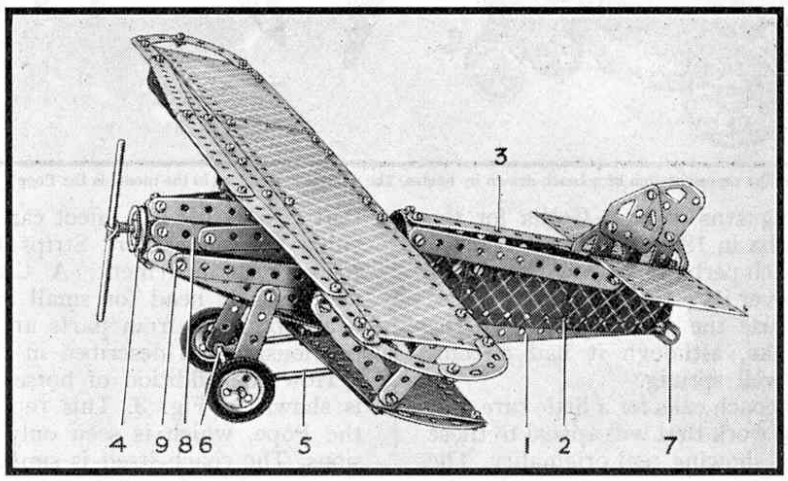

Fig. 1. A splendid model, built with Outfit F, of the Hawker "Super-Fury," a single-seater fighter famous for its high speed. The fine lines of this aeroplane are well reproduced in the model.

The model of the Hawker "Super-Fury" is shown in Fig. 1, and is built with Outfit F. Construction is commenced by first bolting a $5\frac{1}{2}''$ Strip 1 to one corner of a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate 2, and to the free end of the Strip bolting a $3\frac{1}{2}''$ Strip. The Flexible Plate 2 is secured at its free end by means of a Flat Bracket to the connection point between these two Strips, and is extended by a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate held in position by a $12\frac{1}{2}''$ Strip 8, which extends the length of the model. A second $5\frac{1}{2}''$ Strip is bolted through its second hole half an inch from the end of Strip 1, and this is connected at its free end to the Strip 8 by means of an Obtuse Angle Bracket. The bolt that holds the Obtuse Angle Bracket to the $5\frac{1}{2}''$ Strip secures also a $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Bracket.

The engine cowling is then completed. A $2\frac{1}{2}''$ Strip is bolted to the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate and its other end is held in place by the bolt that supports the undercarriage. A $5\frac{1}{2}''$ Strip is bolted to the $5\frac{1}{2}''$ Strip 9, and a $3\frac{1}{2}''$ Strip, which also is bolted to the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate, is bolted one inch from the end of the $12\frac{1}{2}''$ Strip 8. The free end of the $3\frac{1}{2}''$ Strip is fastened by means of a Flat Bracket, and the bolt holding the Flat Bracket carries also a $1'' \times 1''$ Angle Bracket, which will be referred to again later.

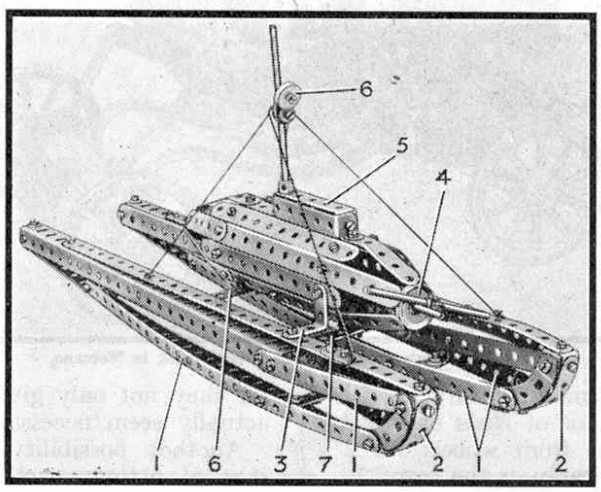

Fig. 2. A Meccano hydroplane, an attractive Outfit E model of an unusual vessel that skims over the surface of the water on its pontoons.

The opposite side of the fuselage is constructed in the same manner, and the two sides are connected at the tail by bolts and at the nose by means of Angle Brackets. A Flat Bracket 7 on one of the tail bolts forms the tail-skid. Obtuse Angle Brackets are secured beneath Strips 8. These are connected by a $\frac{1}{2}''$ Angle Bracket, and carry $4\frac{1}{2}''$ compound Strips that are made by bolting two $2\frac{1}{2}''$ Strips end to end. A $3\frac{1}{2}''$ Strip is next curved into a semi-circle and bolted across the machine, and the ends of the compound strips are bolted to it. A further $3''$ Strip is bolted into the remaining hole of the curved Strip and is provided with a Double Bent Strip that forms the support for the upper wing. The top of the fuselage is carried on a curved $3''$ Strip, and is composed of four $5\frac{1}{2}''$ Strips, as shown in the illustration. Strips 3 are bolted together through their second holes and the bolt passes also through a Trunnion and the tailplane, which consists of two $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates. The fin is built up from a further Trunnion and two Flat Trunnions as shown.

The undercarriage is next built. A $3\frac{1}{2}''$ Rod is pushed through the $2\frac{1}{2}''$ Strips, and this Rod carries also small Fork Pieces 6 that have $3\frac{1}{2}''$ Rods 5 secured in their bosses by Grub Screws. The landing wheels are spaced from the Fork Pieces by two Washers and are held in place by Spring Clips. The Rods 5 are fastened in place by Collars.

A $3\frac{1}{2}''$ and a $5''$ Rod connected by a Coupling are pushed through the opening in the nose of the model, and a $1''$ fast Pulley is placed on it to fill in the opening. The propeller is a $3\frac{1}{2}''$ Rod fastened by cord to an Anchoring Spring on the Rod.

The wings are now constructed. The lower wing has two $12\frac{1}{2}''$ Strips for its main longitudinal members and the leading Strip is bolted to the centre one of three $5\frac{1}{2}''$ Strips, which form the base of the fuselage and are bolted together at the nose and to a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip that spans the fuselage. The covering of the wing is represented by two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plates and the second $12\frac{1}{2}''$ Strip forms the trailing edge, which is strengthened by a $5\frac{1}{2}''$ Strip held in place at the wing tips by one of the bolts that hold the Curved Strips, and at the fuselage end by an Angle Bracket. The construction of the mainplane should be clear from the illustration, in which the only feature not shown is the method of securing it to the fuselage. This is done by

bolting it to the Double Bent Strip already mentioned, and to the 1″×1″ Angle Brackets that were bolted to the fuselage when the engine cowling was being built. The inter-plane struts are also shown.

Parts required to build the model Hawker "Super-Fury": 8 of No. 1; 18 of No. 2; 7 of No. 3; 2 of No. 4; 12 of No. 5; 2 of No. 6a; 7 of No. 10; 1 of No. 11; 12 of No. 12; 2 of No. 12a; 4 of No. 12c; 1 of No. 15; 4 of No. 16; 1 of No. 22; 2 of No. 22a; 2 of No. 35; 101 of No. 37; 8 of No. 38; 1 of No. 45; 1 of No. 48; 3 of No. 59; 1 of No. 63; 2 of No. 90; 4 of No. 90a, 1 of No. 111c; 1 of No. 116a; 2 of No. 126; 2 of No. 126a; 2 of No. 142c, not included in Outfit; 1 of No. 165; 1 of No. 176; 2 of No. 188; 2 of No. 189; 2 of No. 191; 2 of No. 195; 2 of No. 197.

The attractive model hydroplane built with Outfit E, and shown in Fig. 2, is interesting because of the novel construction of its prototype. In building the model the pontoons should first be constructed.

Two 12½″ Angle Girders are bolted together through their end holes and are extended by 5½″ Strips, which are overlapped two holes. At their free ends the 5½″ Strips are bolted to 2½″ Curved Strips and the bolt holding them together carries also a Double Bracket, by means of which the two sides of the pontoon are connected. Two 12½″ Strips 1 are now fastened to the 2½″ Curved Strips, as shown in Fig. 2, and at their opposite ends are secured by Angle Brackets to a 12½″ Strip that forms the keel. The keel Strip is extended by a 3½″ Strip and a 3″ Strip 2 that is curved until it can be secured by an Angle Bracket in the bows. The connection point between the 12½″ and 3½″ Strip is provided by a 1½″ Strip that bridges the Strips 1 and is fixed by Angle Brackets. A 15″ compound strip is finally bolted to the top of the pontoon, and is provided with a 1″×1″ Angle Bracket 3.

The second pontoon is similar in construction, and the two are connected by 2½″×½″ Double Angle Strips 6 and 7.

The cylinder, which in the actual vessel houses the power unit and living-quarters, is built round two 5½″ Strips that are bent into circles, and the method of securing the Strips that form its shell can be seen clearly in the illustration. A 1″ fast Pulley 4 at each end is clamped in place by the ends of the longitudinal Strips, and the Wheels have a compound rod pushed through their bosses. The compound rod is made from a 4½″ and a 5″ Rod connected by a Coupling.

The conning tower 5 is made from three 2½″×½″ Double Angle Strips, and is held in place by an Angle Bracket and a 5″ Rod that forms the mast. This carries a searchlight, made from a ½″ loose Pulley 6 that is bolted to a Flat Bracket held in place by a Collar. At the stern the cylinder is bolted to one of the 2½″×½″ Double Angle Strips that connect the pontoons and at the bows to the Angle Brackets 3.

Parts required to build the model hydroplane: 8 of No. 1; 14 of No. 2; 4 of No. 3; 2 of No. 4; 11 of No. 5; 2 of No. 6a; 4 of No. 8; 1 of No. 10; 4 of No. 11; 10 of No. 12; 2 of No. 12a; 4 of No. 12c; 2 of No. 15; 1 of No. 15a; 1 of No. 16; 2 of No. 22; 1 of No. 23; 2 of No. 35; 86 of No. 37; 5 of No. 38; 1 of No. 45; 5 of No. 48a; 3 of No. 59; 1 of No. 63; 4 of No. 90a; 1 of No. 111c; 2 of No. 200.

A simple model of a mobile crane built with Outfit B is shown in Fig. 3. A 5½″×1½″ Flexible Plate 2 is bolted to a 2½″×½″ Double Angle Strip 5 by means of two bolts, and clamps the two 5½″ Strips 1 in place. At the opposite end the Strips are clamped under the nuts on bolts that hold in place two Angle Brackets, which carry a 2½″×1½″ Flexible Plate 3 that forms a windscreen for the driver. The driver's seat is represented by a ½″ reversed Angle Bracket. A ⅜″ bolt is pushed through the centre hole of the front end of the Flexible Plate 2 and is held in place by two nuts. A Flat Bracket is secured on its shank by a nut, and at the opposite end it carries a 2½″×½″ Double Angle Strip, which is mounted on a lock-nutted bolt. Two 3½″ Rods form the axles and after being pushed through the Double Angle Strips are provided with 1″ fast Pulleys.

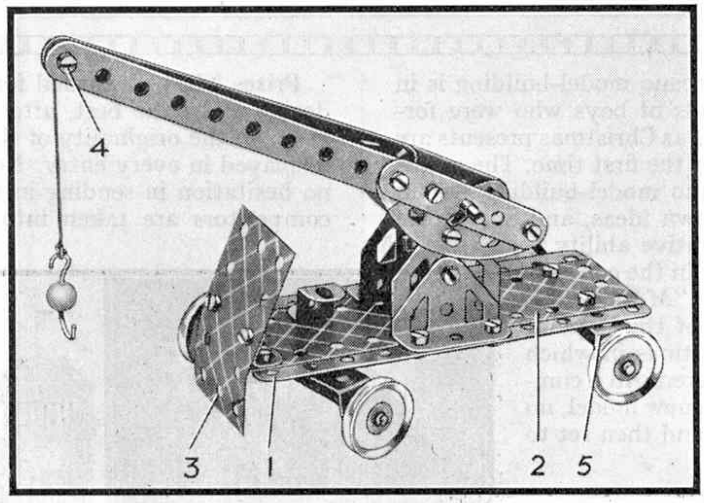

Fig. 3. A simple and ingenious model of a mobile crane, built with Outfit B.

Trunnions are bolted in the middle of the 5½″ Strips 1, and to them are connected Flat Trunnions, each of which carries a 2½″ Curved Strip to which a 5½″ and a 2½″ Strip are bolted to form the jib. The winding drum is a 2″ Rod pushed through the centre holes of the 2½″ Strips and held in place by Spring Clips, and a short length of cord is secured to it by a third Spring Clip. The pulley at the jib-head is represented by a Spring Clip mounted on a ⅜″ Bolt 4.

Parts required to build the model mobile crane: 4 of No. 2; 2 of No. 5; 1 of No. 10; 2 of No. 12; 2 of No. 16; 1 of No. 17; 4 of No. 22; 4 of No. 35; 20 of No. 37; 5 of No. 37a; 1 of No. 40; 2 of No. 48a; 1 of No. 57a; 2 of No. 90a; 3 of No. 111c; 1 of No. 125; 1 of No. 126; 2 of No. 126a; 1 of No. 188; 1 of No. 189.

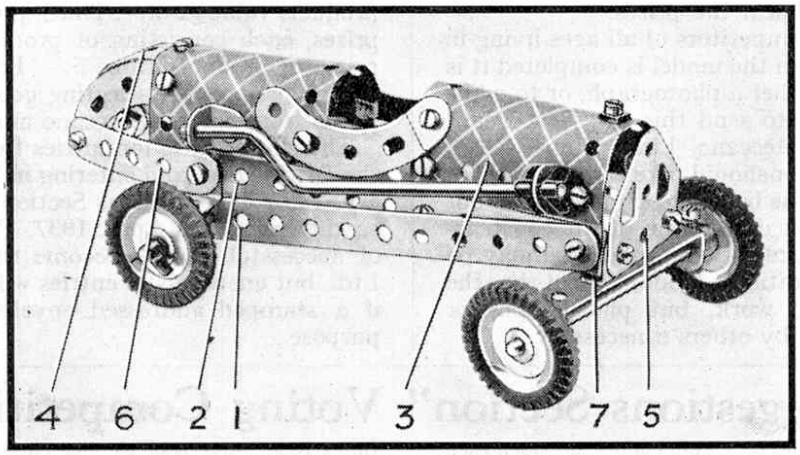

Fig. 4. The appearance of this simple but effective miniature of a racing car suggests speed and power. It is built with parts included in Outfit B, and is easy to construct.

