Oct. 4, 1966 J. A. PHILLIPS, JR 3,276,331

OPERATING SYSTEM FOR PRESS PLATENS

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Fig. 2

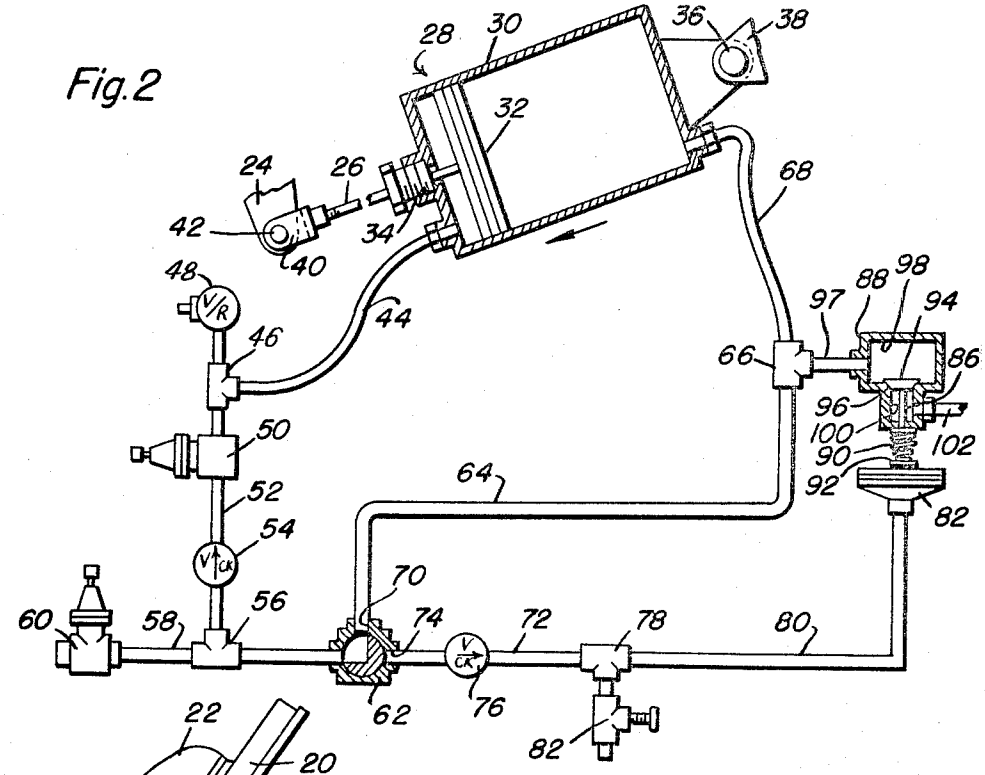

Fig. 1

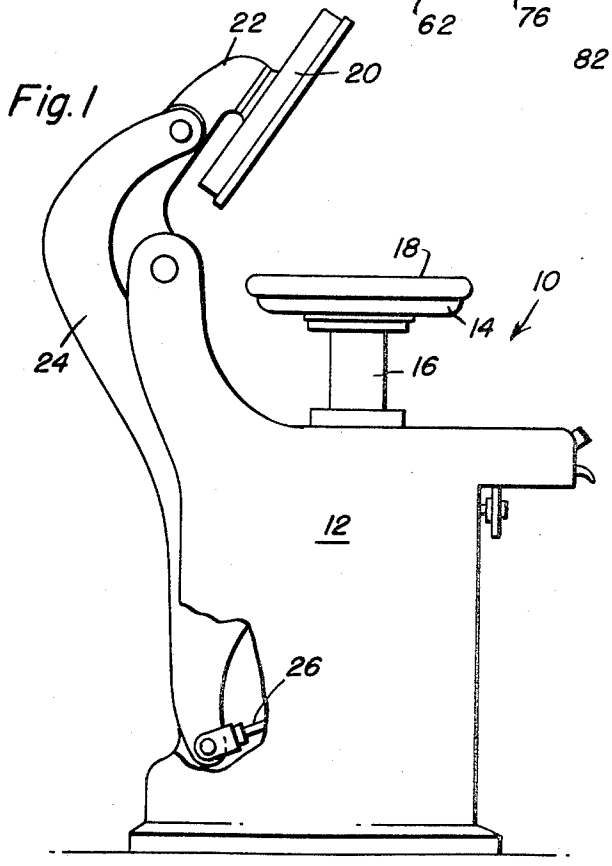

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Fig. 3

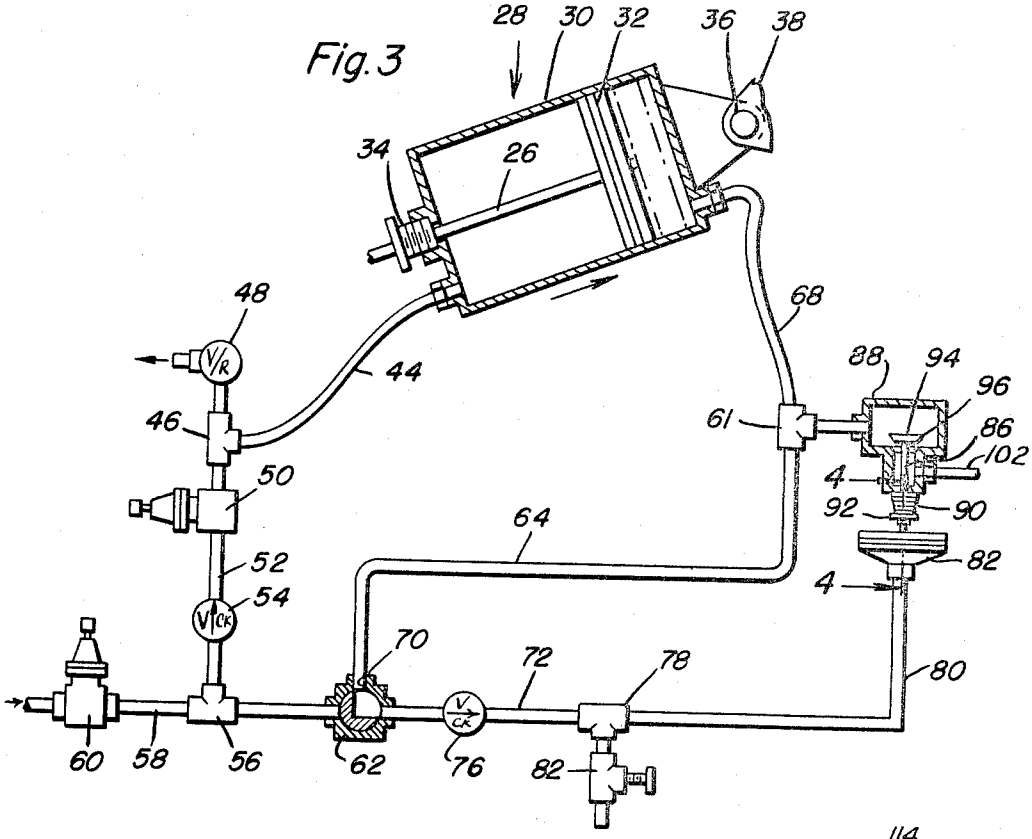


Fig. 4

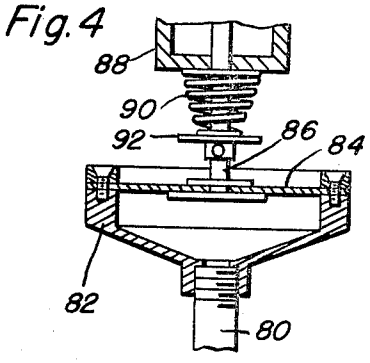
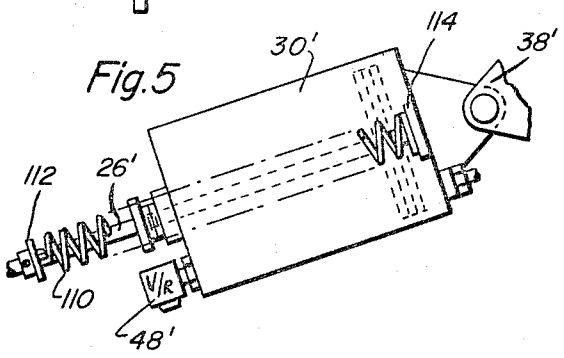


Fig. 5



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3,276,331

OPERATING SYSTEM FOR PRESS PLATENS

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Filed Feb. 9, 1965, Ser. No. 431,371
6 Claims. (Cl. 91—165)

The present invention generally relates to an actuating and control system for various equipment which is operated by hydraulic or pneumatic fluid pressure.

An object of the present invention is to provide an actuating and control system for equipment that is operated by hydraulic or pneumatic fluid pressure with the invention having particular adaptation to the actuation and control of a platen on a pressing machine employed in the garment and dry cleaning industry. It is pointed out that the invention is disclosed in conjunction with such a pressing machine but the actuating and control system is well adapted for use with various types of equipment having movable components which are operated by hydraulic or pneumatic fluid pressure.

