April 29, 1952 W. B. SPARKS 2,595,015

LIFT CONTROL

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FIG. 1.

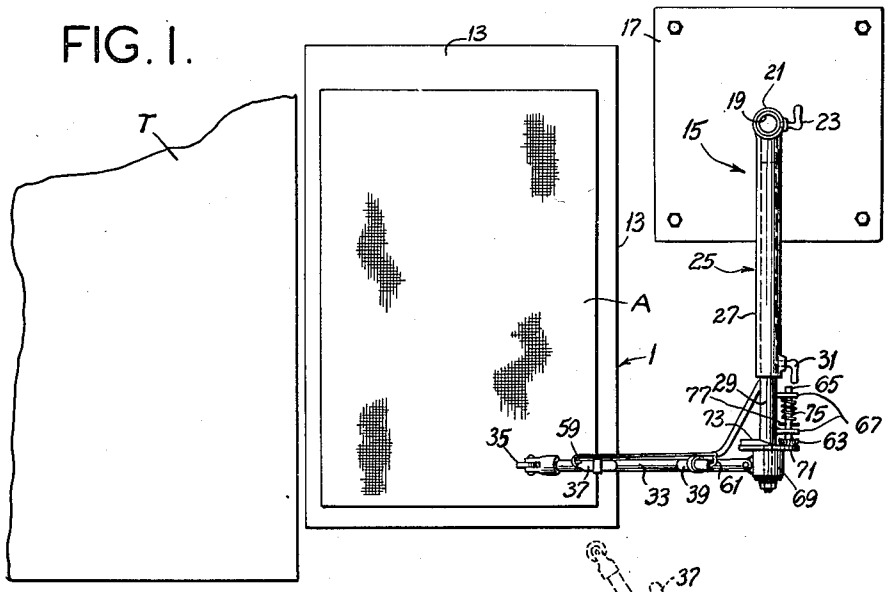


FIG. 2.

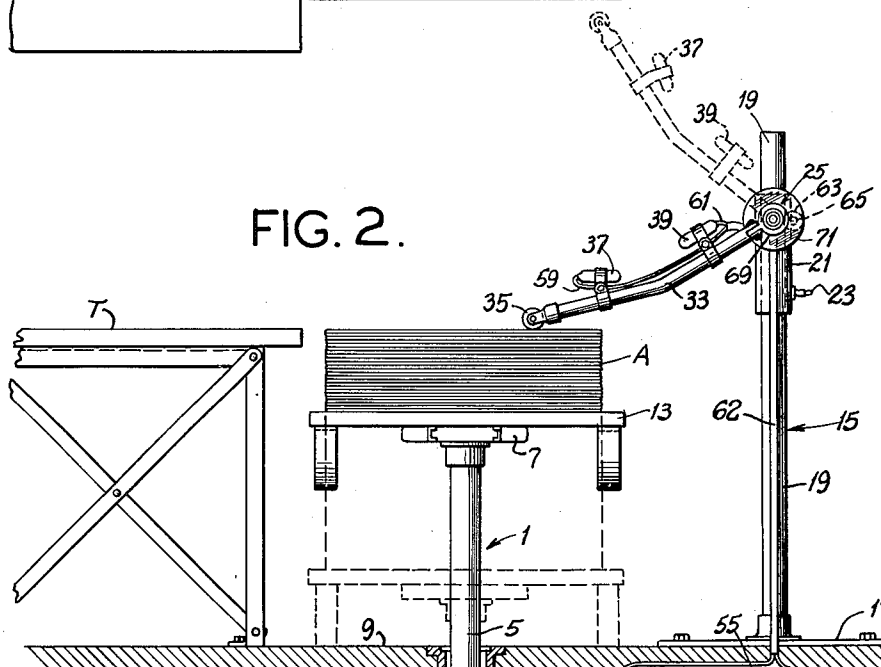
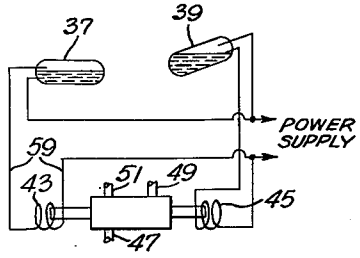
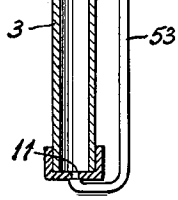


FIG. 3.





