Aug. 24, 1926. 1,597,455

E. F. MILLS

PRESSURE CONTROLLER

Original Filed Dec. 4, 1916

Fig. 1.

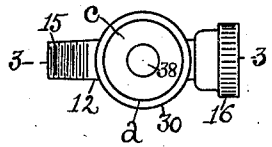


Fig. 5.

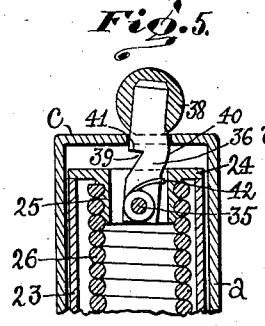


Fig. 6.

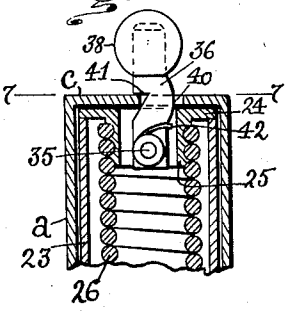


Fig. 2.

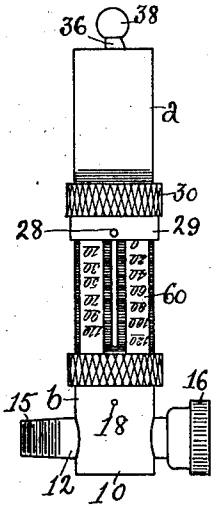


Fig. 7.

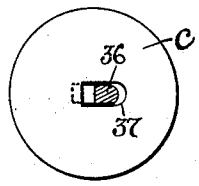


Fig. 4

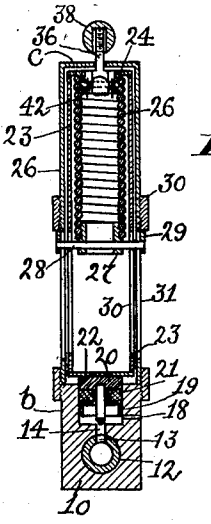
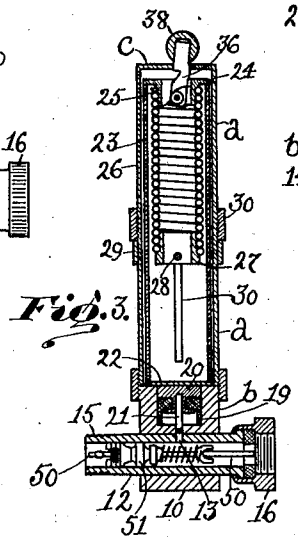


Fig. 3.



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UNITED STATES PATENT OFFICE.

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PRESSURE CONTROLLER.

Application filed December 4, 1916, Serial No. 134,835. Renewed April 15, 1922. Serial No. 553,072.

This invention relates to a pressure controller or instrument and has for its object to provide a simple, and exceedingly sensitive and accurate instrument with which a predetermined or desired pressure in a receptacle may be obtained. The instrument is especially adapted among other uses to be employed for obtaining a predetermined or desired pressure in automobile tires.

To this end, the instrument is provided with a piston and valve operatively connected together to move as one piece, and preferably made as a piston which cooperates with an outlet port to function as a valve. The piston valve is normally closed by a spring which has cooperating with it means for increasing or decreasing the pressure of the spring on said piston valve, and also has cooperating with it means for removing the pressure of the spring from the piston valve under conditions and for a purpose as will be described.

Provision is made for rendering impulses of the fluid pressure ineffective to open the piston valve as will be described. These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1, is a plan view of an instrument or controller embodying this invention.

Figure 2, an elevation of the instrument shown in Figure 1.

Figure 3, a vertical section of the instrument shown in Figure 1, the section being taken on the line 3—3.

Figure 4, a section with the piston valve in its open position and the spring locked in its ineffective position.

Figures 5 and 6, enlarged sections of the upper part of the instrument, and

Figure 7, a section on the line 7—7, Figure 6.

Referring to the drawing, *a* represents a casing having detachably secured to its lower end, a cylinder *b*, and provided at its upper end with a head *c*. The cylinder *b* has extended through its head 10 a nipple or tube 12 provided with a port 13 which communicates with a port 14 leading into the cylinder *b*. The tube or nipple 12 is adapted to have one end as 15 connected with a pump or other suitable source of fluid pressure and its other end 16 connected with the inner tube of an automobile tire. The cylinder *b* is provided with a fluid outlet port 18, see Fig. 4, leading to the outside of the cylinder, and contains a valve 19 which cooperates with said port to open and close the same. The valve 19 is secured to or forms part of a piston 20 located in the cylinder *b*, and said valve is represented as a cylindrical extension of said piston and is preferably made of leather or other yielding material, which is capable of being firmly pressed against the inner walls of the cylinder *b* to effectively close the port 18.