The chassis of the Outfit B racing car shown in Fig. 4 consists of two 5½″ Strips 1 and 2, which are bolted together at one end, and secured to a "U" section Flexible Plate by means of a Flat Bracket. The bolt through the rear end of Strip 2 carries a 2½″ Strip and a ½″ Reversed Angle Bracket. A 4″ Rod, pushed through the Reversed Angle Brackets and the end holes of Strips 1, forms the rear axle and carries two 1″ fast Pulleys, fitted with 1″ Rubber Tyres and held in place by Spring Clips. Two 2½″ Curved Strips are bolted to the Flexible Plate 3 and to a second "U" section Flexible Plate as shown, and at the rear the second Flexible Plate is provided with two 2½″ Curved Strips and a bent 2½″ Strip 4, which are connected to the 2½″ Strip 6 by a Double Bracket.

The radiator is a Flat Trunnion secured by two Angle Brackets, and a Trunnion 7 secured by the same Angle Brackets provides a support for the 2½″ Double Angle Strip

Parts required to build the model racing car: 4 of No. 2; 3 of No. 5; 4 of No. 10; 1 of No. 11; 4 of No. 12; 1 of No. 15b; 1 of No. 16; 1 of No. 19s; 4 of No. 22; 4 of No. 35; 25 of No. 37; 1 of No. 48a; 4 of No. 90a; 1 of No. 111c; 2 of No. 125; 1 of No. 126; 1 of No. 126a 2 of No. 199; four 1″ Tyres not included in Outfit.

New Models for Small Outfits

Four Novel and Interesting Designs

THE first model described this month is the simple speed boat shown in Fig. 1. This model is quite easy to build and can be built up from the contents of Outfit B. Construction should be commenced by bolting one 2½″ × 2½″ Flexible Plate, one 5½″ × 2½″ Strip Plate and one 5½″ × 1½″ Flexible Plate to a 12½″ Strip in the positions shown in the illustration to form one side of the hull. Two 2½″ × ½″ Double Angle Strips are next fastened to the 12½″ Strip by the bolts 1 and 2. The opposite side of the hull is built in a similar manner, and is then bolted to the 2½″ × ½″ Double Angle Strips already mentioned. Two 2½″ small radius Curved Strips are fastened in the bows by a ⅜″ bolt 3.

In the fifth hole from the bows of the 12½″ Strip a 4½″ Flanged Sector Plate is fixed, and a 5½″ Strip is fastened in position by the same bolt, which passes through the sixth hole of the 5½″ Strip. Two Flat Trunnions complete the bows. The 2½″ Strip and the 2½″ small radius Curved Strip are clamped in place by the bolt 4.

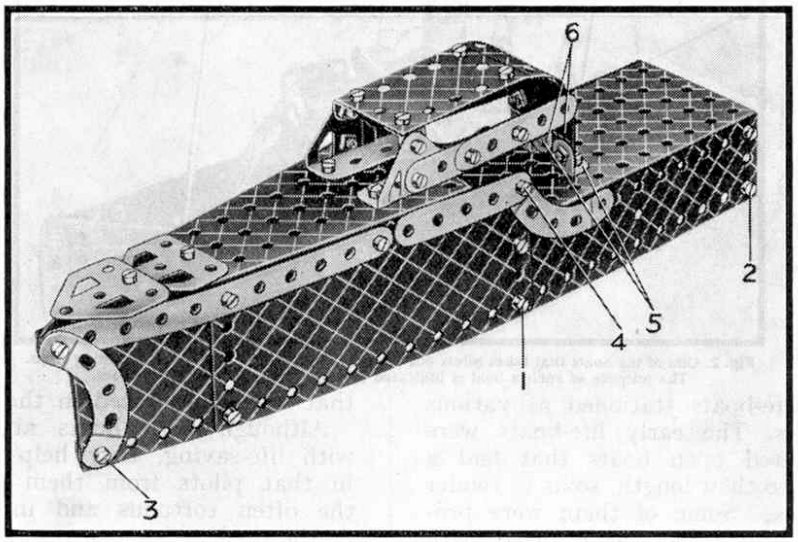

Fig. 1. A neat model speed boat that can be built with the contents of Outfit B.

Construction of the cabin may next be commenced. For this a Flexible Plate is extended by a further 2½″ × 1½″ Flexible Plate, and the compound plate thus formed is bolted to the ½″ × ½″ Angle Brackets 5 by the Bolts and Flat Brackets 6. Angle Brackets connect the front of the cabin to the Trunnions, which are fastened to the 4½″ Flanged Sector Plate. Two 2½″ Strips, overlapped three holes, are fastened to the Flat Trunnions to form the side of the cabin.

Parts required to build the model speed Boat: 2 of No. 1; 2 of No. 2; 6 of No. 5; 3 of No. 10; 4 of No. 12; 38 of No. 37; 2 of No. 37a; 3 of No. 38; 2 of No. 48a; 1 of No. 52; 1 of No. 54a; 4 of No. 90a; 2 of No. 111c; 2 of No. 126; 2 of No. 126a; 2 of No. 188; 2 of No. 189; 2 of No. 190; 2 of No. 195.

Fig. 2 shows a model concrete mixing machine with a tipping and revolving mixing drum. It represents a type used frequently on road repair work, and in the construction of concrete buildings.

This model requires Outfit E for its construction, and it incorporates a *Magic* Motor, which is used to rotate the mixing drum. It is best to start building the model by constructing the framework that supports the *Magic* Motor. This consists of a 5½″ × 2½″ Flanged Plate, to each end of which is bolted a Trunnion extended by a Flat Trunnion. Two 3″ Strips 1 are bolted in the centre hole of the Flat Trunnion, as shown. A 2½″ × 1½″ Flanged Plate 2 is fastened to the 3″ Strip, and is supported at its free end by a 2½″ Strip fastened by Angle Brackets to the 3½″ Strips 3.

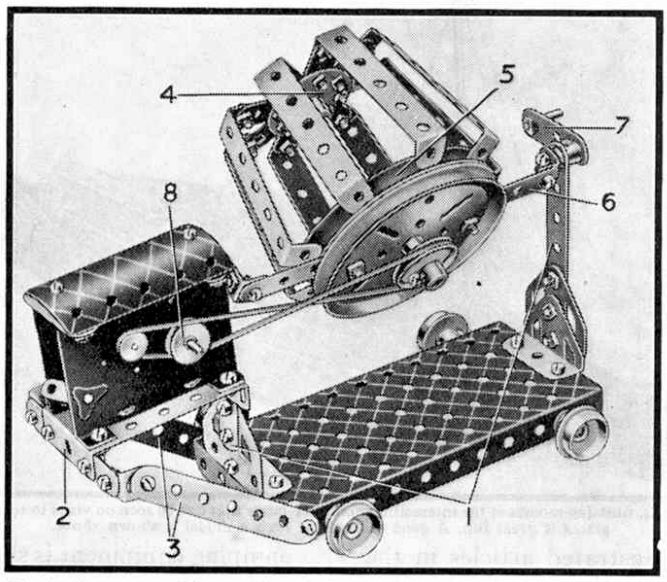

Fig. 2. A concrete mixing machine, built with Outfit E, that incorporates rotating and tipping mechanism operated by a Magic Motor.

The mixing drum is next built up. Eight Flat Brackets are bolted around the Bush Wheel 4, and the 2½″ × ½″ Double Angle Strips are fastened to the slotted holes of the Flat Brackets, so that they are spaced as far as possible from the centre of the Bush Wheel. A 3″ Pulley 5 is fixed between the Double Angle Strips, and is held in place by its groove engaging between them. A 3½″ Rod is pushed through the bosses of the 3″ Pulley and the Bush Wheel and it is retained in place by set screws.

The tipping mechanism for the revolving drum consists of a 5½″ Strip 6 with Angle Brackets bolted to each end. At the centre of the Strip a second 3″ Pulley is fixed by two ⅜″ Bolts, care being taken to align the boss of the Pulley with the hole in the Strip. This assembly is then mounted in the framework already constructed. Two ⅜″ Bolts are locked in position to the Angle Brackets at the ends of the 5½″ Strip, and are pushed through the top holes in the 3″ Strips 1, washers being used for spacing purposes. A Crank 7, fitted with a Threaded Pin is secured to the ⅜″ Bolt, and a nut holds the second ⅜″ Bolt in position.

The 3½″ Rod that supports the revolving drum is pushed through the boss of the 3″ Pulley on the 5½″ Strip.

The *Magic* Motor may now be fitted. To do this two 1½″ Strips are fastened by ⅜″ Bolts to a 2½″ × 1½″ Flexible Plate that has been previously bent to the shape shown in Fig. 2. The Plate is then bolted to the lugs of the *Magic* Motor, which in turn is bolted to the 2½″ × 1½″ Flanged Plate 2. A Driving Band is fixed over the 1″ Pulley on the drum, and round the pulley on the *Magic* Motor. The ½″ loose Pulley 8 is fitted over the winding spindle to prevent the Driving Band from rubbing against it.

Parts required to build the model concrete mixer: 1 of No. 2; 4 of No. 4; 1 of No. 5; 2 of No. 6a; 8 of No. 10; 4 of No. 12; 3 of No. 16; 2 of No. 19b; 4 of No. 20b; 1 of No. 22; 1 of No. 23; 1 of No. 24; 39 of No. 37; 8 of No. 37a; 12 of No. 38; 8 of No. 48a; 1 of No. 51; 1 of No. 52; 1 of No. 62; 4 of No. 111c; 1 of No. 115; 2 of No. 126; 2 of No. 126a; 1 of No. 186; 1 of No. 188; 1 Magic Motor (not included in Outfit).

Model-builders who possess Outfit C, or one that is larger, will find the aircraft carrier shown in Fig. 3 a good subject for their attention. The lower part of the hull consists of a 5½″ × 2½″ Flanged Plate, on each side of which two 12½″ Strips 1 and two 5½″ × 2½″ Strip Plates are fastened by means of Bolts 2 and 3. Further 12½″ Strips are added above these, and the four are bolted together at their free ends by two ⅜″ Bolts, a Flat Bracket being used for spacing purposes. Flat Brackets are also bolted on each side by the bolts 4. The sides of the hull are extended towards the stern by 4½″ × 2½″ Flexible Plates and 5½″ Strips 5, two 2½″ × ½″ Double Angle Strips being used to space them apart. The rounded stern is formed by bolting a curved 5½″ Strip 6 to the 5½″ Strips 5, the Strip 6 overlapping the Strips 5 by two holes. Angle Brackets are then added, and these support two 3″ Pulleys 7 that are held together by a 1½″ Rod pushed through their bosses. Two 2½″ Strips are added as

shown, and a second $5\frac{1}{2}''$ Strip 8 suitably curved, is fixed in position. The forward deck consists of a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate, across which is bolted a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate. The deck is held in place by an Angle Bracket bolted to the Flat Trunnion 9, and by a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate 10.

The flying deck is then constructed. It will be found best to build this as a separate unit and to fix it in place when completed. Otherwise it would be difficult to secure the holding bolts. Two $4\frac{1}{2}''$ Flanged Sector Plates 11 are joined across their narrower ends by two $5\frac{1}{2}''$ Strips, and these overlap four holes on the rear Sector Plate and five holes on the leading Sector Plate. A third $5\frac{1}{2}''$ Strip is joined to the previously mentioned Strips by means of a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip, which will be referred to again later. The forward part of the flying deck is covered by a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate extended over the edge of the Flanged Sector Plate 11. To this are bolted two $2\frac{1}{2}''$ small radius Curved Strips joined together by a Flat Bracket. The stern end of the flying deck consists of two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates overlapping three holes, and bolted to the rear Flanged Sector Plate in the manner illustrated.

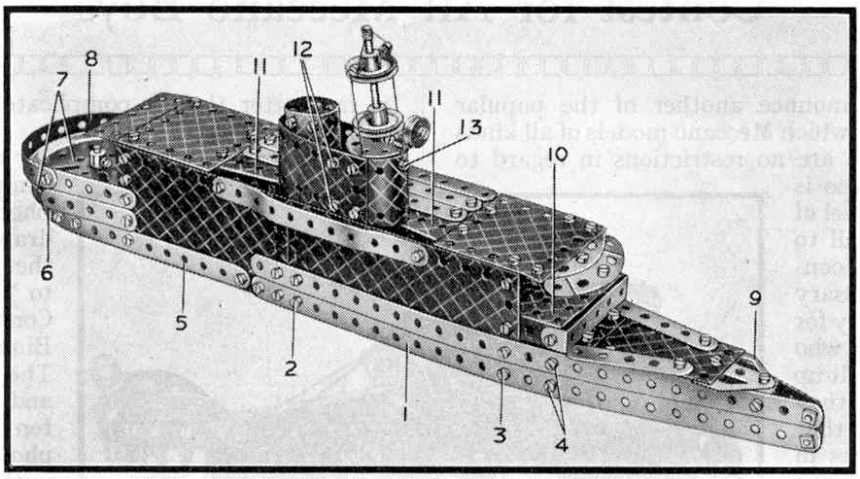

Fig. 3. This model aircraft carrier is based on H.M.S. "Glorious." It includes the main external features of the actual vessel and can be built with Outfit C.

The deck island, which on the actual ship consists of the funnel, wireless masts and bridge, is constructed from $5\frac{1}{2}'' \times 1\frac{1}{2}''$ and $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates curved as shown in the illustration, and then overlapped one hole at each end. A $2\frac{1}{2}''$ Strip is fastened in the position shown by the bolts 12, and serves to hold the deck island to the superstructure. Two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ U-Section Plates overlapped two holes at each end represent the funnel, which is attached to the previously-mentioned $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip. The deck is then ready to be bolted to the hull, and to do this the ends of the $4\frac{1}{2}''$ Flanged Sector Plates 11 are attached to the Strip and Flexible Plates of which the sides of the hull are built. The oval-shaped section consisting of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ and $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates is fastened to the side of the hull by means of the $2\frac{1}{2}''$ Strip held by the bolts 12.

The mast is a 4″ Rod to which are fastened three 1″ Pulleys and a Bush Wheel. The Bush Wheel is placed between the two lower Pulleys, and is fitted with a searchlight consisting of a $\frac{1}{2}''$ loose Pulley fastened to an Angle Bracket. The complete assembly is held in place by a $\frac{3}{8}''$ Bolt 13 that is screwed into the boss of the lower 1″ Pulley.

