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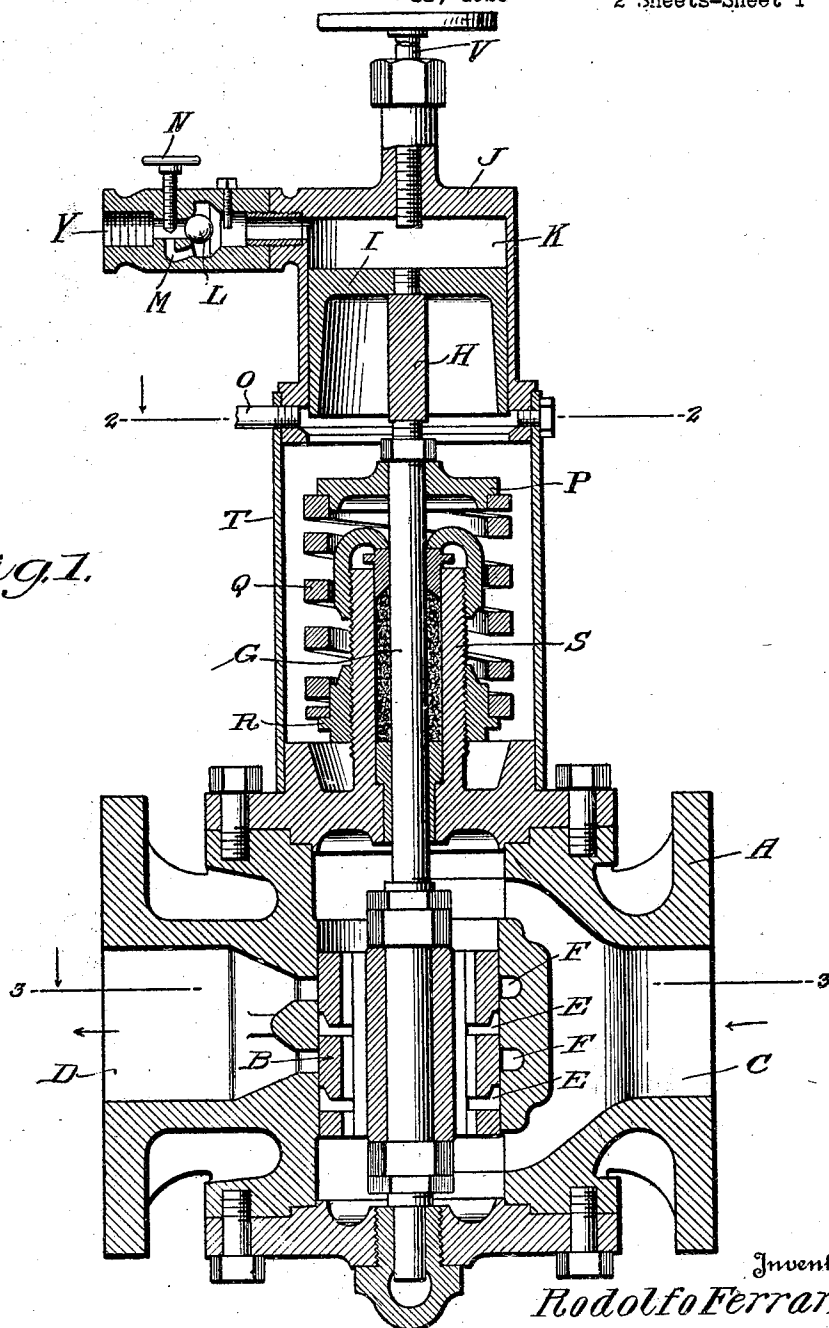
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R. FERRARI

PUMP REGULATING APPARATUS

Filed Jan. 18, 1923

2 Sheets-Sheet 1



Inventor
Rodolfo Ferrari,

Luigi Pavesi & Co.

By

Attorney

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Fig. 2.

