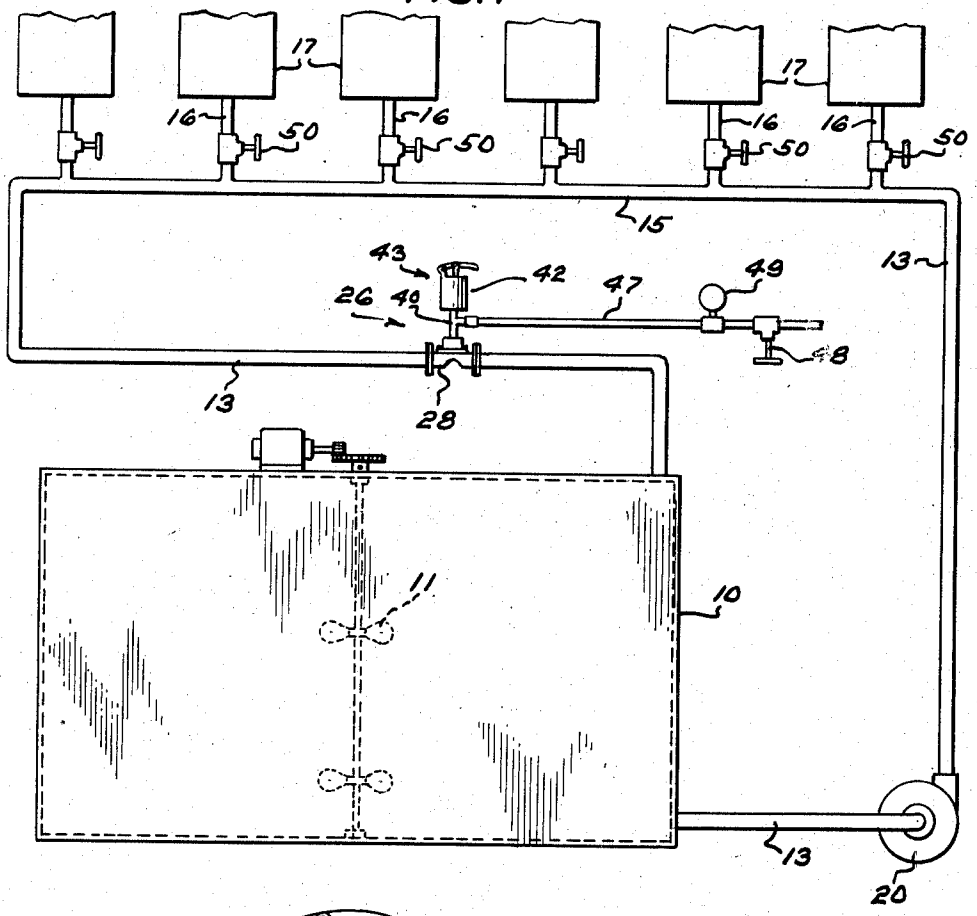
July 21, 1959 B. F. BACHUS 2,895,505

PRESSURE VALVE AND CONTROL SYSTEM FOR PAPER PULP MACHINES

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FIG. 1



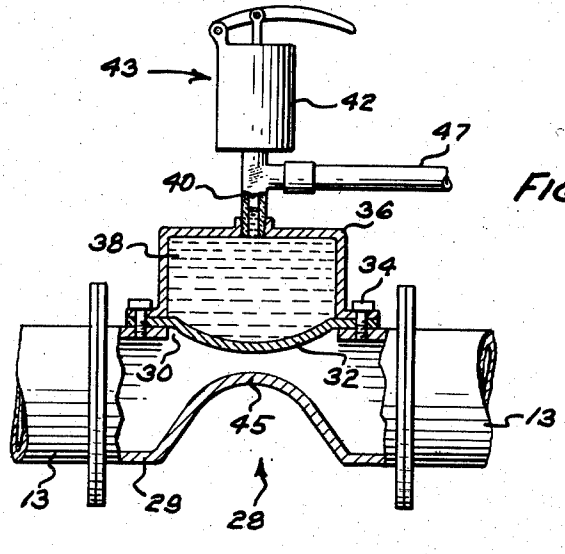


FIG. 2

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PRESSURE VALVE AND CONTROL SYSTEM FOR PAPER PULP MACHINES

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6 Claims. (Cl. 137—563)

This invention relates to a system for supplying paper pulp stock to paper pulp machines under a predetermined uniform pressure and more particularly to a pressure control valve for controlling the pressure of the paper pulp stock supplied to the machines.

In the art of applying paper pulp to electrical conductors to insulate them, it is essential that the paper pulp stock be supplied to the paper pulp machine at a uniform pressure in order to avoid variations in the thickness of the layer of pulp applied to the conductors. Usually a battery of paper pulp machines is connected to a common pulp supply chest through a supply line and as the pulp machines are individually connected to or disconnected from the supply line, the pressure of the pulp stock in the line varies and the control therefor has to be readjusted to bring the pressure to a predetermined uniform value.

An object of the present invention is to provide a systen for automatically supplying paper pulp stock under predetermined uniform pressure to paper pulp machines.

