April 23, 1957 L. J. WOLF 2,789,716

MOBILE PIPE HANDLING MECHANISM

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Fig. 1.

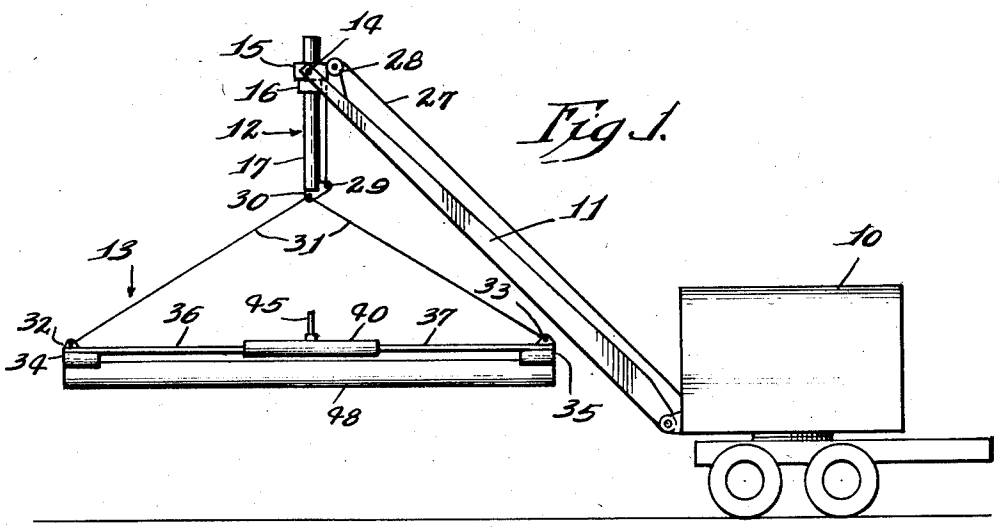


Fig. 2.

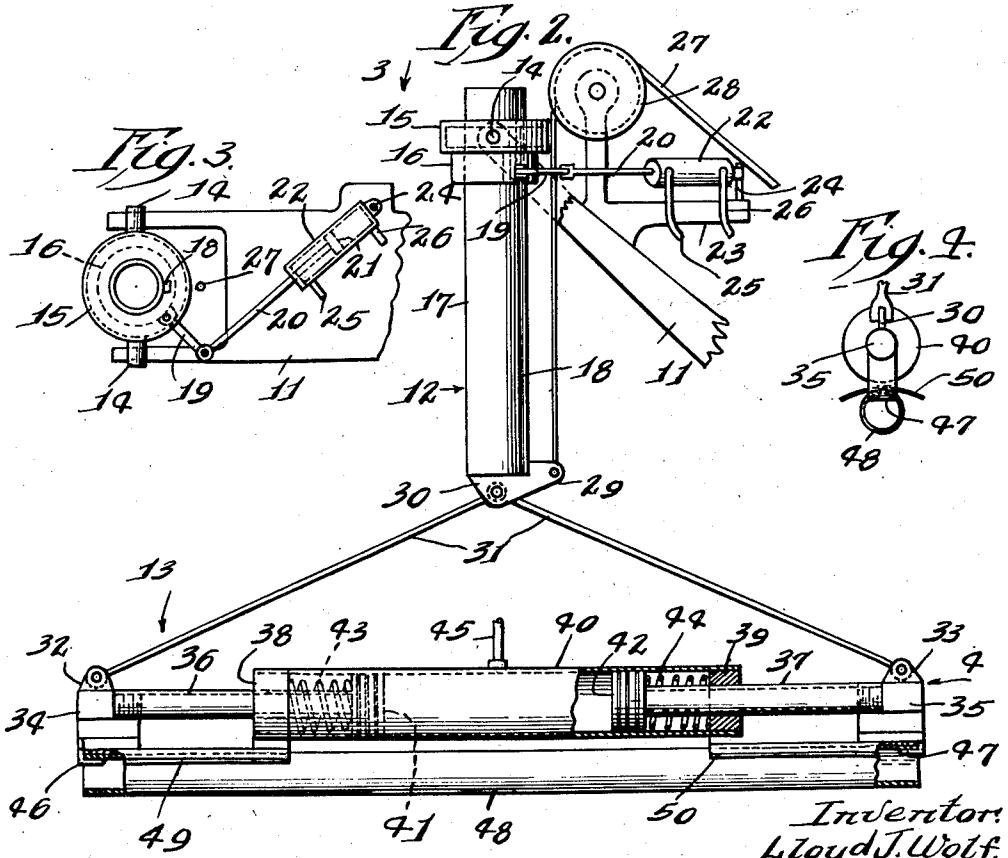


Fig. 3.

Fig. 4.

