Meccano Bucket Dredger

A Fascinating Meccano Model

A COMMON sight at great ports is the fleet of dredgers employed in keeping the docks and entrance channel navigable for shipping. Dredgers are not attractive in appearance, but their importance entitles them to more attention from Meccano model-builders than is usually given to them. The varied types of these vessels and their extensive mechanical equipment provide plenty of scope for enterprising model-builders, and miniature reproductions of suction, cutter-suction and bucket type dredgers are very interesting to construct.

The Meccano model shown in Figs. 1 and 2 is not a reproduction of any particular dredger, but it embodies all the main characteristics of a typical treble type dredger produced by the well-known crane makers, Priestman Brothers Limited, London. The hulls of these vessels are usually constructed by various Clyde dredger and hopper builders, and fitted with cranes and grabs made by the Priestman Company. The model is nearly 4 ft. in length and has a 9½ in. beam, and the three cranes with their grabs are operated automatically from a 6-volt or 20-volt Meccano Electric Motor.

The hull is commenced by building a framework of Angle Girders to form an oblong 31″×9½″. Each long side of this frame is composed of an 18½″ and a 12½″ Angle Girder joined together end to end by means of a 7½″ Angle Girder. The two complete side members are connected together by a series of 9½″ Angle Girders, and these are braced by a number of 5½″ Strips. When the frame is complete it is fitted at each side with four 12½″×2½″ Strip Plates, as shown in Fig. 2. The front ends of these Plates are forced together to form the bow of the model, and secured to ½″×½″ Angle Brackets. Two 2½″ and two 2″ Strips are bolted to this part of the hull, as illustrated, to form the stem.

The upward sweep of the forward part of the ship is reproduced by two 12½″×2½″ Strip Plates, the top forward corners of these being bolted to the 2½″ Strips of the stem. A similar arrangement will be seen at the stern. The upper curve of this part of the model consists of three 5½″×1½″ Flexible Plates bolted to two 12½″ Strips curved to the correct shape, and 12½″ Strips are also used for strengthening the topsides of the bulwarks, both at the stern and at the bow.

The deck at bow and stern is fitted to several ½″×½″ Angle Brackets secured to the inside of the hull, but amidships it is attached to Angle Girders as shown in Fig. 1. The after deck is composed of 9½″×2½″ and 12½″×2½″ Strip Plates, and two 5½″×2½″ Strip Plates which are indicated at 1 and 1A, Fig. 1. These two Plates are set at an angle in order to fill in part of the curved portion of the deck. The entire deck is edged with a number of straight and curved Strips, which serve the dual purpose of hiding unsightly corners of Strip Plates and also filling in any small gaps existing at the ends of the Plates. Beneath each side crane, 2 and 3, a 2½″×2½″ Flat Plate is fitted, to carry the upper ends of the pivot and driving shafts.

The fore deck is built similarly to the deck just described, but a 4½″×2½″ Flat Plate 4 and a 5½″×2½″ Flat Plate 5 are fitted as shown. This deck is also secured to the hull by means of ½″×½″ Angle Brackets, and Strips are used along its edge. The narrow deck along each side of the hopper is constructed from 5½″×1½″ Flexible Plates, strengthened by 1½″ Strips. Angle Girders form coamings round the hopper, and they are secured together at the corners by ½″×½″ Angle Brackets.

