

June 17, 1969

R. M. E. COLNOT

3,450,280

METHOD FOR HANDLING ELONGATED MEMBERS

Filed Aug. 29, 1967

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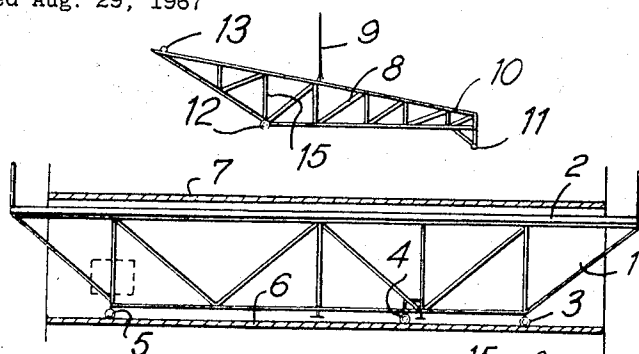


Fig. 1.

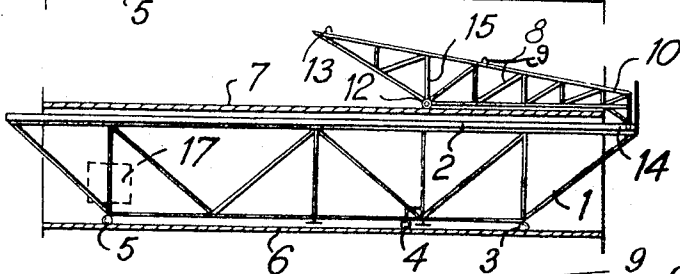


Fig. 2.

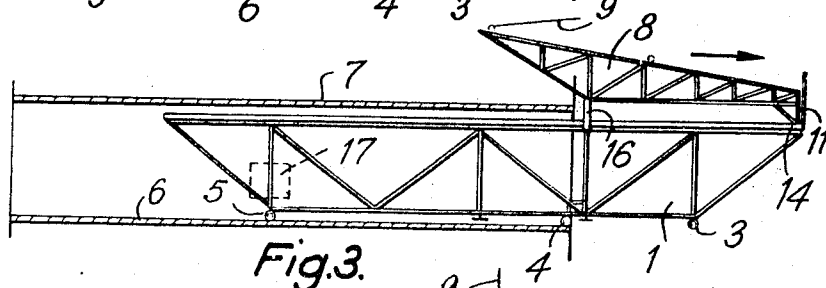


Fig. 3.

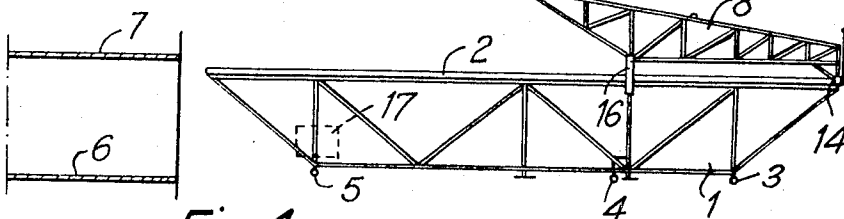


Fig. 4.