Parts required to build the model aircraft carrier: 4 of No. 1; 8 of No. 2; 7 of No. 5; 4 of No. 10; 4 of No. 12; 1 of No. 15b; 1 of No. 18a; 2 of No. 19b; 3 of No. 22; 1 of No. 23; 1 of No. 24; 87 of No. 37; 4 of No. 37a; 1 of No. 38; 1 of No. 48; 3 of No. 48a; 1 of No. 51; 1 of No. 52; 2 of No. 54a; 2 of No. 90a; 4 of No. 111c; 1 of No. 126a; 1 of No. 176; 2 of No. 188; 2 of No. 89; 3 of No. 190; 2 of No. 191; 2 of No. 195; 2 of No. 199.

An important problem in every town, particularly in large industrial centres, is that of collecting and conveying refuse to the destructor plant. In the old days this work was done with horse-drawn open vehicles, but within the last few years mechanically propelled vehicles fitted with bodies specially designed to prevent the escape of dust into the atmosphere have been introduced for the purpose. In some of these the body, or refuse container, is fitted with tipping mechanism, by means of which the container can be tipped endways to discharge its contents at the plant where it is treated.

A model of a vehicle of this kind in which the container is on rails and is interchangeable is shown in Fig. 4. It can be built with Outfit D. The chassis consists of two $12\frac{1}{2}''$ Angle Girders 1, which are bolted to each edge of a $4\frac{1}{2}''$ Flanged Sector Plate and to a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip. Two $12\frac{1}{2}''$ Strips are then fastened along the sides of the Flanged Sector Plate and also to the $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip, and a Double Bent Strip is then bolted to the Flanged Plate in the fourth row of holes from the front end, to provide a bearing for a $1\frac{1}{2}''$ Rod that is held in place by Spring Clips.

The driver's cab is best built as a separate unit to be attached to the chassis. A $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate 2 is bolted to the front end of a $4\frac{1}{2}''$ Flanged Sector Plate 3, the latter being sloped upward in the manner shown. A $3\frac{1}{2}''$ Strip bolted to a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate is then fastened to the Flanged Sector Plate 3 and to the $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate 2. This construction is duplicated on the opposite side of the model, and a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate is then fixed in place to represent the radiator.

The back of the cab is a $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate, which is held in place by Angle Brackets at the top and bottom. The upper Angle Brackets are connected to the $2\frac{1}{2}'' \times 2\frac{1}{2}''$ U-Section Flexible Plate that forms the roof and which is supported at the front by a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip. When the completed cab is fixed in position on the chassis, the radiator is held in place by an Angle Bracket.

The rear axle is supported on two Trunnions 4, and Flat Trunnions 5 are bolted in the positions shown to support the Rod on which the tipping mechanism is pivoted.

The tipping mechanism consists of two pairs of $5\frac{1}{2}''$ Strips fastened together by means of bolts and Angle Brackets, to form angle girders. These are connected together by the $2\frac{1}{2}''$ Strip 7 and the $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 8. A $1\frac{1}{2}''$ Strip is placed across the two Angle Girders 1 and secured to the 5″ Rod 9, which is held in position by Spring Clips. This Rod passes through the centre hole in the $2\frac{1}{2}''$ Strip 7. The $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 8, is pivoted on a $3\frac{1}{2}''$ Rod that is pushed through the Flat Trunnions 5. The container is tipped by moving the Crank Handle 10, which operates a Crank and $2\frac{1}{2}''$ Strip as shown, both of these being lock-nutted together and to the $5\frac{1}{2}''$ Strip.

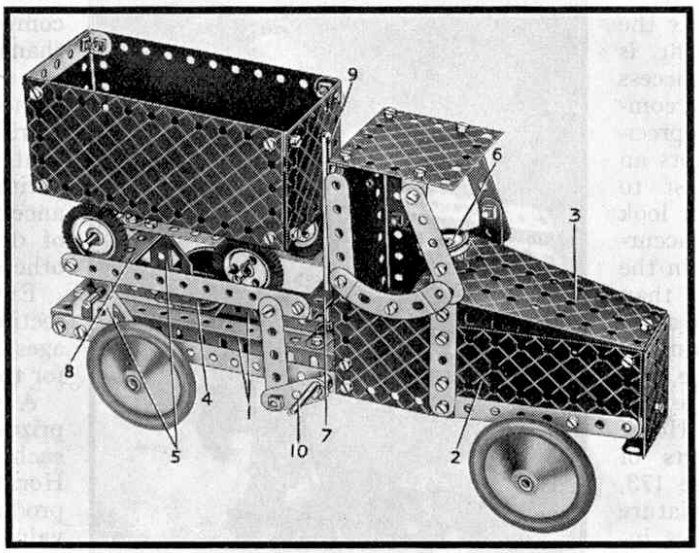

Fig. 4. This refuse collecting vehicle is a good subject for owners of Outfit D or one larger. It includes mechanism for tipping the refuse container endways to discharge its contents.

The front wheels are mounted on a $4\frac{1}{2}''$ Rod, and the rear wheels on a 4″ Rod, side play in the axles being prevented by means of Spring Clips.

The steering mechanism, which is not shown in the illustration, is constructed by fastening a Bush Wheel to a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip by means of two bolts, to one of which a $2\frac{1}{2}''$ Strip is pivotally attached. To the other end of this Strip a Crank is lock-nutted, and in its boss is journalled a $3\frac{1}{2}''$ Rod, that holds the 1″ Pulley 6.

The container consists of two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plates and two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates bolted to a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate. The method of fixing the wheel axle supports is not shown in the illustration but it is quite simple. The rear support consists of two $1'' \times 1''$ Angle Brackets overlapped one hole and bolted to the underside of the truck. A $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip, which is extended by Flat Brackets and is pivotally attached to the bottom of the truck, supports the front wheels. If a *Magic* Motor is available it may be used to drive the model. The Motor may be fixed in position by bolting it to the Angle Girders 1.

Parts required to build model refuse remover: 2 of No. 1; 4 of No. 2; 2 of No. 3; 7 of No. 5; 1 of No. 6a; 2 of No. 8; 2 of No. 10; 9 of No. 12; 2 of No. 12a; 1 of No. 15; 1 of No. 15a; 2 of No. 15b; 3 of No. 16; 1 of No. 17; 1 of No. 19s; 3 of No. 22; 2 of No. 22a; 1 of No. 24; 83 of No. 37; 8 of No. 37a; 12 of No. 38; 1 of No. 45; 1 of No. 48; 6 of No. 48a; 1 of No. 51; 1 of No. 52; 2 of No. 54a; 2 of No. 62; 2 of No. 90a; 3 of No. 111c; 2 of No. 126; 2 of No. 126a; 4 of No. 187; 2 of No. 189; 4 of No. 190; 1 of No. 191; 2 of No. 195; 1 of No. 199; 4 1″ Rubber Tyres (not included in Outfit).

New Models for Small Outfits

Designs of Wide Interest and Variety

THE four models illustrated and described this month are remarkable for their variety. They include a simple motor car and an aeroplane, types that are very attractive to model-builders, together with two working models, one of a planing machine and the other of a pneumatic driller at work. The fourth of these models is particularly effective when in motion, and is an excellent example of the clever and amusingly realistic models that can be so readily built with Meccano Outfits.

The first model to be described is the planing machine, shown in Fig. 1. It is driven by a *Magic* Motor, and can be built with Outfit D. Construction is commenced with the main framework that supports the table. Two $12\frac{1}{2}''$ Angle Girders are joined together at one end by a $3\frac{1}{2}''$ Strip, and at the other end by two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates 1 overlapped three holes. $2\frac{1}{2}''$ Strips overlapped three holes are bolted across the Angle Girders at the centre, in the position shown in the illustration, and the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plate 2, and the $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate 3, are added.

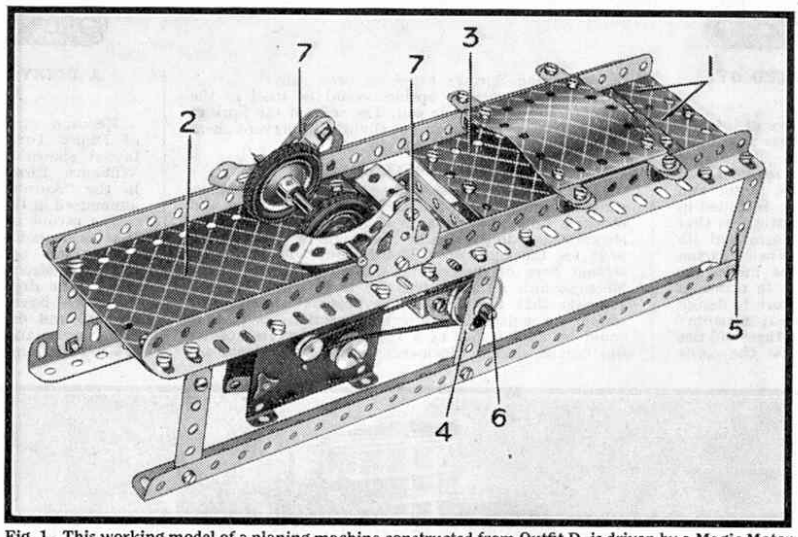

Fig. 1. This working model of a planing machine constructed from Outfit D, is driven by a Magic Motor and has a sliding cover for the revolving blade.

The lower Angle Girders are attached to the table of the machine by $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips at 4 and 5, and the remaining legs are represented by $2\frac{1}{2}''$ Strips. The rotating blades are then constructed. Four $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips are fastened to a Bush Wheel that is attached to a $4\frac{1}{2}''$ Rod 6. The free ends of the Double Angle Strips are bolted to $1\frac{1}{2}''$ Strips, also with the $4\frac{1}{2}''$ Rod passing through them. A 1″ Pulley is fastened next to the Bush Wheel, and the complete assembly is journalled in the centre Double Angle Strip 4. The roller, which on the actual machine holds down the work, is built by bolting two Flat Trunnions 7 as shown, and lock-nutting two $2\frac{1}{2}''$ small radius Curved Strips to them by $\frac{3}{8}''$ Bolts spaced with Washers. Two 1″ Pulleys fitted with Rubber Tyres are fastened to a 3″ Rod and journalled in the Curved Strips.

The cover for the rotating blade consists of a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate suitably shaped. At each corner a Flat Bracket is fastened and by the same bolt Angle Brackets are also attached in the unoccupied holes of the Flat Brackets. Further Angle Brackets are bolted in the unoccupied holes of the Flat Brackets, so that the parts at each corner of the Flexible Plate form a groove into which the top Angle Girders fit.

The *Magic* Motor is added last, and its position is clear from the illustration.

Parts required to build the model Planing Machine: 1 of No. 3; 6 of No. 5; 2 of No. 6a; 4 of No. 8; 4 of No. 10; 10 of No. 12; 1 of No. 15a; 1 of No. 16b; 3 of No. 22; 1 of No. 23; 1 of No. 24; 6 of No. 35; 53 of No. 37; 4 of No. 37a; 8 of No. 38; 8 of No. 48a; 2 of No. 90a; 2 of No. 111c; 2 of No. 126; 1 of No. 186; 2 of No. 188; 1 of No. 190; 1 of No. 191; 1 of No. 195; 1 *Magic* Motor and 2 Tyres 1″ (not included in Outfit).

The next model is the small streamlined car shown in Fig. 4. This is the latest "pear-drop" design, which is considered by motor engineers to be the ideal form of streamlining. It is built with the contents of Outfit C, and is easy to construct, and very effective in appearance.

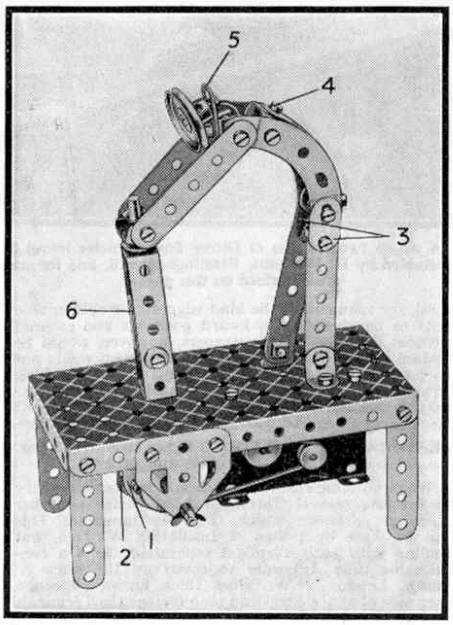

Fig. 2. An amusing model, showing a miniature pneumatic driller at work, that can be built with Outfit B. When the model is set in motion the figure shakes violently.

The chassis consists of a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, to one end of which is fastened two Obtuse Angle Brackets. A $2\frac{1}{2}''$ small radius Curved Strip 1 is bolted to a $2\frac{1}{2}''$ Strip in the centre hole, and the Curved Strip is attached to the Flanged Plate. A $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 2 is fastened to the top hole of the $2\frac{1}{2}''$ Strip, and also is bolted to a similar Strip on the opposite side.

The front is next added. A $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate is attached to the Obtuse Angle Brackets already mentioned, and two $2\frac{1}{2}''$ Strips overlapping the Flexible Plate two holes hold the front to the $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 2. Further Obtuse Angle Brackets are also fitted by means of the same bolts.

A $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate has attached to it a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate 3, which is raised up one hole, and is overlapped three holes. This part is bolted to the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate as shown, and the remainder of the coachwork completed. Two $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips 4 are fitted on, one on each side of the body, and the $5\frac{1}{2}''$ Strip added. A $4\frac{1}{2}'' \times 2\frac{1}{2}''$ and a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate are bolted together, and a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip is fastened at the join. This and another Double Angle

Strip, fastened in the middle of the $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate, hold the $2\frac{1}{2}''$ small radius Curved Strip 5 and a Flat Bracket that supports the $2\frac{1}{2}''$ Strip 6. The end of the $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate is attached to the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate and to Obtuse Angle Brackets on the $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 2. The rear axle is a $3\frac{1}{2}''$ Rod, and the front axle is a $3\frac{1}{2}''$ Strip fitted at each end with Angle Brackets. The 1″ Pulleys that are used for the front wheels are held by their set screws to $\frac{3}{8}''$ Bolts that pass through the Angle Brackets, and the complete assembly is then pivotally mounted to the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate.

