April 26, 1932. W. C. ELLIOTT 1,855,880

PULSATING PRESSURE STABILIZER

Filed Nov. 18, 1929

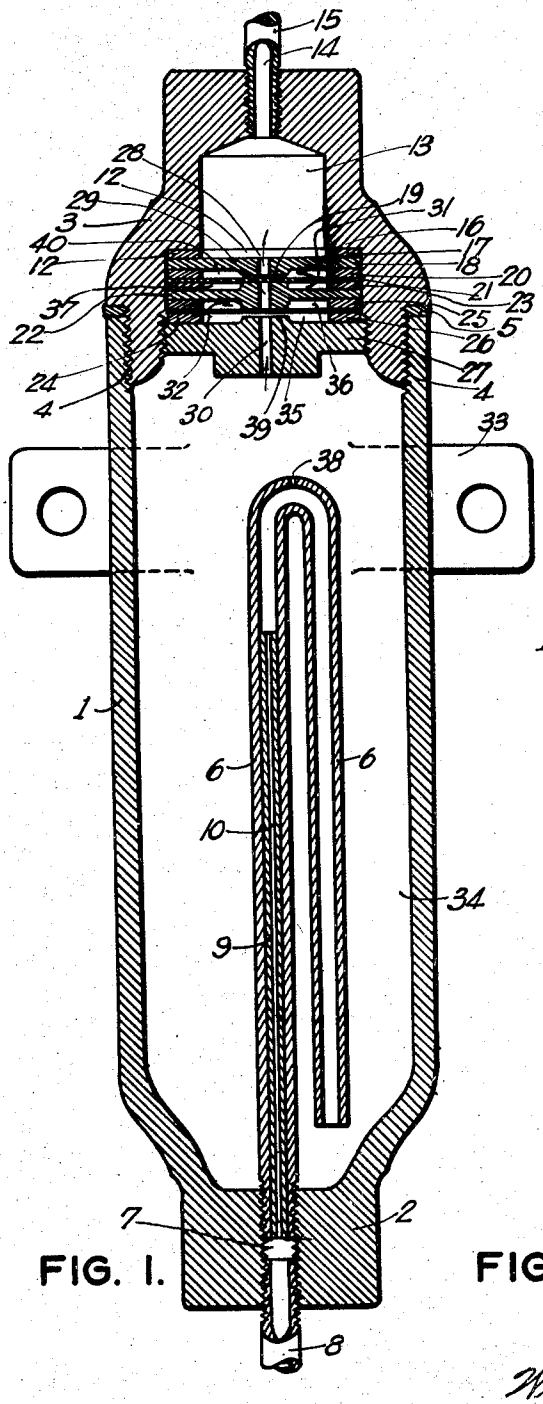


FIG. 1.

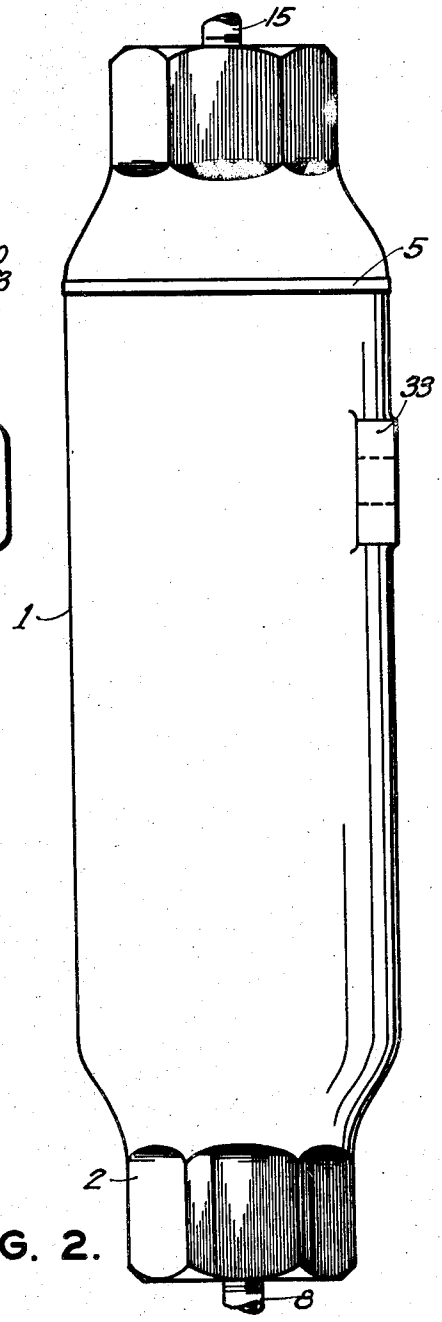


FIG. 2.

