

May 10, 1927.

J. S. WALCH

1,628,084

LIFTING DEVICE

Filed July 30, 1925

2 Sheets-Sheet 1

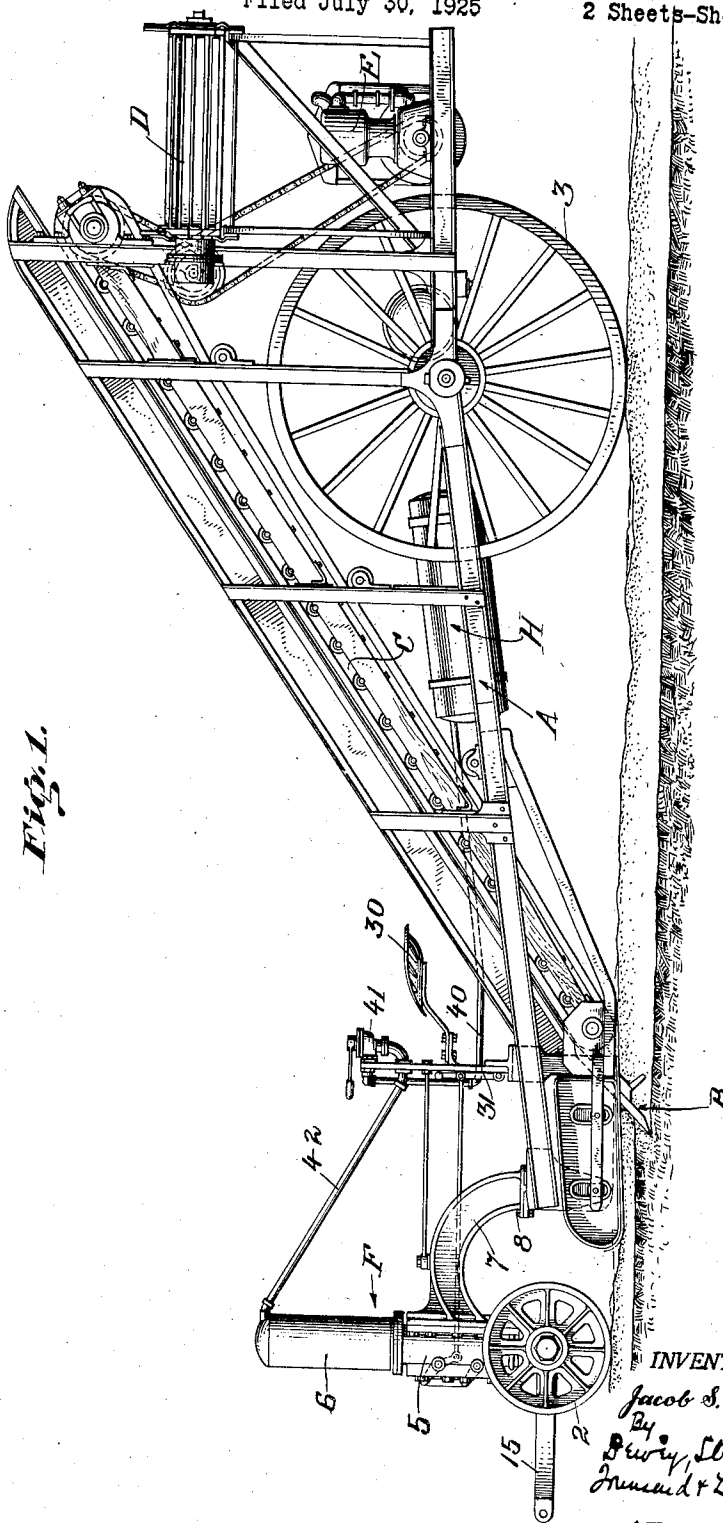


Fig. 1.

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Fig. 2.