Another object of the invention is to provide a simple and effective valve mechanism for automatically controlling the pressure of fluid flowing through a line.

A system illustrating certain features of the invention for supplying paper pulp stock to a plurality of paper pulp machines may include a container for the pulp stock supply having a supply line connected thereto and to a battery of paper pulp machines and with a pump in the line for circulating the paper pulp stock to the paper pulp machines and returning a portion thereof to the supply container. A control valve in the discharge end of the supply line has a flexible diaphragm which forms a portion of the passageway through the valve and is operable by compressed air at a predetermined pressure to vary the size of the passageway to control the flow of paper pulp stock therethrough and maintain a uniform pressure of the pulp stock in the supply line. The compressed air actuates the diaphragm through a body of liquid which contacts the diaphragm and is contained in a laterally disposed chamber on the valve and serves to increase the inertia of the diaphragm to prevent pulsasation of the pulp stock in the supply line.

Other objects and advantages of the invention will become more apparent by reference to the following detailed description and the accompanying drawings illustrating a preferred embodiment thereof, in which:

Fig. 1 is a diagrammatic view of a system for supplying paper pulp stock under a predetermined uniform pressure to a battery of paper pulp machines; and

Fig. 2 is an enlarged fragmentary sectional elevational view of the pressure valve for controlling the pressure of the fluid passing therethrough.

Referring to the drawings 10 denotes a tank or chest for containing a supply of liquid paper pulp stock which may be kept in a thoroughly mixed condition by an agitator 11. A conduit or pipe line 13 is connected at one end to the lower portion of the supply chest 10 and has a manifold section 15 with branch lines 16 leading to a

battery of paper pulp machines 17. The pipe line 13 extends from the manifold section 15 back to the top of the pulp supply chest 10. A centrifugal stock pump 20 in the inlet end of the pipe line 13 draws the paper pulp stock from the supply chest 10 and forces it through the pipe line 13. The pump has a capacity greater than that required to supply paper pulp stock to the battery of paper pulp machines 17 so that a portion of the stock is returned through the pipe line 13 to the pulp supply chest 10.

A pressure control device 26 is connected to the discharge end of the pipe line 13 for maintaining a constant discharge pressure in the pulp circulating pipe line 13 and thereby insure a uniform supply of pulp stock at a constant pressure at each of the pulp machines. The control device 26 comprises a valve 28 having a hollow body member 29 which forms a passageway for the pulp stock to flow through and has an aperture 30 in the upper wall thereof. The aperture 30 is closed by a flexible and resilient diaphragm or membrane 32 which is made of rubber or other flexible and resilient material and forms a portion of the passageway through the valve body 29. The diaphragm 32 is clamped to the valve body 29 by a plurality of screws 34 which also secure to the valve body 29 a cup-shaped bonnet or container 36 which forms a chamber above the diaphragm for receiving a liquid 38 therein. A pipe 40, of transparent material, extends upwardly from the top of the bonnet 36 for indicating the level of the liquid and has a cylinder 42 of an ejector pump 43 secured to the upper end thereof. A supply of water or other liquid 38 may be placed in the cylinder 42 and may be pumped into the pipe 40 and the bonnet 36 when necessary to replenish that which evaporates and maintain the liquid therein at a predetermined level.

Air under a predetermined uniform pressure is applied to the liquid 38 to cause it to stress the diaphragm 32 downwardly for cooperation with an upwardly directed seat portion 45 of the valve body for controlling the cross-sectional area of the passageway through the valve to control the pressure of the pulp stock in the discharge end of the pipe line 13. Compressed air is supplied to the pipe 40 through a pipe 47 which is connected to a supply of compressed air (not shown) and has a valve 48 for controlling the pressure thereof which is indicated on a gage 49. With the valve 48 set to deliver air under a predetermined pressure to the liquid 38, the diaphragm 32 is stressed downwardly and yieldably maintained in a predetermined position for controlling the size of the passageway or orifice of the valve 28 to regulate the flow of pulp stock therethrough and thereby control the pressure of the pulp stock and maintain it at a uniform value. As various ones of the paper pulp machines 17 are either connected to or disconnected from the pipe line 13 by means of shut-off valves 50 in the branch lines 16, the volume of the pulp stock returning to the supply chest 10 varies and as the pulp stock passes through the control valve 28 it acts against the yieldable diaphragm 32 and the uniform air pressure behind it to either increase or decrease the passageway through the valve. The diaphragm is yieldably held against the pulp stock with said predetermined pressure by the compressed air, and being resilient the diaphragm will flex in accordance with the volume of pulp stock passing through the valve and will maintain a uniform pressure on the pulp stock in the pipe line 13.