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PULSATING PRESSURE STABILIZER

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My invention relates to a device for stabilizing the pressure in gauges and in automatic pressure governing means, upon a pump line.

The objects of my invention are to provide a device of this class which is new, novel, practical and of utility; which will transform the throbbing impulses of liquid pressure as delivered from a pump, into a like pressure of steady, even impulse, that accurate gauging of pressure may be had, and in order that automatic pump control devices may be used successfully; which will permit the easy reading of the gauge at all times; a device which will be dependable and durable; which is relatively inexpensive to manufacture; which will be free from the necessity of supervision and repair; which will be efficient in accomplishing all the purposes for which it is intended.

In addition to the detailed uses for which my invention may be used, it may, when desired, be used for operating pressure control means upon a pipe line, without regard to its being used for reading gauges or for pump control purposes.

With these and other objects in view as will more fully appear, my invention consists in the construction, novel features, and combination of parts hereinafter more fully described, pointed out in the claims hereto appended, and illustrated in the accompanying one sheet drawings, of which,

Figure 1 is a front sectional elevational view of the device disposed upon a fragmentary pipe line.

Figure 2 is a side elevational view of the same.

Like characters of reference designate like parts in all the figures.

It is understood that various changes in the form, proportion, size, shape, weight and other details of construction, within the scope of my invention may be resorted to without departing from the spirit or broad principle of my invention and without sacrificing any of the advantages thereof; and it is also understood that the drawings are to be interpreted as being illustrative and not restrictive.

One practical embodiment of the invention as illustrated in the drawings comprises:

A hollow cylindrical barrel 1, having a solid lower end portion 2 which is externally adapted to afford a grip for a wrench. The head 3 of the device is hermetically attached to barrel 1 by means of threads shown as 4, an annular gasket 5 being disposed between the respective shoulders of said head and barrel.

Vertically within barrel 1 is a siphon shaped tube 6, preferably of non-corrosive metal, the longer leg of which is threadedly held, at its lower end portion, within the upper part of a perforation shown as 7 which extends vertically through said end 2. The lower portion of said perforation 7 threadedly embraces the upper end of the pipe 8 which leads to a line not shown, the pressure of which, it is desired to read, to control, or to read and control.

Vertically within the longer leg of the siphon 6, its outer walls closely contacting the inner walls of said leg, is the tube 9, which has a small through bore shown as 10. Tube 9 extends from the bottom end of said siphon leg to a point adjacent its top.

The said head 3 is bored as shown at 12 for the housing of a plurality of horizontally disposed circular diaphrams, discs and spacer rings, yet to be described, and thereabove is provided with a narrow chamber shown as 13, upward from which leads a threaded through bore shown as 14. Bore 14 embraces the threaded lower end of the pipe 15 which leads to a usual or desired pressure gauge, pressure control means, or to both.

Within the said bore 12 and seated upon shoulder 16 is an annular spacer ring 17, next below and contacting ring 17 is a rigid disc 18, centrally provided with a down standing boss which has a flat faced bottom 19. A spacer ring 20 supports said disc 18 from below. Contacting the under side of ring 20 is circular diaphragm disc 21, its upper flat, central portion normally closely adjacent to, but not contacting the bottom 19 of said rigid disc 18. Said diaphragm 21 does, however, normally contact the upper bossed central portion of the rigid disc 22 therebelow.

Separating said diaphragm 21 and the outer portions of said disc 22 is another spacer ring 23. The face of the lower bossed central portion of disc 22 normally contacts the central portion of the thin diaphragm disc 24 therebelow, while separating the circumferential portion of said members 22 and 24 is the spacer ring 25. A spacer ring 26 separates the outer edge portions of said diaphragm 24 from the outer edge portions of a disc 27. Disc 27 is centrally provided with a flat faced boss 39 upon its upper central portion. Normally the said boss 39 is not contacted by said diaphragm 24, though disposed closely adjacent thereto. Disc 27 is threadedly disposed within the said bore 12 of said head 3. Perforations shown as 28, 29 and 30 respectively pass, one each, through said rigid discs 18, 22 and 27. Said diaphragms 21 and 24 are provided at points between their respective centers and their points of contact with said spacer rings 20 and 23, and 25 and 26 with through perforations shown as 31 and 32.

For positioning the device upon a wall, a standard or the like, I provide same with a usual bracket 33.

In use my device as above described will be assembled, the pipe line 8, a gate valve not shown, thereupon, connected by a usual T, or the like, to the outlet line of a water pump or other pressure line. The upper pipe line 15 will be connected in a usual desired manner to a gauge or control means for actuating a pump control or pressure control. Into the chamber shown as 34, of said barrel 1, will have been introduced a quantity of lubricating oil or the like, said quantity varying with the amount of pressure to be carried in the pressure line.