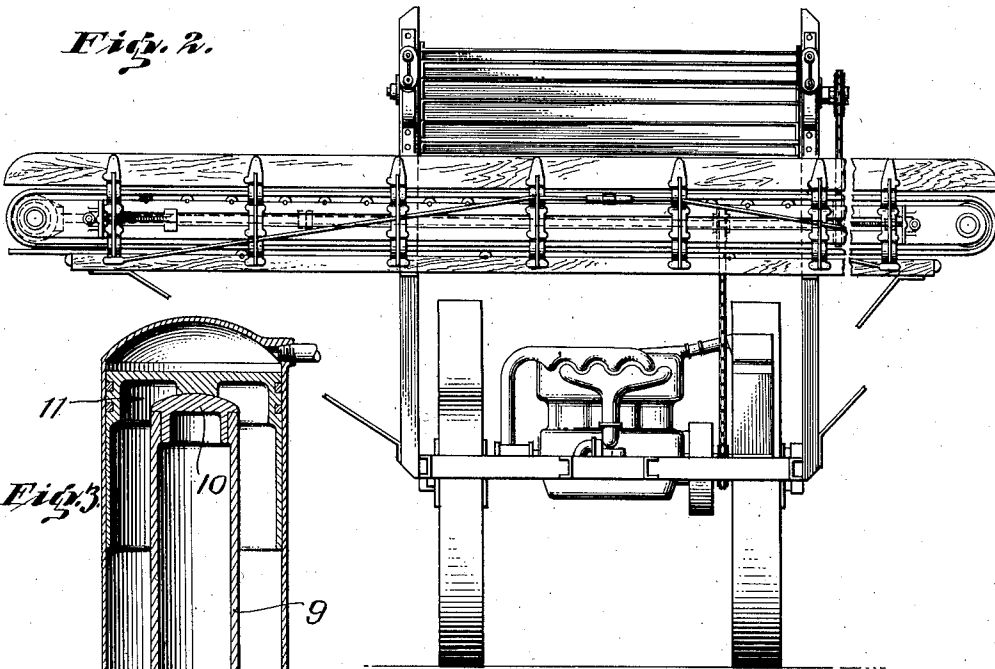


Fig. 3.

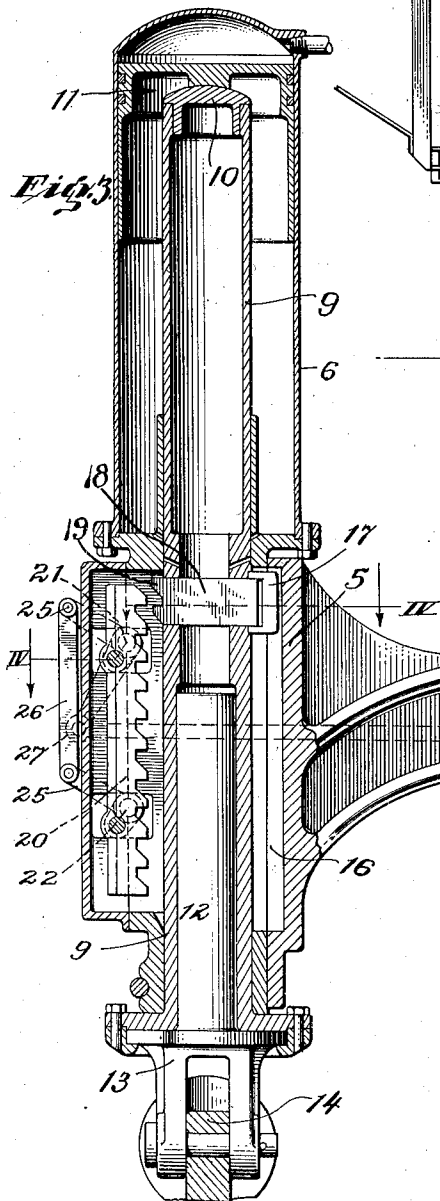
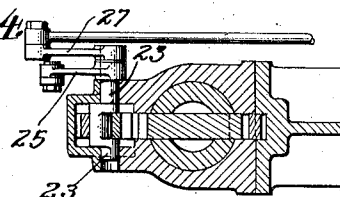


Fig. 4.



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LIFTING DEVICE.

Application filed July 30, 1925. Serial No. 47,050.

This invention relates to a lifting mechanism and especially to a fluid actuated lifting or elevating mechanism adapted for use on digging or excavating machines and the like.