Parts required to build the model streamlined car: 2 of No. 2; 1 of No. 3; 8 of No. 5; 2 of No. 10; 2 of No. 12; 4 of No. 12c; 1 of No. 16; 4 of No. 22; 1 of No. 23; 52 of No. 37; 1 of No. 37a; 2 of No. 38; 5 of No. 48a; 1 of No. 52; 4 of No. 90a; 4 of No. 111c; 2 of No. 188; 2 of No. 189; 1 of No. 190; 1 of No. 191; 1 of No. 192; 4 Tyres 1″ (not included in Outfit).

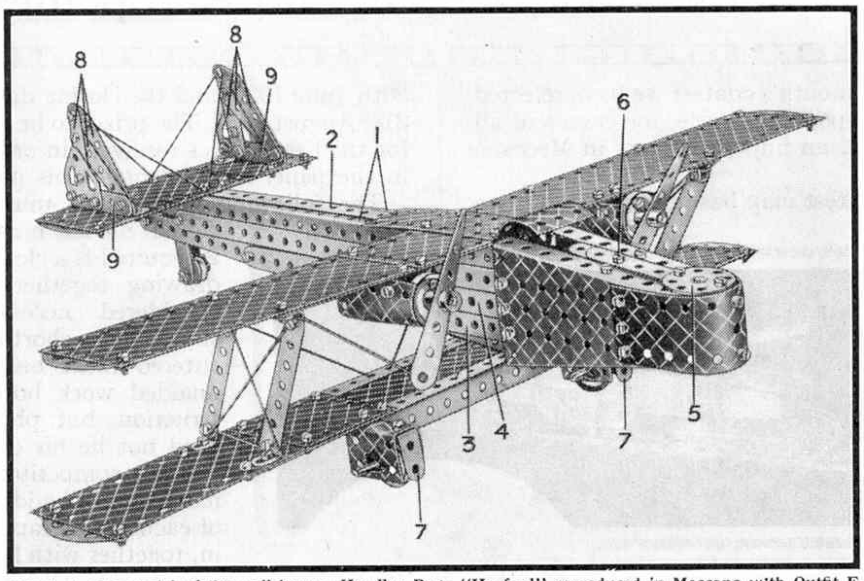

Fig. 3. A fine model of the well-known Handley Page "Heyford" reproduced in Meccano with Outfit E.

The model shown in Fig. 3 is a miniature of a Handley Page "Heyford" night bomber. It can be built with Outfit E and construction should be commenced by bolting two $12\frac{1}{2}''$ Angle Girders 1 together at one end by their elongated holes, and fastening the $12\frac{1}{2}''$ Strip 2 to them by the same Bolt. In a similar manner this construction is used for the underside of the fuselage but the free ends of the Angle Girders and $12\frac{1}{2}''$ Strip are bolted together by Flat Brackets and the two components are joined at the tail by means of Flat Brackets.

A $5\frac{1}{2}''$ Strip 3 is fastened in the seventh hole of the lower Angle Girder and the $12\frac{1}{2}''$ Strip 4 is bolted in the ninth hole from the tail as shown. A further $12\frac{1}{2}''$ Strip is fitted with a Nut, Bolt and Washer, and is clamped in the position shown in the illustration. The fuselage is completed on the opposite side, and the $4\frac{1}{2}''$ Flanged Sector Plates that form the nose are added.

Two $2\frac{1}{2}''$ Strips overlapped four holes are attached to the Bush Wheel 5, and by the Bolts 6 to Flat Brackets secured to the Flanged Sector Plates. An Angle Bracket holds the Bush Wheel in place in the nose.

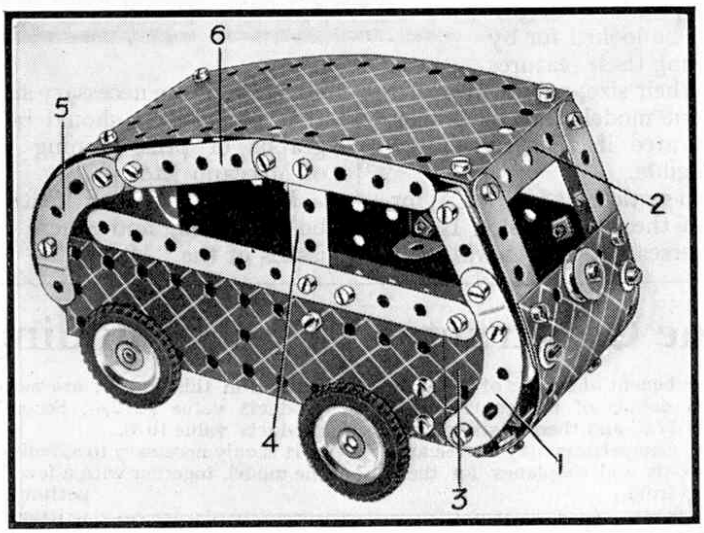

Fig. 4. Streamlining in Meccano. This model car forms a novel subject for owners of Outfit C.

The engines are next built. A $2\frac{1}{2}'' \times 2\frac{1}{2}''$ U-Section Flexible Plate is fastened to a Double Bracket in the second hole from the end, and the remote corners are pulled together by a bolt and nut. Two $\frac{1}{2}''$ Pulleys hold $1\frac{1}{2}''$ Rods on which the propellers are mounted.

Two 1″ loose Pulleys are used for the wheels and the wheel covers are $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates bent into U-shape and covered in at the front by $1'' \times 1''$ Angle Brackets 7. Two $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates overlapping five holes and fitted with $2\frac{1}{2}''$ large radius Curved Strips represent the tail plane. Each of the tail fins consist of three $2\frac{1}{2}''$ Strips 8, a $1\frac{1}{2}''$ Strip 9, and a Flat Trunnion. The method of rigging the model with Cord can be seen from the illustration.

Parts required to build the model "Heyford": 10 of No. 1; 2 of No. 2; 4 of No. 3; 2 of No. 4; 8 of No. 5; 2 of No. 6a; 4 of No. 8; 8 of No. 10; 2 of No. 11; 12 of No. 12; 2 of No. 12a; 2 of No. 22; 2 of No. 22a; 1 of No. 23; 1 of No. 24; 4 of No. 35; 105 of No. 37; 1 of No. 37a; 6 of No. 38; 1 of No. 44; 1 of No. 52; 2 of No. 54a; 2 of No. 59; 2 of No. 90; 4 of No. 90a; 1 of No. 111; 2 of No. 126a; 2 of No. 188; 2 of No. 189; 2 of No. 190; 2 of No. 191; 2 of No. 195; 2 of No. 197; 2 of No. 199.

The model pneumatic driller shown in Fig. 2 is built with Outfit B, and is yet another of the many amusing models that can be built with this Outfit.

The working part of the model is a $3\frac{1}{2}''$ Rod to which is fastened a 1″ Pulley, and a Bush Wheel 1 carrying two Angle Brackets, one of which can be seen at 2. The Brackets are fastened by their elongated holes, and they are inclined at an angle so that they form a cam. It is necessary to adjust these when the model is completed.

The figure is easily constructed. The bolt 4 holds a $2\frac{1}{2}''$ Strip to the two Angle Brackets and the Flat Bracket 5 carries a 1″ Pulley. The Flat Brackets 3 are pivotally attached to the $2\frac{1}{2}''$ Cranked Curved Strips that form the body of the figure.

The sides of the drill are held together by a Cranked Bent Strip 6, and the protruding end of the 4″ Rod is arranged to come into contact with the Angle Brackets on the Bush Wheel 1.

The *Magic* Motor is fitted as shown, and when this is set in motion, an amusing effect is produced provided the model is carefully adjusted. Care must be taken to ensure that the Angle Brackets on the Bush Wheel are positioned so that the Rod does not engage in their holes. The distance through which the drill is raised by the cam can readily be varied as the model-builder wishes. The smaller it is made the higher the speed at which the *Magic* Motor will operate the model, and the more effective the movement.

Parts required to build the model pneumatic driller: 9 of No. 5; 3 of No. 10; 2 of No. 11; 8 of No. 12; 1 of No. 15b; 1 of No. 16; 2 of No. 21; 1 of No. 23; 1 of No. 24; 3 of No. 35; 29 of No. 37; 5 of No. 37a; 2 of No. 38; 1 of No. 44; 2 of No. 48a; 1 of No. 52; 2 of No. 90a; 3 of No. 111c; 2 of No. 126a; 1 of No. 186; 1 *Magic* Motor (not included in Outfit).

New Outfit Models

Good Subjects Requiring Few Parts

THE four models illustrated on this and the opposite page can be built with Outfits ranging from A to C, and include a horse-drawn tipping wagon, a gantry crane, a low-wing monoplane and an amusing representation of a Meccano oarsman. Although they are intended mainly for readers who possess small Outfits, they are all sufficiently interesting to warrant the attention of owners of a more extensive Outfit or collection of parts.

The model horse-drawn tipping wagon illustrated in Fig. 1 is a fine subject for Outfit A. Its construction is commenced by joining two $5\frac{1}{2}''$ Strips 1 with $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips, one at each end. This forms the frame of the wagon, and the axles are passed through holes in the $5\frac{1}{2}''$ Strips, as shown in the illustration. The next step is to build the container, and this is done by bolting $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates to the long sides of a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, and a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate to one of the shorter sides. Two Angle Brackets, indicated at 2, are then lock-nutted to the $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates, and a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate is bolted to them. This allows the end of the cart to swing open. Two Trunnions are bolted to the bottom of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Plate, and the Rod serving as the back axle passes through their bottom holes, supporting the container yet leaving it free to swivel.

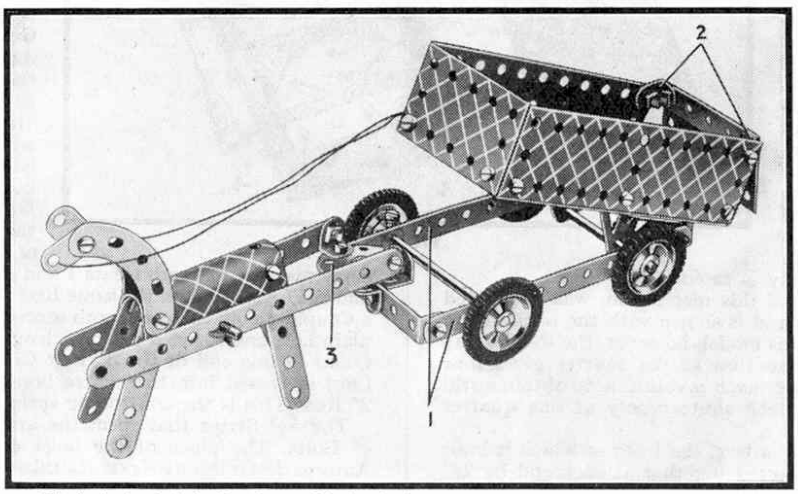

Fig. 1. A simple but attractive model of a tipping wagon, which can be built with Outfit A.

A Reversed Angle Bracket is bolted to the forward Double Angle Strip and adjusted so that the container normally is balanced in a horizontal position. The bolt that fastens the Reversed Angle Bracket in position also holds a $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Bracket. A $\frac{3}{8}''$ Bolt passes through the free hole in the Bracket and is then locked in the boss of Bush Wheel 3, so that the Bush Wheel is free to turn on its pivot. Two $5\frac{1}{2}''$ Strips forming the shafts are then fastened by $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets to the Bush Wheel.

The body of the horse is made from a U Section Plate, and $2\frac{1}{2}''$ Strips are used for its legs. Its neck is constructed of two $2\frac{1}{2}''$ Curved Strips, and two Flat Brackets bolted to the free ends of the Curved Strips represent its head. The animal is held in position between the shafts by a 2″ Rod journalled in the shafts and passing through holes in the U Section Plate.

Parts required to build the model horse-drawn tipping wagon: 4 of No 2; 5 of No. 5; 2 of No. 10; 5 of No. 12; 2 of No. 16; 1 of No. 17; 4 of No. 22; 1 of No. 24; 4 of No. 35; 27 of No. 37; 4 of No. 37a; 1 of No. 38; 2 of No. 48a; 1 of No. 52; 2 of No. 90a; 3 of No. 111c; 1 of No. 125; 2 of No. 126; 2 of No. 188; 2 of No. 189; 1 of No. 199; (4-1″ Tyres not included in Outfit).

The model illustrated in Fig. 2 shows a Meccano oarsman who has obviously rowed himself out and is resting on his oars after a hard pull! This amusing model can be built from the contents of Outfit C.

The construction of the boat will be obvious from the illustration. The body of the oarsman consists of two $2\frac{1}{2}''$ Curved Strips and his legs and arms are $2\frac{1}{2}''$ Strips, held by Bolts 3 and 4 respectively. The Bolt that holds his back in position holds also a Reversed Angle Bracket 5, and an Angle Bracket is bolted to this by a $\frac{3}{8}''$ Bolt. On the shank of the Bolt is a 1″ Pulley. A Bush Wheel is bolted to the free hole of the Angle Bracket to represent a hat. The oars, represented by $5\frac{1}{2}''$ Strips, are secured in the oarsman's hands by means of Cord, and they pivot on rowlocks consisting of 2″ Axle Rods supported by Spring Clips in double brackets, each of which is built up from two Angle Brackets.

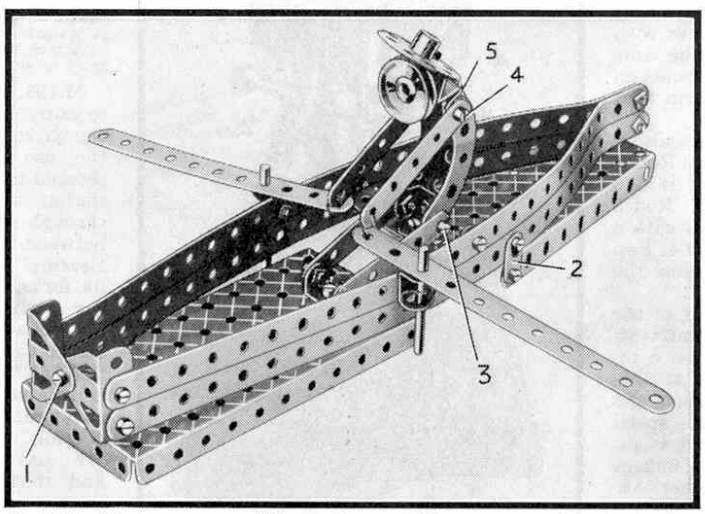

Fig. 2. The Meccano oarsman. This amusing model forms a good subject for Outfit C.

