

June 16, 1942.

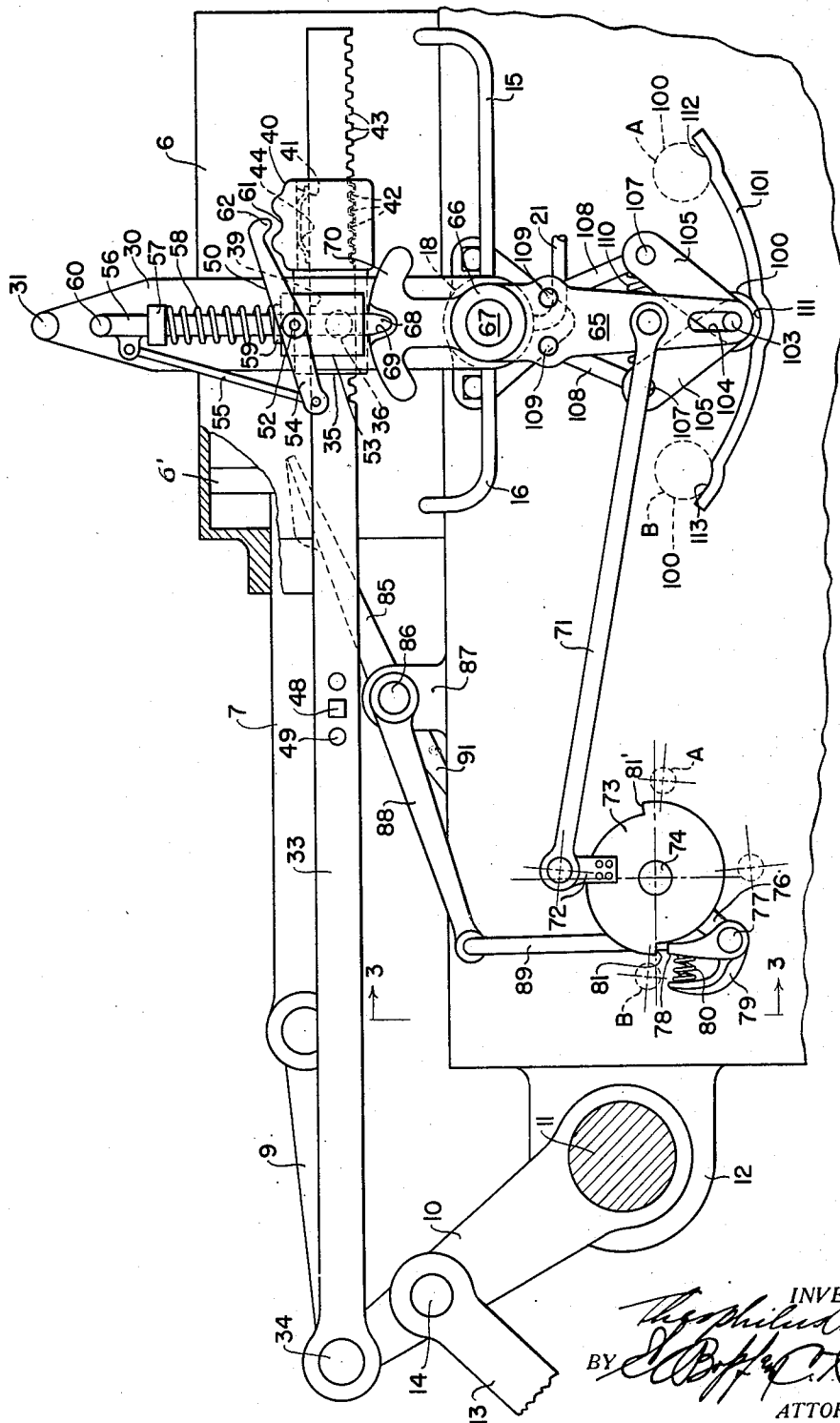
T. BROWN

2,286,256

HYDRAULIC MECHANISM

Filed Feb. 7, 1941

2 Sheets-Sheet 1



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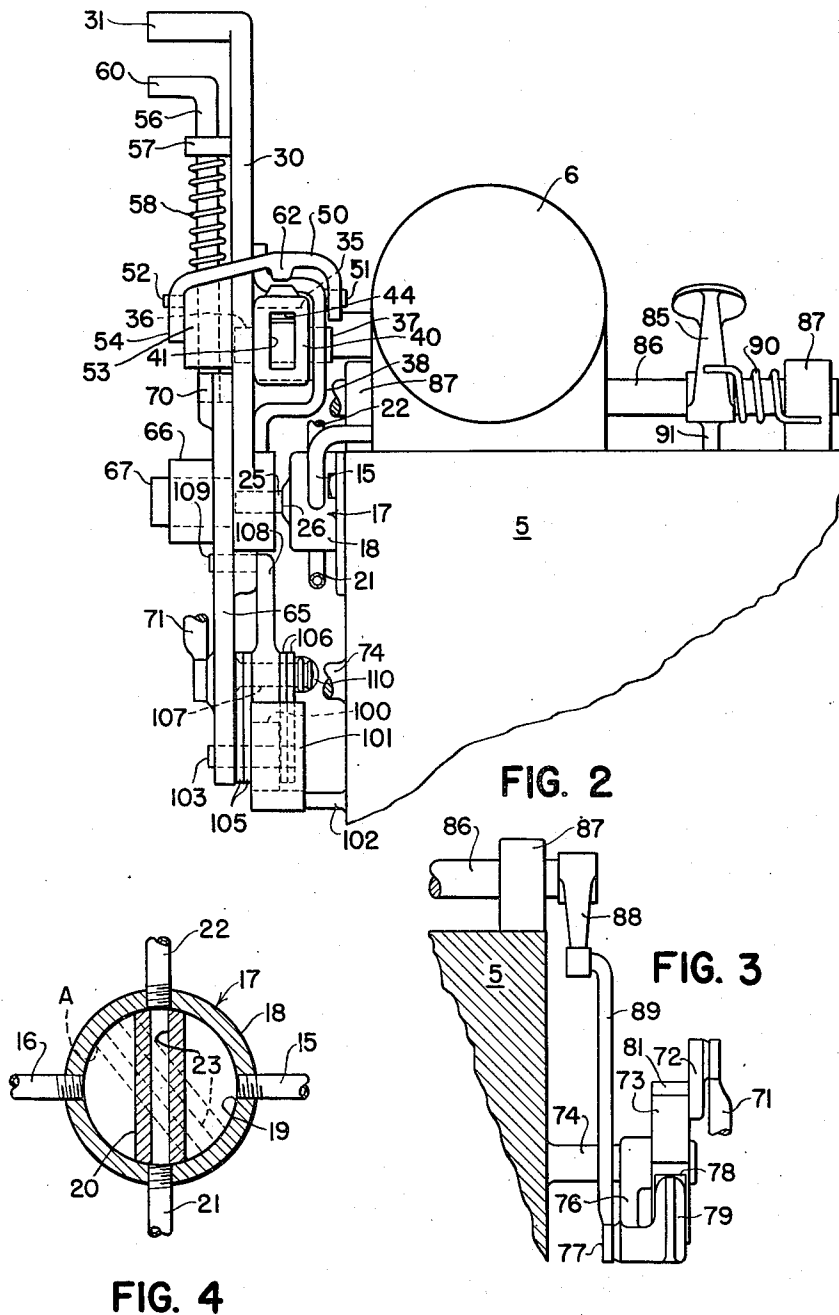
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,286,256

HYDRAULIC MECHANISM

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Application February 7, 1941, Serial No. 377,838

14 Claims. (Cl. 121—38)

The present invention relates generally to hydraulic mechanisms and more particularly to a new and improved hydraulic mechanism for tractors and the like for use as power lift mechanism therefor, and is in the nature of an improvement over the hydraulic mechanism shown and described in Patent 2,107,760, granted February 8, 1938 to McCormick et al.

The mechanism disclosed in the above-mentioned patent comprises a foot pedal control for a hydraulic type power lift, so arranged and constructed that a single actuation of a foot pedal causes a movement of the piston in the cylinder over a fixed range, and in which the valve mechanism is shifted back to a neutral position to stop the piston at the end of its range. This operation can be applied to lift a ground engaging implement to a transport position on the tractor. A second actuation of the foot pedal causes the piston to travel back to the original position to return the implement to the ground. This characteristic, of performing a complete cycle of operation upon a single actuation, without further attention from the operator, is desirable in certain farming operations such as cultivating, for when the tractor reaches the end of a row, the implements must be raised, the tractor turned sharply around, and the implements again lowered, all in a very short time, so that any unnecessary operations or the necessity for accurate adjustments, would greatly interfere with the control of the tractor.

Inasmuch as a power lift piston using this type of control has a fixed range of operation, adjustments in depth of operation must be made by external linkages between the piston and the implements. Although power lift mechanisms are known in the art, which have double acting pistons adapted to force implements down to any desired depth and hold them in such position, this must be accurately adjusted by hand each time that the implements are lowered from transport position.