The piston 20 preferably has extended from it a pin 21 of slightly smaller diameter than the port 14 into which the pin extends when the valve 19 is closed. The piston 20 has cooperating with it a disc 22 of larger diameter than the said piston and located in the casing *a*. The disc 22 supports a tube 23 which in turn supports at its upper end a disc or head 24, which is provided as shown with a hub 25, to the exterior of which is fastened in any suitable manner, the upper end of a helical spring 26. The lower end of the spring 26 is anchored to a device located on the outside of the casing *a*, and as herein shown said spring is fastened in any suitable manner to a tubular head 27, which is connected by a pin 28 with a collar 29 capable of sliding on the outside of the casing *a*. The pin 28 is extended through slots 30—31 in the tube 23 and casing *a*, and the collar 29 bears against a collar 30′ in threaded engagement with the outside of the casing *a*.

By turning the collar 30′ on the casing *a*, the spring 26 can be elongated as will be described so as to increase or decrease the tension on the spring, for a purpose as will be described. The upper end of the spring 26 is normally free to move under the influence of fluid pressure admitted into the cylinder *b* through the ports 13—14 and acting against the piston 20, and provision is made for anchoring said free end for a purpose as will be described.

In the present instance the hub 25 supports a pin 35, which forms a pivot for a lever 36, which is extended through a slot 37 in the head *c*, and is provided as herein shown with a ball 38 serving as a handle for the lever 36, which latter is provided with a notch 39 in one edge and opposite said notch with a bulge 40 on the other edge. The notch 39 forms a tooth 41 which is designed to engage the outer surface of

the head *c* as represented in Fig. 6 and thereby hold or lock the lever 36 from movement into the casing *a* until positively disengaged by the operator. The tooth 41 is engaged with the outside of the head *c* by a spring 42 assisted by the cam or bulge 40.

When the lever 36 is locked to the casing *a* as represented in Fig. 6, the spring 26 is at such time anchored at both ends, and the pressure of the spring is removed from the tube 23 and the piston 20, which is advantageous as will be described.

The tube or nipple 12 is provided within it with the well-known Schrader valve commonly used in connection with the inner tubes of automobile tires, and comprising essentially a stem 50 on which is mounted a rubber valve 51, which closes the outer end of the tube or nipple against air pressure passing through the nipple, until the valve 51 is removed from its seat 52 by pressing upon the outer end of the valve stem 50, which is effected when the nipple 12 is coupled with the pump or other source of fluid pressure or which may be effected by the operator.

The instrument is capable of being used for controlling the amount of pressure pumped into the tire and when so used, the end 15 of the nipple or tube 12 is connected with the pump or other source of supply and the end 16 is connected with the tire. The pin 50 is preferably of sufficient length to normally unseat the tire valve when the coupling 16 is connected to the valve casing. The spring 26 is normally anchored at its upper end against movement in one direction by member 25 and is placed under the desired or required tension according to the pressure it is desired to supply to the tire, by turning the collar 30 on the casing until the collar 29 to which the opposite end of the spring is connected and which acts as an indicator, registers with the graduation on the scale 60 on the outside of the casing *a*, which is indicative of the predetermined or desired pressure. For instance let it be assumed that it is desired to supply the tire with 80 lbs. pressure. In this case, the indicator 29 is moved to the number 80 on the scale, which causes the spring 26 to hold the piston valve 19 closed until the pressure in the tire reaches 80 lbs., whereupon an increase in pressure above the 80 lbs. in the cylinder *b* which is the same as that in the tire, acts on the piston 20 and moves the latter from substantially the position shown in Figure 3 into that shown in Figure 4, so as to open the relief port 18 and allow the pressure supplied by the pump to pass to the atmosphere, and thereby prevent the tire being supplied by the pump with a pressure in excess of the desired or predetermined pressure. When the piston 20 is moved by the air pressure as described, the upper end of the spring 26 is moved through the disc 22 and tube 23, and the locking lever 36 is moved out through the slot 37 until the tooth 41 clears the upper edge of the said slot, whereupon a spring 42 throws the lever 36 into its locking position with the tooth 41 engaging the outer surface of the head *c* of the casing. At such time the tube 23 and piston 20 are relieved from spring pressure tending to close the relief valve, consequently the latter remains locked in its open position and cannot close until unlocked by the operator. As a result, the pump is prevented from supplying the tire with an excessive pressure.

