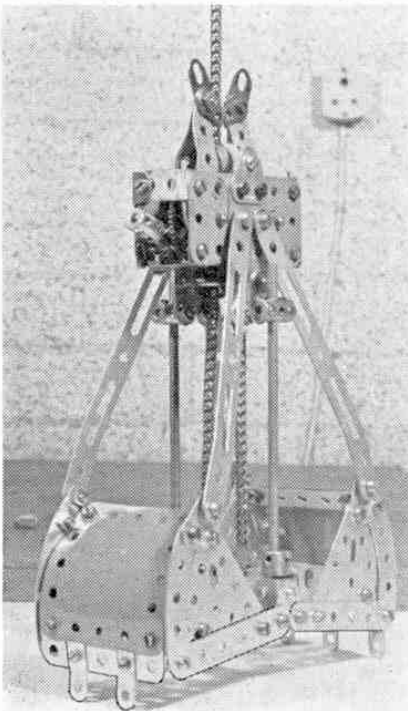


This shows just what can be done with Meccano—a scale model of a Giant Level-luffing Crane built by M.M. reader Eric Taylor of Nuneaton, Warwickshire. The prototype is found in dockyards all over the world.

The single suspension bucket grab in the open position to show the trip gear.



★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

GIANT LEVEL LUFFING CRANE

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

★ An outstanding model by Eric ★
★ Taylor for advanced Meccano ★
model constructors. ★
★ See "Workbench" for details ★
★ of full building notes. ★

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

ILLUSTRATED IN the accompany-
ing photographs is a Meccano
Model of a Giant Level Luffing Crane
which was built by Mr. E. K. Taylor
of Nuneaton. This model reproduces
all the movements of the prototype and
was voted to be the most outstanding
presentation at the Inaugural Meeting of
the Midlands Meccano Guild, an inde-
pendent Meccano 'Club' made up from
enthusiastic adult followers of the
Meccano Hobby. The type of crane
represented by the model may be seen
in many leading ports of the world and
is probably one of the most popular
types in existence due to the fact that
luffing is by jib linkage so that rope
replacement is required only for the
main hoist.

As in the prototype, the crane illu-
strated is fitted with an automatic chain-
operated discharge bucket but this may
be replaced by a cargo hook when
necessary. The model stands approxi-
mately 7 ft. 8 in. high when the main
jib is fully retracted and at maximum
radius the jib luffs out to a distance of
4 ft. 6 in. from the centre of the tower.
Throughout this movement the load
remains at the same height without any
adjustment of the hoisting mechanism
and this is why such cranes are known
as level-luffing types. The grab bucket
is of the single suspension variety, mean-
ing that it requires one hoisting rope
only. Operation of the discharge is
carried out by an ingenious system of
trip levers mounted in the bucket head
which trigger themselves against a
'chandelier' ring suspended on a very
light hoist just above the bucket.

Five movements are carried out by
the crane, namely luffing, hoisting,
bucket discharge, slewing and travelling
which it does with great realism and
smoothness. All operations are remotely
controlled from a control box fitted with
push buttons made from Elektrikit parts.
The secret of the remote operation lies
in the judicious use of no less than five
Meccano Motors, and the versatility of
the different types is exploited to great
effect in the model. One E15R, three
Power Drive Units and one Emebo
Motor are incorporated and each Motor
is wired on a two-wire system to give
forward and reverse directions. The

Power Drive and Emebo units are D.C.
motors and two-wire reversing circuits
are easily applied to them. In the case
of the E15R, which is a Universal motor
normally requiring four connections for
reversing, the 'fourth wire' constitutes
the framework of the model, the mech-
anical reversing lever being removed and
the terminals wired directly to the
remote controller.

The jib linkage of the type of crane
in question requires careful design to
maintain correct geometrical motion for
level-luffing purposes. The particular
real-life version of this model employed
toothed rack quadrants operated by
pinion drive, and Mr. Taylor was able
to simulate the original quadrant by
operating its movement with Sprocket
Chain. This was kept in tension by the
forward weight of the jib system but was
relieved by a sliding counterweight on a
second set of chains situated at the rear
of the control cab. The careful balance
then places a fairly light load on the
E15R Motor used for the luffing
operation.

A Power Drive Unit is employed for
the main hoist and an Emebo Motor
for the 'chandelier' hoist. Speed of
bucket hoist is set by the internal gear-
box of the Power Drive Unit. Both
hoisting barrels are simple, being Axle
Rods fitted with Bush Wheels for end
cheeks. These narrow-diameter Rods
result in fine control of the bucket or
'chandelier' levels for discharge
operations.