Another very important object of the present invention is the provision of an actuating and control system in accordance with the preceding object which enables operation of the platen or other equipment pneumatically in a controlled manner without assistance from actuating springs such as are normally used on pressing machines.

Yet another important feature of the present invention is to provide an actuating and control system having structural arrangements incorporated therein which enable the control of actuating rates in both the forward and reverse direction of travel of the platen or other equipment thereby producing a smooth operation which is free from vibration and shock with this feature being particularly significant on the return of the platen or other equipment to its back position thereby resulting in reduced maintenance cost and longer useful life of the pressing machine.

Yet another significant feature of the present invention is to provide an actuating and control system which is relatively simple in construction, positive in control, easy to install and adapt to various installations and yet relatively inexpensive to manufacture and maintain.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a schematic elevational view of a pressing machine illustrating the platen thereof being controlled by the actuating and control system of the present invention;

FIGURE 2 is a schematic view illustrating the structural components of the actuating and control system of the present invention with the actuating piston at its full working stroke;

FIGURE 3 is a view similar to FIGURE 2 but with the piston returned towards its back position where the back stroke is cushioned;

FIGURE 4 is a detailed sectional view taken substantially upon a plane passing along section line 4—4 of FIGURE 3 illustrating the structural details of the diaphragm control mechanism; and

FIGURE 5 is a detailed view of a modified form of the invention.

Referring now specifically to the drawings, the pressing machine 10 is generally illustrated in FIGURE 1 and includes a base or stand 12, a steam heated buck 14 mounted on the upper end of a neck 16 and having padding 18 on the upper surface thereof in a conventional manner. A

movable platen 20 is carried by a mounting arm or yoke 22 for movement toward and away from the buck 14. An actuating lever 24 is supported in a conventional manner for operating the platen 20 and the lever 24 in turn is operated by a piston rod 26 of a pneumatic piston and cylinder assembly generally designated by numeral 28, as illustrated in FIGURES 2 and 3 whereby movement of the piston rod 26 in one direction causes the platen 20 to move towards the buck 14 and movement of the piston rod 26 in the other direction will return the platen to a retracted position during its back stroke. The particular construction of the pressing machine is conventional and forms no part of the present invention except for its relationship to the components of the actuating and control system. Further, it is pointed out that the actuating and conrol system may be employed with various types of equipment having movable components which move in a cyclic manner where it is desirable to control the movement of the component in both directions and cushion the movement of the component.

The pneumatic piston and cylinder assembly 28 includes a cylinder 30 having a piston 32 reciprocally mounted therein with the piston rod 26 connected thereto and longitudinally movable through a suitable packing gland or stuffing box 34 for sealing both ends of the cylinder 30. The cylinder 30 is supported by a pivot pin 36 from a suitable bracket 38 attached to the base 12 in a suitable manner and the free end of the piston rod 26 is provided with a yoke 40 pivotally attached to the lever 24 by a pivot pin 42 or the like. Here again, the specific details of the cylinder and the specific details of the piston, piston rod, stuffing box and mounting and connecting structure are variable and adapted for various machines in that the size relationships and pressures involved may vary thus requiring some variation in the particular structural details of the piston, cylinder, and the like.

As stated previously, cylinder 30 is of the double acting type and a pipe or tubing 44 is connected to the end thereof having the stuffing box 34 therein. The piping 44 is connected to a suitable T-coupling 46 having a pressure relief valve 48 communicated therewith and exhausting to the atmosphere or the like. For supplying air to the piping 44, a pressure regulating valve 50 is provided in a pipe 52 which extends to the coupling 46 and then into the piping 44. A check valve 54 is provided in the pipe 52 and a T-coupling 56 connects the pipe 52 to a pipe 58 which has a pressure reducing and regulating valve 60 on the supply end thereof. The pipe 58 extends from both sides of the T-coupling 56 and has a two position valve 62 connected thereto on the downstream side of the coupling 56. One outlet for the two position valve 62 is a pipe 64 which extends to a T-coupling 66 and connects with a pipe 68 communicating with the end of the cylinder 30 remote from the stuffing box 34 and on the opposite side of the piston 32 from the point of communication between the cylinder 30 and the pipe 44. The pipe 64 is connected to the branch 70 of the valve 62 while a pipe 72 is communicated with the branch 74 of the two way valve 62. A check valve 76 is imposed in the pipe 72 and a T-coupling 78 is disposed in the pipe 72 on the downstream side of the check valve 76. The coupling 78 is connected with a pipe 80 and also the branch of the T-coupling 78 is communicated with a needle type bleed valve 82 which exhausts in the atmosphere.