It is the principal object of the present invention to provide a power lift mechanism which can be adjusted to a predetermined range of stroke, and after having once been adjusted, the piston always returns to the same desired terminal position upon subsequent actuations of a foot pedal or other control element. A manual control lever is provided for adjusting the position of the cylinder from the predetermined terminal position and at the same time starting the automatic mechanism so that upon subsequent operations of the piston, it will return to the newly

determined terminal position. A further object relates to the provision of a mechanism in which the position of the foot pedal or corresponding control element is not affected by adjustments of the piston by means of the manual control lever.

These and other objects and advantages of my invention will be apparent to those skilled in the art after a consideration of the following description, in which reference is had to the drawings appended hereto, in which:

Figure 1 is a side elevational view of a hydraulic control mechanism embodying the principles of my invention;

Figure 2 is an end elevational view of the mechanism shown in Figure 1;

Figure 3 is an end elevational view of the ratchet mechanism as viewed along a line 3—3 in Figure 2; and

Figure 4 is an elevational view taken in section through the hydraulic control valve and drawn to an enlarged scale.

Referring now to the drawings, reference numeral 5 indicates a main support, which can be a tractor or any other suitable vehicular or stationary support for a hydraulic cylinder 6 disposed in a horizontal position and within which is slidably disposed a piston 6' adapted to travel from one end of the cylinder 6 to the other. The piston is mounted on a piston rod 7 which extends out of the cylinder 6 through a suitable fluid-tight gland or bearing 8 at one end thereof. The piston rod 7 is connected by means of suitable link 9 to an arm 10 mounted on a rock shaft 11, which is journaled in a supporting bearing 12 fixed to the side of the support 5. The rock shaft 11 can be connected in any desired manner to raise and lower or otherwise manipulate an implement or the like associated therewith. Such implement connection is represented by a rod 13 having an upper end journaled on a pin 14 attached to the arm 10. By swinging the latter in a clockwise direction, the implement can be raised by force transmitted through the rod 13, and the implement can be forced into the ground by rocking the arm 10 in a counterclockwise direction. The piston is forced from right to left in the cylinder 6, as viewed in Figure 1, by introducing oil under pressure through a duct 15 connected in communication with one end of the closed cylinder 6, and the piston is forced from left to right, as viewed in Figure 1, by introducing oil under pressure through a duct 16 connected in communication with the opposite end of the cylinder

6. The oil or other fluid is controlled by means of a valve 17 comprising a cylinder casing 18 fixed by any suitable means to the side of the support 5. The casing 18 provides a valve chamber 19 within which is rotatably disposed a movable valve member 20, which is rotatable within the casing but which fits tightly enough to prevent oil from leaking around the edges of the valve member. The oil ducts 15, 16 are connected in communication with the valve chamber 19 at diametrically opposite sides of the casing 18, and a second pair of ducts 21, 22 are connected at opposite sides of the valve casing in communication with the chamber 19 and disposed on an axis substantially at right angles to the axis of the valve ducts 15, 16. The lower duct 21 is connected to the discharge end of a suitable hydraulic pump (not shown), which can be of any suitable type such as the gear type of pump shown in the aforementioned patent. The upper duct 22 is connected to the intake side of the hydraulic pump. The rotatable valve member 20 is provided with a passage 23 therethrough, which passage is disposed in register with the high and low pressure ducts 21, 22 of the pump, when the valve member is in a neutral position, as shown in Figure 3, thus providing a by-pass for the oil flowing from the pump to the valve, through the passage 23 and returning through the return duct 22 to the pump. The valve member 20 also serves as a barrier between the two cylinder ducts 15, 16, thereby locking the fluid in the opposite ends of the cylinder and preventing any movement of the piston within the cylinder.

By rotating the valve member 20 to the position indicated by A in Figure 4, the discharge duct 21 from the pump is connected in communication with the cylinder duct 16, whereby oil under pressure is forced into the left end of the cylinder and thus exerting a pressure upon the piston tending to force the same toward the right, as viewed in Figure 1. In position A of the valve member 20, the other cylinder duct 15 is connected in communication with the return duct 22 to the pump and thus permitting oil to flow from the right hand end of the cylinder 6 through the return duct 22 and back to the pump. The piston can be stopped in any intermediate position in the cylinder 6 by returning the valve member 20 to its neutral position, shown in solid lines in Figure 3, and will be locked in that position, as described above.

The rotatable valve member 20 is shifted by means of a shaft 25 connected thereto and extending axially out of the cylindrical casing 18 through a suitable oil-tight bearing 26. Rigidly fixed to the shaft 25 is a valve control lever 30, which extends vertically upward in the neutral position of the valve member 20. The upper end of the lever 30 is provided with a handle 31 by means of which the lever 30 may be rocked manually about the axis of the shaft 25. Thus, the lever 30 is rocked toward the left, as viewed in Figure 1, to cause the piston and piston rod 7 to move toward the right, and is rocked toward the right from the vertical position to effect a movement of the piston toward the left in the cylinder.