A $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip is used for the seat, and is attached pivotally to the sides of the boat with two $\frac{3}{8}''$ Bolts. The oarsman is fastened to the seat by means of an Angle Bracket, which is bolted to the Double Bracket forming the lower part of the body.

Parts required to build the Meccano oarsman: 4 of No. 1; 2 of No. 2; 5 of No. 5; 3 of No. 10; 2 of No. 11; 8 of No. 12; 2 of No. 17; 1 of No. 22; 1 of No. 24; 2 of No. 35; 26 of No. 37; 7 of No. 37a; 1 of No. 48a; 1 of No. 52; 1 of No. 54a; 2 of No. 90a; 3 of No. 111c; 2 of No. 125; 2 of No. 126.

Fig. 3 shows a fine model of a travelling gantry crane that can be built with Outfit B. The gantry support at one end is made by bolting the two upright $5\frac{1}{2}''$ Strips 1 to a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Plate and bracing them with two more $5\frac{1}{2}''$ Strips 2. The support at the other end consists of two more upright $5\frac{1}{2}''$ Strips bolted to the wider end of a $4\frac{1}{2}''$ Sector Plate. The two units thus built up are then joined by $12\frac{1}{2}''$

Strips, along which the hoisting trolley runs. The bolts 3 hold in position a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip, connecting the $12\frac{1}{2}''$ Strips, and the compound bracing strips 4 are built up from three $2\frac{1}{2}''$ Strips.

The sides of the control cabin consist of $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates, and two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates are used for the top. The crankhandle 5 and Rod 6 are journalled in the holes of the Flexible Plates that form the sides of the cabin. In order that Rod 6 may be turned easily, a Bush Wheel with a $\frac{3}{8}''$ Bolt through one of its holes, is fastened to it. The hoisting trolley consists of two Trunnions joined together by a Flat Bracket, and the Axle Rods holding the 1″ Pulleys, four in number, on which it runs, are passed through the end holes of the Trunnions.

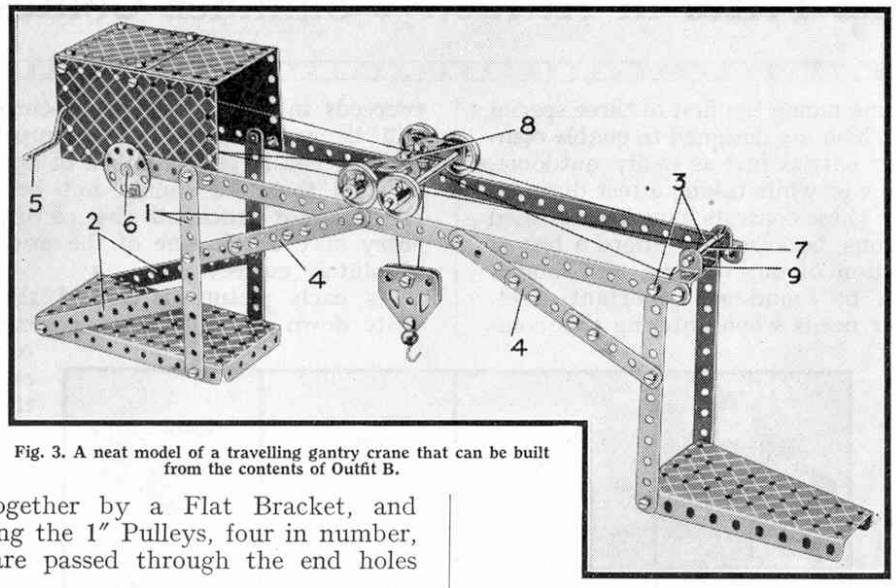

Fig. 3. A neat model of a travelling gantry crane that can be built from the contents of Outfit B.

The pulley block consists of two Flat Trunnions held together by means of a $\frac{3}{8}''$ Bolt 6. On the shank of this Bolt, between the Flat Trunnions, there are three Washers to allow the cord to slide easily. The Hook is held by a $\frac{3}{8}''$ bolt that passes through the bottom holes of the Flat Trunnion.

The Cord for moving the trolley is first attached to Flat Bracket 8, then led over Rod 7 to Crank 5, round the shaft of which it is wound several times. The free end of the Cord is then tied to Flat Bracket 8. The pulley Cord is tied first to the centre hole of Double Angle Strip 9, and is then led over the first axle of the trolley, through the pulley block, over the second axle of the trolley and lastly is fastened to a Cord Anchoring Spring on Rod 6.

Parts required to build the gantry crane: 2 of No. 1; 6 of No. 2; 8 of No. 5; 1 of No. 10; 4 of No. 12; 1 of No. 15b; 2 of No. 16; 1 of No. 17; 1 of No. 19s; 4 of No. 22; 1 of No. 24; 4 of No. 35; 40 of No. 37; 2 of No. 37a; 3 of No. 38; 2 of No. 48a; 1 of No. 52; 1 of No. 54a; 1 of No. 57c; 1 of No. 111c; 2 of No. 125; 2 of No. 126; 2 of No. 126a; 1 of No. 176; 2 of No. 190; 2 of No. 191.

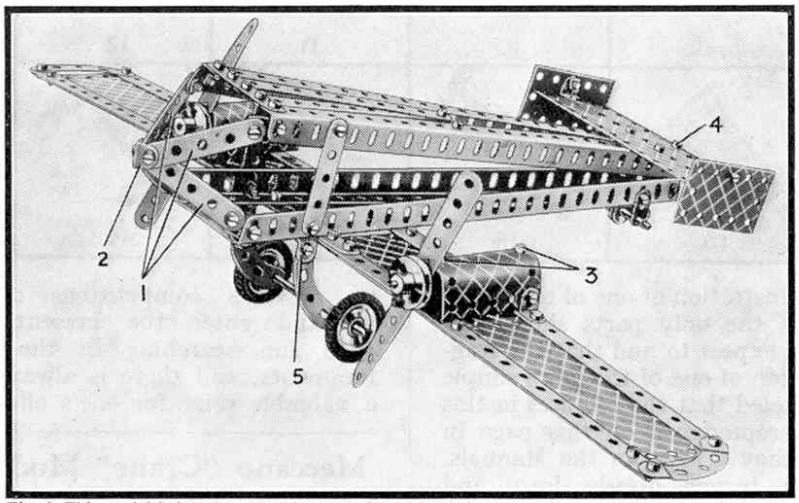

Fig. 4. This model is based on the Monospar ST/25 low-wing monoplane, and is remarkable for the good effect obtained by the use of only a few simple parts. It can be built with Outfit C.

The monoplane illustrated in Fig. 4 can be built with Outfit C, and is based on the Monospar ST/25 five-seater cabin machine, which is equipped with twin engines of 90 h.p. each. The fuselage of the model should be built first. Four $12\frac{1}{2}''$ Angle Girders are joined together at one end by Flat Brackets, and are spaced apart by $2\frac{1}{2}''$ Strips at the other end. The $2\frac{1}{2}''$ Strips 1 that form the nose of the machine are fastened to the fuselage by means of Obtuse Angle Brackets, which are bolted in the elongated holes of the Angle Girders. The free ends of the $2\frac{1}{2}''$ Strips are then bolted to the Angle Bracket 2.

The leading edges of the wings consist of two $12\frac{1}{2}''$ Strips overlapping five holes, and the trailing edges of two $12\frac{1}{2}''$ Strips overlapping seven holes. The Strips are joined together at their ends by $2\frac{1}{2}''$ Curved Strips, and the wings are then bolted to the two $12\frac{1}{2}''$ Angle Girders that form the bottom of the fuselage. The spaces between the Strips are filled in with $5\frac{1}{2}'' \times 2\frac{1}{2}''$ and $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates. The engine nacelles are formed by U Section Plates, and are fastened to the wings by means of Angle Brackets. Bearings for the propeller shafts, which are represented by $3\frac{1}{2}''$ Rods, are formed by $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips held by the Bolts 3.

The tail plane is composed of $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates, and the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates forming the rudders are bolted to it by means of $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets. The entire tail assemblage is fastened to the fuselage by means of Bolt 4. The tail wheel is represented by a $\frac{1}{2}''$ loose Pulley, and the bearings for the $1\frac{1}{2}''$ Rod on which it is carried are two Flat Brackets, bolted to the lower part of the fuselage.

The landing wheels are 1″ fast Pulleys, which are secured on a $3\frac{1}{2}''$ Rod supported in the end holes of two $2\frac{1}{2}''$ Cranked Curved Strips forming the undercarriage. The upper ends of the Curved Strips are fastened by $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets to the fuselage, just in front of the wings.

If a *'Magic'* Motor is available it is a good plan to incorporate it in the model for the purpose of driving the landing wheels. The best position for the Motor, of course, is inside the cabin almost directly above the axle of the wheels. It may be fixed in place by bolts passed through its flanges and into the lower $12\frac{1}{2}''$ Angle Girders forming the fuselage. The drive should be taken from the small pulley of the Motor shaft to a $\frac{1}{2}''$ fast Pulley fixed on the axle of the landing wheels, the driving band being twisted to drive the wheels in the correct direction.

Parts required to build the model Monospar ST/25: 4 of No. 1; 5 of No. 2; 8 of No. 5; 4 of No. 8; 5 of No. 10; 7 of No. 12; 4 of No. 12c; 3 of No. 16; 1 of No. 18a; 4 of No. 22; 1 of No. 23; 6 of No. 35; 61 of No. 37; 1 of No. 37a; 4 of No. 38; 4 of No. 48a; 2 of No. 90a; 1 of No. 111c; 2 of No. 188; 2 of No. 189; 2 of No. 191; 2 of No. 192; 2 of No. 199; (2-1″ Tyres not included in Outfit).

New Outfit Models

Simple Models Fitted with *Magic* Motors

THIS month we are describing three simple working models built with small Outfits. They are a three-wheel sports car, a motor-cycle and a farm tractor, and each of them is fitted with a Meccano *Magic* Motor. Each of the models has been tested and was found to work very satisfactorily, and they show well how the *Magic* Motor can be used to add life and interest to small models.

The first model to be dealt with is the motor-cycle, which is shown in Fig. 1. This can be built with Outfit B, and the difficulty of balancing is got over by fitting a ½″ Pulley to the frame in such a position that the model is kept upright while in motion. This does not spoil the appearance of the model, which runs well and looks very realistic.

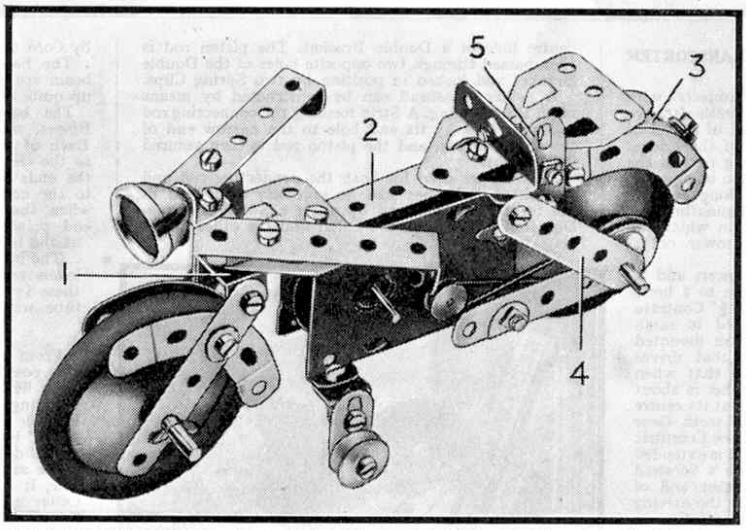

Fig. 1. This simple model motor-cycle is built with Outfit B and is driven by a Magic Motor. It is fitted with a pulley support that keeps it upright while in motion.

Construction should be commenced by making the front forks and handlebars. The Double Bracket 1 is fitted with two 2½″ Strips, to which are bolted two 2½″ small radius Curved Strips that represent the front wheel mudguard. The securing bolts carry Washers on their shanks for the purpose of spacing the Bolts from the rim of the Road Wheel. The handlebar is made from two Reversed Angle Brackets fastened on the shank of a ⅜″ Bolt passing through their elongated holes, and two 2½″×½″ Double Angle Strips. The bolt passes through a Flat Trunnion and the end hole of 5½″ Strip 2, and is secured by lock-nuts to Double Bracket 1 so that the handlebars and forks turn together. The *Magic* Motor is bolted through its upper left-hand flange to the Flat Trunnion attached to Strip 2.

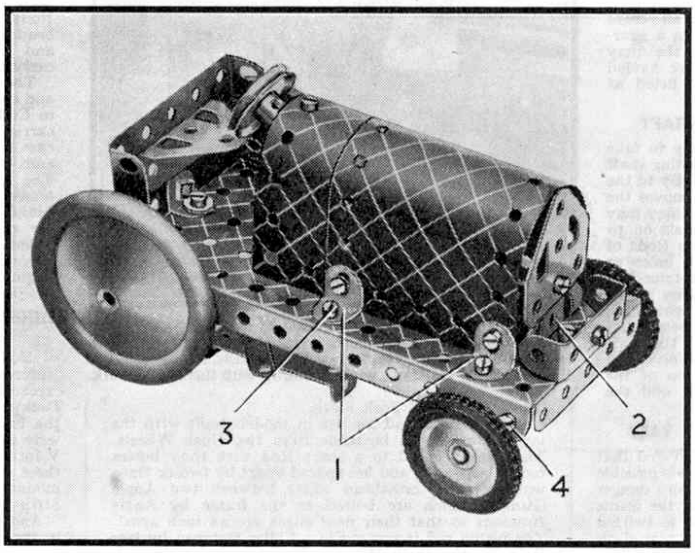

Fig. 2. A model farm tractor that forms a good subject for owners of Outfit C. The front wheels are driven by a Magic Motor.