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LIFT CONTROL

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9 Claims. (Cl. 187—17)

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This invention relates to lift controls and more particularly to controls for lifts such as are used to raise a stack of articles to position the uppermost article of the stack at a desired elevation and successively to raise the stack as articles are removed to maintain the uppermost article at the same elevation.

In general, an apparatus of this invention comprises a lift for raising a stack of articles. A control comprising a feeler arm pivoted for swinging movement on a substantially horizontal axis is positioned adjacent the lift with the free end of the arm adapted to bear on the top of the stack of articles on the lift. A liquid contact switch is carried by the arm for controlling the lift and is mounted on the arm in such angular position and controls the lift in such manner as to effect raising of the lift when, with the free end of the feeler arm bearing on the top of the stack, the top of the stack is below a predetermined level and to stop the lift when the top of the stack reaches said predetermined level. Other features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing, in which one of various possible embodiments of the invention is illustrated,

Fig. 1 is a plan view of an apparatus embodying the invention;

Fig. 2 is a view in elevation of Fig. 1; and,

Fig. 3 is a wiring diagram.

Referring to the drawing, the reference character 1 generally refers to a hydraulic lift comprising a cylinder 3, a piston 5 and a platform 7 on the end of the piston. The cylinder 3 is mounted in vertical position beneath a floor 9. In the lower end of the cylinder is a port 11 through which fluid under pressure may be introduced to raise the platform and through which fluid may be bled from the cylinder to lower the platform to its lowermost position generally at floor level shown in dotted lines in Fig. 1.

The lift is particularly adapted for raising a truck 13 carrying a stack of flat articles A, herein illustrated as folded textile bag blanks ready for sewing, the arrangement being such that a loaded truck may be positioned over the platform 7 when the latter is lowered, and the platform

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then raised to lift the truck with the stack of articles A thereon. At T is shown a table, such as a sewing machine table, at the level of which it is desired to maintain the top of the stack so that the topmost article of the stack may conveniently be transferred to the table. Reference character 15 generally refers to a control of this invention for the lift 1 to maintain the top of the stack at the desired level.

The control 15 comprises a stand consisting of a base 17 and a vertical post 19 extending up from the base. Vertically adjustable on the post is a sleeve 21. This may be locked in any desired vertical (and angular) position of adjustment by a set screw 23 threaded in the sleeve. An extensible beam 25 extends generally horizontally from the sleeve. The beam comprises a tube 27 fixed at one end to the sleeve and a rod 29 telescopically slidable in the tube extending out of its other end. The rod may be locked at any desired extension by a set screw 31 threaded in the tube 27.

A feeler arm 33 is swingable on the outer end of the rod 29 of the beam 25 on the generally horizontal axis of the beam. On the outer free end of the feeler arm is a roller 35 adapted to bear on the top of the stack of articles A. Fixed on the arm are two liquid contact switches 37 and 39, such as mercury switches. Switch 37 is so positioned on the arm as to close whenever the end of the arm swings below a certain level and to open whenever the end of the arm swings above this level, its contact end being directed toward the free end of the arm. Switch 39 is so positioned on the arm as to close when the arm is swung to an upwardly inclined position such as shown in dotted lines in Fig. 2, its axis being inclined with respect to the axis of the switch 37 and its contact end being directed toward the pivot of the arm.

The switches 37 and 39 control a solenoid-operated valve 41 controlling the supply of fluid under pressure to the lift cylinder 3. This valve is of a conventional type having two solenoids 43 and 45, a transfer port 47, a pressure port 49 and a return port 51. The transfer port 47 is connected to the port 11 in the lower end of the cylinder by a pipe 53. The pressure port 49 is connected by a pipe 55 to a source of fluid under pressure (not shown). The return port 51 is connected by a pipe 57 to return fluid to the fluid pressure system. The valve is so constructed that when both solenoids are deenergized, its transfer and pressure ports are blocked and its return port is open. When solenoid 43 is ener-

gized and solenoid 45 deenergized, the pressure port is connected to the transfer port and the return port is blocked. When solenoid 45 is energized and solenoid 43 deenergized, the transfer port is connected to the return port and the pressure port is blocked. Details of the valve are not shown as the specific valve construction does not form a part of the invention and any of various well-known valve constructions may be used. The switch 37 is connected in a power line 59 supplying the solenoid 43 and the switch 39 is connected in a power line 61 supplying the solenoid 45. Lines 59 and 61 extend through a flexible conduit 62 running along the post 19 and the beam 25.