To return the valve lever 30 to a vertical neutral position at the end of a power stroke of the piston, I have provided a valve control rod 33 pivotally connected by means of a pin 34 to the end of the rock shaft arm 10, and slidably supported at its opposite end in a yoke mem-

ber 35 which is pivotally supported on the valve lever 30 on a pair of trunnions 36, 37, extending from opposite sides of the yoke member 35. The trunnion 36 is journaled in the valve lever 30 and the trunnion 37 is journaled in a hammer strap 38, which is fixed in a vertical position on the lever 30 and bent outwardly to embrace the yoke 35. The latter is provided with a central aperture 39 through which the valve control rod 33 extends and is slidably supported therein. Thus, as the piston rod 7 moves from one end of the cylinder toward the other, the valve control rod 33 slides through the yoke 35 by virtue of its connection with the piston rod 7.

An adjustable stop member 40 is mounted on the outer end of the valve rod 33 and has an aperture 41 extending therethrough to receive the rod 33. The lower side of the aperture 41 is provided with a series of teeth 42, which are adapted to interfit with rack teeth 43 provided on the bottom of the control rod 33, for the purpose of preventing the stop member 40 from sliding axially along the rod 33. The teeth 42, 43 are held in engagement by means of a spring 44, which is disposed in the upper part of the aperture 41 above the valve rod 33 and tends to urge the stop member 40 upwardly to bring the teeth into engagement. The stop member 40 can be set at any desired point near the outer end of the control rod 33 and is then adapted to move with the piston rod 7 during operation of the latter.

When it is desired to lower the implements to a predetermined depth in the ground, the control lever 30 is moved toward the right, as viewed in Figure 1, thus effecting a movement toward the left of the piston rod 7 and the valve control rod 33, until the stop member 40 engages the end of the yoke 35, whereupon further movement of the piston causes the lever 30 to be moved back to a vertical or neutral position and thus stopping the piston. By moving the stop member 40 outwardly toward the end of the rod 33, the length of stroke of the piston rod 7 can be increased and thereby increasing the depth of operation of the cultivator or other implement connected thereto, and similarly by moving the adjustable stop 40 to the left along the rod 33, the valve lever 30 can be made to return to neutral position earlier in the stroke of the piston, and thus reduce the length of stroke and consequently the depth of operation of the implement. Figure 1 illustrates the relative positions of the parts during operation of the implement. It will be noted that the adjustable stop 40 is in contact with the yoke 35, having engaged the latter to swing the control lever 30 into the present vertical position.

In the raising stroke of the piston, the valve control lever 30 is swung toward the left, as viewed in Figure 1, thereby effecting a movement of the piston rod 7 and valve control rod 33 toward the right. A second stop member 48 engages the opposite end of the yoke 35 during the raising stroke to return the valve control lever 30 to neutral position to stop the piston at the end of such stroke. Inasmuch as it is not necessary to frequently adjust the upper limit of the movement of the implement, the stop 48 comprises merely a bolt which is inserted through a suitable aperture in the valve control rod 33 and serves the purpose of engaging the yoke 35. It is occasionally desirable, however, to change the upper limit of the raising movement of the implement, inasmuch as some implements require greater clearance to avoid

hitting the body of the tractor in raised position, and for the purpose of making such occasional adjustments, a number of apertures 49 are provided in the rod 33 at spaced intervals therealong, through which the stop bolt 48 may be inserted when necessary.