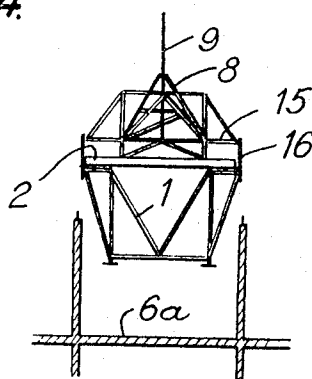


Fig. 5

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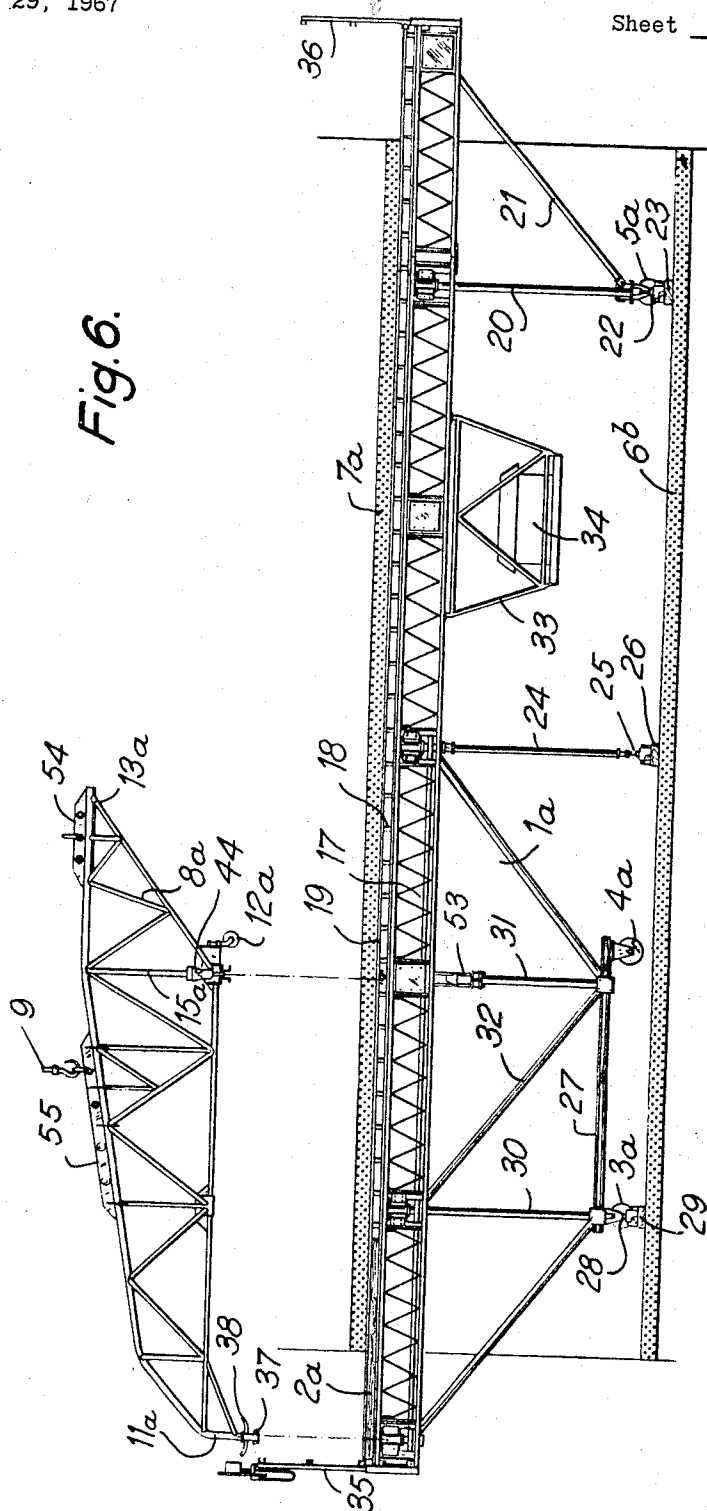
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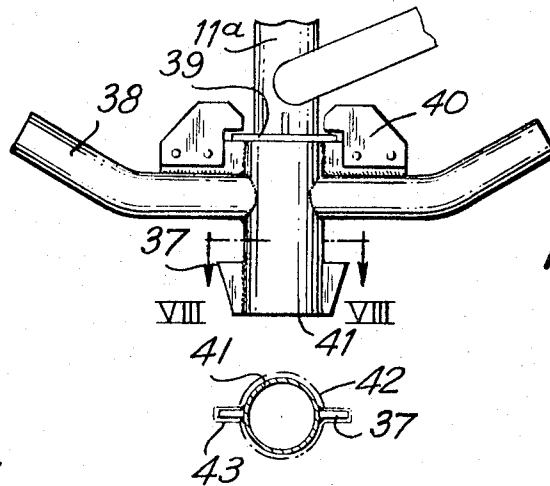


Fig. 7.

