Jan. 20, 1931. W. C. ELLIOTT 1,789,620

LIQUID PRESSURE CONTROL AND DAMPENING DEVICE

Filed March 28, 1928

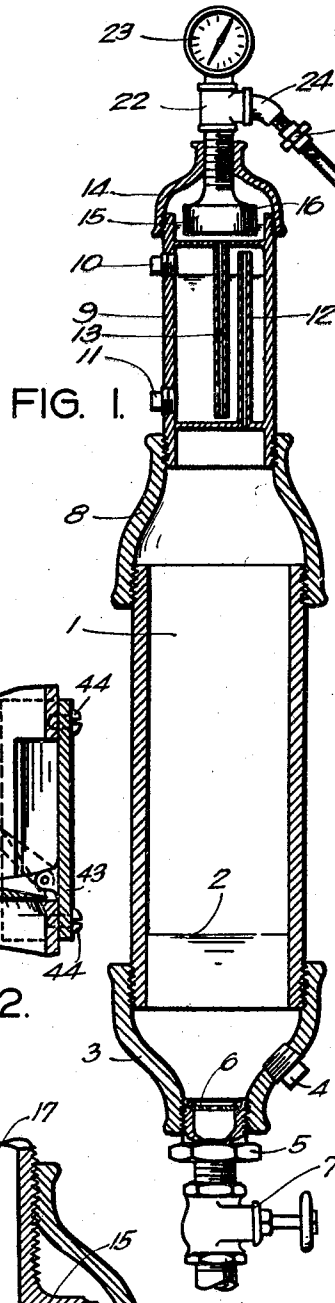


FIG. 1.

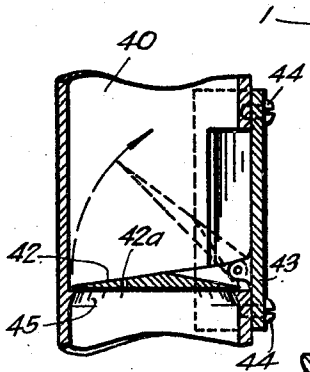


FIG. 2.

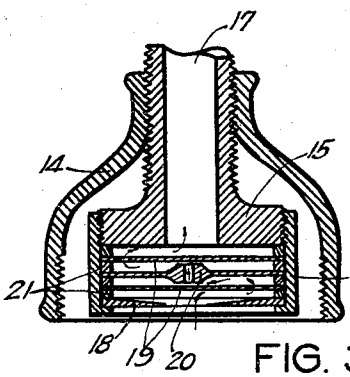


FIG. 3.

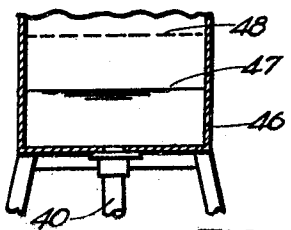
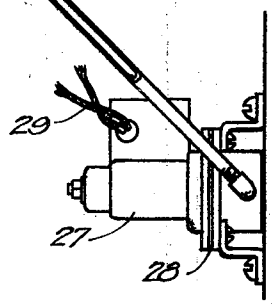


FIG. 4.



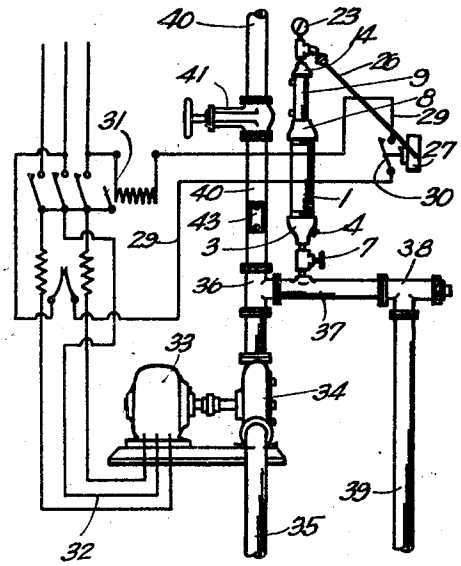


FIG. 5.

William C. Elliott

INVENTOR.

BY Loyal J. Miller.

ATTORNEYS.

Patented Jan. 20, 1931 1,789,620

UNITED STATES PATENT OFFICE

WILLIAM C. ELLIOTT, OF MINCO, OKLAHOMA

LIQUID-PRESSURE CONTROL AND DAMPENING DEVICE

Application filed March 28, 1928. Serial No. 265,495.

My invention relates to improvements in method of and apparatus for starting and stopping electrically driven pumps supplying water to elevated tanks or standpipes.

The principal objects of my invention are to provide a device of this character which will be actuated automatically by the pressure or head of the water in the tank; which can be adjusted to act at any desired pressure; which will obviate the necessity of an overflow return pipe from the tank to the pump; a device which will operate with but very little attention and adjustment; a device which can be placed in the supply line at the pump and still control the depth of water in a standpipe or tank at any desired distance from the well and pump; to provide a device of this character which is simple, novel, new, unusual, useful, inexpensive, strong, durable, reliable and of utility; which cannot easily get out of order and which is efficient for the purposes for which it is intended.