The pipe 80 extends into and communicates with a diaphragm housing 82 as illustrated in FIGURE 4. The diaphragm housing 82 has a flexible diaphragm 84 mounted therein. The flexible diaphragm 84 supports and actuates a valve stem 86 which extends into a valve housing 88. A valve spring 90 is mounted in encircling relation to the valve stem 86 and has one end thereof engaging the housing 88 and the other end engaging an adjustable stop

member or abutment **92** secured on the stem **86** so that the resistance to movement of the valve stem **86** caused by the spring **90** may be adjusted to vary the characteristics of actuation of the valve stem **86** by the diaphragm **84**. The end of the valve stem **86** is provided with a valve member **94** thereon which engages a valve seat **96** in the housing **88**. The housing **88** is communicated with the T-coupling **66** by a branch pipe **97** and the housing **88** has a large chamber **98** communicating with the face of the valve member **94** and a smaller chamber **100** on the opposite side of the valve member **94** from the chamber **98**. The chamber **100** is vented to the atmosphere as by a pipe **102** so that when the valve member **94** is spaced from the valve seat **96**, the chamber **98** will be vented into the atmosphere through chamber **100** and pipe **102**.

In operation of the system, compressed air is supplied to the system at 90 lbs. p.s.i. or more and is reduced by the pressure reducing and regulating valve to approximately 80 lbs. p.s.i. so that air is supplied to the pipe **58** at approximately 80 lbs. p.s.i. The pressure reducing and regulating valve **50** will further reduce the air pressure to approximately 40 lbs. p.s.i. thus supplying air to the cylinder **30** through the pipe **44** at approximatley 40 lbs. p.s.i. The pressure relief valve **48** is set at approximately 5 lbs. p.s.i. above the pressure in the pipe **44** or approximately 45 lbs. p.s.i. When the pressure in the pipe **44** exceeds 45 lbs. p.s.i., the relief valve **44** will become operative and exhaust the excess pressure to the atmosphere. The check valve **54** prevents return flow through the line **52** back towards the T-coupling **56**.

The two way valve **62** may be manually operated or solenoid operated and is set in one of two positions. In the position illustrated in FIGURE 2, air at approximately 80 lbs. p.s.i. will pass from the pipe **58** through the valve **62** and through the pipe **64**, through the T-coupling **66**, through the pipe **68** and into the cylinder **30**. This will move the piston **32** to the left as illustrated in FIGURE 2 so that the platen **20** will be moved in a down stroke. Inasmuch as the branch **74** of the valve **62** is closed and the needle valve **82** is slightly opened to the atmosphere, air pressure will not exist in the pipe **80** and the pressure against the valve member **94** will keep the valve member securely seated. When the piston **32** moves in the direction of the arrow in FIGURE 2, the air which is in the cylinder between the piston **32** and the pipe **44** will raise the pressure in the pipe **44** above the setting of the pressure relief valve **48** thus opening the pressure relief valve **48** and exhausting to the atmosphere.

In order to return the platen to its raised position, the two way valve **62** is rotated from its position illustrated in FIGURE 2 either manually or automatically to the position illustrated in FIGURE 3 in which event the pipe **58** is blocked off and the branch **70** communicates with the branch **74** thus communicating pipe **64** with the pipe **72**. In this event, air supplied through the pipe **44** will move the piston **32** to the right or in the direction of the arrow illustrated in FIGURE 3. The air contained in the cylinder **30** during movement of the piston **32** to the right will pass through the pipe **68** and exert pressure on the valve member **94**. The same pressure will also pass through the pipe **64**, through the branch **70**, through the branch **74**, pipe **72** and pipe **80** and exert pressure on the diaphragm **84**. These pressures will be equal and due to the differential in size between the area of the diaphragm **84** and the area of the valve member **94**, the valve member **94** will be moved upwardly to an open position illustrated in FIGURE 3. This permits the air that was contained in cylinder **30** to escape to the atmosphere thus enabling the piston **32** to move to the right as indicated in FIGURE 3.

Piston **32** will continue to move in the direction of the arrow until pressure in line **80** drops sufficiently to cause the valve member **94** to close by action of the valve spring. This condition is achieved before piston **32** reaches the end of its travel as indicated by the spaced dotted line in FIGURE 3. This cushions the travel of the piston and, full travel of piston **32** in the direction of the arrow in FIGURE 3 is obtained by a continuous bleed of air from the system through the needle valve **82**. The setting of the needle valve opening determines the rate at which the piston travels from the initial cushioned stop to its final return position.