To facilitate adjustment of the adjustable stop 40, a latch arm 50 is provided for engaging the adjustable stop 40 so that the latter can be moved as a unit with the valve control lever 30 when the latter is used for adjusting the position of the piston from its predetermined terminal position. The latch arm 50 is in the form of a bail, one end of which is pivotally connected to the hammer strap 38 on a pivot bearing 51, and from which the bail 50 extends around the lever 30 to a second pivot bearing 52, which is supported on a latch box 53 fixed to the outer side of the lever 30. The bail 50 extends beyond the pivot 52 to provide an actuating arm portion 54, the outer end of which is connected by a link 55 to a vertically extending latch bolt 56, disposed generally parallel to the valve lever 30 and supported for vertical sliding movement in the latch box 53 and in a bearing support 57 spaced vertically therefrom. The latch bolt 56 is urged downwardly by means of a compression spring 58 coiled about the bolt and abutting the under side of the bearing block 57. The lower end of the spring 58 acts against a flange 59 fixed to the bolt 56. The flange 59 also acts against the latch box 53 to provide a stop for the downward movement of the latch bolt 56. The upper end of the latch bolt 56 is turned outwardly to provide a handle 60 adjacent the lever handle 31, which can be gripped with the latter when the valve lever 30 is actuated. By raising the handle 60 the extension 54 of the latch arm 50 is raised through the link 55, thus moving the bail downwardly into engagement with the top of the adjustable stop member 40, the latter being formed to provide a recess 61 adapted to receive a downwardly projecting latch finger 62 formed on the lower side of the latch bail 50. Upward pressure against the handle 60 causes the bail to force the adjustable stop member 40 downwardly against the spring 44 to disengage the teeth 42 from the rack 43 on the control rod 33, after which the valve lever 30 can be swung to control movement of the piston in the cylinder 6. When the piston has been adjusted to the desired position, the lever 30 is returned to a neutral position and the handle 60 is then released, which allows the spring 58 to force the latch bolt 56 downwardly and thus releasing the latch finger 62 from the notch 61 in the adjustable stop member 40, whereupon the latter is again locked in place on the valve rod 33 by means of the teeth 42, 43. Since the adjustable stop 40 is fixed to the valve lever 30 by means of the latch arm 50 during control movements of the lever, the valve rod 33 slides through the stop member 40 during movement of the piston rod 7, so that in the finally adjusted position the stop member 40 is in a new position on the valve rod 33 in abutment with the yoke 35 and thus establishes a new terminal position of the piston rod 7, to which the latter will return during subsequent movements thereof.

The valve lever 30, however, is used only for making adjustments from the predetermined lowered terminal position of the piston, while the control for normally-raising and lowering the implement during operation is effected by mechanism which will now be described.

A second control element in the form of a lever 75

section 65 is provided with a hub 66, which is journaled on a stub shaft 67, the latter being preferably formed integrally with the valve control lever 30 and disposed coaxially with the valve shaft 25. Thus, the lever section 65 and the valve lever 30 are swingable about the same axis of rotation and are normally locked together by means of an extension 68 of the latch bolt 56 which projects below the latch box 53 into a centrally disposed notch 69 in an arcuate sector 70, which is formed integrally with the hub 66 and extends upwardly therefrom. The length of the bolt extension 68 is such that when the valve lever 30 is out of its neutral position and the bolt 56 is withdrawn, the lower end of the bolt extension 68 slides on the arcuate surface of the sector 70 and thus holds the bolt 56 in raised position and the latch finger 62 in engagement with the notch 61, thus insuring that the stop member 40 will be retained in connection with the lever 30 during manual adjustment of the piston.

The control lever section 65 is connected by means of a link rod 71 to a crank arm 72 fixed to a rotary ratchet member 73. The ratchet member 73 is rotatably supported on a stub shaft 74, which is suitably carried by the support 5. Journaled on the shaft 74 is a ratchet crank 76, the outer end of which carries a pivot pin 77, on which is journaled a ratchet dog 78. The end of the ratchet arm 76 is also curved to provide a rigid abutment arm 79 for supporting a compression spring 80 which acts against the ratchet dog 78 to force it into engagement with the outer camming edge of the ratchet member 73, the latter being provided with notches 81 adapted to engage the end of the ratchet dog 78. The ratchet arm 76 is swung through a definite arc by means of a foot pedal 85, which is rigidly fixed to a rock shaft 86 supported in laterally spaced bearings 87 on top of the main support 5. An actuating arm 88 is fixed to the outer end of the rock shaft 86 and is connected by means of a link 89 to the pin 77 on the end of the ratchet arm 76. The foot pedal 85 is normally held in raised position by means of a coil spring 90 which encircles the rock shaft 86 and acts against the lower side of the foot pedal and reacts against the bearing 87. A short stop arm 91 is provided on the foot pedal for limiting the upward movement of the latter by engaging the main support 5 when the pedal is in raised position. The main support 5 provides a limit for the foot pedal when the latter is actuated downwardly by the operator.