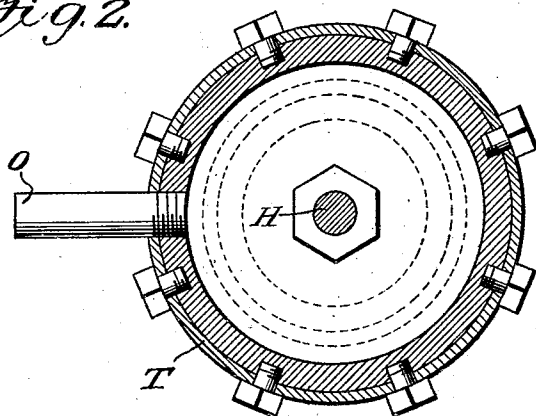


Fig. 4.

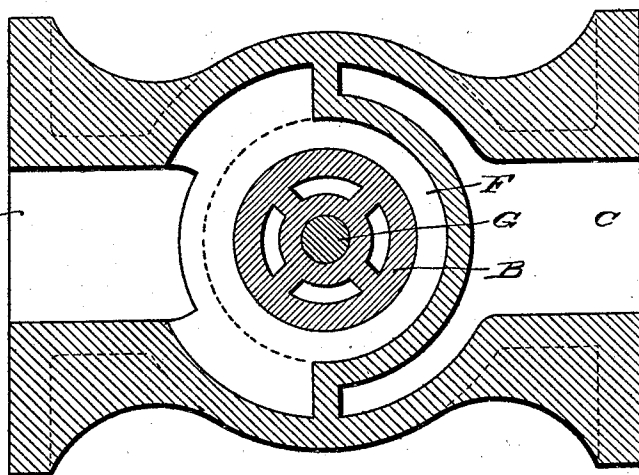
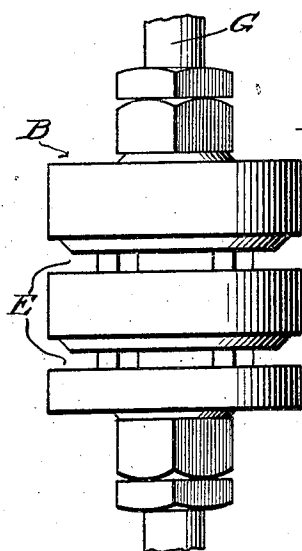


Fig. 3.

Inventor
Rodolfo Ferrari,

By

Luigi Pavesi, Jr.

Attorney

UNITED STATES PATENT OFFICE.

RODOLFO FERRARI, OF BUENOS AIRES, ARGENTINA.

PUMP-REGULATING APPARATUS.

Application filed January 18, 1923. Serial No. 613,521.

To all whom it may concern:

Be it known that I, RODOLFO FERRARI, citizen of the Republic of Argentina, residing at Buenos Aires, Argentina, have invented certain new and useful Improvements in Pump-Regulating Apparatus, of which the following is a specification.

The present invention relates to pump-regulating apparatus; and it proposes, briefly, an improved device for automatically controlling the inlet of steam into pumps utilizing such fluid for the impulsion of liquids of any kind.

According to the invention, a cylinder or chamber is provided containing a piston, the stem of which has attached to it the valve for controlling the passage of steam to the pump motor. This cylinder is in pipe connection with the impulse duct of the pump, and when the pressure of the liquid in said duct rises above a predetermined normal, the liquid will enter the cylinder and depress the steam valve, thereby shutting off the supply of steam to the motor which operates the pump, with the result that the latter stops. As soon as the pressure decreases to an extent sufficient to enable a compensating spring to act, the piston and, hence, the valve, are slowly raised, the steam valve is gradually opened, the liquid in the aforesaid chamber is slowly expelled therefrom and the pump starts working again. The expulsion of the liquid takes place slowly, due to the provision of a by-pass through which it is forced to pass, so that the starting of the motor is made very slow and progressive.

An embodiment of the invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a vertical sectional view of the improved regulating device;

Figs. 2 and 3 are horizontal sections taken on lines 2—2 and 3—3, of Fig. 1, respectively; and

Fig. 4 is a front view of the steam valve.

Referring more particularly to said drawings, A indicates a valve casing which is inserted between the steam supply pipe and the pump and is provided with inlet and outlet passages C and D for the steam. Communication between these passages is controlled by a valve B, here shown as of the balanced type, having annular ducts E for coaction with ducts F formed in a partition which separates the steam inlet

and outlet. The precise structural details of the valve may, of course, be varied, the form of valve illustrated being at present preferred.

