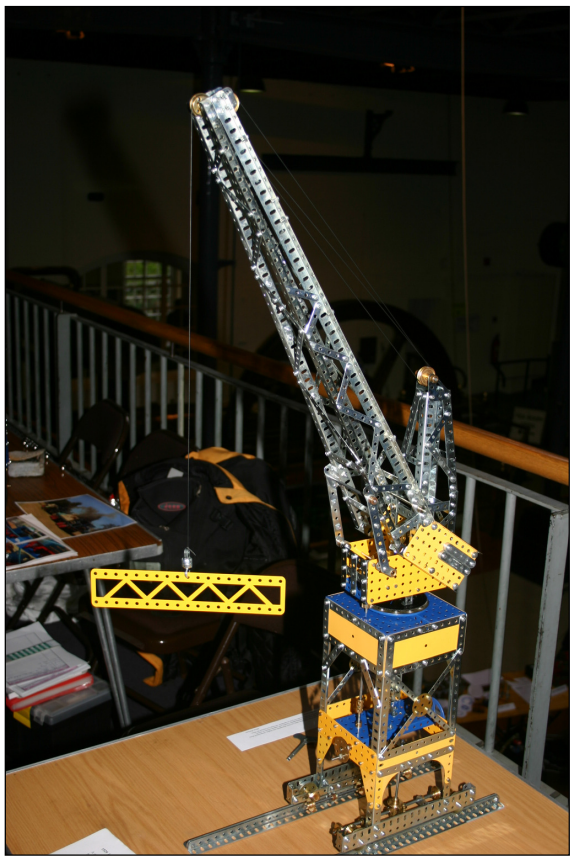
Level Luffing Port Crane

By Brian Elvidge

Introduction



This model was originally published in the January 1931 issue of *Meccano Magazine*, and also appeared in the 1930 *Book of New Models*. It is a relatively small model, said to have been scaled down from Supermodel Leaflet 35, the *Automatic Level Luffing Grabbing Crane*, published in July 1930. The smaller model did not feature the grab of its larger cousin. It shares the general layout of the larger model and uses the same crank and level luffing gear.

The Winter 2005 issue of the *Holy Trinity Meccano Club Newsletter* featured Tony Parmee's version of this model. As the newsletter editor remarked, his model used narrow strips for the jib and tower some 30 years before their introduction. It is not known whether Meccano Limited had a trial batch of narrow strips made, or if an artists retouching was carried out.

My version of this model follows the general views available, and these notes are given so that an average modeller can attempt a rebuild. They are not complete building instructions.