Pressing the foot pedal downwardly against the main support 5 raises the ratchet arm 76 through the arm 88 and link 89 and thus causes the ratchet member 73 to be rotated approximately a quarter of a revolution in a clockwise direction as viewed in Figure 1, by force transmitted through the ratchet dog 78 against one of the notches 81. This rotates the crank arm 72 through approximately a quarter of a revolution and thus swings the lever section 65 by means of the connecting link 71 through a definite angle about its axis of rotation. By virtue of the connection between the latch bolt 68 and the notch 69, the valve control lever 30 is swung with the lever section 65 and thus opens the control valve to effect a movement of the piston in the cylinder 6. Thus, movement of the crank arm 72 through a quarter of a revolution from the position shown in Figure 1, will move the lever section 65 toward the right, and the

control lever 30 toward the left, therefore effecting a movement of the piston rod 7 and valve control rod 33 toward the right to raise the implement until the stop 48 engages the yoke 35 and returns the lever to neutral position. When the valve lever is returned to neutral position the ratchet member 73 is rotated by means of the link 71 and arm 72 through another approximate quarter of a revolution and thus bringing the arm 72 to the lower side of the ratchet member 73. During this movement of the latter, the ratchet dog 78 slides on the camming surface of the member 73 and then slips into the succeeding notch 81' in the member 73 in readiness for another actuation by means of the foot pedal 85. This actuation rotates the arm 72 in a direction away from the lever 65, pulling the latter through the link 71 and swinging the valve lever 30 toward the right. The lever 30 is returned once again to neutral position when the stop member 40 engages the same, and this effects a fourth quarter revolution of the ratchet member 73 to return the same to the position shown in Figure 1.

It will be noted that when the lever section 65 is in either of its extreme positions, the crank arm 72 is in a slightly over-center position with respect to the shaft 74. This insures that when the lever section 65 is returned to central position, the ratchet member 73 will be rotated progressively in the same direction of rotation, thus avoiding a dead-center locking condition between the crank 72 and link 71. Since the top and bottom positions of the arm 72 are necessarily on the right hand side of the center line, the notch 81' must be correspondingly greater than 180 degrees behind notch 81, as indicated.

The levers 30, 65 are retained in vertical or neutral position and in both extreme positions by means of a roller 100 carried at the lower end of the lever section 65 and disposed to roll upon a track 101 which is supported on a bracket 102 fixed to the side of the main support 5. The roller 100 is provided with a shaft 103, which projects through a vertical slot 104 in the lower end of the lever 65. The roller 100 is urged against the track 101 by means of a spring biased toggle mechanism comprising a pair of upwardly diverging links 105, 106 journaled on the shaft 103 at each side of the roller 100 and connected at their upper ends to a pair of pins 107. A pair of links 108 are journaled at their lower ends on the pins 107 between the front and rear links 105, 106 and have outwardly turned upper ends 109 which are pivotally connected to the lever section 65. The two pins 107 are interconnected by a tension coil spring 110 tending to force the pins 107 together and thus press the roller 100 downwardly against the track 101. The track 101 is in the form of a circular arc having as its center the axis of rotation of the lever 65, and is provided with a recess 111 at the center thereof adapted to receive the roller 100 when the levers 30, 65 are in vertical neutral position. The spring 110 must be extended slightly in order to swing the lever 65 in either direction from the neutral position, and thus the spring serves to yieldably retain the lever in said neutral position. Each end of the arcuate track 101 is provided with a recess 112, 113 into which the roller 100 seats when the lever 65 is in either extreme position, and thus holding it in that position until the lever is engaged by one of the stop members 40, 48 to return it to neutral.

Reviewing the operation of the mechanism, 75

which is shown in the drawings as in the position in which the implements are lowered to a predetermined operating depth in the ground, the implements are raised by stepping on the control pedal 85, causing the ratchet dog 78 to move the ratchet member 73 a quarter of a revolution in a clockwise direction, and thus acting through the link 71 to swing the lever section 65 and valve lever 30 in a counterclockwise direction in which the roller 100 drops into the recess 112, corresponding to position A of the valve member 20, as illustrated in Figure 3. This connects the high pressure duct 21 with the cylinder duct 16, forcing the piston to the right and rocking the rock shaft 11 in a clockwise direction until the stop 48 engages the yoke 35 and returns the levers to a vertical position, and swinging the crank 72 downwardly something less than a quarter of a revolution. A second actuation of the foot pedal 85 rotates the ratchet member 73 slightly more than a quarter of a revolution and this pulls the lever section 65 and control lever 30 in a clockwise direction, dropping the roller 100 into the notch 113 and setting the valve member 20 in a reverse position in which the cylinder duct 15 is connected with the high pressure pump conduit 21. This effects a movement of the piston toward the left, thereby rocking the rock shaft 11 in a counterclockwise direction until the stop member 40 engages the yoke 35 and pushes the lever back to a vertical position.