The rear mudguard consists of two 2½″ small radius Curved Strips fixed to Angle Brackets, which in turn are bolted to 5½″ Strip 2, the bolt passing through the third hole from its rear end. The bolt that holds the Angle Bracket carries also a 2½″ Strip 3 extended by a Flat Bracket. The saddle is represented by a Trunnion, and a Flat Trunnion attached to it by an Angle Bracket forms the pillion seat.

The next step in the construction of the model is to fit the rear forks. These consist of 2½″ Strips, which are bolted direct to the *Magic* Motor on the rear side of the model. On the side shown in Fig. 1, however, 2½″ Strip 4 is held in place by a ⅜″ Bolt, and the lower 2½″ Strip is attached to one of the flanges of the Motor by an Angle Bracket. The rear Road Wheel is mounted on a 2″ Rod that carries also a 1″ Pulley spaced from the 2½″ Strips by three Washers. It is important that the Driving Band from the Motor pulley to the 1″ Pulley on the rear wheel is twisted, as shown in the illustration; otherwise the model will travel backwards!

The ½″ loose Pulley that keeps the model upright is carried on a ⅜″ Bolt lock-nutted to a Flat Bracket attached to the Motor by an Angle Bracket. Two Flat Brackets 5 bolted together and lock-nutted to the brake-lever, allow the Motor to be controlled while the model is actually in motion.

If desired a Spotlight from a Meccano Lighting Set can be fitted to the model. It should be clamped to the handlebars by one of the Angle Brackets supplied with the Lighting Set.

Parts required to build the model motor-cycle: 1 of No. 2; 7 of No. 5; 4 of No. 10; 1 of No. 11; 5 of No. 12; 2 of No. 17; 1 of No. 22; 1 of No. 23; 2 of No. 35; 26 of No. 37; 6 of No. 37a; 6 of No. 38; 2 of No. 48a; 4 of No. 90a; 3 of No. 111c; 2 of No. 125; 1 of No. 126; 2 of No. 126a; 1 of No. 186; 2 of No. 187. (1 *Magic* Motor, 1 Lighting Set, not included in Outfit.)

The small but effective model of a farm tractor shown in Fig. 2 can be built with Outfit C. Construction is commenced by bolting two Angle Brackets 1 and also two corresponding Angle Brackets on the rear side of the model, to a 5½″×2½″ Flanged Plate that forms the chassis. Two 4½″×2½″ Flexible Plates are then curved to the required shape, and bolted to the Angle Brackets 1 on the 5½″×2½″ Flanged Plate, the Flexible Plates being overlapped three holes as shown.

The radiator consists of Trunnion 2 and a Flat Trunnion bolted together, and then fixed to the chassis. The

number plate at the front of the tractor is represented by a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip, which is fastened to the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate by an Angle Bracket. A 1″ Pulley that represents the steering wheel is held in position by means of a $\frac{3}{8}''$ Bolt, which is passed through the free hole of an Obtuse Angle Bracket bolted to the bonnet, and secured in the boss of the Pulley.

The back of the tractor is formed by a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate fastened to the chassis by an Angle Bracket, and a Trunnion representing the seat is fixed to the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate, in the position shown in Fig. 2. The *Magic* Motor is held in position underneath the tractor by the Bolt 3 and a second Bolt in a similar position on the other side of the model.

The front axle is a $3\frac{1}{2}''$ Rod, which is journalled in the holes of two Flat Brackets bolted at 4 on each side of the tractor. The $\frac{1}{2}''$ fast Pulley supplied with the Motor is fixed on the front axle, and is connected by a Driving Band with the pulley on the Motor shaft. Bearings for the back axle are formed by the end holes in the sides of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate.

Parts required to build the model farm tractor: 2 of No. 10; 6 of No. 12; 1 of No. 12c; 2 of No. 16; 3 of No. 22; 19 of No. 37; 4 of No. 38; 1 of No. 48; 1 of No. 51; 1 of No. 52; 1 of No. 57c; 1 of No. 111c; 1 of No. 126; 2 of No. 126a; 1 of No. 186; 2 of No. 187; 2 of No. 191. (2 1″ Tyres; 1 *Magic* Motor, not included in Outfit.)

The small three-wheeled sports car, of which two views are reproduced on this page, is fitted with steering mechanism based on the Ackermann principle, and is built with Outfit C. The chassis construction is seen in Fig. 4, which shows an underneath view of the model. In building it two $5\frac{1}{2}''$ Strips 1 (Fig. 4) are fitted with Reversed Angle Brackets bolted in the fourth holes from the ends of the Strips, and at their other ends the Strips carry Angle Brackets, which are bolted to Double Angle Strip 2. Further $5\frac{1}{2}''$ Strips 3 are fastened by their end holes to the Reversed Angle Brackets, and Double Angle Strips 2 is arranged so that its ends fit on the outside of Strips 3. The *Magic* Motor is now bolted in position. The 2″ Rod carrying the rear Road Wheel and 1″ Pulley is journalled in the second holes of Strips 1, and is held in place by Spring Clips. The Road Wheel is spaced from the $5\frac{1}{2}''$ Strip by three Washers.

The tail of the car comprises two $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates bolted end to end, curved, and overlapped as shown in the illustration on this page. A $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate is bolted to the $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates by means of an Obtuse Angle Bracket, and two $1\frac{11}{16}''$ radius Curved Plates are bolted together, the bolt 4 holding also the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate. Each of the $1\frac{11}{16}''$ radius Curved Plates is then bolted at 5 to the $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates forming the sides. A $2\frac{1}{2}''$ small radius Curved Strip fastened to an Angle Bracket, forms the back of the driving seat and completes the tail of the car.

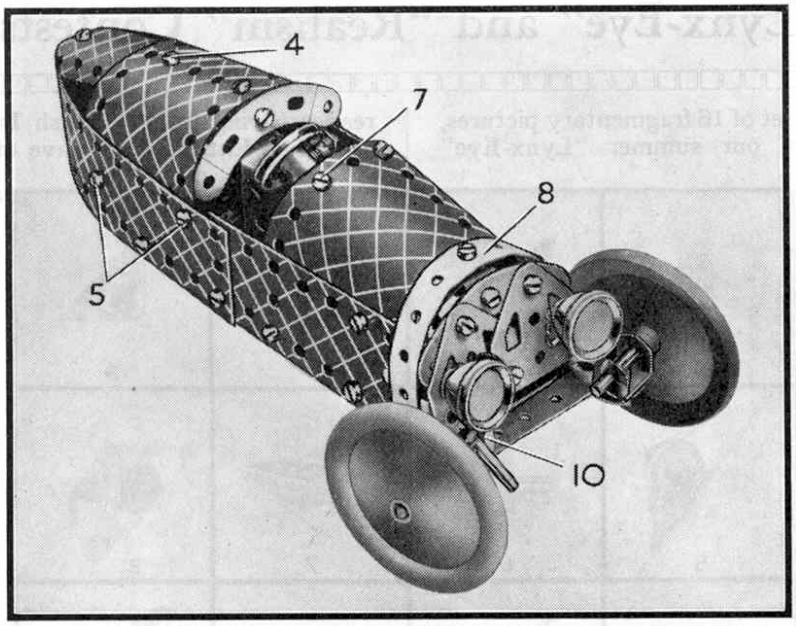

Fig. 3. A sturdy model of a three-wheel sports car, fitted with Ackermann steering mechanism and electric headlights from a Meccano Lighting Set. It can be built with Outfit C.

The side shown in Fig. 3 is extended to the front of the chassis by two overlapping $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates overlapped and bolted as shown, the bolt holding the front Flexible Plate carrying also $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate 6. A $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate is bolted to the other side so that a gap is left to enable the winding key of the *Magic* Motor to be fitted on the winding shaft.

The bonnet is next fitted. This consists of two U-Section Curved Plates overlapping three holes, Bolt 7 holding also an Angle Bracket. The Curved Plates are then fastened to the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates forming the sides, one of the Bolts holding also a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip (see Fig. 4). The steering column is a Crank Handle, and is passed through the centre hole of the $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip and through the Angle Bracket held by Bolt 7, being retained in place by Spring Clips and the 1″ Pulley representing the steering wheel.

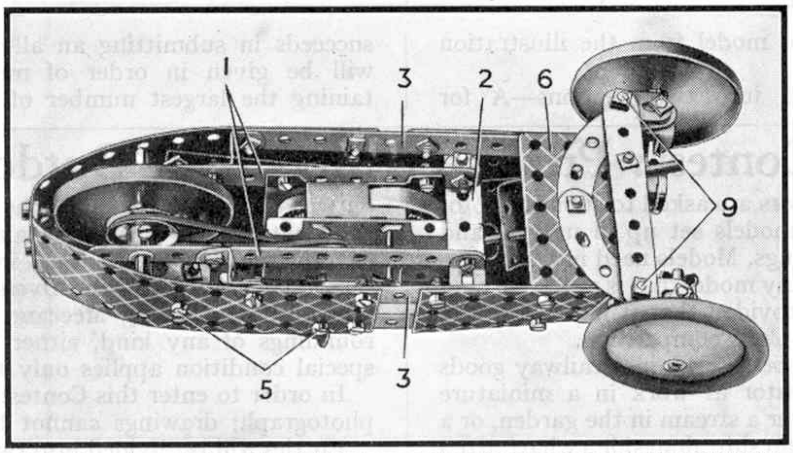

Fig. 4. An underneath view of the Outfit C three-wheel sports car, showing how the Magic Motor is mounted in the chassis.

The radiator consists of two Flat Trunnions bolted to a $2\frac{1}{2}''$ small radius Curved Strip and also to a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip at the bottom. A $5\frac{1}{2}''$ Strip 8 is curved to shape and bolted to $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate 6 and also to the top of the bonnet, the Bolt by which Strip 8 is held carrying also an Obtuse Angle Bracket. Finally the radiator is bolted to the Obtuse Angle Bracket and the $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip is wedged in place.

Two $\frac{3}{8}''$ Bolts have Double Brackets locked on their shanks and pass through the end holes of the $2\frac{1}{2}''$ small radius Curved Strips. A Washer and a Nut are added, and the Flat Brackets are then securely lock-nutted in place to the $3\frac{1}{2}''$ Strip. The Bolts 9 are lock-nutted, and Angle Bracket 10 engages with the end of the Crank Handle.

Parts required to build the model three-wheeled sports car: 5 of No. 2; 1 of No. 3; 1 of No. 5; 2 of No. 10; 2 of No. 11; 5 of No. 12; 2 of No. 12c; 1 of No. 17; 2 of No. 18a; 1 of No. 19s; 2 of No. 22; 6 of No. 35; 42 of No. 37; 8 of No. 37a; 8 of No. 38; 1 of No. 48; 2 of No. 48a; 1 of No. 51; 4 of No. 90a; 2 of No. 111c; 2 of No. 125; 2 of No. 126a; 1 of No. 186; 3 of No. 187; 4 of No. 188; 2 of No. 189; 2 of No. 199; 2 of No. 200. (1 *Magic* Motor, 1 Lighting Set, not included in Outfit.)

More Models for Keen Builders

Cargo Liner—Road Roller—Motor Lorry

ON this and the opposite page we illustrate and describe three new models of widely different types. They are a cargo liner, a road roller and a light motor lorry. The two first are built with standard Meccano parts only, but the motor lorry includes both standard Meccano parts and parts from a No. 2 Motor Car Constructor Outfit.

The cargo liner shown in Figs. 1 and 2 is best commenced by building up the hull. The base of the model consists of two 12½″ Angle Girders joined at each end by a 3½″ Strip. To each of the Angle Girders are then bolted a 12½″×2½″ and a 5½″×2½″ Strip Plate and a 4½″×2½″ Flexible Plate, overlapping as shown to form the sides of the hull. The stern is made by bolting the ends of two 2½″×1½″ Flexible Plates, bent to the shape illustrated, to the base of a Flat Trunnion 5, the opposite ends of the Flexible Plates being bolted to the sides of the hull. The upper part of the stern is formed by two 5½″×1½″ Flexible Plates overlapped five holes and bolted in position one hole above the general level of the sides of the ship.

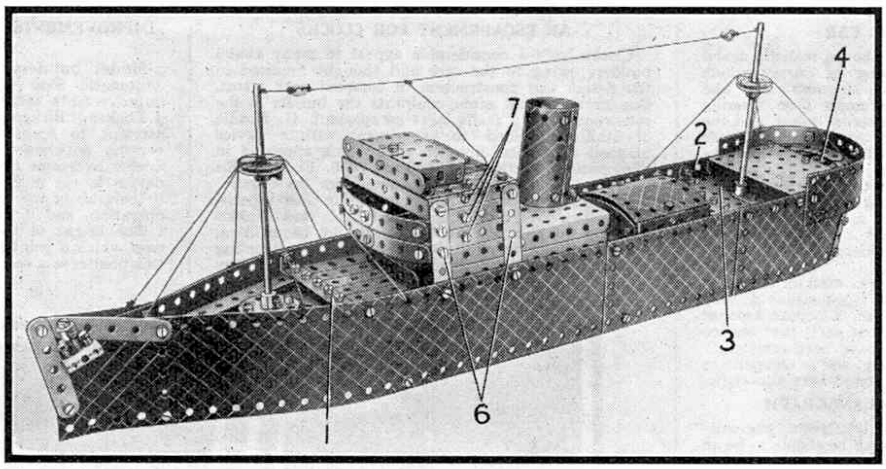

Fig. 1. A fine model of a cargo liner that is easy to construct. The hull is built from Flexible Plates and Strip Plates.

The sides are extended to form the bows by two 2½″×1½″ Flexible Plates, the forward edges of which are bolted together, and the prow is built up of two 3″ and two 2½″ Strips bolted to the 2½″×2½″ Flexible Plate. The anchor is formed from a Coupling, a Collar and three bolts.

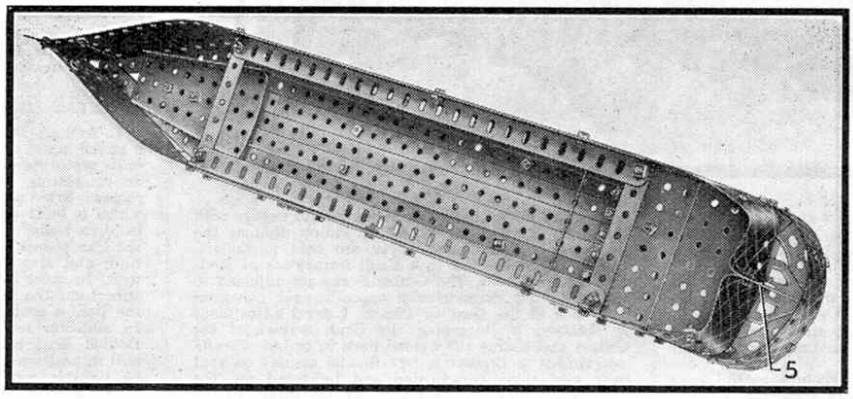

Fig. 2. An underneath view of the cargo liner, showing the construction of the deck.