Thus, from a consideration of the control system of the present invention, the platen will be moved in its down stroke by a pressure differential thus assuring a firm and positive movement and will be moved initially rapidly towards its return position with such movement being cushioned prior to reaching the end of its stroke and then moving slowly to its final back stroke or return position.

As will be apparent, the control system of the present invention has eliminated all of the springs and hydraulic checks normally associated with the platen of a pressing machine. The diaphragm control valve controls and cushions the upstroke while the bleeding of the restricted line to the diaphragm operated valve controls and ends vibration of the head during its return to its final back or up position. The two way valve may be actuated either manually or automatically thus rendering the device automatic in operation if desired. Further, the device may be used with more than one piston having the same components, for example, one for raising the heads up and down and one for applying extreme pressure. Also, the pressure relief valve may be varied for controlling the rate of descent on the downstroke.

The present invention may be used with various other equipment having components movable in a cyclic manner regardless of the direction of movement where it is desired to control the rate of movement in both directions and cushion the final increment of movement in one or both directions thereby more accurately controlling the operation of various equipment and enabling such equipment to have a longer useful life since the operational characteristics of such equipment may be easily controlled in all of its directional movements.

FIGURE 5 illustrates another embodiment of the invention in which primed numerals are employed for elements identical to those in FIGURES 1–4. This structure is the same except that springs **110** urge the piston rod **26'** inwardly thereby eliminating line **52**, check valve **54**, regulating valve **50** and line **44**. The relief valve **48'** is then mounted directly on the cylinder **30'** and operates in the same manner. The springs **110** are connected to brackets **112** and **114** attached to piston rod **26'** and **30'**, respectively.

It is also pointed out that more than one piston and controls can be used together or separately in the same press. The controls and pistons do not necessarily have to control and up and down motion since they can be used with a horizontal in and out motion, side to side motion and the like.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. An operating system for fluid pressure operated machines having a movable component powered by a double acting piston and cylinder assembly, said system comprising a first fluid pressure line communicated with a first end of said cylinder, check valve means in said first line, pressure regulating valve means in said first line between the check valve means and the cylinder, pressure relief valve means in said first line between the pressure regulating valve means and the cylinder, said first line being communicated with a supply line, a sec-

ond fluid pressure line communicated with the second end of the cylinder and also being communicated with the supply line, a two way valve in said second line where it communicates with the supply line, a control line communicated with said two way valve whereby the two way valve will selectively admit pressure to said second line or close off the second line from the supply line and communicate the second line with said control line, check valve means in said control line to admit flow only from the two way valve into the control line, a discharge line communicated with said second line between the two way valve and said cylinder, a discharge valve in said discharge line, control means connected with said discharge valve, said control means being communicated with and operated in response to pressure in the control line whereby the discharge valve will be opened when the two way valve is orientated to communicate the second pressure line with the control line.

2. The system as defined in claim 1 wherein said control line is provided with bleed discharge means for restricted exhaust of pressure in the second line and second end of the cylinder during final movement of the piston toward the second end of the cylinder thereby cushioning such movement.

3. The system as defined in claim 2 wherein said control means includes a diaphragm assembly, said discharge valve including a stem operatively connected with said diaphragm assembly.

4. The system as defined in claim 3 wherein said pressure relief valve means is adjustable to control the rate of movement of the piston toward the first end of the cylinder.

5. An operating system for fluid pressure operated machines having a movable component powered by a piston

and cylinder assembly, said system comprising a fluid pressure line communicated with the one end of the cylinder and also being communicated with a supply line, a two way valve in said fluid pressure line where it communicates with the supply line, a control line communicated with said two way valve whereby the two way valve will selectively admit pressure to said fluid pressure line or close off the fluid pressure line from the supply line and communicate the fluid pressure line with said control line, check valve means in said control line to admit flow only from the two way valve into the control line, a discharge line communicated with said fluid pressure line between the two way valve and said cylinder, a discharge valve in said discharge line, control means connected with said discharge valve, said control means being communicated with and operated in response to pressure in the control line whereby the discharge valve will be opened when the two way valve is orientated to communicate the fluid pressure line with the control line, means urging said piston toward said one end of the cylinder, and a pressure relief valve in the other end of said cylinder.

6. The combination of claim 5 wherein said means includes a spring interconnecting the cylinder and a piston rod extending from the cylinder.

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