Tower

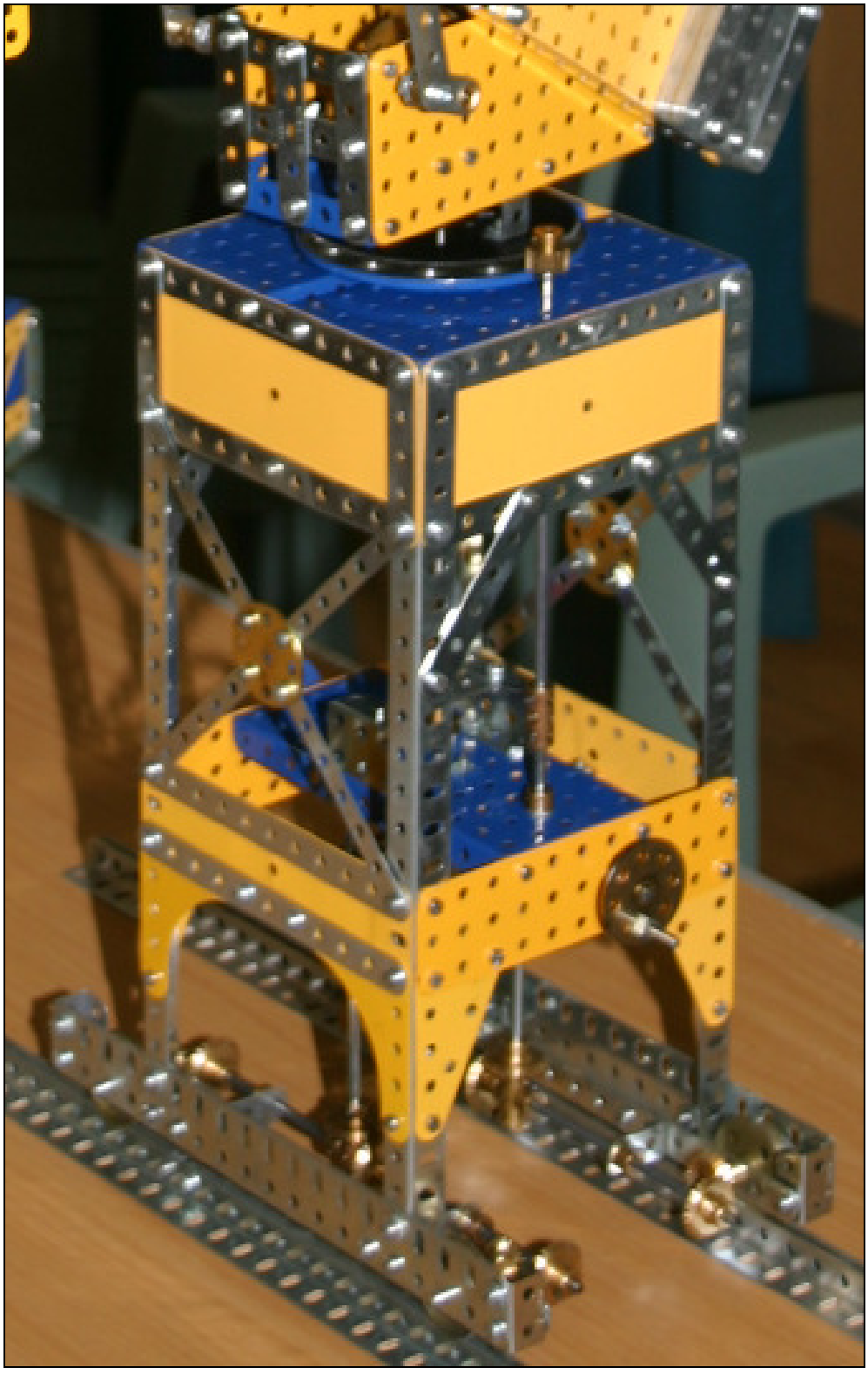
The tower is 5½" square by 12½" high, built from angle girders and two flanged plates (part 52) at the top, with 5½" x 2½" flexible plates below them with strip overlays. A ball race flanged disc is bolted to the top centrally. 7½" further down is a further flanged plate, 5½" x 1½" flexible plates, and 5½" x 1½" flat plates on two of the sides. The flexible plates have strip overlays and are braced to each angle girder by rigid 2½" gusset plates. The flat plates have 2½" x 1½" triangular plates as bracing.

Tower bracing is supplied by 3½" narrow strips, 8-hole wheel discs on the flexible plate sides, and 3" strips elsewhere where appropriate.

The lower end of each leg angle girder is connected by a 9½" flat girder outside and 9½" strips on the inside, spaced by double brackets and washers to allow travelling wheels to turn freely.

There are four travelling wheels (part 20), connected to each other by bevel gears so that the wheels turn in the same direction, via two central shafts carrying 57-tooth gears. These gears are meshed together by three pinions; two are idlers on pivot bolts and the central one is driven by a hand wheel through a 3:1 bevel gearing.

This tower may be used for other similar models, for example, my Shipyard Crane.



