

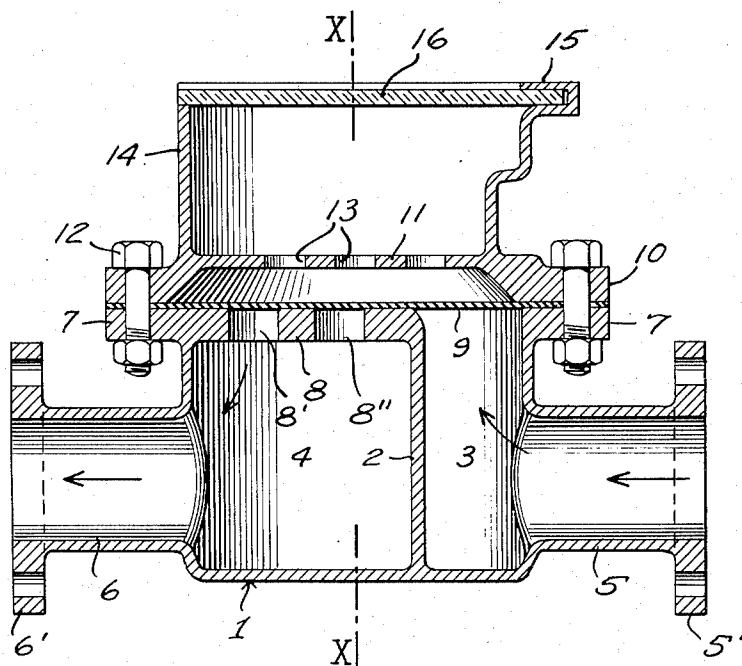
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VALVE

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VALVE

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This invention relates to a valve and more particularly to a valve adapted to permit the introduction of controlled quantities of a liquid or semi-fluid material under pressure into an enclosure under vacuum, or under a lower pressure than that acting on the said material.

An object of the invention is to provide for the introduction of a definite volume of such material under pressure into an enclosure under vacuum, with immediate cessation of flow when the pressure on the said material is removed.

In one embodiment the valve is formed with two intermediate communicating chambers, a supply chamber for receipt of the material under pressure to be distributed and a discharge chamber communicating with the said enclosure for introducing the said material thereto. The chambers are covered by two adjacent portions of a single elastic diaphragm which, when raised under the effect of the prevailing pressure of the material in the supply chamber, maintains communication between the two chambers. The discharge chamber at least has a perforated plate underneath the diaphragm to form a seat upon which the said diaphragm is held by the reduced pressure therein as soon as the pressure in the supply chamber is relieved.

This valve, which is capable of numerous applications, offers special advantages in feeding tanks of spinning liquid in the manufacture of artificial textiles. In such manufacture use is made of coagulable liquids which must be free from gas bubbles and which are forced through the holes in a spinneret in order to form a bundle of more or less fine filaments to be subjected to coagulation. When a liquid containing gas bubbles is spun, the resulting threads have impaired serimetric properties. Ordinarily such gas bubbles are eliminated by prolonged treatment of the liquids under vacuum. The bubbles mount to the surface and burst. However, as the viscosities of the liquids are generally fairly high, the de-aeration represents a long and rather tedious operation, however simple in character. It is essential that the de-aerated liquids should not be reemulsified with air, and when such liquids are to be transferred or otherwise handled by flow under their own weight, by propulsion under gas pressure, by pumping, etc., suitable measures must be taken to avoid the re-introduction of air.

The valve pursuant to the present invention solves this problem in an extremely satisfactory manner.

In the accompanying drawing, submitted

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solely by way of example, the figure is a sectional view of a valve embodying the invention.

