March 9, 1926. 1,575,760

C. F. HEYWOOD

FLUID PUMP CONTROLLING DEVICE AND THE LIKE

Original Filed August 27 1921

Fig. 1.

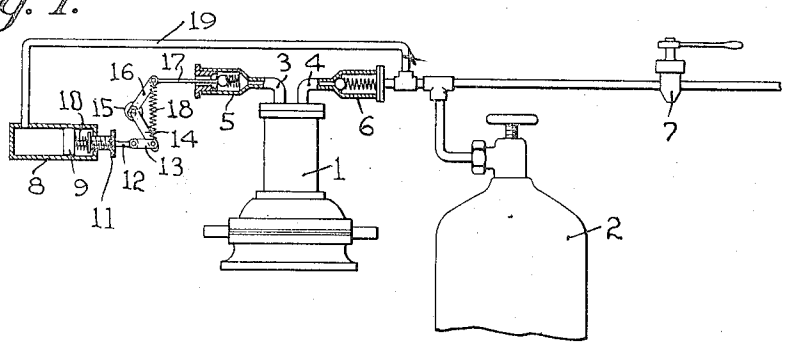


Fig. 2.

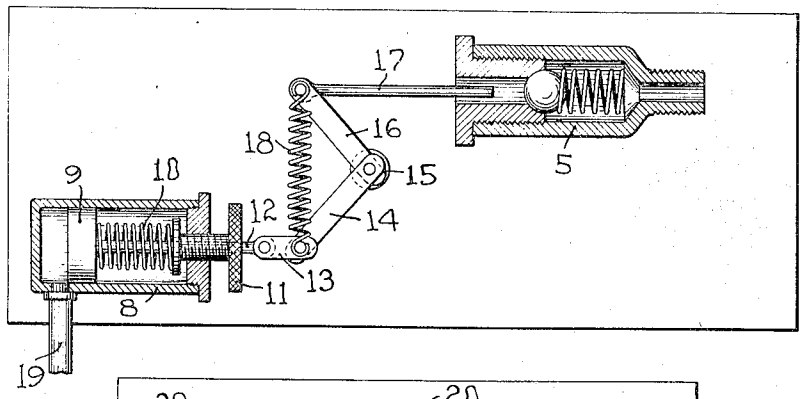


Fig. 3.

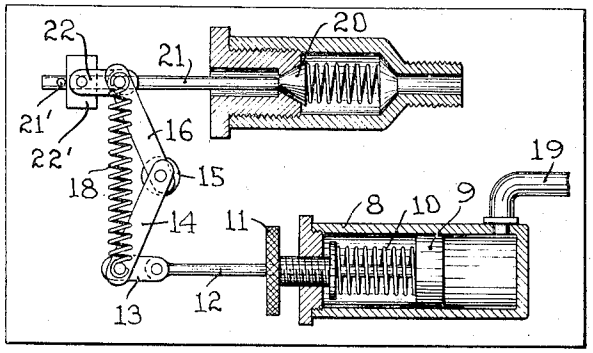
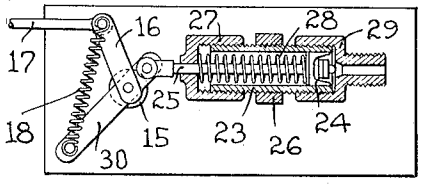


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES FREDERIC HEYWOOD, OF BUENOS AIRES, ARGENTINA.

FLUID-PUMP-CONTROLLING DEVICE AND THE LIKE.

Original application filed August 27, 1921, Serial No. 495,916. Divided and this application filed July 24, 1923. Serial No. 653,608.

To all whom it may concern:

Be it known that I, CHARLES FREDERIC HEYWOOD, a subject of the King of England, residing at Buenos Aires, in the Argentine Republic, South America, have invented certain new and useful Improvements in Fluid-Pump-Controlling Devices and the like; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to controlling devices, and more particularly to fluid pump controlling devices, the type of which I have shown in my co-pending application, Serial No. 495,916, filed August 27, 1921, of which this application is a division.

The invention also relates to devices for use in maintaining fluids, such as air or the like, at a predetermined pressure within a receptacle or tank, while the compressed fluid in such receptacle is usable for starting internal combustion engines, operating automatic air brakes, horns or other warning signals and various devices not only in connection with automobiles, but in any capacity desired.