Fig. 8.

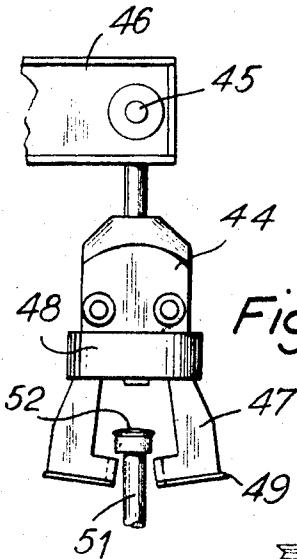


Fig. 9.

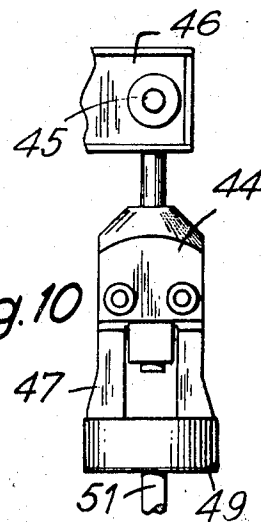


Fig. 10.

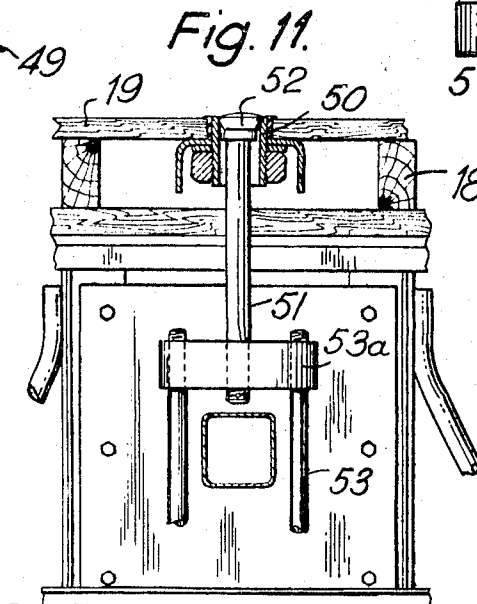


Fig. 11.

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METHOD FOR HANDLING ELONGATED MEMBERS

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U.S. Cl. 214—152

5 Claims 10

ABSTRACT OF THE DISCLOSURE

An arrangement for removal of an elongated member from between upper and lower masking elements which render the elongated member in accessible from above and below, by a boom which is connectable with the elongated member to withdraw the same partially, after which the boom is further connected with an uncovered part of the partially withdrawn member and a hoist is connected to the boom at a location in a plane containing the center of gravity of the connected boom and elongated member so that the latter can be completely withdrawn from the masking elements and transported intact.

Brief summary of the invention

The present invention relates to methods for transporting substantially elongated horizontal members, which are not accessible from above or below, first horizontally to free the members and then vertically.

In the construction of buildings having poured concrete slab floors, it is conventional to use monoblock pouring tables which rest on a previously cast slab and support the forms for the casting of the next overhead slab. It is desirable to avoid dismantling and reassembling of these tables which must, however, be conveyed from one pouring position to another whenever necessary. In most instances, these tables constitute elongated loads which are inaccessible from above precisely because they support the slab which has just been poured and their length and width are quite substantial.

At the moment of breaking the forms into which the concrete has been poured, the monoblock table must be extracted in a generally longitudinal and horizontal direction before being transported to the next pouring site, which is generally effected in turn by vertical displacement.