The control 15 is positioned adjacent the lift 1 so that the roller 35 on the end of the feeler arm 33 may bear on the top of the stack of articles A on the truck 13 when the truck is lifted. The sleeve 21 is adjusted to such height that when the feeler arm 33 is swung to a position wherein the roller 35 at the end of the arm is level with the top of the table T, switch 37 is slightly inclined downward from its contact end and hence open.

To lower the platform 7 to enable a truck 13 carrying a stack of articles A to be skidded into position over the platform, the feeler arm 33 is manually swung upward to a position where switch 39 closes. This energizes solenoid 45. Switch 37 is open and solenoid 43 is deenergized. Under these circumstances, the transfer port 47 is connected to the return port 51, the pressure port 49 is blocked, and fluid flows out of the cylinder 3 to lower the platform 7 to its lowermost position. If desired, a friction stop device may be provided to hold the feeler arm in raised position to eliminate any necessity for manually holding the arm in raised position. As shown, this device may comprise a friction shoe 63 on the end of a plunger 65 mounted for axial sliding movement in guides 67 on the rod 29. The hub 69 of the arm 33 is provided with a flange 71 having a bevel-ended segmental boss 73 on its face toward the shoe 63. A compression spring 75 reacts from the rear guide 67 against a collar 77 on the plunger 65 to maintain the shoe lightly biased against the flange. When the arm is swung upward the boss 73 rides over the face of the shoe 63 to increase the compression of the spring to the point where the friction between the shoe and the boss is sufficient to hold the arm raised.

After the platform 7 has been lowered and a truck 13 carrying a stock of articles A has been positioned on the platform, the arm 33 is lowered to the point where switch 37 closes. This opens switch 39. With switch 37 closed and switch 39 open, solenoid 43 is energized and solenoid 45 is deenergized. Under these circumstances, the pressure port 49 is connected to the transfer port 47, the return port 51 is blocked, and fluid under pressure is supplied through pipe 53 to the cylinder 3 to raise the platform 7. As the platform and the truck and stack of articles on the truck is raised, the roller 35 comes to bear on the top of the stack and the arm 33 swings upward. This continues until the top of the stack reaches the level of the table T, whereupon the arm 33 reaches its angular position where switch 37 opens and deenergizes solenoid 43. Since solenoid 45 is also deenergized at this time, both the transfer and pressure ports 47 and 49 are thereupon blocked. With the transfer port 47 blocked, fluid is retained in the cylinder 3 to hold the platform 7 at such elevation that the top of the stack of articles A is at the level of the table T.

When the height of the stack is reduced as by removing the topmost article, the arm 33 swings down and switch 37 closes. This causes the cylinder 3 again to be supplied with fluid under pressure to raise the stack up to the point where switch 37 again opens and the topmost article is again level with the table T.

It will be seen that the switch 37 remains closed until the arm 33 swings upward to the predetermined angular position where the switch 37 angles slightly past horizontal and then opens. The switch 39 remains open until the arm 33 swings upward well above this position to the raised angular position where switch 39 angles slightly past horizontal and then closes.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In apparatus of the class described, a lift for raising a stack of articles, a control comprising a feeler arm pivoted for swinging movement on a substantially horizontal axis adjacent the lift with the free end of the arm adapted to bear on the top of the stack of articles on the lift, a liquid contact switch carried by the arm controlling the lift and mounted on the arm in such angular position and controlling the lift in such manner as to effect raising of the lift when, with the free end of the arm bearing on the top of the stack, the top of the stack is below a predetermined level, and to stop the lift when the top of the stack is raised to said predetermined level.

2. In apparatus of the class described, a hydraulic lift for raising a stack of articles, an electrically actuated valve for controlling the lift, a control comprising a feeler arm pivoted for swinging movement on a substantially horizontal axis adjacent the lift with the free end of the arm adapted to bear on the top of the stack of articles on the lift, a liquid contact switch carried by the arm controlling said electrically actuated valve and mounted on the arm in such position as to close a circuit to the valve to set the valve to effect raising of the lift when, with the free end of the arm bearing on the top of the stack, the top of the stack is below a predetermined level, and to open and thereby set the valve to stop the lift when the top of the stack is raised to said predetermined level.