The stern deck consists of a 3½″×2½″ Flanged Plate, to one end of which is bolted a Flat Trunnion 4 and two 2½″ small radius Curved Strips, the Flanged Plate being held by the same bolts as the 5½″×1½″ Flexible Plates at the stern. The rear end of the main deck also is formed by a 3½″×2½″ Flanged Plate 3 secured by two Angle Brackets 2 to the sides of the ship. The centre deck consists of two 12½″ Angle Girders and five 12½″ Strips, which are bolted at one end to the 3½″×2½″ Flanged Plate and at the other to a 3½″ Strip 1 fastened to the sides of the ship by Angle Brackets. A Flanged Sector Plate and two 5½″ Strips are used for the fore-deck.

The main part of the superstructure is constructed by extending the sides of a 5½″×2½″ Flanged Plate downwards by 5½″ Strips and the ends by 2½″ Strips. The complete unit is then secured to the deck by a 1″×1″ Angle Bracket. The bridge is built up by bolting two 2½″ Strips 6 to each side of the ship, as shown. The upper ends of these Strips are joined by two 2½″×2½″ Flexible Plates overlapped three holes and carrying a 2½″×1½″ Flanged Plate and a 3½″ Strip. The sides of the wheelhouse are each formed by three 2½″×½″ Double Angle Strips 7 joined by a 1½″ Strip, and are secured in position by Angle Brackets. The rear ends of the Double Angle Strips are joined by small radius Curved Strips. The curved front of the bridge is made with two compound strips bent to shape and fastened to the forward 2½″ Strips by Obtuse Angle Brackets. Each of the compound strips is formed by two 2½″ Strips overlapped two holes. Two U-section Curved Plates, the ends of which are overlapped one hole, are used for the funnel.

The hatch is constructed by fastening two 2½″×½″ Double Angle Strips to the deck by Double Brackets. A 1 11/16″ radius Curved Plate is bolted across the upper ends of the Double Brackets, and the ends of the Double Angle Strips are joined by large radius Curved Strips forming the ends of the hatch.

Parts required to build the model cargo liner: 5 of No. 1; 4 of No. 2; 4 of No. 3; 2 of No. 4; 12 of No. 5; 2 of No. 6a; 4 of No. 8; 2 of No. 10; 3 of No. 11; 10 of No. 12; 1 of No. 12a; 4 of No. 12c; 2 of No. 15; 2 of No. 22; 1 of No. 24; 105 of No. 37; 6 of No. 38; 8 of No. 48a; 1 of No. 48b; 1 of No. 51; 1 of No. 52; 2 of No. 53; 1 of No. 54a; 1 of No. 59; 1 of No. 62; 1 of No. 63; 2 of No. 90; 4 of No. 90a; 1 of No. 111; 4 of No. 111c; 1 of No. 115; 2 of No. 126a.

The novel motor lorry shown in Fig. 3 is fitted with an E6 Electric Motor. The bonnet and centre section are first built up of Motor Car Constructor parts, and the E6 Electric Motor is then secured in position by means of Angle Brackets, so that its side plates project one hole

behind the chassis.

The small Pinion 2 on the driving shaft of the Motor meshes with a 57-teeth Gear 3 on a 3″ Rod journalled in the Motor sideplates. The 3″ Rod carries also a $\frac{3}{4}$″ Sprocket Wheel 4, which is connected by Chain to a 1″ Sprocket Wheel on the rear axle. The axle is a 4″ Rod, journalled in the Motor, and is fitted at each end with a Wheel from the Motor Car Outfit.

A $5\frac{1}{2}$″ Angle Girder is bolted to the upper edge of each side of the Motor, and these support the platform, which consists of two $5\frac{1}{2}$″ × $2\frac{1}{2}$″ Strip Plates and two $2\frac{1}{2}$″ × $2\frac{1}{2}$″ Flexible Plates, arranged as shown and braced around the edges by Strips.

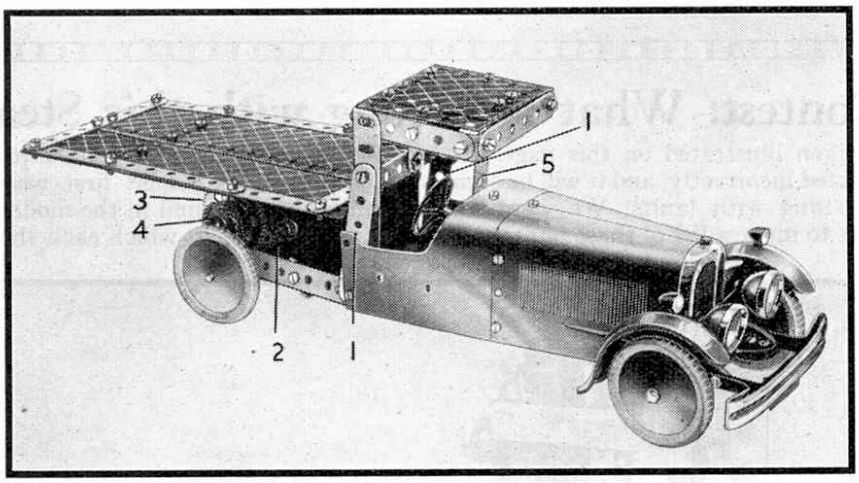

Fig. 3. This light motor lorry is constructed with parts from a No. 2 Motor Car Constructor Outfit and a few standard Meccano parts.

The cab is constructed by bolting a $2\frac{1}{2}$″ Strip 1, the upper end of which is overlapped two holes with a 2″ Angle Girder, to each side of the chassis. The upper and lower ends of the Angle Girders are joined by 3″ Strips, the space between the latter being filled by $1\frac{1}{2}$″ Strips, leaving a gap for the window.

The roof of the cab is formed by a $2\frac{1}{2}$″ × $2\frac{1}{2}$″ Flexible Plate and a $2\frac{1}{2}$″ × $1\frac{1}{2}$″ Flexible Plate overlapped two holes and is supported from the back of the cab by Angle Brackets. The sides of the roof are extended downwards by $2\frac{1}{2}$″ Strips, and the front by a 3″ Strip. The roof is supported from the bonnet by a $1\frac{1}{2}$″ × $\frac{1}{2}$″ Double Angle Strip 5.

Meccano parts required for the model motor lorry: 4 of No. 2; 2 of No. 2a; 3 of No. 3; 4 of No. 5; 2 of No. 6a; 2 of No. 9; 2 of No. 9e; 6 of No. 12; 1 of No. 15b; 1 of No. 16b; 1 of No. 27a; 4 of No. 59; 1 of No. 63; 1 of No. 94; 1 of No. 96; 1 of No. 96a; 4 of No. 190; 2 of No. 192; 1 E6 Electric Motor.

In the model road roller illustrated in Fig. 4, a No. 1 Clockwork Motor is used to form part of the chassis. The Motor is placed in a horizontal position, with the winding spindle upwards, and to the front of it two $2\frac{1}{2}$″ × $\frac{1}{2}$″ Double Angle Strips are bolted vertically. To the upper ends of the Double Angle Strips a Flanged Sector Plate is fastened by its wide end.

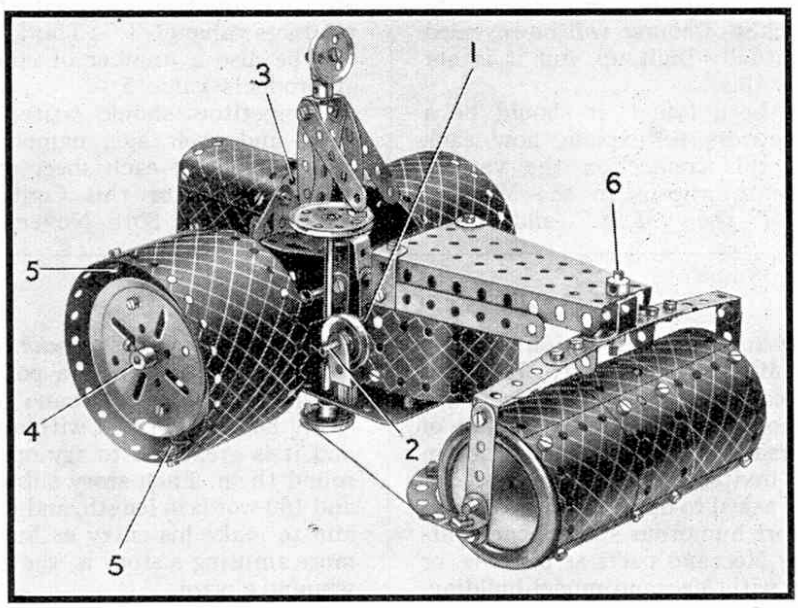

Fig. 4. An unusual and interesting working model of a road roller complete with driver.

The roller is built up from Flexible Plates of various sizes, and into each end of it is pressed a Road Wheel, through the bosses of which a $6\frac{1}{2}$″ Rod is passed to form an axle. The roller is mounted in a frame formed by joining the ends of two $2\frac{1}{2}$″ Strips by a compound $5\frac{1}{2}$″ double angle strip, which is built up by connecting two $2\frac{1}{2}$″ × $\frac{1}{2}$″ Double Angle Strips by a $2\frac{1}{2}$″ Strip. The lower ends of the two $2\frac{1}{2}$″ Strips are joined by a $5\frac{1}{2}$″ Strip and two small radius Curved Strips. A Double Bent Strip is bolted to the centre of the $6\frac{1}{2}$″ Double Angle Strip, and through the former passes the $1\frac{1}{2}$″ Rod 6 that secures the roller to the Flanged Sector Plate of the chassis.

Each of the rear wheels is constructed by bending a $12\frac{1}{2}$″ × $2\frac{1}{2}$″ Strip Plate to form a circle and then bolting together its ends. A 3″ Pulley is secured in the centre of the wheel by a $3\frac{1}{2}$″ × $\frac{1}{2}$″ Double Angle Strip 5, and the two wheels are mounted on a compound $8\frac{1}{2}$″ Rod 4 formed by fastening a 4″ and a $4\frac{1}{2}$″ Rod together by a Coupling. The rod is journalled in the ends of a $2\frac{1}{2}$″ × $\frac{1}{2}$″ Double Angle Strip fixed to the Motor by the two rear bolts securing the Motor sideplates.

A Worm on the driving shaft of the Motor meshes with a $\frac{1}{2}$″ Pinion 1 on a $3\frac{1}{2}$″ Rod 2, which is journalled in the ends of a $2\frac{1}{2}$″ × 1″ Double Angle Strip bolted to the upper Motor sideplate. A 1″ fast Pulley on the end of the Rod is connected by a Driving Band to a second 1″ Pulley on the rear axle.

A $1\frac{1}{2}$″ Pulley fitted with a Threaded Pin for a handle is used for the steering wheel. The Pulley is locked on the end of a 4″ Rod that passes through the sideplates of the Motor, and is held in position by a Collar and a 1″ Pulley. Cord tied to one end of the frame holding the roller is wound several times around the 1″ Pulley, and finally is tied to the other end of the roller frame.

The engine housing is situated at the rear of the machine, and is constructed by joining two $2\frac{1}{2}$″ × $2\frac{1}{2}$″ Flexible Plates by a $1\frac{1}{2}$″ × $\frac{1}{2}$″ Double Angle Strip. The back of the casing is a $2\frac{1}{2}$″ × $1\frac{1}{2}$″ Flanged Plate and the top a $1\frac{11}{16}$″ radius Curved Plate. A Bush Wheel 3 is fastened by an Angle Bracket inside the front arch of the Curved Plate.

Parts required to build the model road roller: 1 of No. 2; 3 of No. 3; 4 of No. 5; 2 of No. 6a; 6 of No. 12; 2 of No. 12a; 1 of No. 15; 1 of No. 15a; 2 of No. 15b; 1 of No. 16; 1 of No. 17; 1 of No. 18a; 2 of No. 19b; 1 of No. 20; 4 of No. 22; 1 of No. 24; 1 of No. 26a; 1 of No. 32; 1 of No. 35; 64 of No. 37; 9 of No. 38; 1 of No. 45; 1 of No. 46; 1 of No. 48; 8 of No. 48a; 1 of No. 48b; 1 of No. 51; 1 of No. 54a; 4 of No. 59; 2 of No. 63; 2 of No. 90; 4 of No. 90a; 1 of No. 111; 1 of No. 115; 1 of No. 126; 1 of No. 126a; 1 of No. 165; 1 of No. 186; 2 of No. 187; 2 of No. 188; 2 of No. 189; 4 of No. 190; 2 of No. 192; 2 of No. 197; 1 of No. 199; 2 of No. 200; 1 No. 1 Clockwork Motor.

Attractive New Models

Varied and Easily-Built Designs

MODEL-BUILDERS on the look-out for an interesting but simple working model that can be built with a few parts will find the aeroplane roundabout shown in Fig. 1 a pleasing subject. A $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate is used for the base, and four $5\frac{1}{2}''$ Strips are fastened to it by means of Angle Brackets. The free ends of the $5\frac{1}{2}''$ Strips are bolted to a Double Bracket by means of the Bolt 2, and a corresponding bolt on the opposite side.

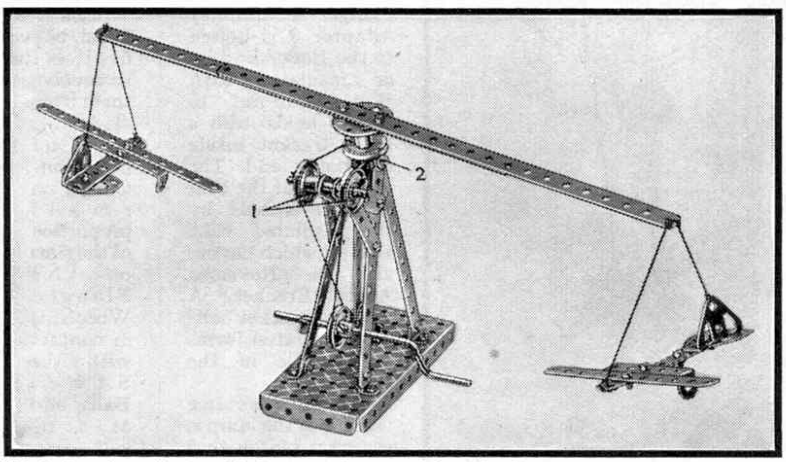

Fig. 1. A neat working model of an aeroplane roundabout that is operated by hand and requires only a few parts for its construction.

