

[54] **PORTABLE HOIST**
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[57] **ABSTRACT**

A portable crane for use in a construction environment requiring a high-lifting device using a minimum of space which may be moved from one area to another and includes a supporting frame having a plurality of wheels and a wheel lock, a mast vertically disposed coupled to said frame, a telescoping boom manually adjustable to different lengths having different extension lengths and a boom drive means hydraulically actuated for lifting and lowering the boom.

1 Claim, 4 Drawing Figures

[56] **References Cited**

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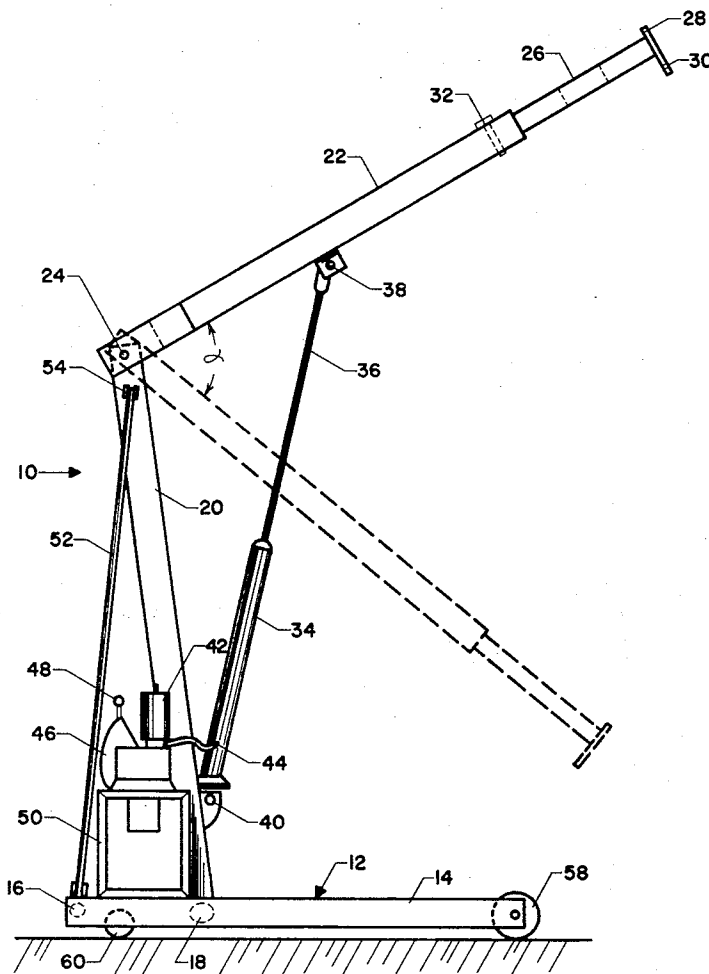


