United States Patent

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[54] **CLIMBING CONCRETE FORM HOIST**
7 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** 425/65
249/20, 264/33
[51] **Int. Cl.** **E04g 11/22**
[50] **Field of Search** ..... 25/131 SA, 131 SB, 131 D, 131 EM, 131 EY, 131 Y; 249/20; 264/33; 52/122, 749

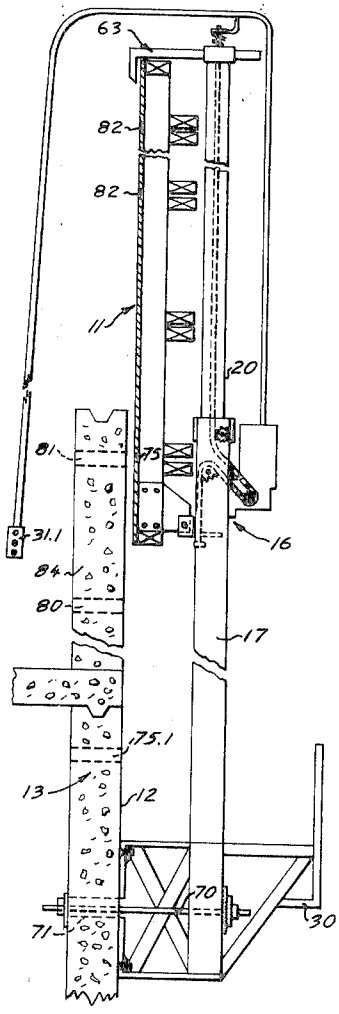
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ABSTRACT: A climbing form hoist for raising a form panel progressively up a concrete wall under construction, the hoist having a telescopic mast, the mast having an upper member secured to upper and lower edges of the panel, and a lower member releasably securable at a lower end to the wall. Means are provided to extend and retract the mast so that with the mast secured to the wall the form panel can be released from the wall and raised to a new position and with the form panel resecured to the wall the lower end of the mast can be released from the wall, raised and resecured.



