A super model rebuilt part 2

The Construction of the Jib

THE main constructional features of the jib may be seen fairly clearly by a careful study of Fig. 2. The two lower longitudinal side members each consist of one 24½ in. and one 12½ in. Angle Girder overlapped ten holes, whilst each of the upper longitudinal members is composed of one 24½ in. and one 7½ in. Angle Girder overlapped four holes. The bottom end of the jib is extended at an angle to the main portion by 12½ in. Angle Girders, the ends of which are connected together by 4½ in. by 2½ in. Flat Plates. Where the 24½ in. and 12½ in. Angle Girders, join at X and Y (Fig. 1), Fishplates are used to connect them together.

The upper extremity of the jib is extended by 7½ in. Angle Girders that are bolted to the end holes of the side members, and a 7½ in. Strip is placed over the slotted holes of each Girder in order to give a neat appearance. Bracing should now be added to the sides as shown, care being taken to ensure that the various Strips are disposed exactly as indicated in the illustration.

The completed sides are now joined together. This is effected at the bottom end by Girders, each of which is 10 in. long (one 5½ in. and one 7½ in. Angle Girder overlapped six holes), and is bolted to the top and bottom sides of the jib, 2 in. in front of the Jib Pivot Pin 14a.

The extremities of the two upper longitudinal members of the jib are connected by a 3½ in. Angle Girder and those of the lower members are joined by a 3 in. Angle Girder. Having in this manner determined the taper of the jib, it is a simple matter to bolt into place intermediate cross-members of the correct length and then to add the bracing. The latter is triangulated, which makes the jib very strong, and yet permits of light construction.

The jib head has two distinct sets of Pulleys. One set is at the extreme end of the jib and consists of a 1½ in. Pulley secured to a Rod that has a 1 in. fast Pulley mounted loosely on each extremity. The other set comprises three pairs of Pulleys on a common Rod. The centre pair comprises two 1 in. loose Pulleys, on each side of which are placed Flat Trunnions to act as guards for the hoisting rope, and each of the two remaining sets consists of a 1 in. fast and a 1 in. loose Pulley. The respective groups are spaced on the Rod by Collars and Washers, and the bosses of the fast Pulleys serve to keep the Pulleys away from the supporting frame, so that they all may run freely.

Construction of the Gear-box

The Gearbox (Figs. 5 and 6) enables the four movements of hoisting, slewing, travelling and luffing to be driven from the 6 volt Meccano Electric Motor (a Power Drive Unit is fitted in today's model) merely by the operation of two levers. A point worthy of note is the fact that it forms a self-contained unit that is readily fitted into the model.

The 5½ in. Angle Girders 18, 18a, are butt-jointed together so that their vertical flanges point in opposite directions, the left-hand pair being bolted to a 5½ in. by 2½ in. Flanged Plate, whilst the right-hand pair are connected together by means of a 2 in. Strip. The Girders 18a also are secured at right-angles to, and two holes from each end of a 9½ in. Angle Girder that will eventually be secured to the ends of the Girders 11 (see Fig. 4). Cross Girders 40, each 7½ in. long, are bolted across the Girders 18, 18a to carry the Centre Plate 19 and the right-hand plate of the gearbox, and a 5½ in. Angle Girder 20. The Centre Plate 19 is a 5½ in. by 2½ in. Flat Plate and it is secured to the Cross Girders by a 5½ in. Angle Girder.

Having now completed the constructional part of the gearbox, we now turn our attention to the gearing. The Mainshaft 21, which is driven by the Motor, has secured to it a 1½ in. Contrate driven by a ½ in. Pinion on the Motor Shaft. On each side of the Mainshaft are two sliding Layshafts 22 and 23, each of which carries a ¾ in. Pinion and a 57-teeth Gear, the latter being in constant mesh with the ½ in. wide Pinion on the Mainshaft.

The Layshaft 22 is moved in its bearings by the Crank 36, which is secured on an 8 in. Rod that carries the Lever 37. The Layshaft 23 is actuated in a similar manner by the Lever 39 through the medium of the Crank 38. Both Cranks carry bolts, the shanks of which locate between Collars spaced a short distance apart on the Rods.

By sliding the Layshaft 23 to the right the ¾ in. Pinion is brought into engagement with a 50-teeth Gear 26. This Gear is secured to a Rod carrying a ¾ in. Contrate that is in mesh with a Pinion on a Rod 41. The latter is journalled in a Flat Trunnion that is bolted to the front top edge of the Gearbox and also in one of the 5½ in. by 3½ in. Flat Plates forming the front of the cabin. It has secured to it a ½ in. Bevel, and this meshes with a 1½ in. Bevel on a short vertical Rod on the lower extremity of which is fixed a 1 in. Sprocket Wheel 35.

A reinforced bearing is provided for the Rod carrying the Bevel and the 1 in. Sprocket Wheel 35 by bolting a 7½ in. Girder across the Girders 18a beneath the floor plates. The Rod also passes through the end hole of a Strip that is bolted to the upper portion of the roller race.