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MOBILE PIPE HANDLING MECHANISM

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4 Claims. (Cl. 214—658)

My invention relates to pipe handling mechanism and is primarily concerned with a device for either stacking lengths of pipe or removing such lengths from a stack for deposit in any location.

The mechanism is more particularly intended for the handling of pipe having a size that cannot be conveniently manually lifted. In the oil fields, for example, pipe lengths may run from twenty to forty feet and their handling normally requires a crane with an operator and an inverted Y-shaped cable suspension hanging from the end of the crane boom. The ends of the suspension include two hooks which are engaged with the respective ends of the pipe and the handling of these hooks requires two additional men.

It is therefore the principal object of my invention to provide a pipe handling mechanism that may be supported by the crane boom and controlled by the crane operator, including swinging of the mechanism into operative relation to and hooking engagement with a length of pipe.

These and further objects of the invention will be set forth in the following specification, reference being had to the accompanying drawing, and the novel means by which the objects are effectuated will be definitely pointed out in the claims.

In the drawing:

Fig. 1 is a diagrammatic elevation of the mechanism supported and adapted to be controlled from a conventional crane, in this instance one of the mobile type, and certain parts being omitted for the sake of clearness.

Fig. 2 is an enlarged elevation, partly in section, of the positioning and hooking assemblies of the mechanism.

Fig. 3 is a plan view of the positioning assembly looking in the direction of the arrow 3 in Fig. 2, the pulley being omitted.

Fig. 4 is an end view of the hooking assembly looking in the direction of the arrow 4 in Fig. 2.

Referring to Fig. 1, the numeral 10 designates a mobile crane having the usual pivoted and controlled boom 11. From the outer end of the boom is freely suspended a positioning assembly generally indicated by the numeral 12 and from the latter is freely suspended a pipe hooking assembly generally indicated by the numeral 13. The details of these assemblies are more clearly shown in Figs. 2 to 4 to which reference will now be made.

The outer end of the boom 11 is forked to pivotally support trunnions 14—14 which extend oppositely and horizontally from a collar 15 that is counterbored from the top to receive the upper shouldered portion of a collar 16 which depends below the collar 15. The fit of the collar 16 within the collar 15 is such that the former may freely rotate within the latter for a purpose presently explained.

A pipe 17 is vertically slidable through the collars 15 and 16 and has externally attached a longitudinal key 18 which fits within a corresponding keyway in the collar 16 so that rotation of the latter will effect a corresponding movement of the pipe 17. This movement is accomplished by means of a radial arm 19, one end of which is fast to the collar 16 while the other end is pivotally connected to one end of a piston rod 20 which connects with a double acting piston 21 reciprocable within a cylinder 22. The closed end of this cylinder is conveniently supported on a bracket 23 mounted on the boom 11, such as a pivotal connection to a post 24 on this bracket. Air hoses 25 and 26 connect the opposite ends of the cylinder 22, respectively, with a suitable source of air pressure on the crane 10 so that by means of a conventional control (not shown), the piston 21 may be shifted in either direction to effect rotary movements of the pipe 17.

Vertical movements of the pipe 17 through the collars 15 and 16 are accomplished by a cable 27, one end of which extends to conventional reeling and unreeling mechanism (not shown) mounted in the cab of the crane while the other end extends over a pulley 28 on the crane boom and downwardly in parallel relation to the pipe 17 and its extremity is fast to a laterally extending eye 29 on this pipe.

A second eye 30 extends downwardly from the lower end of the pipe 17 in generally coaxial relation thereto and the adjacent ends of a pair of stiff eye rods 31—31 are connected thereto for pivotal movement in a vertical plane. These rods constitute the supporting elements of the hooking assembly 13 relative to the positioning assembly 12.

The other ends of the rods 31 are connected in a pivotal manner to spaced eyes 32 and 33 carried by plugs 34 and 35 which are threaded in the outer ends of tubes 36 and 37 that slidably extend through the bushed ends 38 and 39, all respectively, of a cylinder 40. The inner ends of the tubes 36 and 37 carry pistons 41 and 42 positioned in opposed relation and biased in the inward position shown in Fig. 2 by springs 43 and 44 interposed between the bushed end 38 and the piston 41 and the bushed end 39 and the piston 42, all respectively. A hose 45 connects the portion of the cylinder 40 between the pistons 41 and 42 with a source of air pressure under conventional valving control such that when the pressure is admitted to the cylinder 40, the pistons 41 and 42 are shifted outwardly towards the ends of the cylinder and when the pressure is removed, the pistons are spring returned to the retracted positions shown.

Depending from the plugs 34 and 35 are oppositely related hooks 46 and 47 which are intended to engage with the opposite ends of the pipe 48 which is to be moved. When pressure is supplied to the cylinder 40, the hooks 46 and 47 are shifted so that the distance between them is greater than the length of the pipe 48. To assist in locating the hooks 46 and 47 with respect to the latter pipe, the plugs 34 and 35 also carry downwardly curved, guide plates 49 and 50, respectively, which are rested on the top of the pipe 48 while the hooks 46 and 47 are in their fully extended position.