With these and other objects in view, my invention consists of the construction, novel features and combination of parts to be more fully described hereinafter, illustrated in the accompanying one-sheet drawing and specifically pointed out in the claims hereunto appended; it is to be understood that the drawings and these specifications are merely for illustrative purposes and are not restrictive and that various changes in the form, proportion, size, weight, shape, and minor details of construction within the scope of my invention may be resorted to without departing from the spirit or principle of the invention or sacrificing any of the advantages thereof.

In the accompanying drawing Figure 1 is a sectional view through the device showing the pressure switch in elevation; Fig. 2 is a sectional view through the leaking check valve in the water line; Fig. 3 is a sectional view through the baffle plates; Fig. 4 is a fragmentary sectional view of a water tank or standpipe; Fig. 5 is an elevational view of the device installed on a water line showing schematic diagram of the electrical connections.

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

Where water pressure, either for public or private supply is obtained from elevated tanks or standpipes, the latter are usually located on top of a hill or other elevated situation and usually at some considerable distance from the well, spring, lake, river or other source of supply near or in which the pump must be placed. Much loss, inconvenience and annoyance result from the tank overflowing, or running low. My invention seeks to remedy this situation by automatically switching off the power to the motor operating the pump when the tank is full or filled to any pre-determined height; also switching on the power when the tank is empty or contains any pre-determined desired amount of water.

The apparatus consists of an air chamber 1 having a fluctuating water level 2, a bottom reducing coupling 3, a plug clean-out 4 for the said chamber 1, a bushing 5 in threaded connection with the said coupling 3, a perforated disc 6 set rigidly, by any means, into the said bushing 5, a gate valve 7 for shutting off the water from the pump 34, a top reducing coupling 8, having threaded connection with the said air chamber 1 and an oil supply chamber 9, the said chamber 9 being provided with a plugged opening 10 for filling and plugged opening 11 for draining the said chamber 9. Air pressure in-let pipe 12 is in direct communication with the air chamber 1, passes up through the oil contained in chamber 9 and exerts pressure upon the surface of the said oil forcing the oil through oil pressure outlet pipe 13 and into the baffle chamber reducing coupling 14. Within coupling 14 and in threaded connection therewith is baffle holding shell support and connection member 15, having threaded to its lower end baffle holding shell 16. Contained in shell 16 are baffle washer 18, perforated baffle discs 19, bossed central opening baffle 20 and baffle spacers 21. The oil under pressure follows a devious course in its passage through the baffles as indicated by the arrows, best seen in Fig. 3, baffles 19 forming a bellows as the oil enters and leaves the bossed central opening

in baffle 20. Attached to the upper end of member 15 is a pipe T 22, the upstanding opening communicating with the pressure gage 23 and the remaining opening connecting with a strut L 24. A three-part union 25 is interposed between L 24 and oil pipe 26; the said pipe 26 leading to the oil chamber in oil pressure switch 27, where the force of the oil is exerted against diaphragm 28 in said oil pressure switch 27, which throws the circuit breaker 30 set in on the line 29 and cuts off the power to the motor 33. The magnetic switching device 31 in the three phase circuit 32 to the motor 33 operates in the usual manner. It is to be understood that neither the said oil pressure switch 27 nor the magnetic switch 31 forms any part of my invention.

Motor 33 is directly connected to pump 34 located conveniently with reference to the intake water supply pipe 35. The pipe T 36 in the discharge pipe line 40 to tank 46 forms connection with branch off pipe 37 into which my automatic governing device is threaded. At the end of pipe 37 is by-pass blowoff T 38 having a check valve for allowing the water to return to the well or other source of supply through return pipe 39 should the occasion arise. At 41 is cut-off gate valve in line 40 between the pump 34 and tank 46. The automatic leaking flap check valve 42 attached to hinge plate 43 is perforated at 42*a* and is set in the supply line 40 above the pipe T 36 to automatically prevent the water from flowing back into the well when the pump is shut down and to avoid sudden undue and excessive fluctuating back pressure on my automatic governing device. As can best be seen in Fig. 2 the said check valve 42 is set into pipe 40 and attached thereto by screws 44. The perforated flap 42 in closed position rests on valve seat 45 and is held thereagainst by the pressure of the head of water in the pipe and tank above.

In operation it will be understood that when the level of the water 47 in the tank 46 is near the bottom the pressure head against which the pump 34 is operating will be such that the water passing through perforated disc 6 will raise the water level 2 in air chamber 1 very gradually but as the level of the water in the tank 46 rises to 48, which may be at any pre-determined height, the pressure head due thereto will be transmitted in fluctuating pulsations to the air in chamber 1 and the oil in chamber 9 until the oil reaches the baffles 18, 19 and 20. By the time the oil has passed these baffles it reaches opening 17 and passes through pipe 26 with a steady, even pressure to be exerted against diaphragm 28 and when the pressure on said diaphragm 28 reaches a pre-determined amount, circuit breaker 30 is thrown and the motor stops, check valve 42 closes pipe 40 but enough water passes through the perforation 42*a* in valve 42 to maintain pressure in my device until the tank is empty or has reached some predetermined level. The oil will gradually return to the oil supply chamber 9, pressure on diaphragm 28 will be released, when the magnetic switching device 31 will operate to automatically close circuit breaker 30 and the motor will start again.