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SHEET 1 OF 2

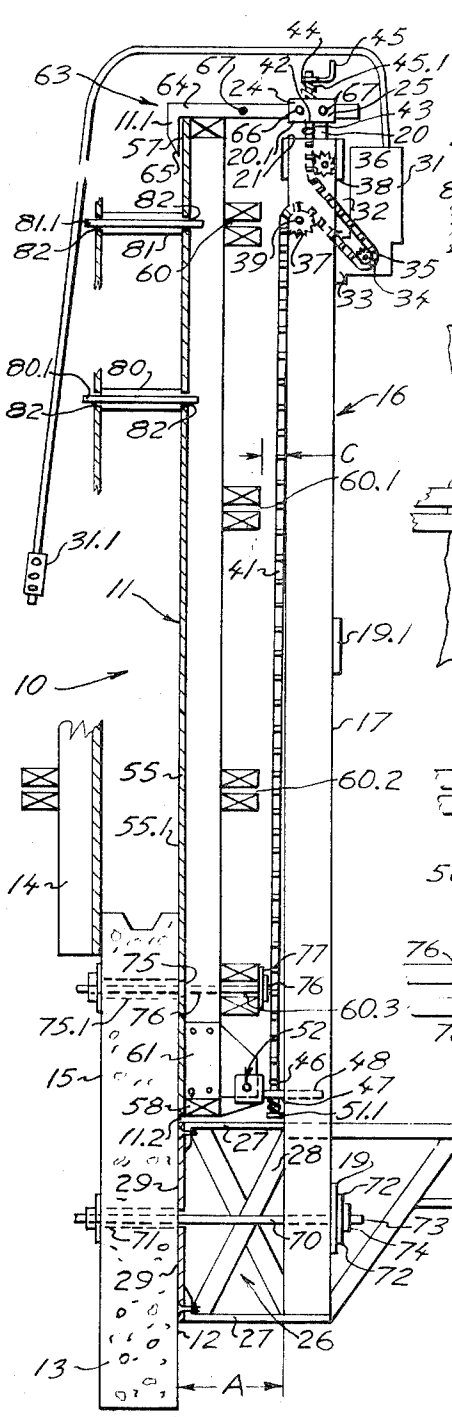


Fig. 1

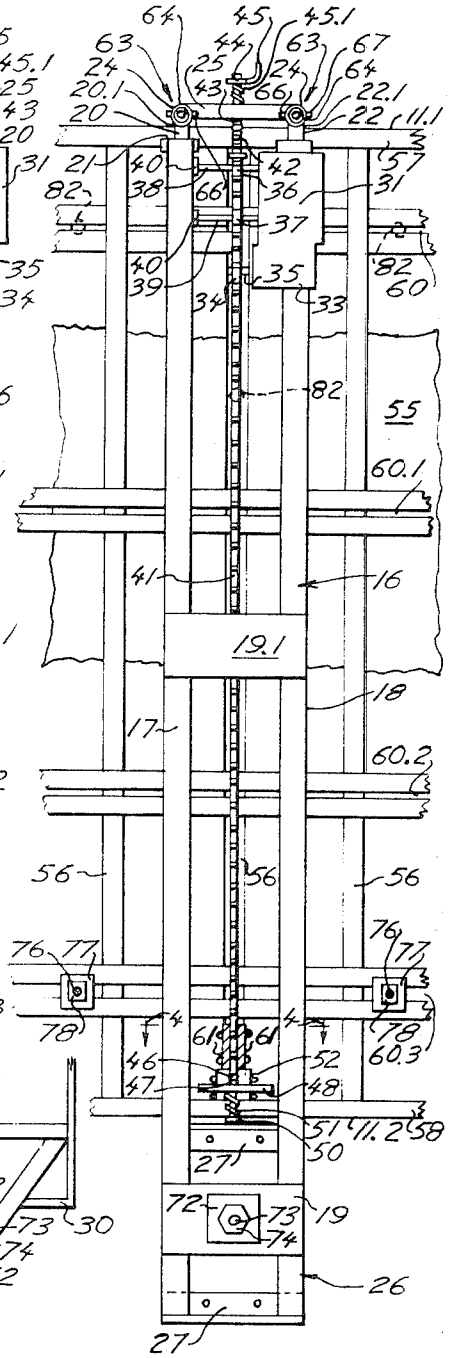
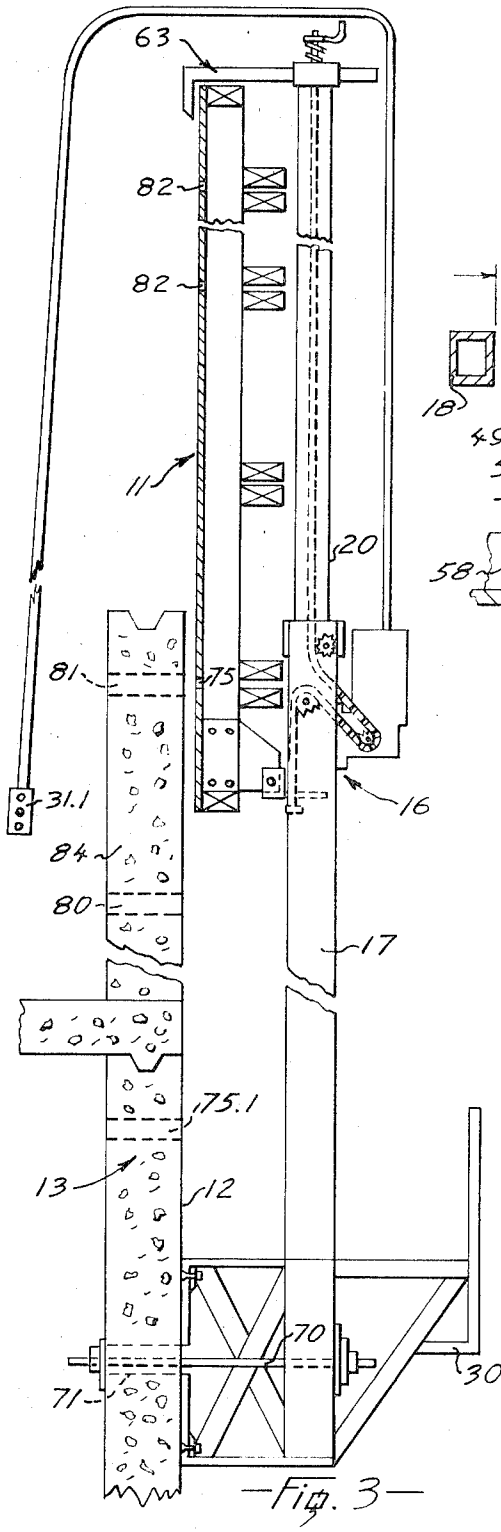


