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FLUID MOTOR FOR PRESSING SOLES ON SHOES

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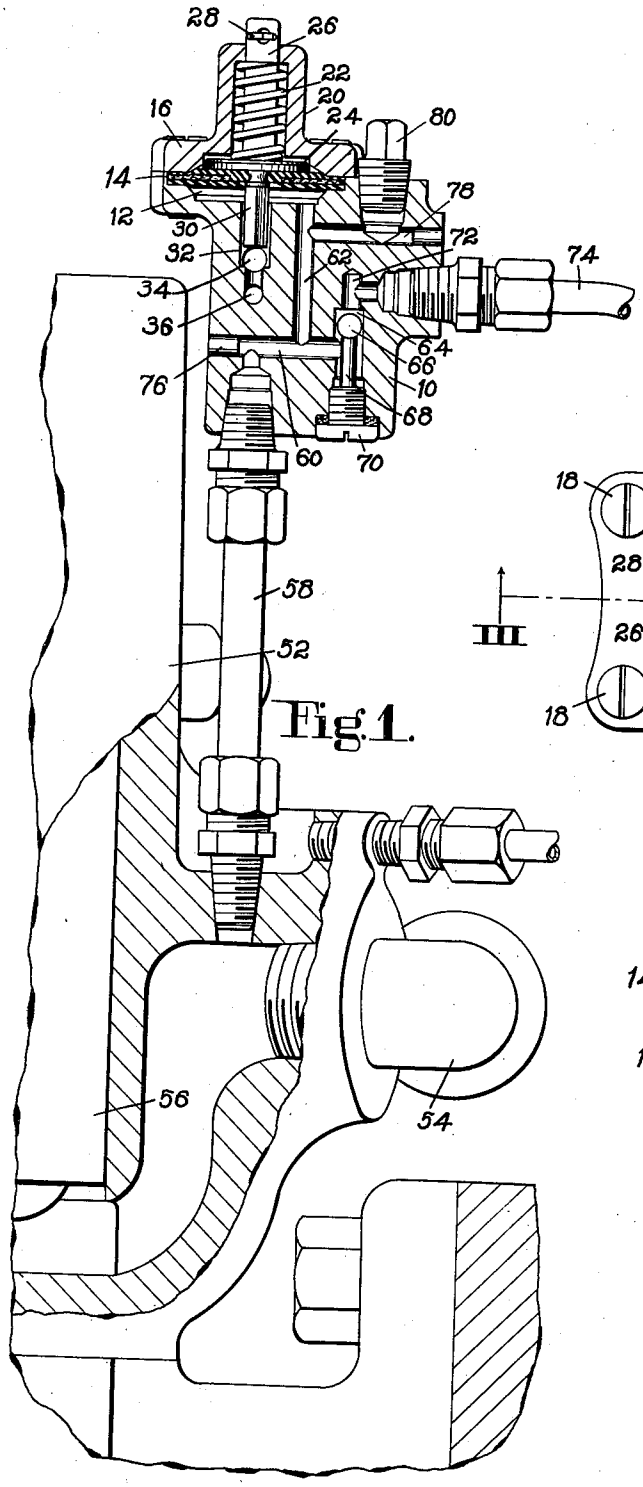


Fig. 1.