With line 8 open, water will be forced into the large chamber 34 against the normal atmospheric pressure therein, and depending upon the water pressure exerted, said water will rise to a considerable height. Upon the water will float the column of said oil.

It will be understood by those familiar with the art to which my invention applies, that in starting a pump against a low pressure in the line, there is a tremendous intermittent variation of pressure in the line until the column of water therein is put in motion throughout the line, and that then and thereafter the throbbing of the pumps is indicated in the pressure gauges and reflected in the pump control devices which are usually present.

In my device the throbbing impulses of the liquid delivered through the pipe 8 are first cushioned through means of the column of water and air in said siphon, thence are further cushioned by the water, oil and air in said chamber 34. The pressure is then delivered through bore 30 into the small chamber shown as 35 below diaphragm disc 24. Through perforation 32 in diaphragm 24 the cushioned pressure will flow into the small chamber 36 immediately above diaphragm 24, in which pressure will somewhat retardedly be built up, until same equals that in said chamber 34 at the peak of the pump's throb. Between impulses of pressure in chamber 34, the pressure which has been bullt up in chamber 36 will be greater than that in chamber 35 and will partly flow back through perforation 32 into chamber 35, but so slowly, because of the smallness of perforation 32, that the residue of pressure in chamber 36 will force diaphragm 24 downward from contact with the face of the lower boss of said rigid disc 22. The air or oil, as the case may be, under pressure, will escape, through said perforation 29, lifting diaphragm 21 from contact with the flat face of the upper boss of said member 22, and will pass into the small chamber shown as 37. As more water is forced into said chamber 34, the oil in said chamber will continue to rise. Pressure building up in chamber 37 will cause the oil or water in said chamber to pass through the small perforation 31 into chamber 40 and thence through bore 28 into chamber 13. By this time the throbbing pulsations of the pressure will have been eliminated, and the pressure made uniform. The uniform pressure, within said chamber 13 will be communicated through said pipe 15 to the gauge, where it can be easily read at all times, and to the pipe line pressure control means.

The description of the operation of the device as above is intended to describe its operation when first placed upon the line, at which time there will be no back pressure, other than atmospheric, in line 15 or chamber 13. It will be obvious that very shortly after the installation of the device the pressure in chamber 13 and pipe 15 will build up to a point at which it will equal the pressure within said chamber 34, but that due to the peculiar action of each of said diaphragms 21 and 24 the greater part of the pressure of each impulse within the chamber 34 can be delivered to each succeeding chamber thereabove, only upon the subsidence of the said impulse. The throbbing impulses upon the line 8 are so retarded and broken up, that by the time they have reached the chamber 13, and pipe line 15, they operate and may be recorded not as impulses but as a steady pressure.

It will be noted that diaphragms 24 and 21 have opposite actions and that the pressure which has been built up in chamber 13 and line 15 will not be lost by a downward passage into chamber 34 between the pulsations of the pump.

The small perforations 31 and 32 respectively through said diaphragms, together with the various small chambers and bores within the diaphragm member of head 3 per-

mit at all times, communication between chambers 13 and 34 but at such a restricted rate that the excess of pressure in one such chamber over that in the other chamber may not be equalized therebetween during the short interval between the throbs of the pump.

As a means of preventing the siphoning of water and oil within the chamber 34, by the pipe 8, at a time when the pumps thereupon are inoperative, I provide upon the crown of the pipe 6 a perforation shown as 38.

Obviously, the invention is susceptible of embodiment in forms other than that which is illustrated in the accompanying drawings and described herein, and applicable for uses and purposes other than as detailed, and I therefore consider as my own all such modifications and adaptations and other uses of the form of the device other than as herein described as fairly fall within the scope of my invention.

Having thus described my invention, what is claimed and desired to be secured by Letters Patent, is:

1. A pressure stabilizer for pump lines, embodying a container adapted to be partially filled with oil, said container having a bottom inlet for connection with a pump line and a top outlet, and an inverted T shaped tube within said container, having one of its legs interiorly constricted and connected to said inlet and its other leg terminating slightly above the bottom of said container, said tube having a perforation through one wall at its extreme upper portion for preventing the oil from being siphoned out of said container when pressure is discontinued in said inlet, said interiorly constricted leg being adapted to retard the flow of a fluid through said inlet.