In my co-pending application entitled Ditch digging machine, filed July 30, 1925, Serial No. 47,051, a machine is illustrated which is particularly adapted for digging or excavating irrigating ditches or the like. A machine of this character is connected to a tractor and drawn thereby, and it is exceedingly important that the digging implement be quickly and readily raised and lowered as the tractor and the machine advance, as large rocks, boulders, and other obstructions are often encountered.

The object of the present invention is to provide mechanism whereby raising or lowering of the digging implement may be quickly and readily accomplished as the machine advances, and particularly to provide a mechanism whereby air or another fluid under pressure may be employed as the actuating medium so that the operation of raising or lowering the implement may be controlled by the operator through a valve mechanism, and further to provide a mechanical locking mechanism whereby the digging implement may be positively locked in any raised or lowered position.

One form which my invention may assume is exemplified in the following description and illustrated in the accompanying drawings, in which—

Fig. 1 is a side elevation of a ditch digging machine showing the application of the lifting mechanism which forms the subject matter of the present application.

Fig. 2 is an end view of the digging machine.

Fig. 3 is a central vertical section through the fluid actuated lifting mechanism.

Fig. 4 is a cross section on line 4—4 of Fig. 3.

Referring to the drawings in detail and particularly to Figs. 1 and 2, A indicates the main frame of a digging machine which in this instance is supported by front and rear wheels as indicated at 2 and 3 respectively. The frame together with the wheels forms a support for a digging implement generally indicated at B, a pair of elevators for removing the soil as indicated at C and D, a motor or other suitable device E whereby power is transmitted to continuously drive

the elevators, and it also forms a support for a lifting or elevating mechanism generally indicated at F. This mechanism forms the subject matter of the present application and will be described in detail.

Referring to Fig. 3, it will be noted that the lifting mechanism consists of a head member 5 on the upper end of which is mounted a cylinder 6. The head member 5 is connected to the forward end of the main frame A by means of a goose neck or bracket arm 7, and it is rigidly secured to the frame A as indicated at 8. Extending through the head member 5 which is hollow and projecting upwardly into the cylinder is a tubular shaft 9. The upper end of the shaft is closed by a swivel head 10 and it supports a piston generally indicated at 11. Mounted in the lower end of the tubular shaft and turnably mounted therein is a king pin 12. The lower end of this pin is forked as at 13 and a transverse shaft or axle 14 is pivotally mounted in the fork. This axle carries the front wheels 2 and it also carries a draw bar 15 whereby the machine as a whole is connected to a tractor. The king pin as previously stated is turnably mounted in the tubular shaft 9 so that the axle 14 may whirl when rounding a curve or the like. It is, however, necessary to lock the tubular shaft 9 against rotation and this is accomplished by forming a key-way in the rear side of the head as shown at 16.

A key 17 carried by the tubular shaft enters the key-way and thus secures the shaft against rotation. The necessity of securing the shaft against rotation is due to the fact that mechanical locking mechanism is employed. This locking mechanism consists of a block 18 in the forward side of which are formed teeth 19. This block cooperates with a rack bar 20 which is carried by a pair of eccentrics or crank pins generally indicated at 21 and 22. These pins are journaled in the head member as at 23 (see Fig. 4) and the outer end of each pin is provided with a crank arm 25. These arms are connected by a link 26 so that they may be swung in unison. The upper crank pin 21 carries in addition to the crank arm 25 a second crank arm as indicated at 27. This arm is connected with a link 28 which extends rearwardly to the operator's seat shown at 30. It is here connected with the operating lever. As the operating lever is pulled toward the

seat, swinging movement is imparted to the crank arms 25 in unison and also to the crank pins 21 and 22, and as the rack bar 20 is carried thereby it will be swung inwardly and into engagement with the teeth 19 of the block 18, thus forming a mechanical interlock which will permit movement of the head 5 and the cylinder 6 with relation to the shaft 9 and the piston 11 as will hereinafter be described.