FIG. 1

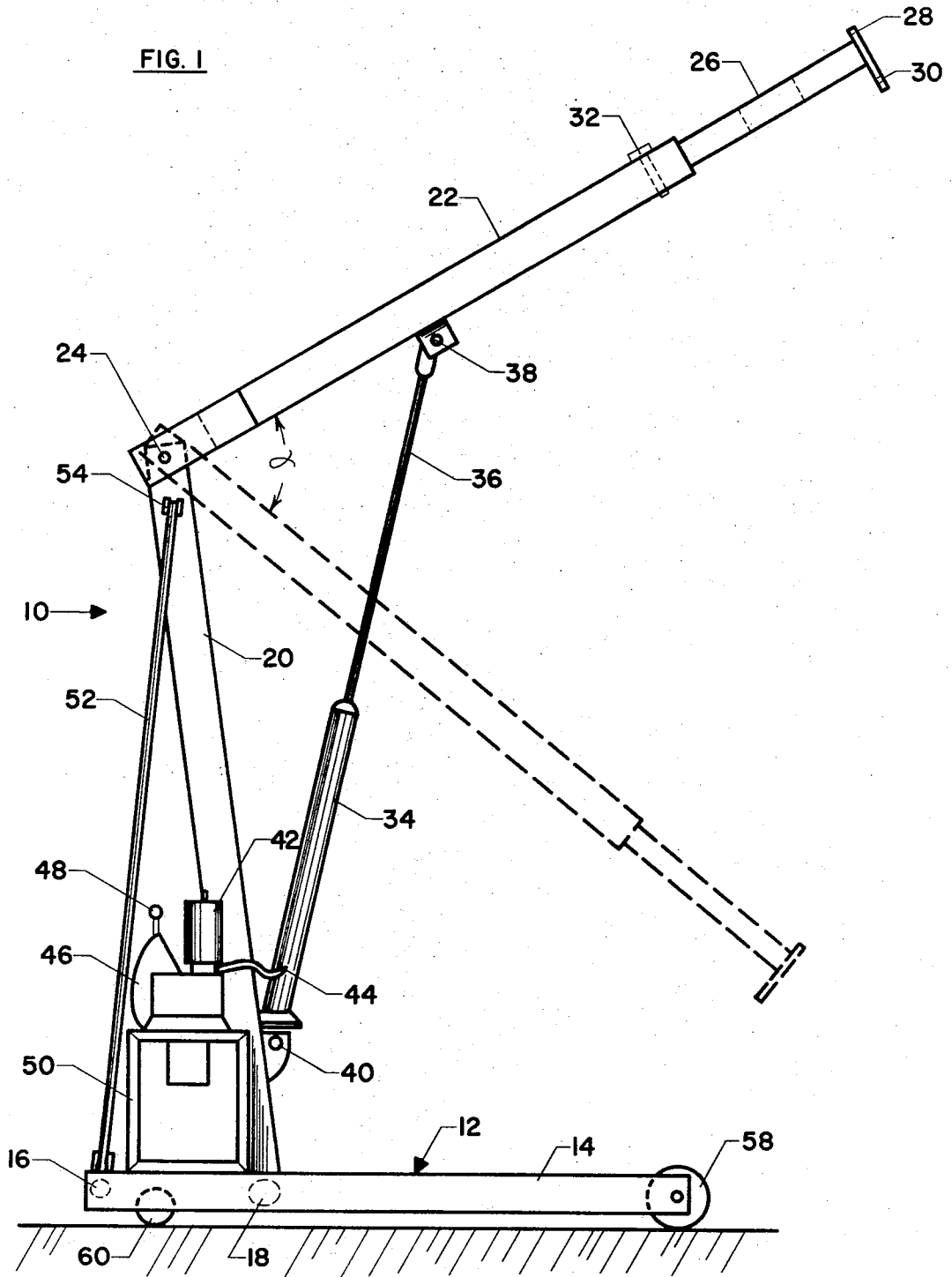
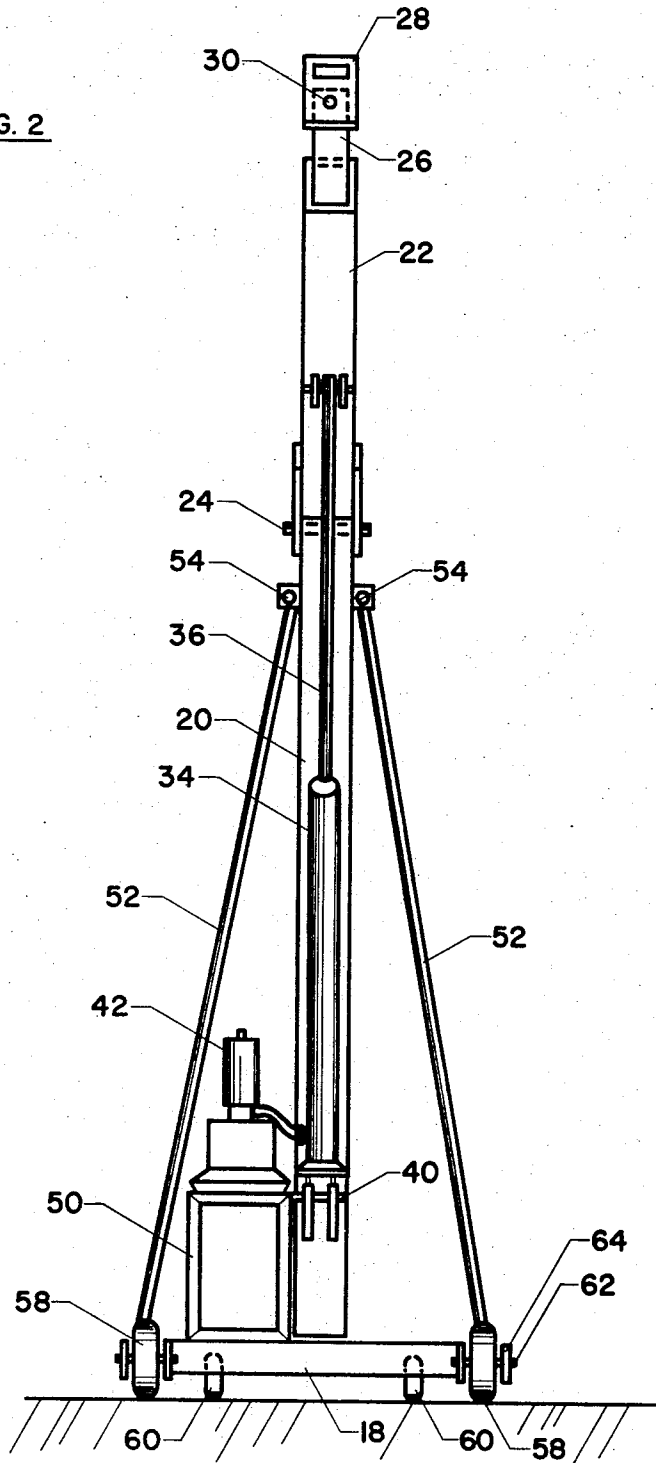