The tower

Superstructure

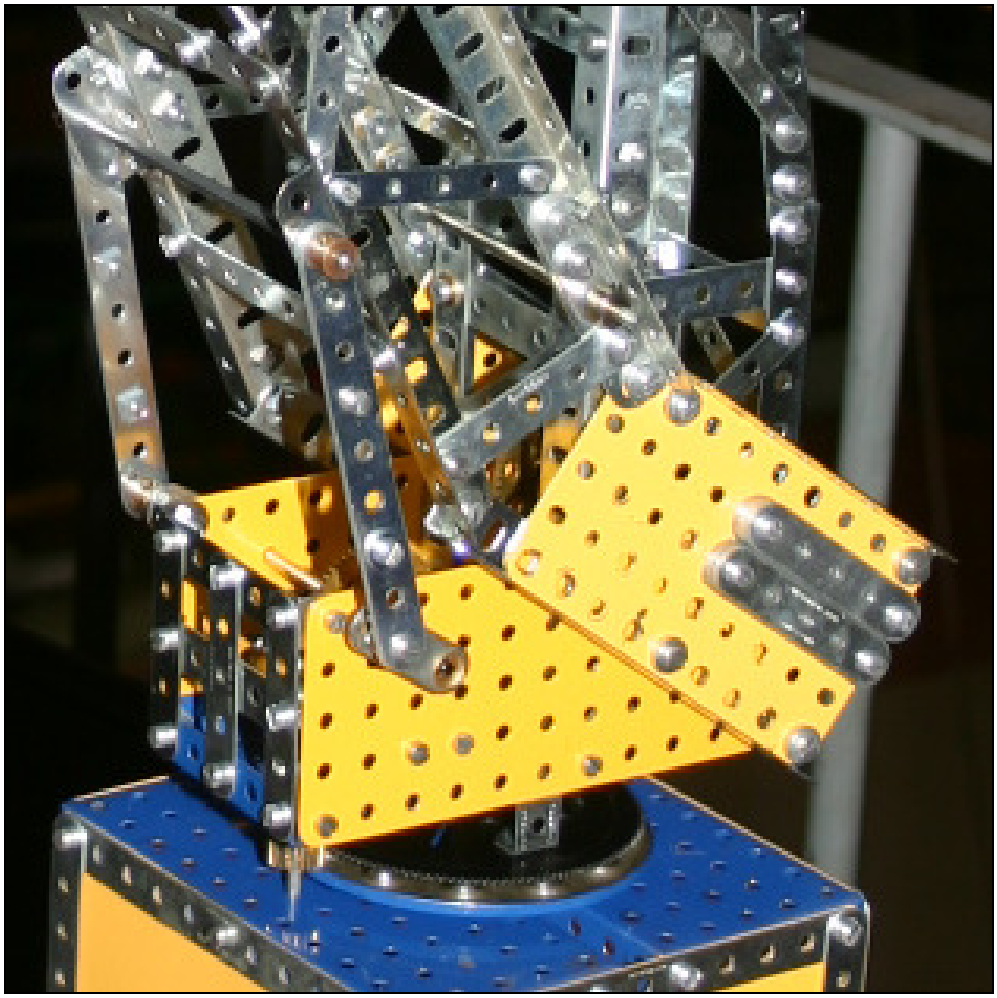
A flanged plate (part 52) forms the base, and it is extended by 5½” x 2½” flat plates on each side with a 2½” x 2½” flat plate at the rear. Also fixed are four 5½” angle girders forming a 2½” x 2½” tower. The front flange of the flanged plate is filled to taste to represent an operator's cabin. Bolted on centrally underneath is a 133-tooth gear by four double brackets, with an 8” rod locked in the gear boss.

The four rear 5½" angle girders are each extended by 5½" strips or girders, overlapped by one hole. This tapers to 1½" x 1" using fishplates and 1½" comer brackets. This tower can be braced by 2½" and 3" narrow strips as desired. The bearings for the jib pivot are 1" triangular plates bolted to each lower tower angle girders top two holes.

In the top holes of the 1½" comer brackets runs a rod (part 18a). Between the brackets are two 1" fast pulleys loose on the rod and four washers (part 38d). This rod is secured by collars.

A front bearing for the luffing mechanism is a 2½" x 1" double angle strip bolted to each side plate second row up, third row in from the front. A rod (part 14a) runs in the rear plate and this double angle strip is offset from central by ½" with a worm behind the double angle strip, a collar in front, and a hand wheel, a bush wheel with a threaded pin next to the rear plate. The hook winding crank is also fitted to the rear plate, to the top row, one hole off centre. This uses a pinion and contrate reduction to the winding drum, which uses a ratchet and pawl brake.

The slewing drive can now be completed. Bolted to the lower flanged plate centrally are two 1½" x 1" edge flanged plates bridged by a double thickness of 2½" strips for the end of the 8" rod to rest in. Two collars are used to hold the 8" rod. A 19-tooth pinion is meshed with the 133-tooth gear using a rod (part 14) extended by a rod (part 17) using a coupling. Below the flanged plate is a further 19-tooth pinion, which meshes with a worm, on a rod (part 16) in bearings - the outer flat plate, one hole offset from central, and a trunnion bolted to the flanged plate. A bush wheel forms a hand wheel.



