

1,353,244.

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UNITED STATES PATENT OFFICE.

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HYDRAULIC HOIST.

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To all whom it may concern:

Be it known that I, FREDERICK JOERNS, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and useful Improvement in Hydraulic Hoists, of which the following is a specification.

This invention has for its object to provide a hydraulic hoist cylinder of a simple construction which is adapted for use for hoisting purposes and is particularly adapted for use to hoist pivoted bodies on automobile trucks, etc., in which a certain predetermined limit of movement is required. The movement of the piston in the hoist cylinder being approximately the same during each operation of the hoist.

This invention further comprises an automatic shut-off valve which is adapted to be operated during the operation of the hoist.

The construction and features will be clearly defined and described in the following specification.

In the drawing forming part of this specification:

Figure 1 is a vertical section of the hoist cylinder with connecting parts.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a detail of a portion of the device.

Fig. 4 is a detail sectional view of the operating valve of the device.

In the drawing, A represents a hydraulic cylinder which is adapted to be used for hoist purposes in which it is preferred to use oil or any other suitable fluids. The cylinder A is provided with a piston 1, having a piston rod 2 which passes through the head 3 of the cylinder A in the usual manner and a packing box 4 is provided to prevent any leakage around the piston rod 2.

The cylinder A has a base portion 5 which is integrally formed with the cylinder having openings 6 therein in which suitable bolts can be inserted to rigidly secure the cylinder A to an automobile frame or to any other device on which it is desired to use the hydraulic cylinder. The base portion 5 of the cylinder A is formed with a passage-way 7 which is adapted to connect through a valve 8 with the intake passage-way 9 of a rotary gear pump 10.

The gear pump 10 is adapted to be secured to the bottom of the extending portion 11 of

the base 5. The exhaust or discharging passage-way 12 of the pump 10 is connected with the passage-way 13 formed in the extension 11 in the base 5 and the passage-way 13 is connected through the valve 8 to a vertical passage-way 14 which is formed longitudinally of the cylinder A and extends to the top of the same. The passage-way 14 is connected to the chamber 15 of the cylinder A through the opening 16 in the wall and at the top of the cylinder.

The pump 10 is adapted to be driven by any suitable source of power which is connected in the usual manner by chain to the sprocket 17. The sprocket 17 is rigidly secured to the driving shaft 18 which is secured to the gear 19 of the pump 10.

The valve 8 is formed with horizontal passage-ways 20 and 21 which are adapted to be in line with the passage-ways 7 and 13 respectively when the valve is in open position or in position to operate the piston 1 of the cylinder A by means of the pump 10. The piston 1 is adapted to be positioned normally at the top of the cylinder A as is illustrated in Fig. 1 and the cylinder A is filled with a fluid, preferably oil. The pump 10 and connecting passage-ways together with the passage-ways 7, 13 and 14 are also filled with oil.

The valve 8 has an operating handle 23 which is rigidly secured to the shaft 24. The shaft 24 is rigidly secured to the body 25 of the valve 8, so that when the handle 23 is engaged and operated, the valve can be rotated in the opening 26 in which the valve is held by the nut 27.

The operating handle 23 of the valve 8 is pivotally connected to the vertical rod 28 by means of the transverse pin 29 which is slidably held in the lower end of the rod 28, the pin 29 having an engaging handle 30 formed on one end and a coil spring 31 held between the end of the rod 28 and the washer 32 which is held in place on the pin 29 by means of the cotter pin 33.

The free end of the pin 29 is adapted to engage the handle 23 in the slot 34 and the spring 31 holding the pin 29 in place but allowing the pin 29 to be disengaged from the slot 34 by engaging the end 30 and pulling outward on the same. The rod 28 is slidably held to the cylinder A by means of the brackets 35 and 36. The rod 28 is bent so that the lower end will extend down

alongside of the valve operating handle 23 and the upper end extending in line with the center line of the cylinder A.

The upper end of the rod 28 has an engaging head 37 secured thereto and a coil spring 38 held between the head 37 and the bearing of the bracket 35 so that the rod 28 is normally held by the spring 38 in elevated position as illustrated in Fig. 1 in full lines.

The cylinder A is formed with flat surfaces 39 on opposite sides which extend longitudinally of the cylinder A and are parallel to each other. Two pairs of angle irons 40 are bolted to the flat surfaces 39 and extend parallel to each other vertically above the cylinder A, the top of the angle irons 40 being broken away in the drawing but it being understood that they are connected to any other suitable mechanism above the cylinder A which is adapted to be operated by the hoist. The pairs of angle irons 40 form channels or guide-ways 41 between their inner faces.