Fig. 2

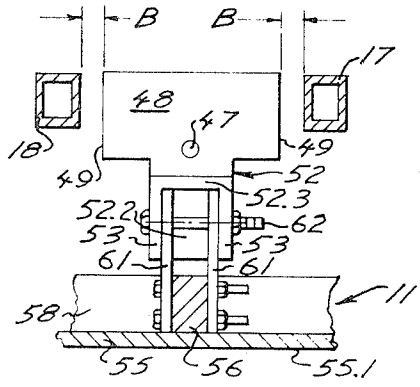
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—Fig. 3—



—Fig. 4—

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CLIMBING CONCRETE FORM HOIST

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to hoists and in particular to a hoist for climbing a concrete structure under construction the hoist being adapted to move a concrete form panel upwards in successive steps.

2. Prior Art

In construction of concrete buildings having walls of unitary construction, that is where the walls are poured in successive lifts, it is customarily the practice to use prefabricated form panels which are removed after a lift has set and then raised, and resecured for another lift to be poured. In buildings of three stories or less scaffolding can be erected around the structure so that workmen can work on outside form panels, the form panels being raised by hoists erected interiorly of the building or by mobile cranes. In buildings over three stories however, the erection of outside scaffolding becomes impracticable, so that any outside work to be performed, that is loosening of forms, repositioning and the like, requires suspended platforms and slings for workmen. This work is dangerous since panels suspended from above, can swing wildly. This can damage scaffolding erected for the construction of smaller buildings and can cause injury to workmen suspended by slings or platforms. Furthermore, workmen can be pulled from the inside of the building when guiding a form panel into position.

SUMMARY OF THE INVENTION

The present invention provides a form hoist which materially reduces the amount of work required exteriorly of a building wall under construction and which is secured adjacent top and bottom edges of a form panel so that it can be raised, under control, up a completed concrete lift to be repositioned for another lift.

The form hoist of the present invention reduces the number of interior hoists normally required and reduces the need for mobile cranes.

The form hoist of the present invention, furthermore, includes a platform upon which a workman can stand. Consequently in most cases equipment required to suspend workmen from above is not required.

The form hoist of the present invention includes a telescopic mast having upper and lower extensible and retractable members, means at a lower end of the lower member for releasably securing the mast in a vertically extending position to an outside surface of a concrete wall under construction, means at an upper end of the upper member for securing the mast at an upper edge of a form panel, a reversible motor mounted on the adjacent an upper end of lower member a drive sprocket driven by the motor, a roller chain passing around the drive sprocket having one end connected at an upper end of the upper member and having an end connected at a lower edge of the form panel so that with the lower member connected to the wall the motor can be operated to extend the mast and raise the form panel from a lower position to an upper position and with the form panel secured in the upper position the mast can be detached from the wall, the motor reversed to retract the mast and raise the lower member and the lower member then resecured to the wall.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of the hoist in a retracted position secured to a wall under construction,

FIG. 2 is a front view of the form hoist,

FIG. 3 is a view similar to FIG. 1, the hoist being shown in an extended position,

FIG. 4 is a view on line 4—4, FIG. 2 illustrating a guide.

A detail description following, related to drawings, gives exemplification of preferred embodiment of the invention which, however, is capable of expression in structure other than that particularly described and illustrated.

DETAILED DESCRIPTION

FIGS. 1 and 2

A climbing hoist, generally 10, is shown secured to an outer form panel 11 having upper and lower edges 11.1 and 11.2 and positioned against an outer surface 12 of a wall 13 of a concrete building under construction. An inner form panel 14, shown fragmented, extends parallel to and against an inner surface 15 of the wall.

The hoist 10, see FIGS. 1 and 2, has a telescopic mast 16 formed of a pair of parallel lower tubes 17 and 18 and transverse braces 19 and 19.1. An upper tube 20 having an upper end 20.1 telescopically and slideably fits in the lower tube 17 and projects from an upper end 21 of the lower tube 17. The upper and lower tubes are considered upper and lower members of the mast. An upper tube 22 having an upper end 22.1 fits, in a like manner, in the lower tube 18. Short tubular sleeves 24 are welded at the upper ends of the upper tubes. A brace plate 25 extending between the sleeves prevents relative movement of the upper ends of the upper tubes.

A base structure 26 having upper and lower members 27, a face member 27.1, and diagonal bracing 28 is secured to the lower tubes 17 and 18 between lower end portions thereof. The base structure is substantially rectangular, the face member 27.1 having a wall engaging face 29, see FIG. 1, which extends parallel to the tubes 17 and 18 and is spaced from the tubes a distance A. A platform 30 is secured to the base structure.