On moving the Layshaft 23 to the left the ¾ in. Pinion is brought into mesh with a 50-teeth Gear 27 on the Hoisting Barrel Shaft. The Hoisting Barrel 31 consists of a Sleeve Piece, one end of which is passed over a ½ in. fast Pulley secured against the face of the 50-teeth Gear, and it is held firmly in place by means of a ¾ in. Flanged Wheel that is pushed on to its other end.

The Hoisting Barrel is fitted with an automatic servo brake that allows the load to be hoisted with perfect freedom, but applies the brake when the barrel tends to unwind. An unequal-armed Crank, composed of a 2 in. Strip bolted to a Double Arm Crank, is fitted on the end of a Rod that is journalled in the Gearbox Sideplate and in the 5½ in. Angle Girder 20. The Rod may be operated by the Lever 33 that is secured to it by a Coupling; by raising the Lever the brake is released. A short length of Cord is passed round the Brake Drum 32 and its ends tied to the shanks of bolts on the extremities of the Crank. The automatic servo effect is accounted for by the fact that the points of attachment of the brake band to the Crank are at different distances from the fulcrum.

A 50-teeth Gear 25 is secured to a Rod that also carries a ½ in. Pinion. The latter will mesh eventually (when the Gearbox is mounted in place) with a 1½ in. Contrate on the upper end of the Rod 9 (see Fig. 4). In this manner the drive will be transmitted from the Gearbox to the wheels.

The last movement to be considered is that of luffing the jib. The two luffing cranks, each obtained from a Crank overlayed by a 2 in. Strip, are secured on the extremities of an 11½ in. Rod 29, which has fixed to it a ¾ in. Contrate that meshes with a ½ in. Pinion 28 on a short vertical Rod. The latter has a further ½ in. Pinion that meshes with a Worm on the Rod carrying the 50-teeth Gear 24. The Rod with the Pinion 28 is journalled at its bottom end in a Strip and at its upper end in a Corner Bracket that is attached to the Flanged Plate by a 1½ in. Angle Girder. One of the bolts that serve to secure the 1½ in. Angle Girder to the Plate is also passed through a 2½ in. Angle Girder, which is bolted vertically to the Plate for strengthening purposes.

Finally, the Power Drive Unit is secured to the 7½ in. Angle Girder 40 bolted between Girders 18a by ⅜ in. Bolts and to the 5½ in. by 2½ in. Flat Plates 34, bolted in positions shown to form the floor of the Gearbox, by ordinary Bolts.

Final Assembly of the Model

We now come to the most interesting stage of the construction, that of fitting together the various units to form the complete model. The Gearbox unit should be first fixed into position on the Girders 11 and 12 between the Girders 13, securing it at points a, b and c, shown in Fig. 4. It will be necessary to remove the Rod temporarily before sliding the Gearbox into place, with the control levers to the front.

A 'spider' for the roller race is now obtained from a 7½ in. Circular Strip, to which eight 2½ in. by ½ in. Double Angle Strips are bolted at 45 degrees to each other. Journalled in the lugs of each Double Angle Strip is a 3½ in. Rod, carrying a Collar on its inside end and a ¾ in. Flanged Wheel on its outside end. The 'spider' is placed on the lower Flanged Ring of the roller race, then the superstructure is lowered on to it so that the upper Flanged Ring of the roller race coincides with the Flanged Wheels of the 'spider'. The 5 in. Rod passes freely through the 9½ in. Strips bolted to the Flanged rings and also through a 1 in. Corner Bracket 42 attached to a 5½ in. Angle Girder that is bolted to a 5½ in. by 2½ in. Flat Plate in the centre of the Gearbox. Mounted on the upper end of the Rod is a 1½ in. Contrate Wheel that meshes with the ½ in. Pinion on the shaft carrying the Gear 25. The upper Race should bed down quite evenly on the ¾ in. Flanged Wheels and the complete superstructure should turn at a touch.

The jib is mounted pivotally on the front of the tower by passing the 11½ in. Rod 14a through the Flat Trunnions 14 and through the bosses of Cranks that are secured to the side of the jib. It is now necessary to add weights at Z in the shape of pieces of scrap lead melted into blocks of the required shape, or large quantities of Meccano parts, until the jib is accurately balanced. The connecting Strips 30a may then be attached pivotally by lock-nutted bolts to the luffing cranks 30, while a 12½ in. Strip 43 is bolted to the top of the Angle Girders 44 in the third hole from the end.

The hoisting cord is attached to the hoisting barrel 31, and is led over one of the pulleys 16 at the superstructure head, passing through a guide pulley on its way. The guide pulley consists of a 1 in. loose Pulley running between two Bush Wheels mounted on an 8 in. Rod that is secured by Handrail Supports to the tower. From Pulley 16, the cord passes over one of the centre pair of Pulleys at the jib head, back over the remaining Pulley 16 and then to the other centre Pulley on the jib head, after which it runs over the 1½ in. Pulley at the extremity of the jib and so down to the load hook or grab, to which it is secured.

The Single Suspension Grab

Although the model may be used as an ordinary crane by fastening a Loaded Hook to the end of the hoisting cord, its interest is vastly increased by the addition of a grab.

The grab employed on the model is known as the single suspension type, and is opened and closed merely by manipulation of the hauling rope, instead of depending for its operation, as is quite usual, upon two distinct falls of rope wound on separate barrels.

Fig. 7 is a general view of the