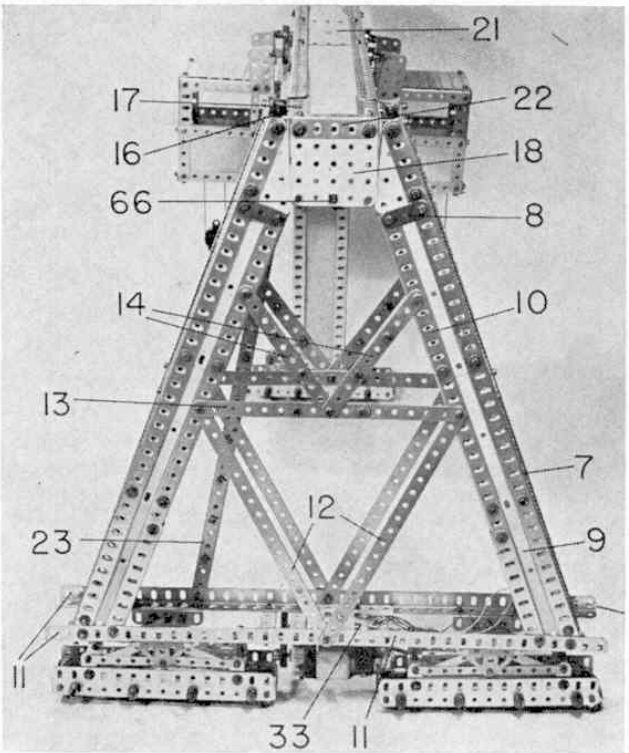


SHIPYARD CRANE

AN ADVANCED MECCANO MODEL DESCRIBED BY 'SPANNER'

An end view of the triangular gantry leg showing its strong girder construction with strip cross-bracing.

SHIP-BUILDING, as an industry, is something which has played a vital role in the greatness of Britain for many centuries. Our very position as a world-trading nation has been achieved to a large extent by the thousands of ships of every shape and size turned out by the shipyards of this country over the years and it is to be hoped that these shipyards continue with the important work they do.

To the Meccano modeller, however, a shipyard is of interest not so much for its importance to the nation, as for the ship-building equipment to be found in it. The average yard is packed with all sorts of fascinating machinery and it is a typical piece of such equipment that has provided the inspiration for the new Meccano model, featured here. A glance at the photographs will show it to be a Shipyard Gantry Crane, based on one of the giants which are used to lift completed ship superstructures into position. Its design is unique in that the two gantry legs are entirely different in shape, one being a vertical single-column affair while the other is a braced triangular shape. Ground, trolley traverse and load hoist movements are all included to increase the model's authenticity.

Main Superstructure

Dealing first with the single-column gantry leg in the main superstructure, this consists of a large, square box girder, built up from four 18½ in. Angle Girders 1 connected at their lower ends by two 2½ in. Strips 2 and two 2½ in. Angle Girders 3. Three sides of the girder are each enclosed by two 9½ × 2½ in. Strip Plates 4, overlapped one hole, while the fourth side is enclosed by one 9½ × 2½ in. and one 7½ × 2½ in. Strip Plate 5, also overlapped one hole. At the upper end of Plate 5 nearby Girders 1 are connected by a 2½ in. Strip, while each pair of side Girders 1 are connected through their first and fifth holes by two 3½ in. Angle Girders 6, the ends of these Girders projecting two holes inwards.