The objects of the invention are to provide a controlling device of the character referred to having a compressed air tank or fluid receptacle with a pump for supplying the receptacle with compressed fluid, and means automatically operable for maintaining the fluid in said receptacle at any desired predetermined pressure, and additional means for preventing the fluid in the receptacle from being compressed above any desired predetermined amount which can be adjusted by a thumb screw operating on a spring or any suitable means.

The invention will first be hereinafter more particularly described, with reference to the accompanying drawings, which are to be taken as a part of this specification, and then pointed out in the claims at the end of the description.

In said drawings, Fig. 1 is a diagrammatic view of an application of my invention showing parts in section;

Fig. 2 is a longitudinal sectional view of the inlet valve and means for removing the ball from its seat, as shown in Fig. 1, with the toggle in a different position;

Fig. 3 is a like view of a modification, which operates in the reverse order from Fig. 2; and

Fig. 4 is a modification of the connection of the piston with the toggle.

Referring to said drawings, in which the same reference numerals are used to denote corresponding parts in different views, a reciprocating air pump 1 is employed with automatic air control to maintain the air pressure in the receptacle or tank 2 constant within very small limits. This pressure can be regulated higher at will within the working limits of the air pump.

In Fig. 1 the reciprocating air pump 1 may be driven preferably by an automobile engine and coupled to it by any ordinary means. However, it is obvious that the device is not limited to an internal combustion engine, but might be applied to any desired device and power might be supplied from any other source. In the pump 1, I preferably employ a cylinder of about 2½ inches in stroke and 1½ inches in bore, the crank shaft of said pump 1 working in oil. A suction pipe 3 and a delivery pipe 4 lead into the head of the pump cylinder, each having a non-return valve properly placed. The delivery valve 6 is shown leading to the receptacle 2 and on to the engine, or other device to be operated, through the starting cock or valve 7 and distributor. This valve 7 is adapted for turning off and preventing the escape of compressed air when the device is not in use. The control of the pressure is effected entirely by holding the suction valve 5 open when the pressure in the receptacle 2 reaches the high limit required, and by releasing this valve 5 and allowing it to seat normally again when the pressure is low in said receptacle. This operation is in turn effected by a small cylinder 8 with a well fitting piston 9 working therein against a spring 10 regulated by a thumb screw 11. The piston rod 12 extends through the coil spring 10 and through the thumb screw 11, and has its end connected by means of a small link 13 to a snap mechanism which includes a pair of links or levers 14 and 16 with their adjacent ends swingable on a common fixed pivot 15, the line 13 being connected to the outer end of the lever 14 and the outer end of the lever 16 being connected to a rod 17, which extends into the suction valve 5 of the pump and is adapted to press said valve

off its seat when the pressure in the receptacle is as high as is desired, thus stopping the pump from feeding as the pump merely forces the air through the suction valve 5 into the atmosphere instead of through the delivery valve 4 into the receptacle. The rod 17, for forcing the suction valve 5 off its seat, is forced in or out of the valve by the spiral spring 18 stretched across and joining the outer ends of the two levers 14 and 16. The cylinder 8 communicates through a small pipe 19 with the outlet of the air pump delivery 4 so that when air pressure rises to the desired degree the piston 9 forces, through means of the rod 12 and link 13, the lever 14 to the right as shown in Fig. 1. The spring 18 consequently throws over the lever 16, carrying the rod 17, and forces said rod into the suction valve 5 and holds it open. When the pressure in the receptacle 2 falls below the desired point the piston 9 in the cylinder 8 is forced back by the spring 10, and the levers 14 and 16 assume the position shown in Fig. 2, allowing the suction valve to function normally. By these levers 14 and 16 and spring 18, a quick, direct and full opening of the valve is obtained which either releases it entirely, or lifts it off its seat without an intermediate positioning or partial or gradual opening of the valve.