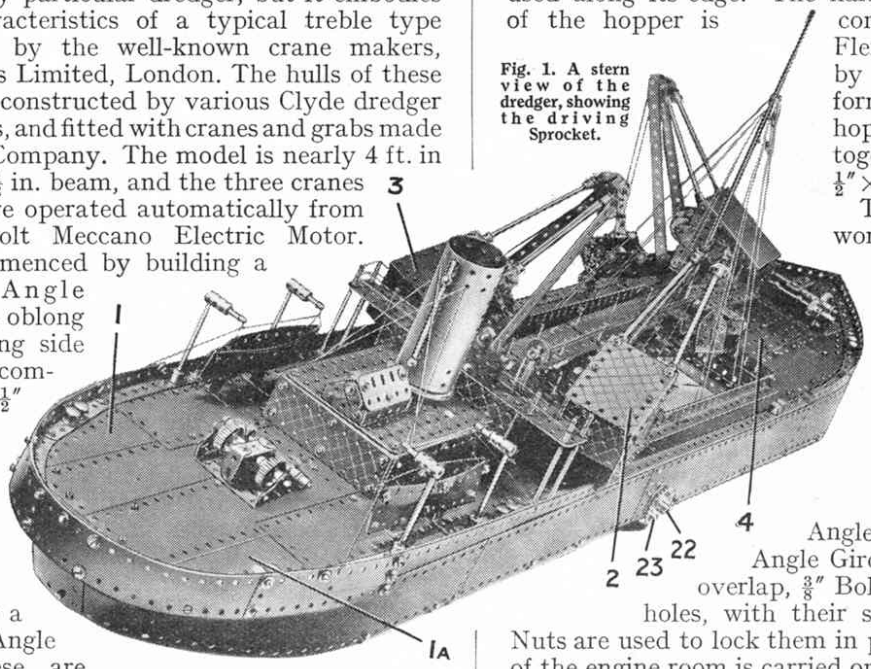

Fig. 1. A stern view of the dredger, showing the driving Sprocket.

The engine room upper works and bridge are built next. An oblong of Angle Girders, 4½″×5½″, is first laid down on the after deck and two 5½″×1½″ and two 4½″×1½″ Flexible Plates are fastened to it. These are strengthened internally with 1½″ Strips and carry at their upper edges two 5½″ Angle Girders and two 4½″ Angle Girders. Where these Girders overlap, ⅜″ Bolts are passed through the holes, with their shanks pointing upwards. Nuts are used to lock them in position, and later the top of the engine room is carried on the four shanks and held in place by nuts. This engine room top consists of two 5½″×3½″ Flat Plates fastened by nuts, and it carries the funnel and skylight.

The base of the skylight consists of two 2½″×½″ Double Angle Strips and two 1½″ Strips. They are surmounted by two 2½″ Flat Girders set at an angle, the triangular gap at each end of these being filled in by means of two Flat Brackets secured to ½″×½″ Angle Brackets. The funnel is represented by a Boiler, minus Ends, the two edges of which are overlapped two holes. The escape steam pipe is fastened to the Boiler by two Handrail Supports, the lower Support of which secures a 1″×½″ Angle Bracket to the inside of the funnel. This is in turn bolted to a 2″ Pulley that is attached to a Wheel Flange by means of two ¾″ Bolts. These Bolts pass through the Wheel Flange and into the top of the engine room, where two nuts hold them in place. The method of bracing the funnel is shown in Fig. 1.

The bridge is supported on a structure built up of two 5½″×2½″ Flat Plates and two 2½″×1½″ Flexible Plates. The structure is secured to the deck by means of 4½″ and 1½″ Angle Girders and to the bridge by means of ½″×½″

Angle Brackets. The bridge consists of one $5\frac{1}{2}'' \times 2\frac{1}{2}''$ and two $3'' \times 1\frac{1}{2}''$ Flat Plates, round the edges of which are arranged a series of 1" Threaded Rods. The Rods support lengths of copper wire, which represent handrails. The two end pairs of supports for the handrails are $4\frac{1}{2}''$ Threaded Rods and these pass through the deck.

The arched structure across the hopper consists of two side members joined together by Double Brackets. Each side member is built up from a $5\frac{1}{2}''$ Curved Strip, to the ends of which are bolted $5\frac{1}{2}''$ Strips overlapping two holes. The centre of the $5\frac{1}{2}''$ Curved Strip carries a Flat Trunnion that is attached to the side of the hopper by two 3" Strips, held in place by $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets. The purpose of the arch is to support four $\frac{1}{2}''$ Pulleys, over each of which passes a length of chain. This chain can be purchased, in nickel or black finish, from this office price 3d. per yard. One end of each chain is secured to a Girder in the bottom of the model, and the other end is linked up by a length of cord to a windlass. Part of one of these windlasses is shown at 7, Fig. 3. In actual practice each chain is connected at its lower end to a big flap in the bottom of the boat, that is let down when a cargo of silt is being discharged.