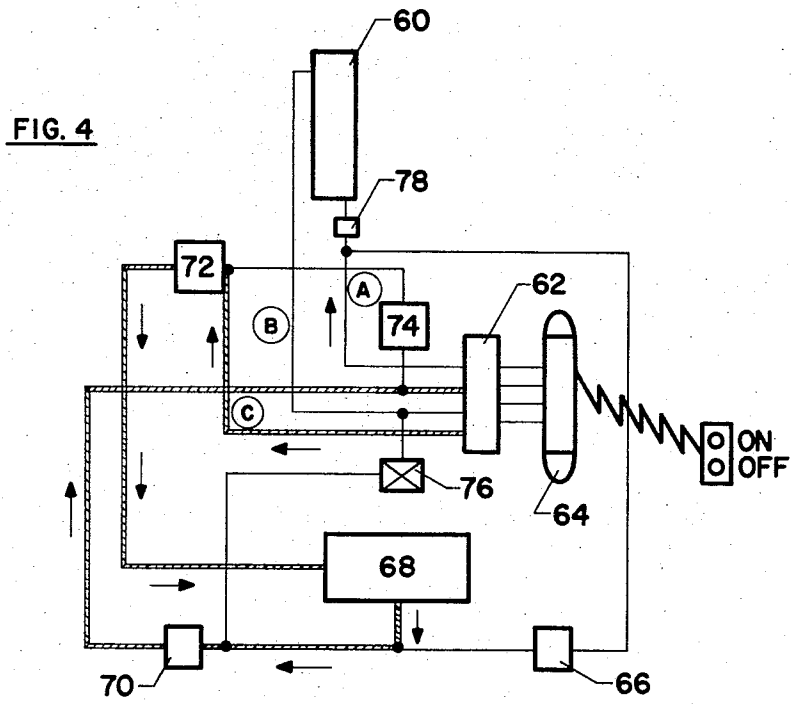
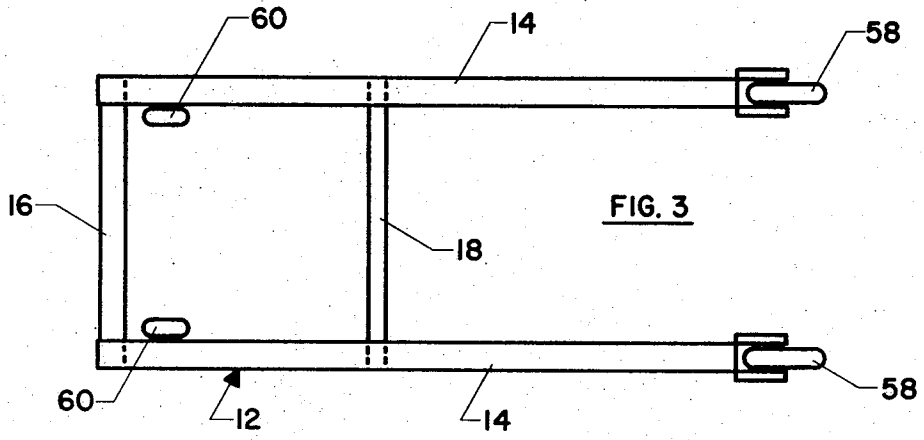