Assuming now that it is desired to adjust the implement to a slightly lower working position, the latch handle 60 is raised, thus raising the lower end of the bolt 68 out of the notch 69 and forcing the latch arm 50 into the notch 61 and pushing the stop member 40 downwardly against the action of the spring 44 until the teeth 42, 43 are disengaged. The valve lever 30 is now free to move independent of the lower lever section 65, and by swinging the lever 30 to the right the valve member 20 is turned in a clockwise direction until oil is forced under pressure through duct 15 and forcing the piston and piston rod 7 toward the left, thus forcing the implements deeper into the ground. When the desired depth has been attained the lever 30 is restored to a vertical position and the handle 60 released, thereby relocking the bolt 68 into the notch 69 and also restoring the teeth 42, 43 into interengagement to secure the adjustable stop in fixed relation to the rod 33. The next actuation of the foot pedal 85 effects a movement of the piston to the right to raise the implement to the same position in which it was previously raised, with the stop 48 against the valve lever 30, but upon the next actuation of the foot pedal 85 the implement returns to the new operating depth by virtue of the fact that the adjustable stop 40 is now in a different location upon the valve rod 33, causing the piston to move a slightly greater distance in the cylinder 6 than in the previous actuation of the foot control. If it is desired to raise the implements to a greater height, the stop bolt 48 is moved to an aperture 49 spaced to the left of its present position, and if it is desired to decrease the height to which the implement is raised, the bolt 48 is moved to an aperture 49 spaced to the right of the present location.

I do not intend my invention to be limited to the details of the embodiment shown and described herein, except as specifically limited by the terms of the claims which follow.

I claim:

1. In a device of the class described, the combination of a power actuated movable member, a control lever associated therewith and shiftable from a neutral position to effect a movement of said member in a certain direction, a stop attached to said movable member and movable therewith into engagement with said control lever to shift the latter back to said neutral position to stop said movable member in a certain terminal position, said stop being shiftable relative to the latter to adjust the terminal position thereof, and a latch carried by said control lever and engageable with said stop for shifting the latter with said lever.

2. In a hydraulic mechanism, the combination of a cylinder and a piston movable relatively therein, a control element associated therewith and shiftable from a neutral position to a definite position to effect a movement of said piston in said cylinder, means responsive to the movement of said piston to a predetermined terminal position for returning said control element to said neutral position to hold said piston at said terminal position, an auxiliary control lever shiftable to adjust said piston from said terminal position, and means, cooperative with said piston movement responsive means, and responsive in turn to the adjustment of said piston, for determining a new terminal position at which the piston is stopped during subsequent movements thereof.

3. In a device of the class described, the combination of a power actuated movable member, a control element associated therewith and shiftable from a neutral position through a definite range to effect a movement of said movable member, means responsive to the movement of said member to a predetermined terminal position for returning said control element to said neutral position to stop said member, an auxiliary control lever shiftable to adjust said movable member from said terminal position, and means, cooperative with said movement responsive means, and adjusted by said auxiliary control lever, to adjust said movement responsive means and thereby determining a new terminal position at which said movable member is stopped during subsequent movements thereof.

4. In a device of the class described, the combination of a power actuated movable member, a control member associated therewith and having a first control lever shiftable from a neutral position to a definite position to initiate a movement of said movable member, a pair of interengageable parts attached to said movable member and said control member, respectively, and movable therewith for returning the latter to said neutral position responsive to movement of said movable member into a predetermined terminal position, and thereby stopping the latter, and a second control lever associated with said control member for adjusting said movable member from said predetermined terminal position, said second control lever being connected to one of said interengageable parts for shifting the latter relative to the member to which the part is attached, when said movable member is adjusted, to determine a new terminal position at which said movable member is stopped responsive to engagement between said parts during subsequent movements of said movable member initiated by said first control lever.

5. In a device of the class described, the combination of a power actuated movable member, a

control element associated therewith and shiftable from a neutral position through a definite range to effect a movement of said movable member, a pair of interengageable parts attached to said movable member and said control element, respectively, and movable therewith for returning the latter to said neutral position responsive to movement of said movable member into a predetermined terminal position, and thereby stopping the latter, an auxiliary control lever shiftable to adjust said movable member from said terminal position, and means connected with said auxiliary control lever for shifting one of said interengageable parts when said movable member is adjusted, and thus establishing the adjusted position of the latter as a new terminal position at which said movable member is stopped during subsequent movements thereof.

6. In a hydraulic mechanism, the combination of a cylinder and a piston movable relatively therein, a control valve associated therewith and shiftable from a neutral position to effect a movement of said piston in said cylinder, a manually controlled lever for shifting said valve, a control element detachably connected to said valve and movable from a neutral position to a definite active position to actuate said valve, a pair of interengageable stops attached to said piston and to said valve, respectively, to move therewith into engagement to actuate the latter to stop said piston in a predetermined terminal position, means for detaching said valve from said control element to permit actuating the valve independent thereof for adjusting said piston from said terminal position, and means for adjusting one of said stops coincident with said independent valve actuation to establish the adjusted position of said piston as a new terminal position at which said piston is automatically stopped during subsequent movements thereof.