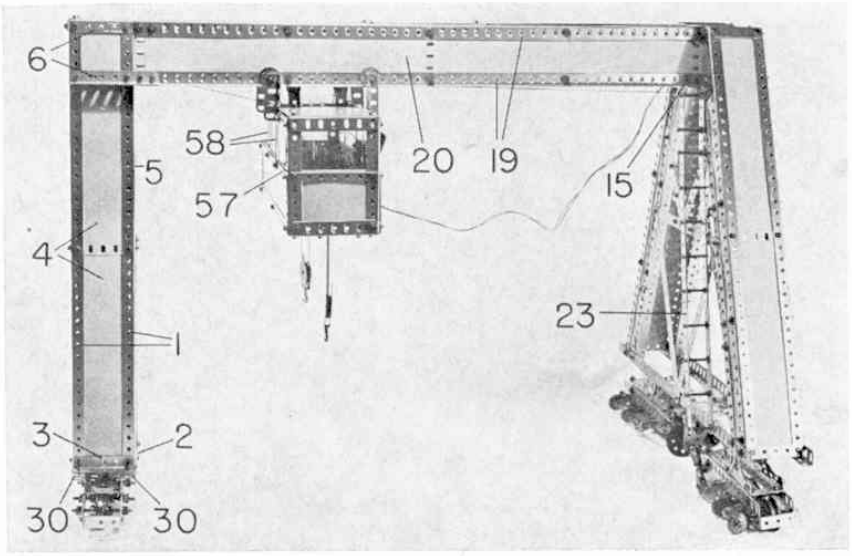
Turning to the other and more complicated gantry leg, two rectangular Girder arrangements are each produced from two 18½ in. Angle Girders 7, connected at top and bottom by a 2½ in. Strip and, along their whole length, by two 9½ × 2½ in. Strip Plates overlapped one hole. Attached to each Girder 7 by a 1½ in. Strip 8, secured through the sixth hole of the Girder, and by three 5½ × ½ in. Flexible Plates 9, is a 15½ in. compound angle girder 10, built up from one 12½ in. and one 4½ in. Girder.

When completed, the two rectangular arrangements are angled inwards, as shown, and are connected together by two 18½ in. Angle Girders 11, bolted to the lower ends of Girders 7 and 10, the ends of Girders 11 projecting two holes beyond Girders 7. Cross-bracing is supplied by a series of Strips and compound strips—two 9½ in. Strips 12 bolted between each Girder 11 and nearby compound girders 7, the upper securing bolts also fixing an 8½ in. compound strip 13 in place, this strip in turn being further attached to Girders 7 by two 5 in. compound strips 14.

Fixed by Angle Brackets to the upper ends of each pair of compound girders 10 is 3½ in. Angle Girder 15, to which a 2½ × 2½ in. Flat Plate 16 is Bolted. The upper corners of this Plate are further connected by Angle Brackets to the upper ends of Girders 7, the securing Bolts also fixing a 3½ in. Angle Girder 17 in position, then another 2½ × 2½ in. Flat Plate 18 is secured to the end of the Plates by Angle Brackets as shown. The lower edge of this Plate is also attached to Plates 16 at each side by a 2½ × ½ in. Double Angle Strip.

The main gantry cross-girder consists simply of four 24½ in. Angle Girders 19 bolted between Girders 6, 15 and 17, the ends of the Girders overlapping the two holes in each case. The sides of the resulting framework are each enclosed by two 12½ × 12½ in. Strip Plates 20, at the same time fixing three 2½ × ½ in. Double Angle Strips in strategic positions between lower Girders 19 for strengthening purposes. The top of

Advanced Meccano modellers may like to build this Shipyard Crane, with working movements powered by two Motors with Gearbox. The Part identified by "5" is on the inside of the gantry leg, out of view in the photograph.



the framework is enclosed by two further 12½ × 2½ in. Strip Plates, connected by a 5½ × 2½ in. Flexible Plate 21, the end securing Bolts also fixing two 2½ in. Angle Girders 22, one between the ends of upper Girders 6 and the other between the ends of Girders 17. Flat Plate 18 is also secured to latter Girder 22.

A gantry access ladder 23, secured to inside Angle Girder 11 and the upper end of compound girder 10, is built up from two 15 in. compound strips connected by eleven 1⅛ in. Bolts and Nuts, the Bolts of course serving as the rungs of the ladder. Each compound strip consists of two 9½ in. Strips overlapped eight holes.

Bogies

Ground movement of the Crane is achieved on three bogies, two on the triangular leg and one on the single-column leg. All three are basically similar in design, except that the two on the triangular leg are motor-powered while the other is free-running. In each case, the frame is supplied by two 7½ in. Flat Girders 23, slotted holes uppermost, joined at each end by a 1½ × ½ in. Double Angle Strip 24. A 5½ in. Angle Girder 25 is bolted to each Flat Girder, the ends of these Angle Girders in turn being joined by further 1½ × ½ in. Double Angle Strips 26, lugs pointing upwards.