FIG. 2





PORTABLE HOIST

BACKGROUND OF THE INVENTION

This invention relates generally to a crane or hoist and more specifically to a portable, reduced in size, crane that is easily moveable, is small in shape and stature, with increased lifting power.

In recent years, the building construction boom using poured concrete, and the like, has increased the number of high-rise buildings under construction. In the past, it has been common to use a large boom that is mounted on the top floor and is raised as the building increases in height, requiring time and expense in the movement of the boom. Applicant's invention eliminates the necessity for using a large boom by providing a small portable crane which may be easily moved to desired locations at the construction site.

BRIEF DESCRIPTION OF THE INVENTION

A portable crane comprising a rigid structural frame having a plurality of wheels mounted thereon, including a locking means for locking the wheels in place, a vertically disposed mast rigidly mounted on said supporting frame, a plurality of mast braces coupling said frame to said mast for supporting the mast in a vertical position, a boom telescopically extendable to a plurality of six positions, a boom pin for manually locking said boom in one of a plurality of possible extended positions, said boom rotatably coupled to said vertically disposed mast, a boom lifting mechanism coupled between said mast and a position between the ends of said boom, said boom lifting device being hydraulically actuated for raising and lowering the boom, and a means for providing hydraulic fluid pressure to said boom driving mechanism. The boom may be controlled by a hand or electrical pump which provides the hydraulic fluid under pressure for raising and lowering the boom. The structural frame is rectangular. The vertical mast is disposed adjacent one end of the structural frame with the boom disposed parallel to and coupled at the same end thereby providing a center of gravity along or toward one end of the entire device.

In operation the boom is wheeled to a desired location such as adjacent the edge of a floor in a building under construction. The wheels are locked in place and the telescopic boom is adjusted by removing the pin and pulling out the extension to the desired location and inserting the pin for locking the boom position. Straps may then be attached to the free end of the boom extension and then down to the object to be lifted. The boom is then driven and lifted to the desired position. The wheels may be unlocked and the device moved manually to a desired location.

It is an object of this invention to provide a portable crane which may be moved about a construction site and is capable of moving heavy objects.

It is another object of this invention to provide a portable crane having a manually actuated boom extension which may be lengthened or shortened to a plurality of predetermined positions.

And yet another object of this invention is to provide a portable crane having a center of gravity disposed adjacent one end.

And still yet another object of this invention is to provide a portable crane that is supported on a plurality of wheels that may be locked or unlocked in a position al-

lowing the crane to be moved about a construction site to and from objects to be moved.