A reversible electric motor 31, operated by remote controls 31.1, is secured to a bracket 32 near an upper end of the lower tube 17, the motor being connected through a reduction gear to a drive sprocket 34 mounted on a horizontal drive shaft 35 and located centrally between the lower tubes 17 and 18.

Idler sprockets 36 and 37 are mounted on transverse shafts 38 and 39 which extend between, and are supported in brackets 40 seen in FIG. 1, adjacent upper ends of the lower tubes, the brackets 40 on the lower tube 17 only being shown.

A roller chain 41 being a tension element, is connected at an upper end 42 to a bolt 43 which passes through the plate 25. A nut 44 having a turning handle 45 is threaded over the bolt and bears against a compression spring 45.1 fitted against the plate 25. The chain passes over the idler sprocket 37 from which it depends substantially downwards to a lower end 46. As seen in FIG. 1, the sprockets are arranged so that the chain passing over the drive sprocket forms a U-shaped loop so that about half the teeth of the drive sprocket are engaged with the roller chain.

The lower end 46 of the chain, see FIGS. 1 and 2, is connected to a bolt 47 which passes through and centrally of a rectangular guide plate 48, see FIG. 4, having end edges 49. The guide plate fits loosely between the lower tubes, the end edges 49 having a clearance of approximately 1 inch. The bolt 47 is secured by a nut 50 bearing against a compression spring 51.

A saddle 52 having a base plate 52.2, an end plate 52.3, and spaced-apart side plates 53 is welded to the guide plate as shown. The saddle 52 serves as means for connecting the form panel 11 to the chain.

The form panel 11 includes sheeting 55 having an inner face 55.1 and vertically spaced-apart studs 56, extendings between top and bottom plates 57 and 58. Wales, see FIG. 2, arranged in vertically spaced apart pairs 60, 60.2, and 60.3 are secured to the studs. The form panel 11 is secured to the chain 41 by means of a pair of plates 61 bolted to a stud just above the bottom plate 58, the plates 61 fitting in the saddle 52 and being secured by a bolt 62.

The panel 11, see FIG. 1, is secured at its upper edge to the mast by means of a pair of hook members 63 having tubular shanks 64 slideably fitting in the sleeves 24, the shanks having downward extensions 65 which extend over the upper edge of the panel 11 adjacent to inner face 55.1 of the sheeting. The lock members 63, which are means to connect the upper members of the mast to the form panel at the upper edge thereof, are adjustably secured in the sleeves 24 by means of

locking pins 66 which can be extended through the sleeve and through any one of a series of space aligned holes 67 in the shanks 64.

As seen in FIG. 1, the panel 11 has a thickness defined by distance between the inner face 55.1 of the sheeting a side edge of the walls confronting the mast, the thickness being such that when the inner face 55.1 of the sheeting and the face 20 of the base frame structure are aligned there is a clearance C, of approximately 2 inches, between the walls and the lower tubes 17 and 18. The panel has a top to bottom measurement such that, with the mast retracted as seen in FIG. 1, the bottom plate 58 of the panel is just clear of the base frame structure 26 and the top plate 57 touches the shanks of the hook members 63. Vertical adjustment of the panel 11 on the mast is effected by operating the nut 44 so as to extend or retract the bolt 43 relative to the plate 25.

OPERATION

FIGS. 1, 2, and 3

To secure the hoist to the concrete wall 13, see FIGS. 1 and 2, the concrete wall being considered a basement wall which has been formed in a conventional manner, the hoist is positioned so that a horizontal bolt 70, extended through a sleeve 71 which has been set in the wall passes through the face member 27.1 and a centrally located aperture, not shown, in the brace 19. A bearing plate 72 is placed over a projecting end 73 of the bolt 70 and a nut 74 is threaded on the bolt 70 and tightened against the plate 72 to press the face 29 of the base structure 26 against the outer surface 12 of the wall. Frictional engagement of the face 29 and the outer surface 12 of the wall prevents rotational movement of the mast about the bolt 70.

The form panel 11 is then secured to the hoist and the mast, in its retracted position, is then adjusted to align holes 75 in the sheeting 55 into registry with sleeves 75.1 which, like the sleeve 71, previously have been set in the wall above the sleeve 71. Bolts 76 are extended through the sleeves 75.1, plates 77 are fitted over the bolts, and nuts 78 are tightened against the plates 77. The form panel 11 and the inner panel 14 are tied and braced in a known manner.