The arm holding the aeroplanes consists of two $12\frac{1}{2}''$ Strips overlapping 17 holes, and it is bolted to a Bush Wheel. A 2″ Rod that is fastened in the boss of the Bush Wheel carries also a 1″ Pulley, and the Rod is journalled in bearings formed by the Double Bracket and an Angle Bracket, which is held in place by the Bolt 2.

The construction of the aeroplanes themselves is quite simple. The wings are $5\frac{1}{2}''$ Strips, and directly behind them $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips are bolted. The tail planes are made with Flat Trunnions, and are fastened in position by the Bolts 7, which also hold the Trunnions that represent the rudders.

The model is operated by a Crank Handle journalled in two of the $5\frac{1}{2}''$ Strips. The Crank Handle carries at its centre a 1″ Pulley, which is connected by Cord to the 1″ Pulley on the shaft carrying the aeroplane beam. The Cord passes over two further 1″ Pulleys 1, and the manner in which these are supported will be clear from the illustration.

Parts required to build aeroplane roundabout: 2 of No. 1; 6 of No. 2; 2 of No. 2a; 4 of No. 5; 1 of No. 11; 5 of No. 12; 2 of No. 17; 1 of No. 19s; 4 of No. 22; 1 of No. 24; 5 of No. 35; 24 of No. 37; 2 of No. 38; 2 of No. 48a; 1 of No. 52; 2 of No. 126; 2 of No. 126a.

The fine working model heavy oil engine illustrated in Fig. 2 is commenced by building up the base. This consists of three $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates fastened together by their longer flanges. On it two $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates are mounted vertically by means of Angle Brackets, and their flanges are joined by two $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates. The E120 Electric Motor is bolted to the baseplate in the centre of the superstructure so formed. The Motor pinion meshes with a 57-teeth Gear fixed on a $1\frac{1}{2}''$ Rod journalled in the sideplate of the Motor and the left-hand $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate. The Rod carries also a $\frac{1}{2}''$ Pulley, which is later connected by a Driving Band to a $1\frac{1}{2}''$ Pulley on the crankshaft.

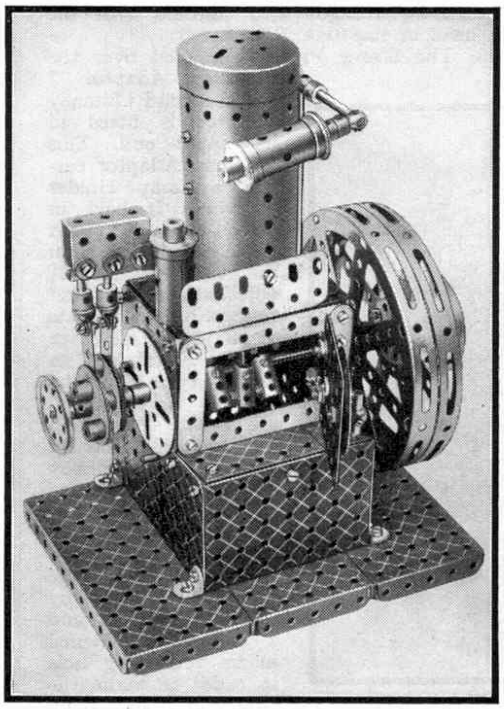

Fig. 2. This model heavy oil engine is driven by an Electric Motor concealed in the base. It is equipped with a built-up crankshaft, a working piston and oil pumping gear.

The top of the structure containing the Motor is next partially covered by two compound plates, each comprising two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates overlapped three holes at their ends. These plates are fastened by Angle Brackets in the positions shown, so that a space is left between them for the Driving Band operating the crankshaft.

Two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates are secured by $2\frac{1}{2}''$ Strips to the upper edges of the $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates, so that they protrude upwards to form the ends of the crankcase. The back of the crankcase is filled by a further $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, but the front is provided with an inspection door. This consists of a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plate, to the centre of which a 2″ Pulley is bolted, and its handle is formed by a 1″ Rod fastened in a Handrail Support.

Two Hinges and Angle Brackets fasten the door to a frame, which is built by joining the ends of two $3\frac{1}{2}''$ Strips by two $2\frac{1}{2}''$ Strips. The frame is fastened by Angle Brackets to the two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates of the crankcase, and the top of the latter is covered by two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plates, bolted in position by their flanges so that a space is left between them in which the piston can work.

The crankshaft is next built up as shown, and placed in the model. The connecting rod is a 2″ Rod locked in the Coupling forming the "big end," and to it a $4\frac{1}{2}''$ Rod is pivotally secured by a Swivel Bearing to represent the piston rod. The webs are fastened on the ends of two 4″ Rods which are journalled in the $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flat Plates of the crankcase. These bearings are reinforced by Face Plates, as shown in the illustration.

A Boiler, fastened by Angle Brackets to the top of the crankcase is used for the cylinder. The piston rod moves up and down in guides formed by the centre holes of two $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips placed inside the cylinder. These Double Angle Strips are secured to the sides of the Boiler by $\frac{1}{2}''$ Bolts, but spaced from them by Collars.

The oil pumping apparatus consists of two Triple Throw Eccentrics fastened on the end of the crankshaft. An End Bearing is bolted to the end of the arm of each Eccentric, and in its boss is locked a $1\frac{1}{2}''$ Rod. Other details of the apparatus are shown clearly in Fig. 2.

Parts required to build model oil engin :2 of No. 3; 4 of No. 5; 1 of No. 10; 19 of No. 12; 4 of No. 15a; 1 of No. 16; 1 of No. 17; 5 of No. 18a; 1 of No. 18b; 3 of No. 20b; 2 of No. 21; 1 of No. 22; 1 of No. 27a; 55 of No. 37a; 14 of No. 38; 2 of No. 48; 2 o) No. 51; 3 of No. 52; 3 of No. 53; 7 of No. 59; 3 of No. 63; 2 of No. 72; 1 of No. 103d; 2 of No. 109; 4 of No. 111a; 2 of No. 118; 2 of No. 130; 1 of No. 136; 2 of No. 136a; 1 of No. 160; 1 of No. 162; 1 of No. 162a; 2 of No. 163; 1 of No. 164; 1 of No. 165; 2 of No. 166; 1 of No. 186; 1 E120 Electric Motor.

The roadway of the simple model bridge shown in Fig. 3 is constructed by joining the ends of two compound girders, each comprising two $18\frac{1}{2}''$ Angle Girders overlapping two holes, by $4\frac{1}{2}''$ Strips. The space between the girders is filled by four $12\frac{1}{2}'' \times 2\frac{1}{2}''$ and four $9\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plates.

The top of the main pier, which is next constructed, is formed of a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, with its sides extended by a compound plate consisting of a $5\frac{1}{2}'' \times 1\frac{1}{2}''$ and a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate. At its ends are two $3\frac{1}{2}'' \times 2''$ Flanged Plates. The sides and ends of the pier are fastened together by two $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips. The bottom of the pier consists of a second $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate.

The steel work of the bridge is built up by bolting two $3\frac{1}{2}''$ Angle Girders to each end of the bridge. The upper ends of these Angle Girders are then joined by Curved Strips of various sizes to $3\frac{1}{2}''$ Strips, which are fastened to the sides of the roadway at the centre of the bridge.

The approach roadways are constructed as separate units and then fastened in position at each end. Each unit consists of two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plates bolted together, overlapping one hole along their sides. The sides of the compound plate so formed are strengthened by two $5\frac{1}{2}''$ Angle Girders, the vertical flanges of which are connected by $2\frac{1}{2}''$ and $3''$ Strips to two further $5\frac{1}{2}''$ Angle Girders. The latter Girders are bolted to the top of a small pier built up by extending the flanges of a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate downwards by $5\frac{1}{2}'' \times 1\frac{1}{2}''$ and $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates. When completed, the approach roadways are attached by Flat Brackets to the ends of the roadway of the bridge.

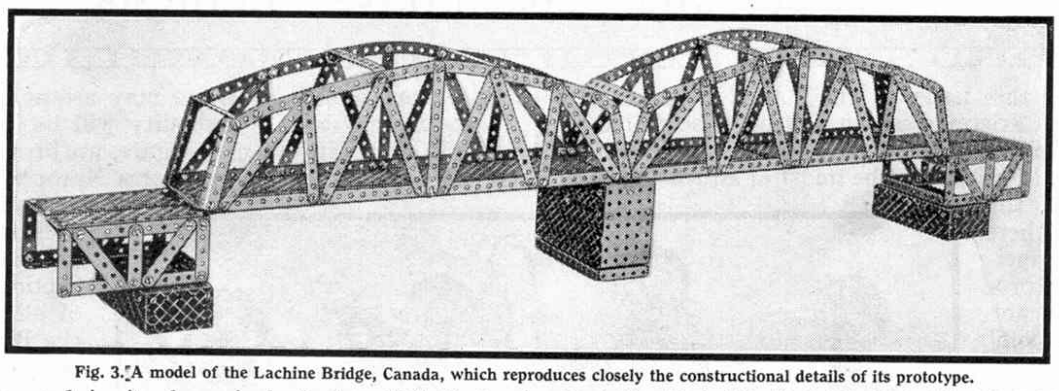

Fig. 3. A model of the Lachine Bridge, Canada, which reproduces closely the constructional details of its prototype.

To complete the bridge the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate of the bottom of the pier is removed, when the pier and the roadway can be bolted together. The method of securing the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate in position again, when the pier and roadway have been bolted together, is to fix a bolt on the lower flange of each $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate by a nut. The $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate can then be fitted on the bolts and secured by further nuts.

Parts required to build model bridge: 28 of No. 2; 10 of No. 2a; 4 of No. 3; 24 of No. 4; 12 of No. 5; 8 of No. 6a; 4 of No. 7a; 8 of No. 9; 4 of No. 9a; 4 of No. 9b; 2 of No. 48a; 8 of No. 48c; 4 of No. 52; 2 of No. 53; 4 of No. 89; 4 of No. 188; 6 of No. 189; 6 of No. 192; 4 of No. 196, 4 of No. 197.

Fig. 4 shows a model of a disc sander or wood smoothing machine, of a type sometimes used in joinery shops. If strongly constructed the model can be used for sandpapering small pieces of wood, and it also makes a handy pencil sharpener.

In making it two $3''$ Angle Girders are first bolted to a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, as shown in the illustration. The ends of the Angle Girders are joined by two $5\frac{1}{2}''$ Strips. The sanding disc consists of a $4''$ Circular Plate, to the face of which is glued a sheet of sandpaper. A Bush Wheel is bolted to the centre of the Circular Plate, and by means of this the Plate is fastened on the end of $2\frac{1}{2}''$ Rod 1. This Rod carries a $\frac{1}{2}''$ Pinion, and is journalled in a $1'' \times 1''$ Angle Bracket and a $1\frac{1}{2}''$ Flat Girder. The Bolts holding the $1'' \times 1''$ Angle Bracket also carry beneath the $5\frac{1}{2}''$ Strips, a Coupling in which is journalled a $2''$ Rod. A $\frac{1}{2}''$ Pinion 2 and a 57-teeth Gear that meshes with the Pinion on Rod 1 are locked on this Rod. The $\frac{1}{2}''$ Pinion 2 meshes with a 57-teeth Gear 4 on a $2\frac{1}{2}''$ Rod, the bearing for which is provided by another Coupling bolted underneath the $5\frac{1}{2}''$ Strips. At its outer end, this Rod carries a Coupling 3, in the longitudinal bore of which is secured a $2''$ Rod. A second Coupling fixed on the other end of the Rod forms the operating handle.

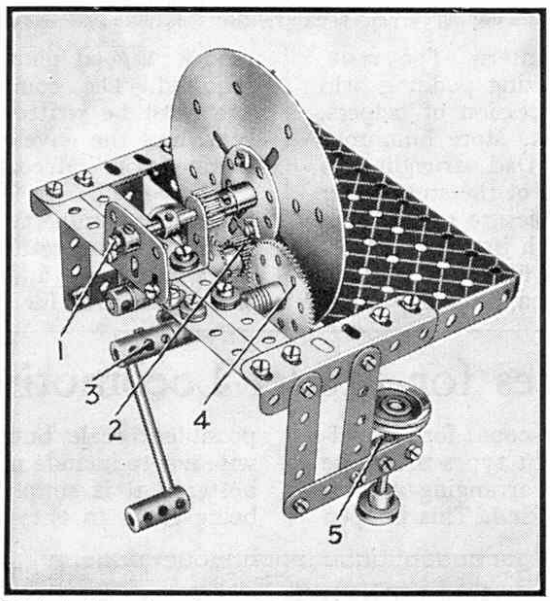

Fig. 4. A disc sandpapering machine that can be used for smoothing small pieces of wood, or for sharpening pencils.

The model is fixed to a table or work bench by two clamps, each of which consists of two $2\frac{1}{2}''$ Strips bolted to one end of the base. The lower ends of these Strips are joined by a further $2\frac{1}{2}''$ Strip, to which a Coupling 5 is bolted. A $2''$ Screwed Rod is screwed through the central tapped hole of the Coupling and on it a $1''$ Pulley and a $\frac{1}{2}''$ Pulley are locked. The $\frac{1}{2}''$ Pulley forms a grip by which the clamp is operated.

Parts required to build model disc sander: 2 of No. 2; 6 of No. 5; 2 of No. 9c; 2 of No. 12; 1 of No. 12a; 3 of No. 16a; 1 of No. 17; 2 of No. 22; 2 of No. 23a; 1 of No. 24; 2 of No. 26; 2 of No. 27a; 30 of No. 37a; 18 of No. 38; 1 of No. 52; 6 of No. 59; 6 of No. 63; 2 of No. 81; 1 of No. 103b; 1 of No. 146a.