Journalled in the circular holes of Flat Girders 23 are four 2½ in. Rods, each carrying a double-flanged wheel 27, built up from a 1⅛ in. Flanged Wheel and an 8-hole Bush Wheel. In the free-running bogey, all the Rods are held in place by Collars, but in each of the driven bogies, a ⅞ in. Bevel Gear 28 is mounted on the inside end of each of the two end Rods. Before fitting the inner Bevel, however, a 2½ × 1 in. Double Angle Strip 29 is bolted to inside Flat Girder 23 in the position shown.

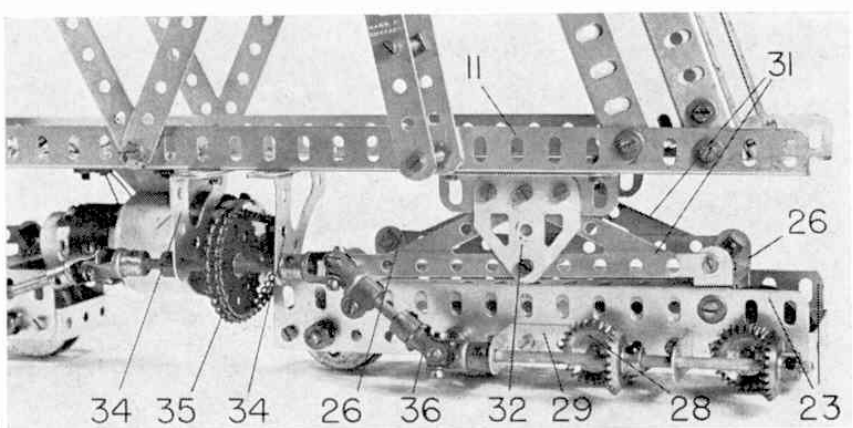
When mounting the single bogey in place under the Crane, two 5½ in. Angle Girders 30 are bolted to the lugs of Double Angle Strips 26 these Girders then being bolted to Girders 3 in the Gantry leg. In the case of each driven bogey, however, two Girder Frames 31 are bolted to the lugs of Double Angle Strips 26, a Flat Trunnion 32, apex downwards, being bolted, in turn, to each of these Frames, then the Frames and Trunnions are tightly fixed to two 2½ in. Angle Girders bolted to Angle Girders 11.

Now bolted across Girders 11, between the two bogies, are a 2½ × 2½ in. Flat Plate 33 and two 3 in. Strips, one hole separating them, one right-hand and one left-hand Flanged Bracket 34 being bolted to these Strips. A 3–12 volt Motor with Gearbox, set in the 12 : 1 ratio, is secured to the underside of the Flat Plate, while journalled in the lowest holes of the Flanged Brackets is a 3 in. Rod, on which a 1½ in. Sprocket Wheel 35 is fixed. This Sprocket is connected by Chain to a ¾ in. Sprocket fixed on the Motor output shaft.

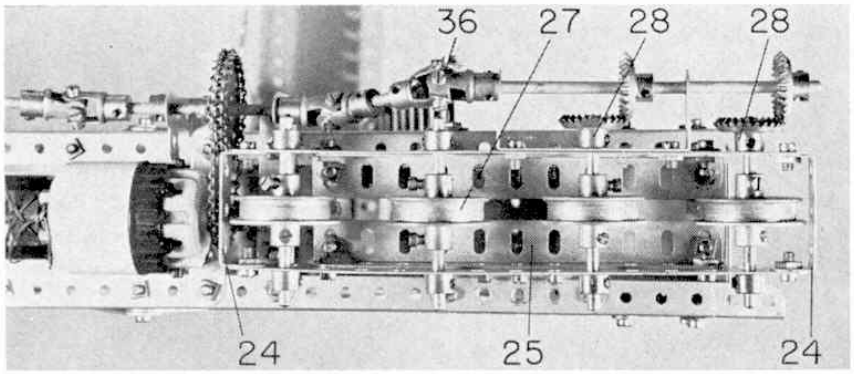
Mounted on each end of the 3 in. Rod is a Universal Coupling, in the other half of which either a 3in. or a 1 in. Rod is held, depending on the end in question. Another Universal Coupling 36 is fixed on the end of the relevant Rod, the other half being fixed on a 4½ in. Rod, journalled in the lugs of nearby Double Angle Strip 29. Mounted on this Rod are two ⅞ in. Bevel Gears which mesh with Bevel Gears 28.