3. In apparatus of the class described, a lift for raising a stack of articles, a control comprising a feeler arm pivoted for swinging movement on a substantially horizontal axis adjacent the lift with the free end of the arm adapted to bear on the top of the stack of articles on the lift, a first liquid contact switch carried by the arm controlling the lift and mounted on the arm in such angular position and controlling the lift in such manner as to effect raising of the lift when, with the free end of the arm bearing on the top of the stack, the top of the stack is below a predetermined level, and to stop the lift when the top of the stack is raised to said predetermined level, and a second liquid contact switch carried by the arm controlling the lift and mounted on the arm in such position and controlling the lift

in such manner as to effect lowering of the lift when the arm is swung upward to a raised position.

4. In apparatus of the class described, a hydraulic lift for raising a stack of articles, an electrically actuated valve for controlling the lift, a control comprising a feeler arm pivoted for swinging movement on a substantially horizontal axis adjacent the lift with the free end of the arm adapted to bear on the top of the stack of articles on the lift, a first liquid contact switch carried by the arm controlling said electrically actuated valve and mounted on the arm in such position as to close a circuit to the valve to set the valve to effect raising of the lift when, with the free end of the arm bearing on the top of the stack, the top of the stack is below a predetermined level, and to open and thereby set the valve to stop the lift when the top of the stack is raised to said predetermined level, and a second liquid contact switch carried by the arm controlling the valve and mounted on the arm in such angular position as to close a second circuit to the valve and thereby set the valve to effect lowering of the lift when the arm is swung upward to a raised position.

5. In apparatus of the class described, a hydraulic lift for raising a stack of articles, said lift including a vertical cylinder, a solenoid valve having a transfer port connected to the lower end of the cylinder, a pressure port connected to a source of fluid under pressure, and a return port, and having a first and a second solenoid, said valve being adapted to block the cylinder port when both solenoids are deenergized, to connect the pressure port to the transfer port when the first solenoid is energized and the second deenergized, and to connect the transfer port to the return port when the second solenoid is energized and the first is deenergized, a feeler arm pivoted for swinging movement on a substantially horizontal axis adjacent the lift with the free end of the arm adapted to bear on the top of the stack of articles on the lift, a first liquid contact switch carried by the arm in position such as to remain closed until the arm swings upward from a lowered position to a predetermined angular position and then to open, said first switch being connected in a circuit including the first solenoid, and a second liquid contact switch carried by the arm in position such as to remain open until the arm is swung upward well above said predetermined angular position and then to close, said second switch being connected in a circuit including said second solenoid.

6. In apparatus as described in claim 5, the first switch being mounted on the arm with its contact end directed toward the free end of the arm and the second switch being mounted on the arm inclined with respect to the first switch and with its contact end directed toward the pivot of the arm.

7. A control for a lift comprising a stand consisting of a base and a vertical post extending upward from the base, a beam extending generally horizontally from the post, a feeler arm pivoted for swinging movement about a generally horizontal axis on the beam, and two liquid contact switches mounted on the arm, one switch having its liquid contact end directed toward the free end of the arm and the other switch being inclined with respect to said one switch and having its liquid contact end directed toward the pivot of the arm.

8. A control for a lift comprising a stand consisting of a base and a vertical post extending upward from the base, an extensible beam extending generally horizontally from the post and vertically adjustable with respect to the post, a feeler arm pivoted for swinging movement about a generally horizontal axis at the end of the beam, and two liquid contact switches mounted on the arm, one switch having its liquid contact end directed toward the free end of the arm and the other switch being inclined with respect to said one switch and having its liquid contact end directed toward the pivot of the arm.

9. In apparatus of the class described, a lift for raising and lowering a stack of articles, a control comprising a feeler arm freely pivoted for swinging movement on a substantially horizontal axis adjacent the lift with the free end of the arm adapted to bear on the top of the stack of articles on the lift, electrically controlled means for raising and lowering the lift, a first switch actuated by said arm and a second switch actuated by said arm, said first switch being closed when the arm is lowered below a first predetermined position and the second switch being closed when the arm is swung above a second predetermined position that is above said first predetermined position, said first switch energizing said electrically-controlled means to raise the lift and said second switch energizing the electrically-controlled means to lower the lift.

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REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
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