The liquid 38 in the chamber 36 increases the inertia of the diaphragm 32 and serves to prevent pulsation of the diaphragm and of the pulp stock in the pipe line 13. Any suitable liquid, such as water or oil, may be used to increase the inertia of the diaphragm, or, if desired, other fluid or granular materials, such as sand, may be substituted for the liquid and used for the same purpose.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of this invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. A device for controlling the pressure of fluid material flowing in a line comprising a hollow member connectible to said line and forming a passageway for said fluid material and having a lateral opening in a portion thereof, a resilient membrane covering the opening in said hollow member and forming a portion of said passageway and operable to vary the cross-sectional area thereof, means on said hollow member forming a chamber on one side of said membrane, a substance in said chamber in engagement with said membrane and capable of movement with said membrane for damping the vibrations thereof, and a gas under a predetermined pressure in said chamber for yieldably exerting said predetermined pressure to said substance and said membrane.

2. A device for controlling the pressure of fluid material flowing in a line comprising a hollow member connectible to said line and forming a passageway for said fluid material and having a lateral opening in a portion thereof, a resilient diaphragm covering the opening in said hollow member and forming a portion of said passageway and operable to vary the cross-sectional area of said passageway, means on said hollow member forming a chamber on one side of said diaphragm, a pool of liquid in said chamber in engagement with said membrane for damping the vibrations thereof, a gas in said chamber for yieldably exerting a predetermined pressure to said liquid and said diaphragm, means for supplying said gas to said chamber, and means for varying the pressure of the gas in said chamber.

3. A device for controlling the pressure of fluid material flowing in a line comprising a hollow member connectible to said line and forming a passageway for said fluid material and having an opening in the upper portion thereof, a resilient membrane covering the opening in said hollow member and forming a portion of said passageway and operable to vary the cross-sectional area thereof, means on said hollow member forming a chamber on the upper side of said member, a pool of liquid in said chamber supported on said membrane for damping the vibrations thereof, a gas in said chamber for yieldably exerting a predetermined pressure to said liquid and said membrane, means for supplying said gas to said chamber, means for varying the pressure of the gas in said chamber, and means for supplying said liquid to said chamber.

4. A control system for paper pulp machines comprising means for containing a supply of pulp stock, a supply line having an intake portion and an outlet portion connected to said container means and having an intermediate manifold portion connected to a battery of pulp machines, means in the intake portion of said supply line for circulating the pulp stock through the supply line, means for connecting the pulp machines individually to and disconnecting them from the supply line, and control means in the outlet portion of said supply line for controlling the flow of pulp stock therefrom into said container means to maintain a predetermined uniform pressure of the pulp stock in the supply line.

5. A control system for paper pulp machines comprising means for containing a supply of pulp stock, a supply line having an intake portion and an outlet portion connected to said container means and having an intermediate manifold portion connected to a plurality of pulp machines, a pump in the intake portion of said supply line for feeding the pulp stock therethrough, means for connecting the pulp machines individually to and disconnecting them from the supply line, and control means in the outlet portion of said supply line for controlling the flow of pulp stock therefrom into said container means to maintain a predetermined uniform pressure of the pulp stock in the supply line, said control means including a flexible diaphragm forming a portion of the passageway in the supply line for said pulp stock and operable to vary the cross-sectional area of said passageway, and means for applying air under a predetermined pressure to said diaphragm.

6. In a system for supplying pulp stock at a uniform pressure to a plurality of pulp machines while permitting the pulp machines to be individually connected to and disconnected from the system, means for containing a supply of pulp stock, a supply line having an intake portion and a return portion connected to the container means and having a manifold portion between the intake and the return portions provided with a plurality of outlets connected to pulp machines, valve means at the outlets of the manifold portion for establishing and shutting off the flow of pulp stock to the pulp machines, a pump in the intake portion of the supply line capable of feeding the pulp stock therethrough at a uniform rate greater than the needs of the pulp machines, and means in the return portion of the supply line for controlling the return of the pulp stock to the container means to apply a predetermined pressure thereto, said means comprising a hollow member forming a passageway for the movement of the pulp stock therethrough and having a lateral opening therein, a resilient diaphragm covering the opening and forming a portion of the passageway and operable to vary the cross-sectional area of the passageway, means on said hollow member forming a chamber, a pool of liquid in the chamber engaging the diaphragm for damping the vibrations thereof, a gas in said chamber under a predetermined pressure for yieldably applying said predetermined pressure to the liquid in the chamber to cause the diaphragm to yieldably maintain said predetermined pressure on the pulp stock in the supply line, and means for supplying said air to said chamber.

References Cited in the file of this patent

UNITED STATES PATENTS

Re. 19,151	Saunders	May 1, 1934
150,545	Duckett	May 5, 1874
1,123,124	Harcourt	Dec. 29, 1914
1,651,507	Bloomquist et al.	Dec. 6, 1927
1,676,889	Davis	July 10, 1928
2,220,470	Balsiger	Nov. 5, 1940
2,283,155	Lang	May 12, 1942
2,519,242	Garrett	Aug. 15, 1950
2,587,188	McFadden	Feb. 26, 1952
2,590,215	Sausa	Mar. 25, 1952
2,627,874	Johnson	Feb. 10, 1953
2,686,462	Prevost	Aug. 17, 1954
2,697,451	Knouth	Dec. 21, 1954
2,786,642	Comb	Mar. 26, 1957

FOREIGN PATENTS

132,054	Sweden	June 19, 1951
278,096	Switzerland	Sept. 30, 1951