7. In a hydraulic mechanism, the combination of a cylinder and a piston movable relatively therein, a control valve associated therewith and shiftable from a neutral position to effect a movement of said piston in said cylinder, a manually controlled lever for shifting said valve, a control element, latch means connecting the latter with said valve, said control element being movable from a neutral position to a definite active position to actuate said valve, a pair of interengageable stops attached to said piston and to said valve, respectively, to move therewith into engagement to actuate the latter to stop said piston in a predetermined terminal position, a latch lever mounted on said manually controlled lever and operative to detach said control element from said valve to permit actuating the latter independent of said element for adjusting said piston from said terminal position, and means responsive to said independent movement of said manually controlled lever for adjusting one of said stops to establish the adjusted position of said piston as a new terminal position at which said piston is automatically stopped during subsequent movements thereof.

8. In a hydraulic mechanism, the combination of a cylinder and a piston movable relatively therein, a control valve associated therewith and shiftable from a neutral position to effect a movement of said piston in said cylinder, a manually controlled lever for shifting said valve, a control element, latch means connecting the latter with said valve, said control element being movable from a neutral position to a definite active position to actuate said valve, a pair of interengage-

able stops attached to said piston and to said valve, respectively, to move therewith into engagement to actuate the latter to stop said piston in a predetermined terminal position, a latch lever mounted on said manually controlled lever and operative to detach said control element from said valve to permit actuating the latter independent of said element for adjusting said piston from said terminal position, and means responsive to movement of said latch lever for shifting the stop associated with said piston relative to the latter by means of said manually controlled valve lever, said last mentioned stop being reconnected to said piston upon release of said latch lever to establish the adjusted position of said piston as a new terminal position at which said piston is automatically stopped during subsequent movements thereof.

9. In a device of the class described, the combination of a power actuated movable member, a control element associated therewith and shiftable from a neutral position through a definite range to effect a movement of said movable member, a stop member detachably connected to said movable member to move therewith into engagement with said control element to shift the latter back to said neutral position to stop said movable member in a predetermined terminal position, an auxiliary control lever shiftable to adjust said movable member from said terminal position, and a latch controlled by means carried on said lever, for engaging said stop member to shift the latter with said lever and reconnect the stop after the piston has been adjusted in position to determine a new terminal position at which said movable member is stopped during subsequent movements thereof.

10. In a hydraulic mechanism, the combination of a cylinder and a piston movable relatively therein, a control valve associated therewith and shiftable from a neutral position to effect a movement of said piston in said cylinder, a manually controlled lever for shifting said valve, and mounted for rocking movement and connected to said valve to shift the latter, a second control lever mounted for independent rocking movement about the same axis, a sector fixed to said second control lever and having a notch therein, a latch bolt slidably mounted on the first mentioned lever and adapted to engage said notch to latch the two levers together, a control rod attached to said piston for movement therewith, a stop member detachably fixed to said rod and movable into engagement with

said first control lever to shift the latter back to said neutral position to stop said piston, and means responsive to movement of said latch bolt out of said notch for detaching said stop member from said control rod and attaching the same to said lever to move therewith.

11. The combination set forth in claim 10 with the further provision of a foot pedal operated ratchet mechanism for successively moving said second control lever alternately in opposite directions to effect alternate movements of said piston in opposite directions.

12. In a device of the class described, a control member movable from a neutral position in either of two directions to definite active positions, a unidirectionally operable step-by-step mechanism for moving said control member from said neutral position to said active positions alternately upon successive actuations of said mechanism, and separate means for returning said control member to neutral position, said mechanism including a crank member, link means connecting said crank member with said control member, a control element, and means for angularly moving said crank member through unequal portions of a revolution during one complete cycle of movement of said crank upon actuations of equal extent of said control element.

13. In a device of the class described, the combination of a power actuated movable member, a control element associated therewith and shiftable from a neutral position to effect a movement of said member in a certain direction, a stop supported for movement relative to said control element, the latter being engageable with said stop incident to relative movement therebetween, to limit the extent of movement of said member, and an adjusting device mounted on said control element, for adjusting the position of said stop, thereby changing the terminal position of said member.

14. In a device of the class described, the combination of a power actuated movable member, a manually operable control lever associated therewith and shiftable from a neutral position to effect a movement of said member in a certain direction, a stop engageable with said lever and operative to limit the extent of movement of said member, a handle mounted on said lever and movable relative thereto, and means for optionally connecting said handle with said stop for shifting the latter and thereby changing the terminal position of said member.

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