The piston 11 as previously stated is supported by the swivel head 10 for the purpose of permitting free alignment between the cylinder and the piston. The swivel head 10 is carried by the tubular shaft 9, the axle 14, and the front wheels 2, and as such forms a stationary member upon which the head 5 and the cylinder 6 are movable. To impart movement to the cylinder 6 in the head, a fluid under pressure is employed, such as compressed air. This may be contained in the tank such as shown at H which is maintained in a charged condition by an air compressor or the like operated from the engine. An air line passes from the tank H as indicated at 40 to a valve 41. A second air line 42 connects the valve with the upper end of the cylinder. Movement of the valve in one direction will admit air under pressure to the upper end of the cylinder and as the piston is relatively stationary it is obvious that the cylinder together with the head member 5 will be raised in a vertical direction, and as the forward end of the frame is connected to the head by means of the bracket 7 upward movement will also be transmitted to the forward end of the frame and the digging implement carried thereby. By turning the valve to another position, the air is permitted to exhaust and the forward end of the frame together with the digging implement may be dropped to any depth desired.

In actual operation, a digging implement of this character is attached to a tractor and is drawn thereby. The cylinder 6, the head member 5, and the forward end of the frame A carrying the implement B is adjusted so that a cut of desired depth may be made. After the adjustment has been made, it is possible to lock the mechanism by swinging the rack 20 into engagement with the teeth 19 on the block 18. This insures a positive lock between the shaft 9 and the head, and a cut of uniform depth will be maintained. If, during operation, boulders, rocks, or other obstructions are encountered, it is obvious that it will be necessary to raise the digging implement to avoid the obstruction. This is quickly and readily accomplished by merely turning the air valve so that air under pressure will be admitted. This will impart a quick and rapid upward movement to the cyl-

inder, the head 5, and the forward end of the frame which carries the digging implement, and the obstruction is thus cleared; and it may be just as rapidly lowered after the obstruction is cleared by merely releasing or exhausting the air through the valve. It is then possible to reengage the rack and the teeth 19 and thus again positively lock the digging implement when a cut of desired depth is reached.

While the lifting mechanism as here illustrated has been illustrated and described in connection with a specific form of digging implement, it is obvious that it may be employed with a variety of implements of this character, and while certain features of the invention have been more or less specifically described it should be understood that changes may be made within the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. The combination with a frame supported by front and rear wheels and a digging implement carried by the frame, of a fluid actuated lifting mechanism interposed between the frame and the front wheels, said mechanism comprising a cylinder secured to the frame, a piston within the cylinder, a rod forming a connection between the piston and the front wheels, means for admitting a fluid, under pressure, to the cylinder and on top of the piston to raise the cylinder and the frame with relation to the piston and the wheels, said means also capable of exhausting said fluid to permit the cylinder and frame to be lowered with relation to the piston and wheels, locking teeth carried by the piston rod, a rack bar carried by the cylinder and having teeth adapted to engage the locking teeth on the piston rod to form a positive lock between the piston and the cylinder, and means for moving the rack bar into or out of engagement with the teeth on the piston rod.

2. The combination with a frame supported by the front and rear wheels and a digging implement carried by the frame, of a fluid actuated lifting mechanism interposed between the frame and the front wheels, said mechanism comprising a cylinder secured to the frame, a piston within the cylinder, a rod forming a connection between the piston and the front wheels, means for admitting a fluid, under pressure, to the cylinder and on top of the piston to raise the cylinder and the frame with relation to the piston and the wheels, said means also capable of exhausting said fluid to permit the cylinder and frame to be lowered with relation to the piston and wheels, locking teeth carried by the piston rod, a rack bar carried by the cylinder, a pair of crank shafts mounted on the cylinder and support-

ing the rack bar, said crank shafts when in one position causing inward movement of the rack bar so that the teeth thereof will engage the locking teeth and form a positive lock between the cylinder and the piston, and means for rotating the crank shafts in unison to move the rack bar into or out of locking engagement with the teeth on the piston rod.

3. The combination with a frame supported by front and rear wheels and a digging implement carried by the frame, of a fluid actuated lifting mechanism interposed between the frame and the wheels, said mechanism comprising a head member secured to the frame, a cylinder supported on the upper end of the head member, a piston in the cylinder, a rod extending through the cylinder and the head and connecting the piston with the front wheels, a swivel connection between the rod and the front wheels, a locking member carried by the rod, a pair of crank shafts extending through the head, a rack bar mounted on the cranks of said shafts, said cranks when assuming one position forcing the rack bar into locking engagement with the locking member on the piston rod, and means for rotating the crank shafts in unison to move the rack bar into and out of locking engagement.

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