Cab and Winches

In common with most shipyard Cranes, the gantry trolley of the model also serves as the operator's cabin and winch house. Before building the cabin, however, it is best to first complete the hoist equipment, using two 5½ × 3½ in. Flat Plates 37, overlapped five holes, as a baseplate. Secured by 1½ in. Angle Girders to this baseplate, in the positions shown, are two 3 × 2½ in. Flat Plates 38 in which is mounted a 3½ in. Rod, held in place by Collars and carrying a ½ × ½ in. Pinion 39 between the Plates and a 50-teeth Gear Wheel 40 outside the Plates on one end of the Rod. This Gear Wheel meshes with a ¾ in. Pinion



A close-up view showing the drive to one of the powered bogies.



In this underside view of one of the powered bogies, the layout of the flanged wheels is clearly shown.

on the output shaft of another 3–12 volt D.C. Motor with Gearbox (also set in the 12 : 1 ratio) bolted to the baseplate, as shown.

Also journalled in Flat Plates 38, two holes above the 3½ in. Rod, is a sliding layshaft supplied by another 3½ in. Rod, this one carrying a 57-teeth Gear 41, an 8-hole Bush Wheel and a ½ in. Pulley with boss 42, a Collar on one end of the Rod acting as a stop. Movement of the Rod is controlled by a 3½ in. Strip 43, lock-nutted to a 1 × ½ in. Angle Bracket bolted to one Plate 37. A Threaded Pin fixed in the third hole from the top of the Strip locates between Gear Wheel 41 and the Bush Wheel. Movement of the Rod should be limited to ensure that the Gear Wheel remains in constant mesh with Pinion 39.

Another sliding layshaft is journalled in Flat Plates 38, on a line with the first 3½ in. Rod. In this case a 4 in. Rod is used, this carrying two ½ in. Pinions 44 and 45 between the Plates. Movement of the Rod is controlled by a 2½ in. Strip 46, lock-nutted through its centre hole to a Corner Angle Bracket bolted to one of the Plates. The end hole of the Strip locates on a Threaded Pin 47, fixed in the bore of a Collar 47, loose on the Rod, but held in place by two further Collars, one at each side.

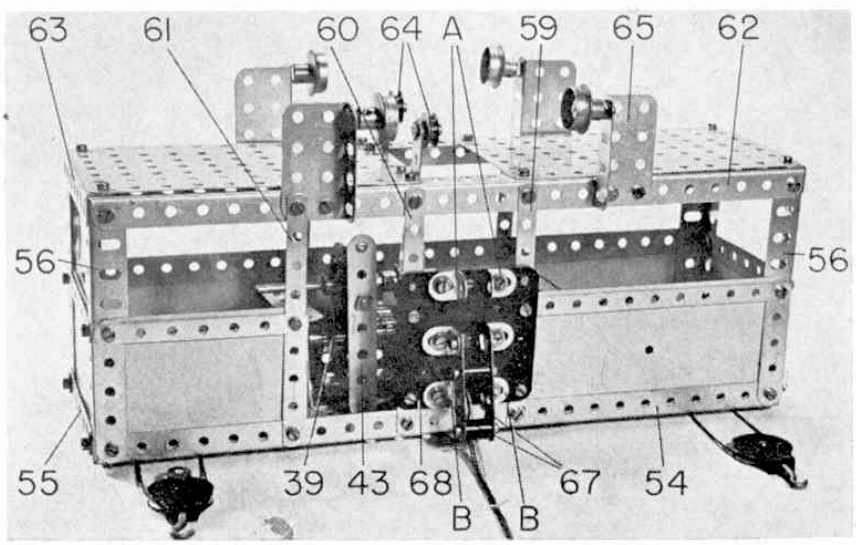
Depending on the position of the Rod, Pinions 44 and 45 mesh with two further Pinions, one on a 4½ in. Rod 48 and the other on a 6½ in. Rod 49. In each case, the Rod is journalled in one Flat Plate 38 and in an Angle Bracket bolted to a 1½ × 1½ in. Flat Plate which is bolted in turn to a 2½ in. Angle Girder 50 fixed to the end of appropriate Plate 37. Note that the Pinion meshing with Pinion 44 is spaced by four Washers from its Flat Plate.