And still yet another object of this invention is to provide an electrically driven portable crane unit having plug-in cable for use on a construction site and an electrically actuated or driven control unit for movement of the boom.

In accordance with these and other objects which will be apparent hereinafter, the instant invention will now be described with particular reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a side elevation view of Applicant's invention including various boom extension positions.

FIG. 2 shows a front elevation view of Applicant's invention.

FIG. 3 shows a plan view of the supporting frame of Applicant's invention.

FIG. 4 is a schematic of the hydraulic system of Applicant's invention.

PREFERRED EMBODIMENT OF THE INVENTION

Referring now to the drawings, and especially FIG. 1, Applicant's portable crane is shown, generally at 10, comprised of a rigid structural supporting frame 12 horizontally disposed having parallel horizontal braces 14 coupled to cross braces 16 and 18 in a rectangular fashion. Rotatably coupled to the side frame members 14 are mast end wheels 58 and free end wheels 60 which are smaller. Rigidly coupled vertically to frame cross brace 18 is the main structural mast 20. The vertically disposed mast 20 is fixed and supported by vertical braces 52 mounted on each side of the mast and coupled to the mast by joints 54 and at the opposite end of the braces to the structural frame 16.

Rotatably coupled at one end of the vertical mast is a boom 22 coupled at joint 24 and moveable through an angle α of approximately 70° which includes a position above the horizontal to one below the horizontal. The boom has a second section 26 that is disposed within section 22 and is telescopically moveable to an extended position as shown in FIG. 1 and is retained in that position by a boom pin 32 which is coupled down through the boom section 22 and through holes in extension 26. A plurality of positions may be provided by providing appropriate holes in the boom extension 26 for receiving the boom pin. An attaching device 28 with an aperture 30 is rigidly fixed to the end of the extension 26 which may receive lifting belts used to couple an object to be lifted.

The boom is driven and retained in position by a hydraulic mechanism which includes tube 34, a hydraulic piston inside said tube and the piston extension 36 coupled to a moveable joint 38, rigidly fixed to the boom. Fluid under pressure in the piston chamber 34 drives the piston and extension 36 up or down, allowing the boom to move through angle α .

The hydraulic mechanism is actuated by a hydraulic motor 42 coupled to the hydraulic chamber 34 by conduit 44. The entire hydraulic mechanism is supported by joint coupling 40 which is attached adjacent the base of vertical mast 20. The hydraulic motor 42 is connected to frame 50 which supports control device 46 including hydraulic control handle 48 for actuating and controlling the electric motor. This housing is mounted on structural frame 12. By placing all the weight of the

driving mechanism, housing 50, the vertical boom and the braces near one end of the structural frame 12, the center of gravity is effectively placed as far from the boom extension end 28 as practicable. This will allow for increased lifting loads without movement of the structural frame from the floor.

FIG. 2 shows Applicant's device 10 and the pair of mast braces 52 coupling frame members 14 to the mast 20 at joints 54. The joints are essentially flange members rigidly fixed to the mast. The boom driving mechanism 34 is shown with extension 26 coupled to a rotatable joint having a cross pin 38 coupled through extending flanges located on the underside of the boom 22. The boom extension 26 has attached at the free end the lifting and coupling plate 28 with aperture 30. The boom is pivotally attached to the vertical mast 20 by pin 24 which permits rotation of the boom through the angular position shown in FIG. 1. The driving mechanism for the boom is supported by the pin 40. The support structure 50 houses the motor contained therein, having a plurality of panels, with the control mechanism mounted on top of the housing for easy access by the operator.

The control mechanism is comprised of a hydraulic control handle 48 which adjusts the hydraulic flow to the boom extension chamber 34 allowing the amount of force or pressure to be varied within the piston chamber itself. The actual control of the mechanism may be done either by controlling the speed of the electric motor driving a hydraulic pump or by changing the pressure in the hydraulic pump itself.