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

1. In a device of the class described, in combination, an air chamber having its lower end adapted to receive water under pressure from a water supply line, and to hold same in varying volume, and for retarding the flow of water into and out of said air chamber, said air chamber adapted through the entering of said water to compress air therein, an oil chamber mounted on said air chamber, means for filling and draining said oil chamber, means for transmitting the air pressure from said air chamber to the upper surface of oil in said oil chamber, a baffle chamber, and air pressure means for forcing the oil from said oil chamber into said baffle chamber.

2. A device for stabilizing pulsating pressure on fluid supply lines, having in combination, an air chamber adapted for attachment upon said supply line and for holding air in varying quantities under varying pressure, and adapted at its lower end to receive and hold water in fluctuating quantities, said chamber having a perforated disc for retarding the inflow and outflow of water from and to said supply line, means for draining and cleaning said air chamber, an oil chamber mounted on said air chamber adapted for receiving and holding oil and air in varying quantities and pressure, means for transmitting the air pressure from said air chamber to the upper surface of oil in said oil chamber, a baffle chamber having a discharge line, said air pressure forcing said oil into said baffle chamber, a plurality of baffle discs within said baffle chamber, said discs having perforations therethrough arranged to form a devious course for the oil under pressure in its passage through said baffles to said discharge line.

3. A device for stabilizing pulsating pressure in fluid supply lines having, in combination, an air chamber adapted at its lower end for attaching a branch-off pipe from said supply line, said chamber having its lower inlet opening bridged by a perforated disc, an oil chamber communicating with said air chamber, a baffle chamber communicating with said oil chamber, an outlet pipe for said baffle chamber, a plurality of perforated baffle plates within said baffle chamber for stabilizing fluctuating pressure of oil passing therethrough, and means upon which said device is mounted, for allowing the fluid, after reaching a pre-determined pressure, to return to the source from which it is being pumped.

4. A device for stabilizing pulsating pressure in fluid supply lines, having in combination, a hinged check valve in said water supply line, adapted for permitting back pressure therethrough and for retarding the back flow of water therethrough, an air chamber having its lower end adapted to receive water under pressure from said water supply line, and to hold same in varying volume, and for retarding the flow of water into and out of said air chamber, said air chamber adapted through the entering of said water to compress air therein, an oil chamber mounted on said air chamber, means for filling and draining said oil chamber, means for transmitting the air pressure from said air chamber to the upper surface of oil in said oil chamber, a baffle chamber having an outlet, and air pressure means for forcing the oil from said oil chamber into and through said baffle chamber and into said outlet.

5. A device for stabilizing pulsating pressure in fluid supply lines, having in combination, a hinged perforated check valve in said fluid supply line, an air chamber adapted at its lower end to connect said fluid supply line, said chamber having a perforated disc in its intake opening for retarding the flow of water therethrough, an oil chamber mounted on said air chamber, a baffle chamber mounted on said oil chamber, said baffle chamber having a plurality of perforated discs therein, the lower of said discs having a perforation of larger size than the others, said large perforation being at the center of said lower disc, the disc next above being flexible and having a small perforation adjacent its outer edge, the disc next above said flexible disc being rigid and having a bulged portion at its center, said bulged portion being perforated at its center, the disc next above said bulged disc being flexible and having a small perforation adjacent its outer portion, said flexible discs being adapted to press against and close the perforation in said bulge in said bulged disc until enough oil has passed through the said perforations adjacent their respective outer portions to equal the pressure being exerted either above or below said flexible discs.

6. A device for stabilizing pulsating pressure in fluid supply lines, having in combination, a hinged check valve in said fluid supply line, adapted for permitting back pressure therethrough and for retarding the back flow of fluid therethrough, an air chamber having its lower end adapted to receive fluid under pressure from said supply line, and to hold same in varying volume, and for retarding the flow of fluid into and out of said air chamber, said air chamber adapted through the entering of said water to compress air therein, an oil chamber mounted on said air chamber, said oil chamber adapted for receiving and holding oil and air in varying quantities and pressure, means for filling and draining said oil chamber, means for transmitting the air pressure from said air chamber to the upper surface of oil in said oil chamber, a baffle chamber having an upper outlet, air pressure means for forcing said oil into said baffle chamber, baffle discs in said baffle chamber for retarding the passage of said oil, said disc means having perforations therethrough, said perforations arranged to form a devious course for the flow of said oil under said pressure in its passage through said baffle discs to said outlet.

WILLIAM C. ELLIOTT.