Mounted in the 1½ × 1½ in. Plate and in a Trunnion bolted to a 3 in. Strip 51, secured to Plate 37, is a 3 in. Rod, held in place by a ½ in. Pinion and a Collar. The Pinion meshes with a Worm Gear 52 on Rod 48 or 49, as the case may be. Two 8-hole Bush Wheels 53 are mounted on the 3 in. Rod to serve as one or other of the two hoisting winches. Meccano Cord acts as the winch cable, this being tied to nearby Flat Plate 37 and passed round a Single Pulley Block before being wound round the winch drum.

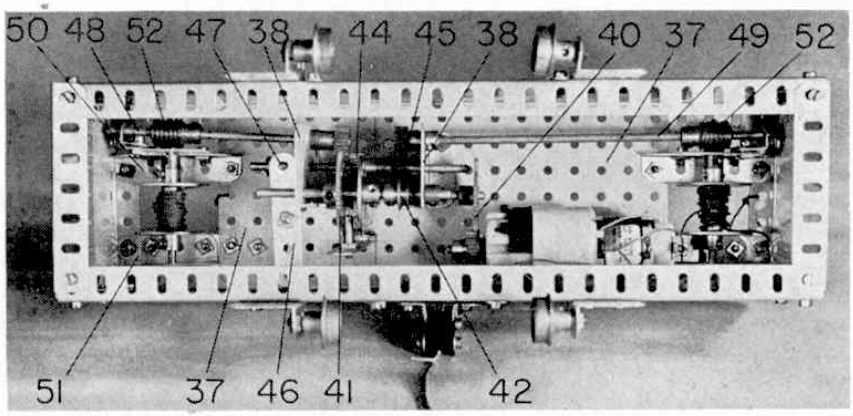
The cabin itself can now be built round the hoisting mechanism, using Flat Plates 37 as the major part of the floor. The Plates are edged by two 12½ in. Angle Girders 54, the ends of which are connected by two 3½ in. Angle Girders 55. Strips 51 and the Angle Girders carrying Plates 50 are also bolted to Girders 55, then corner posts are provided by 4½ in. Angle Girders 56, at the same time fixing the side plates of the cabin in position. One of the long sides is enclosed by a 12½ × 2½ in. Strip Plate, edged along the top by a 12½ in. compound narrow strip 57, built up from three 4½ in. Narrow Strips, and down the sides by two 2½ in. Strips. The securing Bolts also hold three 4½ × 2½ in. Transparent Plastic Plates in position to serve as windows, with window frames being supplied by two 2½ in. Narrow Strips 58, bolted to compound strip 57. The two short sides are each enclosed by a 3½ × 2½ in. Flexible Plate, edged by a 3½ in. Narrow Strip and with a window supplied by a 3½ × 2½ in. Transparent Plastic Plate.

The remaining side is a little more complicated, incorporating the doorway and the winch motor switch. Three 4½ in. Narrow Strips 59, 60 and 61 are fixed to Girder 54 in the positions shown. Bolted between Strip 59 and nearby Angle Girder 56 is a 5½ × 2½ in. Flexible Plate edged along the top by a 5½ in. Narrow Strip, while, bolted between Strip 61 and its Girder 56 is a 3½ × 2½ in. Flexible Plate edged by a 3½ in. Narrow Strip. Both Plates are edged down the outside end by a 2½ in. Strip, but note that no windows are fitted so as to allow access to the winch control levers. The upper ends of Girders 56 are connected by two 12½ in. Angle Girders 62 and two 3½ in. Angle Girders 63, as shown.