The structural frame support rides on a pair of front wheels 58 and a pair of slightly smaller rear wheels 60. The front wheels 58 rotate on axle 62 which is coupled to extending flanges rigidly attached to the cross frame which house a wheel unit. Wheel locks may be provided which hold and prevent the wheels from rotating whenever the crane is in operation.

The structural frame (FIG. 3) is comprised of a pair of parallel structural members 14 rigidly coupled near the mid-section and at one end to structural cross-members 18 and 16 respectively. The wheels are coupled at the ends of members 14. The mast and driving mechanism are mounted between cross-brace 18 and the end cross-brace 16. Thus the center of gravity of the unit would be somewhere between cross-brace 18 and the end unit 16.

Fig. 4 shows the operation of an electrical hydraulic driving mechanism which allows the boom to be driven either upward or downward by hydraulic pressure that is kept under pressure in a closed system. The heart of the system is an electrically driven hydraulic pump 70 which maintains a constant fluid pressure at all times in the system from the pump to the valve box 62. The constant pressure is provided in order to drive the boom in either direction, up or down. A reservoir tank 68 provides for the supply of hydraulic fluid or oil for the system. Fluid under constant pressure is received by the valve box 62 which is positioned into various valve settings by the motorized unit 64. An electrical control button or panel provides for the positioning of the motorized unit which positions the valve for a particular line. The valve may be positioned to allow fluid to flow through line A into the piston chamber 60 which would force the boom upward and allow fluid to return in line B and then back through line C under pressure and into tank 68. In the other position fluid flows through line

B striking the piston on the opposite side retracting the boom and forcing out line A and also back into line C, into the filter 72, and back to the reservoir tank 68. When both valves into lines A and B are closed, the pump 70 applies continuous pressure into the valve 62 and back through line C completing the circuit. A hand pump 66 is also in the line and may be utilized to apply pressure similar to that supplied by pump 70. A check valve 74 is hand adjustable which allows the by-pass flow to be varied. A shut-off valve is employed downstream of the boom piston assembly.

To operate the telescopic boom, the boom pin is manually removed and the boom extension is slideably moved to its desired position. The pin is reinserted through the boom and the extension, locking the extension in place.

The portable crane may be operated by connecting the electric motor into an on site electrical outlet. The crane is ready for use and can be moved and operated anywhere around the construction site.

The instant invention has been shown and described herein in what is considered to be the most practical and preferred embodiment. It is recognized, however, that departures may be made therefrom within the scope of the invention and that obvious modifications will occur to a person skilled in the art.

What I claim is:

1. A portable crane comprising:

- a structural frame;
- a first pair of wheels coupled to one end of said frame;
- a second pair of wheels coupled to the opposite end of said frame;
- said frame comprising a first pair of rigid parallel structural members;
- first pair of cross-members, the first of said cross-members coupled perpendicularly at one end of each said structural frame member, a second cross-member coupled substantially near the mid-section between said first structural frame members whereby the cross-members and portions of the structural frame side members form a rectangular portion;
- a vertical support member obliquely coupled to said middle cross-member bar;
- a boom rotatably coupled to one end of said vertical structural member;
- boom lifting means obliquely coupled to said boom and said vertical support member for moving the boom through an angular distance;
- extension means coupled within said boom for extending the length of said boom;
- lifting means coupled to the end of said boom extension for coupling to an object to be lifted;
- means for locking at least one of said wheels to prevent rotational motion of said wheel relative to said structural frame;
- said boom lifting means includes a hydraulic chamber, a hydraulic piston moveably engaged within said chamber, a structural member coupling said piston to said boom;
- means for providing hydraulic fluid into said piston chamber for raising said boom;
- said hydraulic means includes an electric motor, said motor connected to hydraulic pump, and a hydraulic fluid reservoir coupled to said pump and into said piston chamber, said hydraulic chamber cou-

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pled at one end to said vertical supporting structure
and at the other end to a midpoint on said boom;
and
a pair of supporting rails, each of said rails coupled

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obliquely at its lower end to said frame and at its
upper end to the lateral side of said vertical support
member.

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