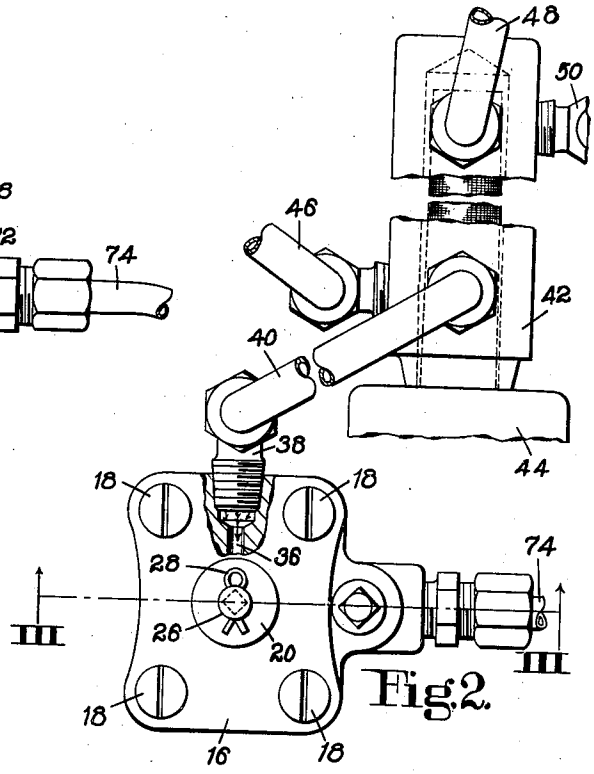


Fig. 2.

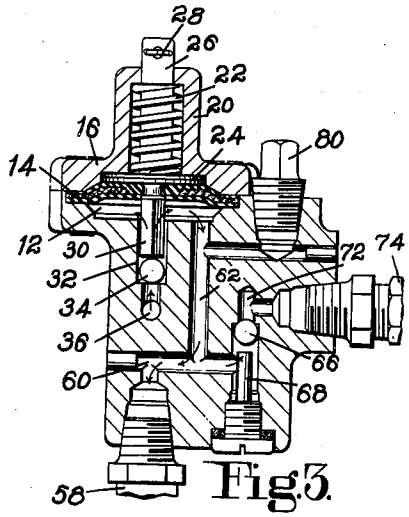


Fig. 3.

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FLUID MOTOR FOR PRESSING SOLES ON SHOES

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4 Claims. (Cl. 121—38)

This invention relates to cement sole attaching and sole laying machines of the type in which pressure is applied to the shoe and sole by hydraulic means, for example by oil under pressure, and particularly to improved valve mechanism for restoring the hydraulic pressure if it should for any reason become reduced.

A machine of the type in which the present invention may be embodied is disclosed in Letters Patent of the United States No. 2,047,185, granted July 14, 1936, upon application of Ballard et al. This machine comprises a plurality of pads which are brought successively to an operating station where, after the shoe and sole are located relatively to each other, pressure is applied to the shoe to force it against the pad by hydraulically operated pressure-applying mechanism, the pressure-applying mechanism being duplicated for each of the pads. The final pressure thus applied at the operating station should be maintained until the shoe to which pressure has been applied has passed around the machine and has arrived at the station next to the operating station where pressure is relieved. Sometimes, due to compression of the work in response to the heavy pressure to which it is subjected or due to slight leakage of the valves by which the liquid is held under pressure, a substantial drop in pressure may occur before the shoe arrives at the station where the pressure is relieved.

In Letters Patent of the United States No. 2,134,726, granted November 1, 1938, upon an application of Vernon H. Meyer, apparatus is shown embodied in a machine of this type which acts when pressure is applied at the operating station to restore pressure in all of the other cylinders except the one which is being exhausted.

By my invention novel and improved mechanism is provided for restoring pressure in machines of this type. As illustrated herein, the novel mechanism comprises a valve, for example a ball valve, in a passage leading from the source of liquid pressure to the cylinder, said passage being independent of and in addition to the passage through which pressure is applied to the cylinder at the operating station. The valve, when pressure in the cylinder is exhausted or reduced below a predetermined amount, is held closed by a strong spring. A diaphragm acted upon by pressure of liquid from the cylinder is arranged to act in opposition to the spring, movement of the diaphragm against the spring relieving pressure upon the valve and allowing the pressure liquid to pass from the source of supply to the cylinder. Thus, as long as pressure is maintained in the cylinder above the predetermined low pressure, the valve is released and permits pressure liquid from the source of supply to pass to that cylinder if the pressure therein is below the pressure of the source of supply. When, however, the pressure in the cylinder is exhausted or reduced below a certain low pressure, the spring reacts to hold the valve against its seat and thus prevent passage of liquid from the source of supply to that cylinder, there being then little or no pressure on the diaphragm to oppose the spring.