Sleeves 80 and 81, corresponding to the sleeves 71 and 75.1, shown in solid lines in FIG. 1 and in broken outline in FIG. 3, are positioned between the inner and outer form panels in a pattern corresponding to spacing and pattern of the sleeves 71 and 75.1. In order to secure the sleeves 80 and 81 against movement they are slipped over locating rods 80.1 and 81.1 which are extended through holes 82 in both form panels.

A new lift of concrete 84, see FIG. 3, is then poured between the inner and outer form panels. When the new lift has set, the nuts 78 are removed from the bolts 76, the bolts are withdrawn, and the outer form panel is broken away form the wall. The electric motor is then operated to extend the mast, see FIG. 3, so as to raise the form panel 11 until the openings 82 register with the sleeves 80 and 81 in the newly poured lift and the panel 11 is again bolted to the wall and braced, as previously described. The bolt 70 is then withdrawn to disconnect the base structure and the wall—the hoist thus being suspended by the back members from an upper edge of, and being supported by, the outer form panel. The motor is then operated to retract the mast—the base structure being raised until it reaches a position to permit it to be connected to the wall by the bolt 70, now passed through the sleeve 80. The inner form panel is then repositioned for another lift to be poured.

Successive lifts of concrete can be added in the manner described, the operation of the hoist not being limited by the height of the building.

It is to be understood, a metal form panel, rather than the form panel described, can be used so as to eliminate the need for intermediate ties between the inner and outer form panels. All of the work performed in connecting and disconnecting both the outer panel and the hoist can thus be done by a workman on the hoist platform. It is also to be understood a hydraulic or pneumatic motor can be used in place of the electric motor and that a cable can be used in place of the chain, the drive sprocket being replaced with a suitable drive pulley.

It will be seen that during the operation of the hoist form the outer panel is not free to swing as its movement away from the face of the concrete is limited. Furthermore, workmen detaching and resecuring the form panel need not be suspended by slings swinging platforms or the like as practically all the work can be done from platform 30. A workman can gain access to the platform by climbing up or down the mast on rungs, not shown, on the lower tubes.

What I claim is:

1. A climbing form hoist including:
   a. a telescopic mast (16) having upper (20, 22) and lower (17, 18) telescopically united members,
   b. means (26) at a lower end of the lower member for connecting the mast in an upright position to, and spaced from, a wall of a building under construction,
   c. a tension element (41) connected at an upper end of the upper mast member and connectable at a lower end to a lower edge of a form panel, the form panel being disposed between the mast and the wall,
   d. means at an upper end of the upper member for connecting the form panel, at an upper edge thereof, to the upper end of the upper member,
   e. reversible drive means (31) at an upper end of the lower member in driving engagement with the tension element, so that with the mast connected to the wall the means (31) can be operated to raise the form panel, the lower end of the mast can be disconnected from the wall, the means (31) operated to retract the mast and to raise the lower member and the mast then reconnected to the wall.

2. A climbing form hoist as claimed in claim 1, in which the tension element is a roller chain and the reversible drive means includes a reversible motor driving a sprocket (34) over which the chain passes.

3. A climbing form hoist as claimed in claim 1 in which the means (d) includes at least one hook member at the upper end of the upper member adapted to engage an upper edge of the form panel so as to support the mast when the latter is disconnected from the wall.

4. A climbing form hoist as claimed in claim 3, including means (66, 67) for effecting adjustment of the hook member towards and away from the mast.

5. A climbing form hoist as claimed in claim 4 in which the means (66, 67) includes a sleeve at an upper end of the upper member, the hook member having a shank slidably fitting on the sleeve, the shank of the hook member and the sleeve each having spaced, aligned holes adapted to be position in registry for receiving a locking pin.

6. A climbing form hoist as claimed in claim 1, in which the means (b) includes a base structure (26) having a wall engaging face (29) extending parallel to the mast and spaced laterally therefrom so as to maintain the mast parallel to and spaced from the wall, and bolt means for releasably connecting the base structure to the wall so as to press the face (29) into frictional engagement with the wall.

7. A climbing form hoist as claimed in claim 5 in which the means (66, 67) includes a base structure (26) having a wall engaging face (29) extending parallel to the mast and spaced laterally therefrom so as to maintain the mast parallel to and spaced from the wall, and bolt means for releasably connecting the base structure to the wall so as to press the face (29) into frictional engagement with the wall.

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