There have already been provided handling means for such displacements comprising a rig of fork shape having a lower arm of greater span than the opposed upper arm, the latter being adapted for connection thereto of a hoist cable. The lower arm is intended to slide underneath the load constituted by the table which is to be removed and relocated. The lower arm of the fork is supported for this purpose in a horizontal position whatever may be the handling condition, with or without the load of the rig, and this is achieved with the use of a movable connection whereby alignment is maintained constantly and automatically between the center of gravity of the rig alone, or that of the rig and its load, and the vertical hoist cable.

One particular object of the present invention is to facilitate and simplify such a handling method while also improving the safety factor in use.

With this object in view, the invention consists of a method of handling elongated loads which are generally inaccessible from above. In this method a boom is brought into position above a slab which masks the load from above, the boom being supported from a hoist. A forward

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end of the boom is attached to one of the ends of the load which extends beyond the wall. A unit consisting of the load resting on its support and the boom is displaced in a direction such that the load is withdrawn at said end to which the boom is attached. There is then attached to the thus extended load another portion of the boom. The point of connection of the hoist is then transferred on the boom in such a way that this point is vertically aligned with the center of gravity of the unit consisting of the load and boom. Finally, with the unit connected to the hoist, the load is completely withdrawn and relocated to another working location for a subsequent pouring operation.

The invention also contemplates apparatus for carrying out the said method, and more particularly but not exclusively booms having connecting members engageable successively, and pouring tables provided with means adapted for cooperation therewith.

In an advantageous embodiment, the pouring table and the boom are respectively provided with rolling means respectively intended to cooperate with a support surface for the table, for example, the ground or a previously poured slab, and with a poured slab covering the table from above after pouring and setting of this slab.

According to another advantageous embodiment, there is provided a means for connecting the boom to the load which comprises locking members located in the median portion of the table which are retractable and sealable in the form to enable casting of the slab therein without leakage.

When the pouring table is provided with heating means to facilitate and accelerate setting of the concrete, it is advantageous to provide an electrical supply transformer for the heating means acting as a counterweight beneath the rear portion of the table. This counterweight serves to compensate for the mass of the boom connected to the table in the boom-table unit so as to maintain the center of gravity of the unit in the central area of the table.

These arrangements make it possible to facilitate substantially the construction of the booms relative to those of the prior art which are of fork shape. This construction improves the safety factor, because with a lighter and less cumbersome boom, all connections can be better distributed and carried out at the upper part of the table.

Brief description of the drawing

FIGURE 1 illustrates diagrammatically and in side elevation a boom above a concrete slab which has been poured on a pouring table shown in lowered position after breaking of the forms;

FIGURE 2 illustrates similarly the phase of first forward connection of the boom to the table;

FIGURE 3 illustrates the intermediate phase of connection of the boom to the table after the extraction of the latter has been partially achieved;

FIGURE 4 illustrates similarly the complete extraction of the table, the boom-table unit being suspended from a hoist cable;

FIGURE 5 illustrates an end view of a boom-table unit before positioning the table at a site at which a slab is to be poured;

FIGURE 6 illustrates at a greater scale and with some details a modification of a table and cooperating boom; and

FIGURES 7-11 illustrate various means for connecting a boom to a table.

Detailed description

As illustrated in FIG. 1, a pouring table of truss construction 1 having a form face 2 rests by means of rollers 3, 4 and 5 on a support surface 6 which may be the last poured and set slab. When resting upon the rollers 3, 4 and

5, the table is no longer supported by retractable stanchions which constitute movable parts of the truss 1 and which are retracted for separation of the form face 2 from the slab 7 which has just been poured.

Because the space between the slabs 6 and 7 is generally small but of great length and because the pouring table is constituted as a single unit, which it is undesirable to dismantle, the table can be extracted only by horizontal translation in a longitudinal direction within the space defined between the slabs 6 and 7 until the table is completely disengaged for transfer to a subsequent work station.