The gauge herein shown is especially useful when the tire is to be supplied with air from a source of high pressure, as the opening of the tire valve makes the tube 12 practically an extension of the tire valve, and consequently the small volume of high pressure which passes by the valve 51 into the tube 12 and into the tire, is reduced, and the pressure of the air on the side of the valve 51 next to the tire is reduced to the same amount as that in the tire and is gradually built up to the point at which the spring 26 is set for the relief valve to open.

As a result, the relief valve of the gauge is prevented from being opened by the high pressure on the inlet side of the tube 12 before the pressure in the tire reaches the proper amount.

The instrument is also capable of being used for reducing the pressure in the tire to a predetermined or desired amount. To illustrate let it be supposed that the tire has been supplied with 80 lbs. pressure in the garage and that after a run say of 50 or 100 miles on a hot day, the pressure in the tire has increased considerably over the 80 lbs. and that the driver or owner of the car desires to reduce the pressure to 80 lbs. In this case, the driver first sets the instrument to 80 lbs. by turning the collar 30 to bring the indicator 29 to the 80 mark on the scale 60. He then applies the end 16 of the nipple to the tire valve nipple whereupon the pin 50 unseats the tire valve and the pressure in the tire passes into the cylinder *b* and acts on the piston 20 to open the relief valve 19 and allows the pressure to be reduced to 80 lbs. During this operation, the operator holds the lever 36 in its unlocked position, shown in Figure 5, so that, as soon as the pressure in the tire has been reduced to 80 lbs., the spring 26 will act to close the relief valve 19 and thereby again establish in the tire the desired pressure.

The instrument may also be used to ascertain the amount of pressure in the tire.

In this case the operator adjusts the in-

strument to say 100 lbs. and applies it to the tire, the tire valve being opened by the valve stem 50. In this case the pressure flows from the tire into the cylinder *b*, and if it is less than 100 lbs. the relief valve will not be opened. The operator then turns the collar 30 back until the tension on the spring 26 has been reduced so that the pressure acting on the piston 20 moves the latter and through the tube 23 and head 24 moves the lever 36 out into its locking position, the operator then knows that the pressure in the tire corresponds to that indicated by the instrument, to wit, the amount on the scale 60 with which the indicator 29 registers. At this point the instrument is to be disconnected from the tire valve to prevent loss of air pressure from the tire.

It will therefore be seen, that with an instrument embodying this invention and such as herein shown, it is possible to provide the tire or other receptacle with a predetermined pressure, and also to reduce an excessive pressure to a predetermined pressure, and further to ascertain or determine the pressure in the tire or other receptacle. The pin 21 is preferably employed so that when the relief valve 19 is closed, the pin is extended into the port 14, and the said pin is made somewhat smaller than the said port so as to allow a restricted flow of fluid pressure into the cylinder as long as the relief valve remains closed. In this manner the relief valve is protected from sudden impulses or blows of the fluid pressure which might be sufficient to open the valve. The pin 21 on the other hand is made short enough to be entirely removed from the port 14 when the relief valve is opened, so as to provide for a free and unobstructed flow of the excess pressure.

The slot 37 is elongated to one side of the center and when the spring 42 acts, it throws the lever 36 into line with the piston. I have herein shown one construction of apparatus embodying the invention but it is not desired to limit the invention to the particular construction shown.

Claims:

1. In a fluid pressure gage, in combination, a casing provided with a cylinder having a fluid outlet port, and a fluid inlet port, a piston valve controlling said fluid outlet port, a device carried by said piston valve and cooperating with said fluid inlet port to restrict the flow of fluid pressure into the cylinder while said piston valve is closed and to allow an unrestricted flow when the piston valve is opened, and means to close said piston valve when the pressure in the cylinder is below a predetermined point.

2. In a fluid pressure gauge, in combination, a casing provided with a cylinder having a fluid outlet port, a fluid passage provided with a port leading to said cylinder, a piston in said cylinder, means carried by said piston for partially closing the way through said passage, a valve connected with said piston and controlling said outlet port, and a spring to act on the piston in opposition to pressure admitted into the cylinder from said fluid passage.

In testimony whereof, I have signed my name to this specification.

EDWARD FRANK MILLS.