It can be seen from one of the accom-
panying photographs that the control cab
is mounted on what appears to be a
sturdy roller bearing, but, in actual fact,
this is of very simple construction and its
only job is to take up the tilting thrust.
Hence, its rollers act only in a radial
direction. The entire weight of the re-
volving superstructure is carried by a
thrust bearing situated at the base of
the long pivot which pass down through
the centre of the main tower. The thrust
bearing is even simpler, being a pair of
wheel flanges running on a roller race
of $\frac{1}{4}$ in. Pulleys, the grooves of which
make the whole bearing self-centring.
This arrangement allows a multi-core
control cable to pass up through the
central pivot post to the control cab,

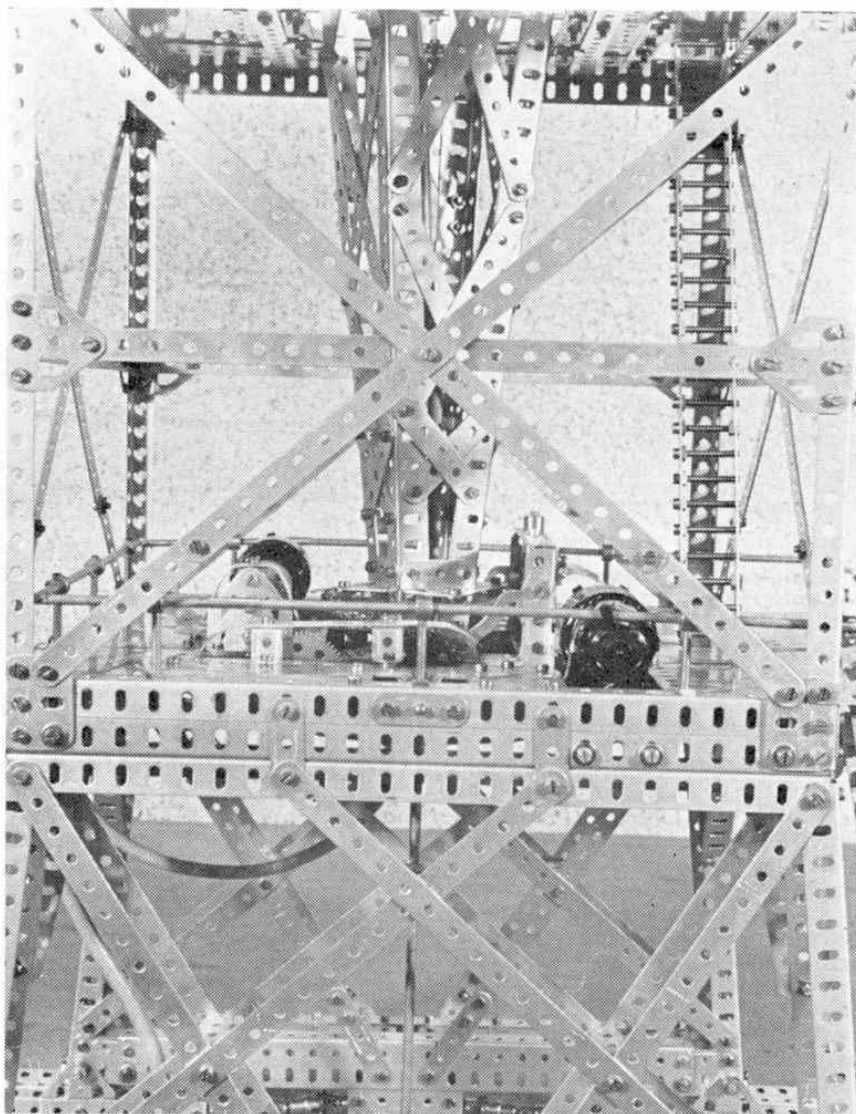
In this detail shot of the main tower, the lower machinery platform is clearly shown.

while the flexibility of the cable in turn allows the super-structure to rotate at least two revolutions in either direction without damage to the cable.

The pivot post carries a $3\frac{1}{2}$ in. Gear Ring just above the lower bearing and this is used to slew the superstructure. The Gear Ring is Pinion driven, the drive coming, via a reduction ratio, from another Power Drive Unit, mounted on the machine platform at the base of the pivot. The third Power Drive Unit is connected through reduction gearing and Chain drive to bevel gearing which transmits the drive to the travelling bogies by means of vertical shafts in the portal structures at the sides of the tower base and then by further Bevels. Universal Couplings and Worm drives to the bogie wheels. Each bogie is pivoted at the foot of each 'leg' to accommodate uneven rails or dock surfaces, as in the prototype.

Great care has been taken throughout the construction of the model to reproduce the original outlines as faithfully as possible with a light, but rigid construction. The well-known principle of triangle construction for maximum strength is exploited to the full in the tower, superstructure and jib constructions. All bearings are reinforced by additional Strips to improve the running qualities of the machinery and to ensure accurate gear meshing.

An important requirement of the main hoist rope in any real-life crane is that it be of a non-spinning type. This lets out the common flexible wire rope as this is normally twisted up from strands of wire with a uniform right hand 'lay' and such a wire tends to untwist slightly resulting in an appreciable spin over a long length, when loaded. The normal cargo hook is fitted with a spinning swivel to allow for this, but special non-spin hoisting ropes are woven for single-hoist buckets. In the model, this rope was simulated by a platted cord, patiently made by Mrs. Taylor with a crotchet hook from strong linen thread. It gave a nice chunky appearance to the hoisting rope and proved very satisfactory in practice.



The travelling bogies of Mr. Taylor's Crane use fairly complex drive systems as this photograph shows.

A close-up view of the cab front showing the hoisting compartment. All movements are controlled remotely from an external unit built from Elektrikit Parts.

A view of the rear of the control cab showing the luffing gear and sliding counterweight.