The stem G of valve B projects upward and passes axially through a cylindrical chamber T mounted on top of the casing A and containing a spiral compensating spring Q, the tension of which can be adjusted by rotating a nut R threaded on the outside of a stuffing-box S. The latter is disposed centrally of chamber T, and the valve stem G extends through it; and on the other hand, it is encircled by spring Q which bears at its lower end upon nut R and at its upper end against the under side of a disk or collar P carried by stem G.

A second chamber or cylinder J is secured in the top of chamber T and contains a piston I, the stem H of which aligns with stem G and is suitably fastened thereto. The space K above piston I communicates directly with a short pipe or nipple Y which, in turn, is connected with the impulsion or discharge duct of the pump so that the liquid in said duct will thus be free to flow through pipe Y into space K when its pressure in the duct reaches a predetermined point. This pipe Y is provided with an internal by-pass M which opens at one end into the bore of the pipe and at the other end into the lower portion of an annular enlargement of said bore. The enlargement provides a valve seat for a check valve L preferably in the form of a ball, which, in one position, fits in said seat and, hence, prevents the liquid from flowing back from space K through the pipe except by way of the by-pass; and to control the flow of the liquid through said by-pass, a screw N is provided which is mounted in a threaded, vertical opening in the top of the pipe immediately above the by-pass end so as to move toward and from the same.

A screw V is mounted vertically in a threaded opening in the top of the cylinder or chamber J and projects into the space K so as to function as an adjustable stop to limit the upward movement of piston I; and at the top of chamber T there is arranged an outlet pipe O. The piston I, as will be understood, closes communication between the chambers J and T, but it is possible that some liquid may seep between the walls of the piston and its chamber, and it is to discharge this liquid that the pipe O is pro-

vided. The chamber T is devoid of communication with the interior of the valve casing A.

As explained above, the outlet D of the valve casing communicates by way of suitable passages, piping or the like (not shown) with the pump motor, so that when valve B is open and communication between the ducts E and F is established, steam admitted to the casing through inlet C will be free to pass through the casing and thence to the pump motor to actuate the pump. The connection between the impulsion or discharge duct of the pump and the pipe Y will enable some of the liquid raised by the pump to flow through pipe Y past the ball valve L, which is normally open, into the space K above piston I, so that the pressure of the liquid in said space will thus be the same as that in the impulsion duct of the pump. Now if the pressure in said duct rises from any cause—for example, the gradual closing of the discharge opening of the duct—there will be a corresponding rise in the pressure of the liquid in space K, and if this increase in pressure progresses far enough, the piston I will be forced downward against the action of spring Q, thereby partially or entirely closing the steam valve B, with the result that the steam supply to the pump motor is decreased, or shut off, thereby slowing down or stopping the operation of the pump.

When the discharge opening of the pump is again opened, the pressure in the duct and, hence, in space K will be instantly relieved, and the spring Q will then be enabled to force piston I upward. This upward movement of the piston will tend to exhaust the liquid from space K, as will be apparent; but the pressure of the liquid, on the other hand, will raise ball L into its seat, thereby closing the passage through pipe Y except by way of the by-pass M. As the diameter of the by-pass is quite small, as compared with the bore of pipe Y, and as the outlet end of the by-pass can be constricted by means of the needle valve or screw N, the flow of the liquid through said by-pass will necessarily be very slow, and the upward or opening movement of the steam valve B will be correspondingly retarded. Hence, the supply of fresh steam to the pump motor will be slow and gradual, and there will be a slow and progressive starting of the pump motor.

The nut R, previously referred to as controlling the tension of spring S, may thus be regarded as regulating the working pressure within the impulsion duct of the pump—that is to say, the pressure which the liquid must reach in order to depress piston I and close the steam valve. The screw V mounted in the top of the piston chamber may, if desired, be turned down far enough to depress the piston, thereby keeping the steam valve closed and the steam supply shut off

from the pump motor in the event of any injury to the mechanism.

It is to be observed, finally, that the motive agent acting on the piston I is not the steam supplied to the pump motor but the liquid actually raised or discharged by the pump itself. In other words, the space K which receives the aforesaid motive agent is connected with the outlet side of the pump, and is entirely devoid of connection with the steam supply.