A drain is also provided to conduct away from an idle cylinder liquid which may collect therein due to leakage or other cause, the drain being arranged to be closed by the rush of liquid through the drain when normal high pressure is applied to the cylinder.

In the drawing,

Fig. 1 is a sectional view of a novel pressure-restoring mechanism applied to a machine of the type disclosed in the Ballard et al. patent mentioned above;

Fig. 2 is a plan view illustrating how the pressure liquid is conducted to the pressure-restoring mechanisms attached to the various cylinders; and

Fig. 3 is a sectional view of the pressure-restoring mechanism showing the parts in the positions they assume when a cylinder is under pressure.

The illustrated pressure-restoring mechanism for pressure cylinders comprises a block or casing 10 having holes drilled therein to provide various passages, tapped holes being provided for making usual pipe connections to the drilled passages. At the top of the casing is a chamber 12 over which is secured a diaphragm 14 by a cap piece 16 held thereon by screws 18, the margin of the diaphragm 14 being gripped between the casing 10 and the cap piece 16. The cap piece 16 is provided with a cylindrical extension 20 in which is housed a spring 22. Resting upon the top of the diaphragm is a disk 24 which has a stem 26 extending upwardly inside the spring 22 and through a hole in the upper end of the cylindrical extension 20 of the cap piece. The stem 26 may be provided with a cotter pin 28 to hold the stem in place. The disk 24 is provided with a polygonal, downwardly extending stud 30 loosely fitting a counterbore 32 in the casing 10. At the bottom of the counterbore is a ball valve 34 normally closing a passage 36 which extends laterally of the casing 10 and is connected at 38 (Fig. 2) to a pipe 40 which leads to the source of pressure supply. As shown, the pipe 40 is connected to a nipple 42 which is threaded into the turret head 44 of a machine of the type disclosed in the Ballard et al. patent, it being understood that each time a cylinder is operated pressure is applied in the turret head 44.

The pressure-restoring devices connected with

other cylinders may be similarly connected to the source of pressure by pipes 46, 48, 50. One of the eight pressure cylinders with which the machine is provided is indicated at 52, the cylinder being supplied with pressure fluid from the turret 44 through a large pipe 54. The pressure fluid entering through the pipe 54 acts upon a piston 56 to actuate mechanism for applying pressure to a shoe. The pressure liquid applied to the cylinder is conducted by a pipe 58 to the casing 10 and passes through pipes or passages 60, 62 to the chamber 12 where it acts to lift the diaphragm 14 against the pressure of the spring 22, as shown in Fig. 3, the spring prior to that time having been strongly depressing the stud 30 to hold the ball valve 34 against its seat closing the passage 36, thus preventing passage of pressure liquid through the pipe 40 from the turret 44 when other cylinders are being operated. Thus, if any one of the cylinders is exhausted or is at a pressure insufficient to lift the diaphragm, the valve 34 remains closed and prevents the passage of liquid to the cylinders from the source of supply 44.

Preferably the size of the diaphragm 14 and the strength of the spring 22 are so selected that a pressure of fifty pounds or more in the cylinder will operate the diaphragm to release the valve 34 and, when the pressure in the cylinder is less than fifty pounds, for example when it is exhausted, the spring 22 will hold the valve 34 firmly against its seat and prevent passage of liquid through it. Supposing the cylinder 52 to be under working pressure, which may be as high as three hundred pounds per square inch, the pressure will act upon the diaphragm 14 and hold the spring 22 compressed so that, each time another cylinder is put under pressure, liquid may pass from the turret 44 through the pipe 40, through the passage 36, by the valve 34, around the polygonal stud 30, into the chamber 12, and through the pipes or passages 62, 60 and the pipe 58 to the cylinder to restore pressure therein if, for any reason, it has diminished.