In Fig. 3 is shown a modification applicable to another method of effecting the control consisting in holding the suction valve 20 firmly on its seat by the controlling rod 21 to stop the pump feeding the receptacle and releasing the valve for normal feed, the reverse of the first method. When the valve 20 is in an unseated position it is loosely held so that working of the pump causes this valve to seat momentarily so that fluid is forced through the delivery valve 6 into the receptacle 2. However, when the valve 20 is rigidly held upon its seat, the entrance of air to the pump is prevented, thus preventing the pump from feeding the receptacle 2. A block 22', having an opening therein, allows the valve stem 21 to slide freely therethrough. The valve stem 21 has, on the end opposite the valve, a stop 21' by means of which the lever 16 can exert an outward pressure on valve 20, maintaining it on its seat, and directly the lever 16 is thrown over on the opposite side it leaves the valve stem 21 free to slide through the block 22'. The release of the valve 20 is achieved by connecting the piston rod 21 directly to the valve head and causing the pressure of the spring 18, when the piston 9, in the cylinder 8, occupies the position shown, to be transmitted from the levers 14 and 16 to the piston rod 21 through a link 22, the levers 14 and 16 constitute a toggle that will not collapse under the pressure of the spring 18, but which will yield to permit the valve 20 to open, when the pressure in cylinder 8 returns the piston to normal position, and allows the levers 14 and 16 to be thrown over to the opposite side, releasing valve 20 and allowing it to automatically open again. Obviously it is possible by connecting the pressure tank directly to one of the cylinders through a non-return valve to store up the exhaust gases at a sufficient pressure to utilize the same in a like manner. This would obviate the necessity of an air pump.

In Fig. 4 is shown another type of means for operating devices of a similar nature. This type of device comprises a cylinder 23, externally threaded throughout its length, having a piston 24, carried by a piston rod 25, adapted to reciprocate in said cylinder. The cylinder 23 is screw threadedly mounted, substantially midway its ends, in a pivoted nut 26 and is adjustable by screwing it backwards and forwards through said nut. Confined within the cylinder 23, between the plunger 24 and the cap 27 adapted to be screwed upon the cylinder, is a spring 28 which may be tensioned as desired by tightening or loosening the cap 27. Any suitable means may be employed for connecting the opposite end of the cylinder 23 with the pipe line. However, I have shown a nipple 29 having a large internally screw threaded portion adapted to screw upon the end of the cylinder and having its other end reduced and externally screw threaded for connection to the high pressure air supply. The piston 25 is connected directly to the extended end of the lever 30 which is similar to the lever 14. The rod 17 pivoted to the lever 16 is adapted for connection with a valve, clutch, fast or loose pulley, an electric switch or other suitable devices.

By adjusting the thumb screw 11 a varying amount of pressure in the receptacle is required to move the piston 9 in the cylinder 8 and thus cause the toggle to operate the valve 5. The more the thumb screw 11 is tightened the more force will be required to move it and consequently greater pressure in the receptacle 2 will be necessary to cause the valve 5 to be forced off its seat.

Obviously, various modifications and changes in the construction and arrangement of the parts may be made without departing from the spirit and scope of the invention.

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

1. In a device of the class described, the combination with a fluid receptacle, and a continuously operable pump for supplying fluid thereto under pressure, of a non-re-

turn valve associated with said receptacle, an inlet valve admitting fluid into said pump, a valve actuating rod, a snap mechanism operating said rod, and pneumatic means operable by the pressure of fluid delivered by said pump effecting the direct actuation of said snap mechanism.

2. In a device of the class described, the combination with a fluid receptacle, and a continuously operable pump for supplying fluid thereto under pressure, of a non-return valve associated with said receptacle, an inlet valve admitting fluid to said pump, a snap mechanism including links independent of said inlet valve and resilient means retaining said links flexed and ensuring a rapid snap action in one or other direction, an inlet valve unseating member active when said links are flexed in one direction and inactive when said links are oppositely flexed, and fluid pressure controlled means associated with said receptacle and operating said snap mechanism.

3. In combination with fluid pressure operable devices, a fluid receptacle, a continuously operable pump for supplying said receptacle with fluid under pressure, a valve between said pump and receptacle, a second valve for admitting fluid into said pump, and means intermittently interrupting the pumping action of said continuously operable pump, comprising a plunger in said last named valve for holding said valve off its seat when moved in one direction, means controlled by the pressure in the receptacle for operating said plunger, and means ensuring the rapid positive movement of said plunger to its full extent in one or other direction.

In testimony whereof I affix my signature.

CHARLES FREDERIC HEYWOOD.