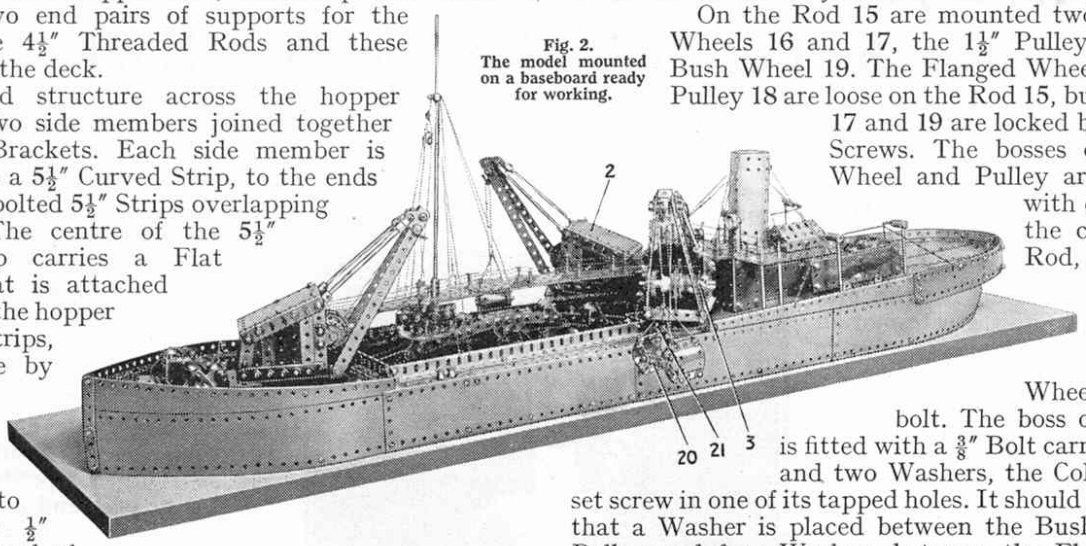

Fig. 2. The model mounted on a baseboard ready for working.

The forward crane is shown in Fig. 3, and a description of this will serve for cranes 2 and 3, which are identical with it in every respect. A $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, fitted at each side with a $3\frac{1}{2}''$ Angle Girder, forms the crane platform. Each Angle Girder carries two 3", two $2\frac{1}{2}''$ and three 2" Strips and they pass behind a second $3\frac{1}{2}''$ Angle Girder at their upper ends. Where possible the Strips are bolted to this $3\frac{1}{2}''$ Girder. The back of the crane consists of a $1\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate 8. The roof is a $3\frac{1}{2}'' \times 2\frac{1}{2}''$ Strip Plate, but this is not fitted until the operating mechanism for the grab has been installed.