The cabin roof is supplied by two 5½ × 3½ in. Flat Plates bolted to Girders 62 and 63 with a space of three holes separating them. Two 1 × ½ in. Angle Brackets are fixed by their short lugs to one of the Plates, a ½ in. Pulley without boss 64 being mounted free on a ⅜ in. Bolt held by Nuts in the end hole in the long lug of each of these Brackets. Four Girder Brackets 65 are then



A general view of the travelling operator's cabin and winch house. Note the built-up switch controlling both motors.



A top view of the operator's cabin with the roof removed to show the winches.

bolted, two to each Angle Girder 62, a $\frac{3}{4}$ in. Flanged Wheel being mounted on a Pivot Bolt fixed to each of these. The completed cabin is of course slung beneath the main cross-member of the Gantry, the flanged Wheels running on the spare flanges of lower Girders 19. The traverse drive system is provided by a length of cord which is tied to the Strip at the upper end of Plate 5, taken over first Pulley 64, then brought down and passed a *full* turn around Pulley 42. From there, it is taken up and over second Pulley 64 to be finally tied to a Tension Spring fixed by bolt 66 to the Double Angle Strip joining Plates 16 and 18.

Switch and Wiring

Start/Stop control for both the Motors used in the model is from a single built-up switch bolted to Narrow Strips 59 and 60 in the cabin. Two 2 in. Strips 67, connected by two Insulating Spacers, are lock-nutted to two Angle Brackets bolted to a $2\frac{1}{2} \times 2\frac{1}{2}$ in. Insulating Flat Plate 68. Four more Angle Brackets in two pairs (A and B), are also bolted to the Plate to serve as switch contacts, one pair above the first Brackets and the other pair below them.

On the reverse side of the Plate, one Bracket in pair A is wired to the diagonally opposite Bracket in pair B, the other Brackets in each pair also being wired together. The cabin Motor leads are connected to the Brackets in pair A while the bogey Motor leads are connected to the central Brackets carrying Strips 67. The leads from the power source are finally connected to the Brackets in pair B. Note, however, that both the power source and bogey Motor leads are neatly grouped together, using cord or sticky tape, to form a neat, four-strand cable which trails behind the cabin as it moves on the gantry. This "trailing cable" system is by no means unusual in full-size cranes.

AIR NEWS (*Continued from page* 559)

The Pucara, an efficient-looking design from Argentina for counter-insurgency and similar operations.

on the time spent in getting from city centre to airport at one end, through Customs, on to the aircraft and then repeated the process in reverse at his destination, he might just as well have flown by one of the old Hannibal biplanes of the 'thirties.

All that should change when British Caledonian—Britain's new "second force" airline set up to provide competition for BEA and BOAC—open a service between Gatwick Airport, London, and Le Bourget Airport, Paris, on November 1 this year. Using BAC One-Eleven jets, British Caledonian claim that they will be able to provide the fastest available link between the two city centres, with a total journey time of just over $2\frac{1}{2}$ hours.

The situation of the two airports provides the key Gatwick has its own railway station and provides a fast connection with Victoria Station in London. Le Bourget is congestion-free and provides prompt boarding or disembarkation through the terminal, which is only 30 minutes by autoroute from the centre of the French capital.

Argentinian Coin

The last picture on this page shows a very different kind of attack aircraft, this time from the Argentine. Designed by Vice Commodore Hector Eduardo Ruiz and known as the IA 58 Pucará, it is a twin-turboprop two-seater intended for counter-insurgency (COIN) operations. The main requirements for such work are agility and the ability to carry a heavy load of assorted ground-attack weapons, rather than high speed. Thus, the Pucará has a top speed of only 308 m.p.h. but can take off in under 500 yards, fly 2,235 miles with full fuel, and carry bombs, rockets and napalm tanks under its fuselage and wings, as well as two 20 mm cannon and four machine-guns in its fuselage.

The second prototype Pucará (AX-02, illustrated) has 1,022 h.p. Turboméca Astazou turboprops instead of the 904 h.p. AiResearch TPE 331s fitted to the first machine to fly. This should ensure increased performance, and the Argentine Air Force is expected to announce soon an order for 80 production Pucarás.