I claim as my invention:—

1. Pump-regulating apparatus, comprising a valve and valve casing for controlling the supply of motive fluid to the motor of a pump; a cylinder mounted upon the casing but devoid of communication therewith; a piston in said cylinder having its stem connected to said valve; a spring acting upwardly against said piston to normally hold the same in raised position and the valve open; a pipe opening into the top of the cylinder and adapted to be connected to the impulsion duct of the pump to supply the liquid which is being pumped to the cylinder above the piston, so as to automatically depress the latter and thereby close the valve when the pressure of the liquid in said duct exceeds a predetermined normal, said pipe being provided with a by-pass of small cross-sectional area; and automatically-acting means normally closing the by-pass to permit the unobstructed flow of the liquid from said duct through said pipe, but opening the by-pass when the pressure is relieved so as to cause the return flow of the liquid through said pipe to said duct to take place solely through said by-pass, thereby to retard the upward movement of the piston.

2. Pump-regulating apparatus, comprising a valve and valve casing for controlling the supply of motive fluid to the motor of a pump; a cylinder mounted upon the casing but devoid of communication therewith; a piston in said cylinder having its stem connected to said valve; a spring acting upwardly against said piston to normally hold the same in raised position and the valve open; a pipe opening into the top of the cylinder and adapted to be connected to the impulsion duct of the pump to supply the liquid which is being pumped to the cylinder above the piston, so as to automatically depress the latter and thereby close the valve when the pressure of the liquid in said duct exceeds a predetermined normal, said pipe being provided with a by-pass of small cross-sectional area, and with a circumferential enlargement into which one end of the by-pass opens; and a ball valve normally disposed in said enlargement in position to close said by-pass end and movable automatically by the pressure of the liquid behind it, when the pressure in said duct is

relieved, into a position to close the bore of the pipe and open the by-pass thereby to cause the returning liquid to flow solely through the by-pass.

5 3. Pump-regulating apparatus, comprising a valve casing adapted to be connected at its inlet side to a source of motive fluid supply, and at its outlet side to the motor
10 of a pump; a controlling valve in said casing; a spring for normally holding the valve in open position; a cylinder adapted to be connected with the discharge side of the pump to receive the liquid being pumped;
15 a piston in said cylinder to be moved in one direction by the liquid in the cylinder when the pressure at the delivery side of the pump exceeds a predetermined normal; means for transmitting the movement of the piston to the valve to close the latter; a valve normally open to permit the liquid to flow freely
20 into said cylinder, but closing automatically when the pressure is relieved so as to prevent the direct return flow of the liquid from said cylinder; and means for by-passing the returning liquid around the
25 last-named valve, thereby to retard the flow of the liquid and insure a consequent slow movement of the piston and first-named valve in the other direction under the action of said spring, said by-pass means being
30 blocked by the second-named valve when the latter is in its normal open position.

4. Pump-regulating apparatus, comprising a valve and valve casing for controlling
35 the supply of motive fluid to the motor of a

pump; a cylinder mounted upon the casing but devoid of communication therewith; a piston in said cylinder having its stem connected to said valve; a spring acting upwardly against said piston to normally hold
40 the same in raised position and the valve open; a pipe opening into the top of the cylinder and adapted to be connected to the impulsion duct of the pump to supply the liquid which is being pumped to the cylinder
45 above the piston, so as to automatically depress the latter and thereby close the valve when the pressure of the liquid in said duct exceeds a predetermined normal; said pipe having its bore provided, intermediate the
50 ends thereof, with an annular enlargement, and with a by-pass of small cross-sectional area opening at one end into the lower portion of the enlargement and at the other end into said bore; and a ball valve normally
55 disposed in the lower portion of said enlargement in position to close the first-named by-pass end and thus enable the unobstructed flow of the liquid through the pipe bore, but movable automatically out of
60 such position when the pressure is relieved into one in which it is disposed in line with said bore, so as to cause the return flow of the liquid through said pipe to said duct
65 to take place solely through said by-pass, thereby to retard the upward movement of the piston.

In testimony whereof I affix my signature.

RODOLFO FERRARI.