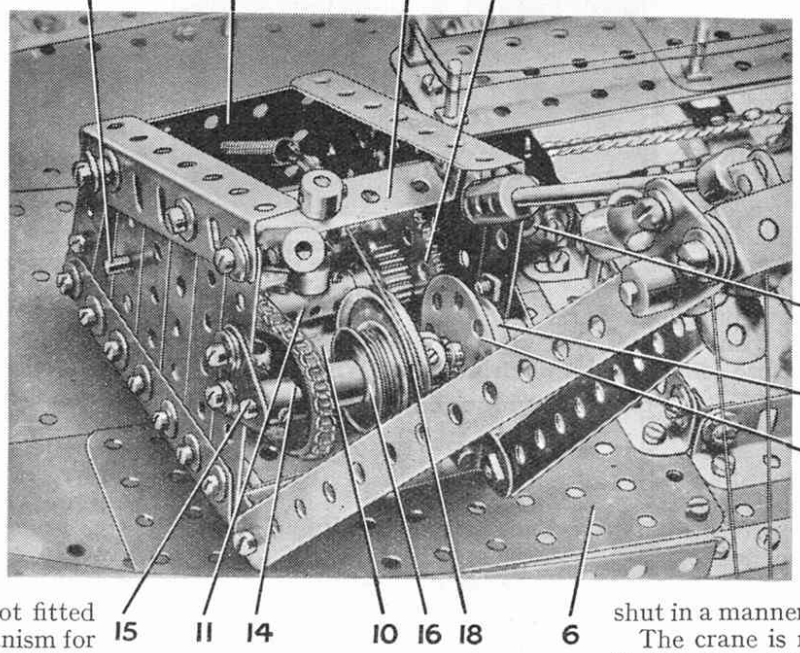

Fig. 3. A sectional view of one of the cranes in which the roof has been removed.

A 5" Rod is passed through a hole in the base plate, $1\frac{1}{2}''$ from the front edge, and it is journalled at its upper end in the $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip 9. A $1\frac{1}{2}''$ Contrate 10, a Coupling 11 and a Collar are mounted on the 5" Rod, the Coupling being spaced away from the Contrate by three Washers. One end of the Coupling accommodates the inner end of a $1\frac{1}{2}''$ Rod that carries a $\frac{1}{2}''$ Pinion, meshing with the Contrate 10 and the 57-teeth Gear 12. The Gear 12 is in engagement with a second $\frac{1}{2}''$ Pinion on the Rod 13, the other end of which is fitted with a $1\frac{1}{2}''$ Sprocket Wheel. A length of Sprocket Chain couples up this Wheel with a 1" Sprocket 14 that is locked on a Rod 15 journalled in 1" Triangular Plates.

On the Rod 15 are mounted two $\frac{3}{4}''$ Flanged Wheels 16 and 17, the $1\frac{1}{2}''$ Pulley 18 and the Bush Wheel 19. The Flanged Wheel 16 and $1\frac{1}{2}''$ Pulley 18 are loose on the Rod 15, but the Wheels 17 and 19 are locked by their Grub Screws. The bosses of the Bush Wheel and Pulley are in contact with each other in the centre of the Rod, and one of the tapped holes in the boss of the Bush Wheel carries a bolt. The boss of the Pulley is fitted with a $\frac{3}{8}''$ Bolt carrying a Collar and two Washers, the Collar having a set screw in one of its tapped holes. It should be noted here that a Washer is placed between the Bush Wheel and Pulley and four Washers between the Flanged Wheel 16 and Sprocket 14.

The Pivot Rod of the crane, already mentioned, is now passed through one of the holes in the deck of the dredger, and the lower end is locked in the boss of a Double Arm Crank. This Crank is bolted to one of the transverse $9\frac{1}{2}''$ Girders of the hull. As the crane is rotated by hand, the Contrate 10 remains stationary and the Gears rotate. The mechanism is completed by fitting a very delicate band brake to the $1\frac{1}{2}''$ Pulley 18 as shown.

The grab is connected to the hoisting barrel in the following way. A cord from the Flanged Wheel 17 is attached to the centre Rod of the grab, as shown at 20 in Fig. 2. A second cord from the Wheel 16 is attached by four short cords to the upper corners of the grab and secured in place underneath Washers. When the cords are correctly adjusted for length and the crane is turned, the grab will not only be raised and lowered but also opened and shut in a manner suggesting real dredging.

The crane is rotated from a $\frac{3}{4}''$ Pinion 21, Fig. 2, and the vertical shafts carrying the two Pinions for cranes 2 and 3 are connected together by a horizontal shaft and $1\frac{1}{2}''$ and $\frac{1}{2}''$ Bevels. A horizontal shaft is also connected to the vertical driving rod of the forward crane. Lengths of Sprocket Chain connect the two horizontal shafts to the Rod 22 carrying the driving Sprocket 23 for the model. This Sprocket is connected by Sprocket Chain, through a slip clutch, to a reversing gear similar to S.M. No. 63, and this in turn is linked up with a 6-volt or 20-volt Meccano Motor.