In order to carry out this manipulation with a hoist, there is provided a boom 8 suspended from a hoist cable 9, the boom having in profile the shape of a scalene triangle, the longest side of which is at the upper part, the cable 9 being connected to that longest side. The forward apex 10 of the boom is provided with an appendage 11 which includes means for connecting it to the table. The lower apex of the triangle is provided with rollers 12. A connecting device 13 for the cable 9 is provided in the vicinity of the rear apex.

As illustrated in FIG. 2, the boom 8 is placed on the slab 7 and can roll thereon by means of the rollers 12 until the appendage 11 overhanging the edge of the slab 7 engages an extending part 14 of the pouring table 1, said extending part being provided with means for connecting the table 1 to the appendage 11.

It is then possible to effect longitudinal movement of the unit consisting of the table 1 and the boom 8 secured thereto, by travel of the rollers 12 along the slab 7 and travel of the rollers 3, 4 and 5 on the slab 6. This translation is connected until the position illustrated in FIG. 3 is reached, wherein the table 1 rests only on the slab 6 by rollers 4 and 5, rollers 3 being then beyond the edge of slab 6 and unsupported, and the boom 8 no longer resting by rollers 12 on the slab 7. Forwardly of the rollers 12, the boom 8 is provided with a transverse panel having lateral arms 15, including connecting means 16 adapted to be secured to underlying parts of the table 1 which at that time lie outside the slab 7.

For safety purposes, there is provided in a rearward portion of the table 1 a counterweight 17 which maintains the center of gravity of the table and boom unit between the rollers 4 and 5.

With the stability of the unit thus maintained on the underlying slab 6, the hoist cable 9 can be released from the intermediate location on the longest side of the boom and then secured at support 13 which is positioned in the plane containing the center of gravity of the unit. The unit is then slightly lifted vertically by the hoist cable 9 which makes it possible to complete the horizontal, longitudinal translation of the table 1 until it is fully extracted from the space between the slabs 6 and 7, as illustrated in FIG. 4. The hoist can now convey the unit as shown in FIG. 5 to another construction site having a support slab 6a above which it is desired to pour a slab such as that of slab 7 of FIGS. 1-4. The table 1 is brought to rest on the slab 6a. The boom is disconnected from the table. The table 1 is raised on its stanchions so that the rollers 3, 4 and 5 are out of contact with the support surface 6a and the table is in position as a form face for the next pouring.

In the modification illustrated in FIG. 6, the table 1a is provided with upper spreaders 17 consisting of truss beams, and these spreaders support by means of cross-members 18 the bottom form 19. The spreaders 17 are supported by a truss construction comprising at one end columns 20 and braces 21. There are also transverse tie members (not shown) between the columns 20. At the foot of the columns there are provided rollers 5a associated with jacks 22 for lowering skids 23 into contact with the support 6b.

At the central part of the spreaders 17 there are provided intermediate columns 24 with jacks 25 and skids 26.

The other end of the spreaders 17 is supported by a truss 1a of trapezoidal shape having a lower shorter base 27 with forward rollers 3a with jacks 28 and skids 29 and rear rollers 4a on a short overhanging extension of base 27. The trapezoidal truss includes columns 30, 31 and diagonal brace 32.

Between the columns 20 and 24 there is provided beneath the spreaders 17 a cradle 33 for supporting a counterweight 34 consisting advantageously of an electrical transformer in the event that the pouring table is of the heated type supplied with electrical heating current from the said transformer.

The ends of the table, the length of which is materially greater than that of the slab 7a to be formed, are provided with guard rails 35 and 36, at least one of which, for example, is retractable or removable to allow passage of the table in the direction of the opposite end.

The boom 8a associated with such a table comprises a truss beam of substantially triangular cross-section. Rollers 12a adjacent to the lower apex of the beam are preferably caster rollers.