The superstructure

Jib

The main members are 24½" angle girders. At the top end these girders are bolted together with two 1" flat girders, one each side, also fixing the jib head pulley, a 1" pulley without boss, on a bolt (part 111d) using two collars as spacers. Two 1" angle girders are bolted to the top members with a further 1" pulley without boss on a bolt (part 111d) with collars as spacing.

The jib main members at the lower ends are spaced 2½" apart by 2½" strips bolted across holes two of the main members. Bracing is supplied by narrow strips in the slotted flanges of the girders - 2", 2½", 3" and 3½" are used each side.

The two round hole flanges are separated by 4" strips, 2½" from the lower ends of each set of girders. Bracing is provided by narrow strips as desired; these are on the top of the jib - 2½", 3", 3½", 4", 4½", 5" and 5½" . The lower face uses similar strips, except for one 2½" strip with a slotted 1½" strip leaving out the 5" narrow strip.

The luffing arm pivot point is two 1½" angle girders bolted to the lower round hole flange 3½" from the lower ends.

Each main member is now extended by a 5½" angle girder bolted to the lower slotted flange using washers on the bolts. The top main girder is also extended by a double thickness of 5½" x 2½" flat plates, edged by a 4½" angle girder each side so that the round hole flanges face each other. Due to the limited clearances between the jib and the superstructure, washers are required on each fixing bolt; some need two washers to achieve clearance.

The counterweight on each arm should be of steel or lead weights of around 250g each, for a total of 500g. My model used weights made from of 80 stacked 2½" strips on each arm, though this is not quite sufficient.

The jib pivot point is a double thickness of 1½" strips bolted to the top jib main girders, so that the pivot axle passes through the third hole from the lower ends of each main member of the jib. A rod (part 15b) retained by collars is spaced by four washers between the superstructure and the jib, and this should be sufficient to allow the jib to pivot over a large range.

The luffing mechanism is now completed by a 57-tooth gear in mesh with the worm in the cabin using a rod (part 16) with two heavy duty cranks on each end.

The levers are double thicknesses of 4½" strips bolted together, pivoted onto each crank by pivot bolts and collars as spacing. At the jib end a rod (part 15a) is used and is secured by collars.

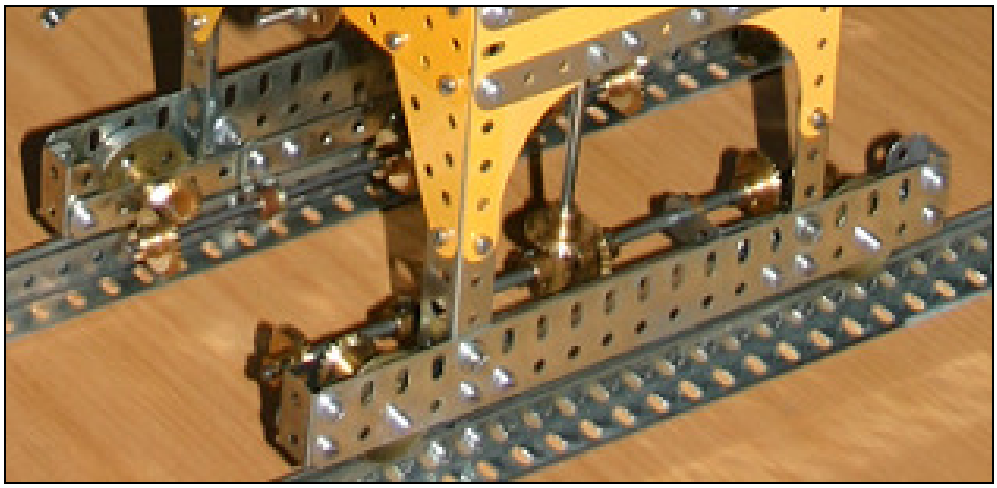
The jib

Cordage

The hook cord, tied around the hoisting barrel or secured using a cord anchoring spring, is led over the tower head pulley, over the upper jib head pulley, back to the other tower head pulley, then over the lower jib head pulley to a hook tied on.

Travelling Rails

These are optional, but use two pairs of 18½” angle girders, with strip spacing, so that the flanges of the wheels run in a nut spacing between the strips and the girder. A more formal track of aluminium curtain track may be used, screwed to a base board.



The travelling rails