Should one of the cylinders remain in disuse, it is desirable to prevent the accumulation therein of pressure liquid which would gradually cause the operation of the piston. To prevent this, the passage 60 leads to a chamber 64 in which is a ball 66, of less diameter than the chamber, normally resting by gravity on the top of a pin 68 attached to a screw plug 70. Leading from the chamber 64 is a passage 72 smaller in diameter than the ball 66 and connected with a drain pipe 74. With this construction any slight flow or seepage of oil into the cylinder when idle will pass around the ball 66 and out through the drain 74. If, however, as when pressure is applied to a cylinder, there is a rush of oil through the pipe 58, it will lift the ball 66 and hold it against the opening of the passage 72 to close it.

The unused end of the drilled hole 60 is closed by a plug 76 and a drilled and plugged passage 78 is provided with a screw plug 80 for the attachment of a pressure gage if desired.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In pressure-restoring means for hydraulic cylinders, the combination with a cylinder having a closed end, a piston in said cylinder, and a single source of supply of liquid under pressure connected to the closed end of the cylinder for operating the piston, of an auxiliary pipe connecting the closed end of the cylinder with the source of supply to operate the piston, a valve in the auxiliary pipe, and a spring-pressed diaphragm normally acting on the valve to hold it closed against passage of liquid from the source of supply through said auxiliary pipe, said diaphragm being subject to pressure from the cylinder so that pressure in the cylinder above a predetermined low pressure will act on the diaphragm against the spring to release the pressure on said valve and allow the liquid from the source of supply to open said valve and to pass to the cylinder through said auxiliary pipe, and when the pressure in the cylinder is below said predetermined pressure the spring will hold the valve closed and prevent passage of liquid from the source of supply through said auxiliary pipe to the cylinder.

2. In pressure-restoring means for hydraulic cylinders, the combination with a cylinder having a closed end, a piston therein, and a single source of supply of liquid under pressure connected to the cylinder at its closed end for operating the piston, of an auxiliary pipe from the closed end of the cylinder to the source of supply, a valve in the auxiliary supply pipe, and a spring-pressed diaphragm normally acting on the valve to hold it closed against passage of liquid from the source of supply through said auxiliary pipe to the cylinder but arranged to be acted upon by the pressure in the cylinder above a predetermined low pressure to release said valve for movement to open position to permit the liquid to pass from the source of supply to the cylinder.

3. A pressure-restoring device for hydraulic cylinders comprising a cylinder, a fluid-operated piston in said cylinder, a valve casing, a valve in the casing, pipes communicating with each other through the valve, one pipe leading to the source of liquid pressure supply for the cylinder, another pipe leading to the cylinder and the third pipe being a drain, a diaphragm in the casing subject to pressure from the cylinder and to pressure from the source of supply through said valve, spring means acting on the diaphragm to hold the valve closed against the pressure of the source of supply, substantial pressure in the cylinder acting on the diaphragm against the spring means to release the valve and permit liquid to pass to the cylinder, and a valve in the drain pipe normally held open by gravity and adapted to be closed by a rush of liquid through it.

4. A pressure-restoring mechanism for hydraulic cylinders comprising a cylinder, a fluid-operated piston in said cylinder, three pipes communicating with each other, one pipe being a drain, one pipe leading to the cylinder and the other pipe leading to a source of pressure supply, a check valve acting when permitted to do so to let liquid pass through the pressure supply to the cylinder but not reversely, a spring holding said check valve closed to prevent passage of liquid from the pressure supply, means operated by pressure in the cylinder to overcome the spring and permit operation of the check valve, and a ball valve in the drain passage normally held open by gravity and adapted to be closed by rush of liquid from the cylinder.

SIDNEY J. FINN.