2. A pressure stabilizer for pump lines, embodying a hollow, cylindrical container adapted to be partially filled with oil, said container having a bottom inlet for connection with a pump line and a top outlet, an inverted U shaped tube within said container for retarding the flow of a fluid through said inlet, and a plurality of perforated discs within said container for retarding the flow of oil to said outlet and for retarding the return of oil from said outlet.

3. A pressure stabilizer for pump lines, embodying a hollow, cylindrical container adapted to be partially filled with oil, said container having a bottom inlet for connection with a pump line and a top outlet, an inverted U shaped tube within said container having a perforation through its uppermost extremity, said tube being adapted to retard the flow of a fluid through said inlet, and said perforation being adapted to prevent the oil from being siphoned from said container when pressure is relieved at said inlet, and baffle and diaphragm means for retarding the flow of oil to said outlet and for retarding the return of oil from said outlet.

4. A pressure stabilizer for pump lines, embodying a hollow cylindrical container adapted to be partially filled with oil, said container having a bottom inlet for connection with a pump line, and a top outlet, and an inverted U shaped tube having a perforation through its uppermost extremity, said tube disposed within said container for retarding the flow of a fluid thereinto, and said perforation being adapted to prevent the oil from being siphoned from said container when pressure is relieved in said inlet.

5. A pressure stabilizer for pump lines, embodying a hollow, cylindrical container adapted to be partially filled with a comparatively light weight liquid, said container having a bottom inlet for connection with a pump line for supplying said container with a second liquid heavier than the first mentioned liquid, a top outlet and, an inverted U shaped tube disposed within said container for retarding the flow of said second liquid into said container, said tube having one of its ends threadedly connected in said inlet, its other end terminating adjacent the bottom of said container and having a lateral perforation through its uppermost portion above the normal level of the first mentioned liquid, for preventing the first mentioned liquid from being siphoned out of said container when the second liquid is drained out through said inlet.

6. A pressure stabilizer for pump lines, embodying a hollow, cylindrical container adapted to be partially filled with oil, said container having a bottom inlet for connection with a pump line, and a top outlet, an inverted U shaped tube disposed within said container for retarding the flow of water into said container, said tube having one of its ends threadedly connected in said inlet, its other end terminating adjacent the bottom of said container and having a lateral perforation through its uppermost portion above the normal level of said oil, a plurality of perforated baffle discs and diaphragms intercepting said outlet, said discs adapted to retard the flow of oil to said outlet and to retard the return of oil from said outlet.

7. A pressure stabilizer for pump lines, embodying a hollow, cylindrical container adapted to be partially filled with oil, said container having a bottom inlet for connection with a pump line, and a top outlet, an inverted U shaped tube disposed within said container for retarding the flow of water into said container, said tube having one of its ends threadedly connected in said inlet, its other end terminating adjacent the bottom of said container and having a lateral perforation through its uppermost portion above the normal level of said oil, a plurality of perforated diaphragms and baffle discs

intercepting said outlet, said discs adapted to temporarily and intermittently close said outlet upon a sudden pressure within said container and to retard the return of oil from said outlet.

8. In a pressure stabilizer for pump lines, the combination with a hollow cylindrical container adapted to be partially filled with oil, said container having a bottom inlet for connection with a pump line and a top outlet, of an inverted U shaped tube disposed within said container for retarding the flow of water into said container, said tube having one of its ends threadedly connected in said inlet, its other end terminating adjacent the bottom of said container and having a lateral perforation through its uppermost portion above the normal level of said oil, for preventing the siphoning out of oil when the water in said container is drained out through said inlet.

9. In a pressure stabilizer for pump lines, the combination with a hollow cylindrical container adapted to be partially filled with oil, said container having a bottom inlet for connection with a pump line and a top outlet, of an inverted U shaped tube disposed within said container for retarding the flow of water into said container, said tube having one of its ends threadedly connected in said inlet, its other end terminating adjacent the bottom of said container and having a lateral perforation through its uppermost portion above the normal level of oil for preventing the oil from being siphoned out of said container when pressure is relieved in said inlet, and a plurality of perforated diaphragms and baffle discs intercepting said outlet, said discs adapted to temporarily and intermittently close said outlet upon a sudden pressure within said container and to retard the return of oil from said outlet.

10. Organization as described in claim 3, in which said baffle and diaphragm means comprises a plurality of centrally bossed baffle discs spacedly and rigidly disposed in an upper portion of said container and intercepting said outlet, said discs having alined through perforations, and a plurality of diaphragms each disposed between two of said discs, said diaphragms each having a through perforation at a point comparatively distant from the perforations in the adjacent discs so that the oil must travel a circuitous route in reaching said outlet, said diaphragms adapted to temporarily close a perforation in one of said discs when a sudden pressure is exerted upon said oil.

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