The appendage 11a, as illustrated in greater detail in FIGS. 7 and 8, supports a rotary latch with lugs 37 which can be maneuvered by handles 38 and which is supported on the truss on either side of an end collet 39 by claws 40. The lugs 37 and the central socket 41 which supports them are intended to cooperate with a corresponding keyway 42 provided in a cross tie of the table 1a adjacent the forward end thereof, the keyway 42 being provided with passages 43 for insertion and removal of the lugs 37. With this mechanism it is possible to provide for rapid connection of the outwardly extending ends of the table and boom.

Intermediate connections between the table 1a and the boom 8a can be provided with reversible grippers 44 hingedly connected by pins 45 to the lower members 46 of a transverse panel 15a of the boom 8a. Each gripper 44 is provided with a pair of suspended jaws 47 adapted to be locked in closed position by a slip ring 48 supported in locked position by a bottom flange 49 of the jaws 47.

When the boom is separately suspended, the grippers 44 are raised as illustrated in FIG. 6. They are lowered for establishing the desired connection to the table 1a. Facing these grippers are sockets 50 provided in apertures of the form 19 through which hanger rods 51 and heads 52 can extend acting as valve bodies. There is thus established the necessary seal against drainage from the poured concrete. The rods 51 are connected to stirrups 53a and to twin rods 53 by which the heads 52 can be raised to cooperate with the jaws 47 as illustrated in FIGS. 9 and 10.

The boom 8a is provided adjacent its tail end on its upper ridge with a plate 54 for engagement by the hook of the hoist cable 9. A second plate 55 is provided at the median part of the member constituting the upper ridge of the boom. Each of the plates 54 and 55 is provided with a plurality of holes for the hook so that it is possible to select the proper one for suspension from the cable 9, to maintain horizontal lifting of the boom and the boom table despite variations in their respective centers of gravity. It is also possible to adjust slightly the position of the center of gravity if necessary by moving the counterweight 34 in the cradle 33.

It is to be understood that the example of a pouring table is given only for illustrative purposes and that the method and apparatus disclosed herein are intended for use in the handling of any load of substantial length which is inaccessible from above in the vicinity of its center of gravity and which is required to be moved at least in a substantially horizontal direction.

What is claimed is:

1. A method for handling an elongated member which is horizontally disposed between upper and lower masking elements, and rendered inaccessible from above and below, the elongated member partially projecting from

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between the masking elements, said method comprising supporting a boom with a hoist above the upper masking element, connecting the boom at one end thereof to the elongated member where the latter projects from the masking elements, moving the boom by the hoist to withdraw the elongated member further from between the masking elements, although not entirely, connecting the boom at a second location spaced from the first connection to a now exposed portion of the elongated member, changing the location of the connection of the hoist on the boom so that such connection is located in a vertical plane containing the center of gravity of the connected boom and elongated member, and completing the withdrawal of the elongated member from between the masking elements so that the elongated member can now be transferred to another location.

2. A method as claimed in claim 1, wherein the hoist is connected to the boom at a location thereon lying in a vertical plane containing the center of gravity of the boom before the boom is connected to the elongated member.

3. A method as claimed in claim 1 comprising rollably advancing the boom on the upper masking element, serving as a support for the boom, as the elongated member is initially withdrawn from between the masking elements.

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4. A method as claimed in claim 1 comprising rollably advancing the elongated member on the lower masking element, serving as a support for the elongated member, as the elongated member is withdrawn from between the masking elements.

5. A method as claimed in claim 1 comprising fixing the position of the center of gravity of the assembled boom and elongated member such that it lies within the masking elements when the elongated member has been partially withdrawn from between the masking elements for the second connection of the boom.

References Cited

UNITED STATES PATENTS

2,851,170	9/1958	McDonough	214—1
2,966,718	1/1961	Dave	25—131.5

GERALD M. FORLENZA, *Primary Examiner*.

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U.S. Cl. X.R.

25—131.5; 52—122, 741; 214—1; 249—19, 26; 264—34, 336; 294—67