To lift the pipe 48, the crane operator rotates the pipe 17 until the hooking assembly 13 is generally aligned with and above the pipe 48, pressure being then or prior thereto admitted to the cylinder 40 so that the hooks 46 and 47 are in their extended position. The cable 27 is then unreeled to drop the hooking assembly 13 sufficiently to rest the guide plates 49 and 50 on the top of the pipe 48 and when the air pressure is exhausted from the cylinder 40, the springs 43 and 44 will effect engagement of the hooks 46 and 47 with the ends of the pipe 48. Some minor rotary adjustment of the pipe 17 may be necessary to insure the hooking engagement, but, in any case, all control is exercised by the crane operator. Further, the fact that the hooks 46 and 47 connect through the tie rods 31 with the common eye 30 which

is centrally located with respect to the ends of the pipe 48 insures continued engagement of the hooks with the pipe during lifting by the cable 27.

To deposit the lifted pipe in the desired position, it is merely necessary to rotate the pipe 17 until the hooking assembly 13 is generally above this position and to lower the latter by the cable 27. Air pressure is then supplied to the cylinder to disengage the hooks 46 and 47 whereupon the assemblies 12 and 13 are simultaneously lifted by the cable 27.

Standard pipe lengths are generally twenty, forty and sixty feet and the hooking assembly 13 can be easily conditioned to meet these requirements. For example, considering the assembly 13 as accommodating a twenty foot pipe, longer lengths thereof can be handled by appropriately different lengths of tie rods 31 and by employing one or more spacer tube sections between the plug 34 and tube 36 and between the plug 35 and tube 37. The connection of the tie rods 31 to the plugs 34 and 35 which, for any given pipe 48, always lie immediately adjacent the ends of this pipe, respectively, serves to stabilize and provide better control on the handling of the pipe.

I claim:

1. Pipe handling mechanism comprising a positioning assembly adapted for support from the boom of a crane to hang in a substantially vertical position and including a cylindrical member, means for rotating the cylindrical member about its vertical axis, and a hooking assembly supported from and swingable by the cylindrical member including a cylinder, opposed pistons operable in the cylinder and each having a fixed hook connected thereto for engaging the ends of a pipe, means for supplying pressure to the cylinder to shift the pistons away from each other and the hooks to disengaging position, and means for shifting the pistons to engage the hooks when the pressure is relieved.

2. Pipe handling mechanism comprising a cylindrical member adapted for support from the boom of a crane to hang in a substantially vertical position, means for rotating the member in either direction about its vertical axis, and a hooking assembly supported by the cylindrical member at a point intermediate with respect to and above the hooking assembly and swingable by the cylindrical member, the hooking assembly including a cylinder, opposed pistons operable in the cylinder and each having a fixed hook connected thereto for engaging the ends of a pipe, means for supplying pressure to the cylinder to shift the pistons away from each other and the hooks to disengaging position, and means for shifting the pistons to engage the hooks when the pressure is relieved.

3. Pipe handling mechanism comprising a positioning assembly adapted for support from the boom of a crane to hang in a substantially vertical position, means for rotating the positioning assembly about its vertical axis, a hooking assembly supported and swingable by the positioning assembly and including hook members movable between positions engaging and releasing the ends of a cylindrical pipe, and curved guide plates carried by the ends of the hooking assembly, respectively, and adapted to rest and position the latter assembly on the pipe to facilitate engaging of the hooking members.

4. Pipe handling mechanism comprising a cylindrical member adapted for support from the boom of a crane to hang in a substantially vertical position, means for rotating the member in either direction about its vertical axis, and a hooking assembly supported by the cylindrical member at a point intermediate with respect to and above the hooking assembly and swingable by the cylindrical member, the hooking assembly including an elongated cylinder, opposed pistons operable in the cylinder and each having a fixed hook connected thereto for engaging the ends of a pipe, stiff rods having a common connection at their adjacent ends to said point on the cylindrical member and flaring downwardly and outwardly for connection to the hooking assembly adjacent the hooks, respectively, means for supplying pressure to the cylinder to shift the pistons away from each other and the hooks to disengaging position, and means for shifting the pistons to engage the hooks when the pressure is relieved.

References Cited in the file of this patent

UNITED STATES PATENTS

477,621	Bulmer	June 21, 1892
1,834,499	Richter	Dec. 1, 1931
2,375,747	Brown	May 15, 1945
2,577,689	Morin	Dec. 4, 1951
2,584,870	Hally	Feb. 5, 1952
2,617,548	Falkner	Nov. 11, 1952
2,699,879	Bertram	Jan. 18, 1955