The guide-ways 41 are adapted to form a guide for a horizontal arm 42 which is rigidly secured to the piston rod 2 in any suitable manner and is adapted to travel up and down in the guide-ways 41 when the piston 1 is operated. The horizontal arm 42 is formed with a downwardly bent portion 43 which extends beyond the guide-way 41 on one side of the cylinder. When the piston 1 is operated by the pump 10, the horizontal arm will be drawn down into the position illustrated in Fig. 1 in dotted outline and the portion 43 of the arm 42 will engage automatically against the head 37 of the rod 28 depressing the rod and simultaneously operating or rotating the valve 8 into the position illustrated in dotted outline in Fig. 1, locking the fluid in the cylinder A and also holding the piston 1 in the position it assumes when the valve is shut off.

In operation of the hoist cylinder A, the valve 8 is placed in the position illustrated in Fig. 1 and the pump 10 rotated by suitable operating mechanism from any source of power (the source of power and connecting mechanism not being illustrated in the drawing). As the pump rotates, it will draw the oil through the passage-way 7, valve passage-way 20 and passage-way 9 from the bottom of the cylinder chamber 22 and discharge it through the passage-way 12 into the passage-way 13 through the valve passage-way 21 and up through the passage-way 14 through the opening 16 into the cylinder chamber 15 creating a downward pressure against the piston 1 which causes the piston to move downward in the cylinder A. Thus as the oil is drawn from the chamber 22 of the cylinder and discharged to the other side of the piston 1 into the chamber 15, the piston will move

downward into the position illustrated in dotted outline in Fig. 1.

When the valve 8 is in the shut-off position illustrated in Fig. 1 in dotted outlines, the passage-ways 20 and 21 will extend vertically across the passage-ways 7 and 13 and the portion 44 of the valve will close off the passage-ways 7 and 14 from communication with the pump 10 locking the piston 1 in the position illustrated in dotted outline in Fig. 1, the center wall 45 of the valve 8 also cutting off communication from the pump passages to the passages 7 and 14 but allowing fluid or oil to travel or be by-passed through passage-way 21 of the valve and through the pump and its connecting passage-ways, thereby allowing the pump to continue to rotate without any damage and allowing a by-passing of the oil circulated by the pump through the valve 8.

When it is desired to turn the piston 1 of the hoist cylinder A back to normal position at the top of the cylinder, the pump 10 is stopped and the pin 29 is disengaged from the handle 23 and the handle 23 moved to rotate the valve 8 a half a turn so that the valve will be in the position illustrated in Fig. 4. The passage-way 21 forming a by-pass so as to allow the oil to pass back down through the passage-way 14 through the passage-way 21 of the valve and into the cylinder chamber 22 through the passage-way 7, it being understood that there is a sufficient pressure against the mechanism connecting the piston rod so as to draw the piston back into its upper normal position. The valve 8 has three distinct positions: first, operating or open position as illustrated in full lines in Fig. 1; second, pump by-passing and piston locking position illustrated in dotted outline in Fig. 1 and third, cylinder or piston by-passing and pump locking position.

The operation of the valve into its second position is automatic by the depressing of the arm 42 and when the piston returns to normal position at the top of the cylinder, the rod 28 returns automatically by means of the spring 38 and the pin 29 can be inserted again into the slot 34 of the handle 23. It is obvious that any suitable mechanism such as cross arms and sheaves can be connected to the piston rod 2 together with cables, etc., to form the desired hoist for the particular occasion, but the principal features and elements of the hoist are the cylinder, together with the valve, pump and other connecting mechanism. For this reason the last mentioned elements only have been illustrated in the drawing.

While I have illustrated one particular form and construction of mechanism in the drawings, I desire to have it understood that this construction is only illustrative and that the invention can be carried out by other

means and applied to uses other than those above set forth within the scope of the following claims:

I claim—

5 1. In a device of the class described, a cylinder having a movable piston therein, a pump, passage-ways connecting said pump with either end of said cylinder, a three position valve in said passage-ways, said valve
10 being formed with two separate passage-ways so that when said valve is in open position, said pump can draw oil from said cylinder to transfer it from one side of the piston to the other, the second position, of
15 said valve locking the oil in said cylinder and forming a by-pass for the passage-ways of said pump and a third position of said valve forming a by-pass for the oil in said cylinder to pass from one side of piston to
20 the other and closing the passage-ways connecting said pump with said cylinder.

2. In a device of the class described, a cylinder and piston movably held therein, a pump, passage-ways connecting said pump
25 with said cylinder to draw oil from the bottom of said cylinder and deliver it to the

top thereof to operate said piston, a valve in said passage-ways, transverse openings formed in the same plane through said valve, and connecting means for automatically
30 closing said passage-ways so as to automatically lock said piston in said cylinder and to simultaneously form a by-pass through said valve for the connecting passages from said pump when said piston reaches its
35 downward limit of movement in said cylinder.

3. In a device of the class described, a hydraulic cylinder having a movable piston therein, a pump for transferring oil from
40 one side to the other of said piston, passage-ways connecting said pump with said cylinder, a controller valve in said passage-ways having means for opening said passage-ways in one position, for closing said passage-
45 ways to said cylinder and by-passing said passages of said pump in another position and to connect said passage-ways with either side of said piston and close the passages from said pump in a third position.

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