Referring to the drawing, a cylindrical housing 1 is shown having a partition 2 parallel to its longitudinal axis X—X and forming two chambers 3 and 4. A duct 5 opens into the supply chamber 3. This duct is provided with a flange 5' for attachment to the corresponding flange of a supply line for the liquid or other material such as semifluid (paste, concentrated dispersion, etc.) under pressure. The discharge chamber 4 is provided with an outlet duct 6 connected by a flange 6' to a corresponding flange on a delivery line for the liquid or other material, such as the nozzle of a spinning pump for the direct supply of spinning mills which is kept under vacuum. Usually two pumps are used, one of which discharges under pressure to feed the spinning wheels while the other provides suction.

In its upper portion, the housing 1 is provided with a flange 7 and a perforated plate 8 extending at least over the chamber 4 and having holes shown at 8' and 8''. The plate 8 completely covers the chamber 4, and is welded at its edge to the partition 2. It is to be noted that this plate may also extend over the chamber 3, in which case it would of course be perforated over that chamber.

An elastic diaphragm 9 formed of suitable material such as flexible rubber and reinforced at the edge if desired is retained at its circumference between the flange 7 and a flange 10 of a cover or cap consisting of the latter flange and a covering plate 11. The flanges 7 and 10 are connected by bolts 12 or by other suitable means.

The plate 11 contains holes 13, three of which are shown in the figure. These holes may be closed with transparent material. They serve to permit inspection of the deformation of the diaphragm and of its proper functioning. In the form shown, the plate 11 serves as a base for a box 14 having a slide 15 with a sheet of glass 16, serving as a sight glass and protective shield, but not hermetically sealed to the housing.

The operation of the valve is as follows: When the liquid or other material is introduced under pressure, as shown by the arrows, through the duct 5 into the chamber 3, the diaphragm 9 is raised and the liquid enabled to pass between the diaphragm 9 and the plate 8 into the chamber 4 through the holes 8' and 8''. The deformation of the diaphragm is limited by the plate 11. As soon as pressure ceases to be applied to the chamber 3 the diaphragm returns to its original position, with the aid of the vacuum in the cham-

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ber 4, and delivery ceases. Even very slight flow by leakage is prevented, as is the propagation of the vacuum into the chamber 3 with emulsification of the liquid or other material. It is thus possible to introduce precisely the desired volume into the chamber 4 and stop delivery immediately as soon as this volume is reached by simply removing pressure as by stopping the feed pump or otherwise reducing the pressure of the material in the chamber 3.

The valve pursuant to the invention is capable of numerous applications. It is particularly adapted to be utilized to feed spinning pumps in the manufacture of artificial textiles. It may also be used to advantage to supply water to boilers; it is sufficient merely that the feed pressure should exceed the internal pressure. Many applications might also be cited in the chemical industries, for the introduction of proportioned volumes of liquids into reaction vessels. In all cases, the drop of pressure on the liquid in chamber 3 to the level of the pressure prevailing in the vessel to be supplied and in the chamber 4 causes the seating of the diaphragm 9 on its seat 8 and positively stops the passage of liquid.

Of course the invention is in no wise restricted to the embodiment illustrated which has been chosen solely by way of example.

What is claimed is:

A valve for the controlled introduction of a highly viscous spinning solution under pressure into a chamber maintained under reduced pressure, said valve comprising a housing having a transverse partition forming separate supply and discharge chambers, inlet and outlet ducts communicating respectively with said chambers, a flat perforated wall extending across the top of said discharge chamber only, said supply chamber having an unobstructed top opening equal in

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size to the cross sectional area of said supply chamber, and an elastically deformable impermeate diaphragm having a flat lower surface normally resting on said flat wall and extending over the top opening of said supply chamber to form a closure therefor, said diaphragm being sealed around its entire periphery to said housing, said diaphragm being constructed and arranged to seat on said flat wall to close the perforations therein and to close said top opening in response to a reduction of the fluid pressure in said discharge chamber and to be elastically deformed and lifted from said wall in response to fluid pressure in said supply chamber, and a cover disposed over said wall and over said diaphragm, the surface of said cover toward the diaphragm being concave and shaped to permit and limit the elastic deformation of the diaphragm so as to provide an unobstructed passage beneath said diaphragm and above said wall for establishing communication between said supply and discharge chambers.

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